ControlWave® ExpressPAC SCADA RTU Package

Emerson's ControlWave® ExpressPAC is a highly integrated pre-engineered package solution that combines the ControlWave Express SCADA RTU with a variety of options commonly required in SCADA applications.

These include a compact NEMA 4X rated enclosure, power supply and solar panel options with battery backup, operator display/keypad input options, and wireless communication options. Standardization eliminates the need for in-house panel and packaging design and fabrication resulting in lower initial installation cost. This also standardizes the maintenance effort to reduce the long-term cost of ownership.

As an integrated RTU in a SCADA system, ControlWave ExpressPAC has the unique attributes required for wide area networks, without sacrificing process control performance.

- Pre-engineered SCADA RTU package solution reduces integration and maintenance costs
- Multiple serial communication ports for network, local and multi-vendor connectivity
- Built-in BSAP, Modbus & DNP protocols for broad network compatibility
- Report-By-Exception for communication efficiency
- Modbus Store and Forward capability for geographic flexibility with radio networks
- Ultra-low power modes minimizes cost of solar/battery power systems
- Wide operating temperature range for remote outdoor locations

Application Suitability

Based on years of experience in water-, gas-, and SCADA-related industries, ControlWave ExpressPAC has the technology, functional benefits, and open architecture to excel in many applications.

- **Water Distribution**: Pump, tank, well, and reservoir control.
- **Wastewater**: Lift station and storm water monitoring
- **Natural Gas**: Gas well, storage, and plunger lift control

Features

- ARM processor provides exceptional performance and low power consumption.
- IEC 61131-3 programming with ACCOL III process control function block library
- Optional 100/10 Mb Ethernet port
- Three serial communication ports are standard.
- Flexible fixed I/OI configurations
- Four digital inputs
- Two digital inputs
- Two selectable digital inputs/outputs
- Two selectable digital inputs/counters
- Two selectable digital/pulse inputs on CPU
- Three optional analog inputs

ControlWave ExpressPAC Integrated Solution

The ControlWave ExpressPAC is delivered in a compact, Lexan enclosure that includes the RTU electronics, optional operator display/keypad, battery/solar power system, and a broad selection of modem and radio communications options.

Features of Package

- Dimensions, Lexan Housing: 15.77 in. H by 7.8 in. W by 9 in. D (401 mm by 198 mm by 229 mm)
- NEMA Rating: NEMA 3R (NEMA 4x except with a battery vent)
- Mounting: Pipe-mounted or wall-mounted
- Solar Panel Mounting: All solar panels are delivered with all hardware necessary for 2" pipe or mast-mounting

Integrated LCD Display/Keypad Option

The ControlWave ExpressPAC offers a convenient local operator interface. The 2-button display allows an operator to view site, configuration, and process data. The screens are organized in a series of lists. The operator can select a list and then manually scroll through the data. Additionally, you can define a "scroll list" and then set the ControlWave ExpressPAC to automatically scroll through this list.

The 25-button Display/Keypad performs the same functions and additionally allows the operator to view and modify ControlWave ExpressPAC inputs, process variables, calculated variables, setpoints, tuning parameters, and outputs used in a measurement or control application. Status bits include the alarm state, alarm acknowledge, control, and manual (Auto/Man). Providing access to such variable information allows you complete control over the process operation.

The standard LCD provides 4-line by 20-character display with either a 2-button read-only keypad or a 25-button read-write keypad. Both display/keypad assemblies have the same "footprint" on the front door

Features: Display/Keypads

- 4-line by 20-character backlit liquid crystal display (LCD)
- Adjustable display contrast
- Membrane keys with tactile feedback
- Self-adhesive overlay mounts to the enclosure door or panel (the ControlWave ExpressPAC is delivered with this assembly installed on the door)
- Easy configuration via ACCOL III function block
- Scrolling display mode
- Adjustable time turns off display when not in use.

Specifications: Display/Keypads

- Window size: 1.1 in. H by 3.1 in. W (28 mm by 79 mm)
- Character size: 4 mm H by 3 mm W
- Dimensions: 7.4 in. H by 5.5 in. W (188 mm by 144 mm)
- Power consumption: 2.5 mA @ 3.3V (0.008 watts)
- Operating temperature: -4 to 158 ° F (-20 to 70 ° C)

Shown above is the LCD with 25-button keypad. The 2-button version is similar but includes only two arrow buttons to sequence through lists.

Scalability

ControlWave ExpressPAC can also be combined seamlessly with other members in the ControlWave product family. For remote applications requiring more I/O flexibility, ControlWave Micro provides a modular RTU/PLC expandable up to 14 I/O modules.

For natural gas well site and measurement station automation, ControlWave single- and multi-run flow computers share a common architecture with the ControlWave family of products and all meet API 21.1 requirements for multiple meter runs.

For in-plant control applications, ControlWave and ControlWave Micro are powerful, flexible PLCs. ControlWave offers the greatest local and remote I/O expansion to hundreds of I/O points, up to three Ethernet ports for network segmentation, plus CPU, communication and I/O redundancy capability.

The combined benefits of the ControlWave family of products integrates your wide area network with your local area network.

Open Standards

By employing open standards for programming, network configuration, and communications, only ControlWave brings the perfect combination of industry standards to minimize learning, engineering and implementation costs.

By adhering to such industry standards as Ethernet, TCP/IP, Microsoft Windows®, COM/DCOM, FTP, OLE and ActiveX®, ControlWave achieves the highest degree of openness in control system architecture and brings the optimal process efficiency and productivity needed to ensure a successful system implementation.

ControlWave Designer with ACCOL III

To minimize your engineering and development time, Emerson has adopted the international standard for controller programming, IEC 61131-3. ControlWave Designer is a fully IEC 61131-3-compliant programming environment for the ControlWave family of products. ControlWave Designer includes all five IEC 61131-3 process languages for batch, continuous and discrete control: Function Block Diagram, Structured Text Sequential Function Chart, Ladder Logic Diagram and Instruction List.

ControlWave Designer includes an extensive library of more than 200 basic IEC 61131-3 functions and function blocks common to many IEC 61131-3 based products. These include:

- Flip-flops, counters, and timers
- Ladder diagram functions (coils and contacts, etc.)
- Numerical, Arithmetic & Boolean functions (Sine, Cosine, Add, Sub, Square Root, And, Or, etc.)
- Selection & Comparison (Min, Max, Greater than, Equal, Less than, etc.)
- Type conversions (integer to real, Boolean to Word, etc.)

ACCOL III

In addition to the basic functions and function blocks, ControlWave Designer brings the benefit of many years of experience in measurement and SCADA to the ACCOL III function block library. ACCOL III includes over 60 function blocks that are valuable for use in oil & gas, water & waste water, and process measurement & control applications. Further, ACCOL III is designed to take full advantage of the significant features ControlWave offers.

Briefly, this library includes function blocks for:

- AGA gas flow and API liquids calculations
- Audit, Archive, and File Handling
- Average, Compare, and Totalize
- Scheduling and Sequencing
- PID and Lead/Lag

Additionally, in the event of a communication interruption, ControlWave ensures data integrity by storing critical time-stamped alarm and historical data in the controller memory. This data is then securely retrieved when communication is restored.

Specifications

CPU

- 32-bit ARM processor: 14 and 33 MHz CPUs
- Sleep mode for low power applications
- Real-time clock/memory battery backup (9000 hours)
- Program execution and data memory: 2 Mb battery-based SRAM memory.
- Data and file storage memory: 8 Mb flash for program source, historical archive, and audit storage
- Historical Archive memory: stored in flash
- Option solar power regulator
- LED status indicators – watchdog and CPU Idle LEDs

Communication

- Two RS-232 and one selectable RS-232/RS-485 serial communication port supporting baud rates up to 115.2 KB
- One optional 100/10 Base-T Ethernet port with RJ45 connector
- One RJ45 connector for interface to ControlWave LCD display/keypad
- Solar power regulator

Power Input

- 5.4 to 16 Vdc power input with 14 MHz CPU; surge suppression 16 V transorb
- 11.4 to 28.0 Vdc power input with 33 MHz CPU; surge suppression 30 V transorb
- Power-fail detection and recovery sequencer
- Battery voltage monitor
- Reverse voltage protection

Environmental Specifications

- **Operating Temperature Range:**
  -40 to 70 °C (-40 to 158 °F); 85 °C storage
  -20 to 70 °C (-4 to 158 °F) with display/keypad
  -20 to 60 °C (-4 to 140 °F) with Lead Acid Cell batteries
- **Relative Humidity**: 15 to 95% RH non-condensing
- **Vibration:**2.0 g for 10-150 Hz – 1.0 g. for 150 Hz to 2000 Hz
- **RFI Susceptibility**: 3V/m – 80 MHz to 1000Mhz (EN50082.2)
- **Electrostatic Discharge**: Meets IEC EN 60001-4-2, EN 61326

CPU RFI

- **Immunity:** ENV 50140 Radio-frequency
- Electromagnetic field amplitude modulated EMC
- **Emissions:** EN 55022: 1998 Class A ITE emissions requirements (EU)
- ICES-003 Issue 3 Class A Digital Apparatus emissions requirements (Canada)
- **AS/NZS3548:** 1995/CISPR Class A ITE emissions requirements (Australia)

I/O RFI Susceptibility:

- 3Vm – 80 MHz to 1000 MHz (IEC 1000-4-3)

Hazardous Area Approvals

- Approved as non-incendive for operation in Class I, Division 2

ControlWave ExpressPAC is approved by UL as an instrument. This certification does not allow installation of any other hardware, not indicated by the model number, in the instrument enclosure. Wiring to and from the I/O, communication and power connections inside the enclosure, in accord with the *ControlWave ExpressPAC Instruction Manual* (part D301384X01) are, of course, allowed.

Power Consumption:

- 14 MHz CPU: 0.036 watt
- 33 MHz CPU (w/o Ethernet): 0.12 watt
- 33 HHz CPU (with Ethernet): 1.0 watt
- DIO card: 0.018 watt
- DIO plus AIO card: 0.021 watt

ControlWave ExpressPAC Process I/O

The ControlWave Express I/O module is designed to maximize usability while minimizing installation and maintenance. The I/O module provides a mix of analog and digital inputs and outputs that are a perfect fit for small RTU applications:

- 2 DI/PI (on CPU)
- 1 RTD input on 14 MHz CPU
- 4 DI
- 2 DO
- 2 selectable DI or DO
- 2 selectable DI or HIS
- Optional 3 AI or 3 AI and 1 AO
- Off-shore platforms
- Separation plants
- Compressor stations
- Storage facilities
- Transmission metering stations
- Distribution/LDC metering/gate stations

Features

- Convenient pluggable local
- All configuration jumpers and switches accessible without disassembly of circuit boards
- Termination points for external loop power supply

Specifications:

All I/O

- I/O access: 50 ms with 33 MHz CPU; 250 ms with 14 MHz CPU
- 1 second for 2 DI/PI inputs on CPU module
- Surge protection: Meets C37.90-1978 30 Vdc transorb between signal and ground
- Terminations are pluggable and accept a maximum wire size of 16 gauge.
- Power consumption is stated for each I/O module type measured at the input supply and does not include loop power.

Pulse/Digital Inputs

- Inputs located on base CPU board
- Number of points: up to two non-interrupting inputs

- Internally sourced, dry contact single-ended inputs
- Scan rate: once per second
- Input filter: 20 ms
- Voltage Range: Internally sourced dry contact input – 3.3 Vdc
- On-state: > 1.6 V; off-state < 1.3 V
- Input current: 200 μA for low power applications
- Power consumption: 200 μA input, all input on: 0.0002 watt

Used as Pulse Inputs

- Frequency Range: 0-10 kHz
- Debounce: none
- Accumulator 16-bit

RTD Inputs

Specifications are for the interface only and do not include the RTD probe or wiring.

- Input **only** available on 14 MHz Ultra Low Power
- RTD conversion accuracy: ± 0.1 °C **or** ± 0.1% of reading, whichever is greater.
- Ambient temperature effect on RTD measurement: ± 0.01 °C/ °C max
- Long term stability at constant conditions: ± 0.25 °C / month max

Digital Inputs

- Number of points: up to 4 dedicated DI and 4 selectable DI (2 DI/DO, 2 D/HSC)
- Non-interrupting inputs
- Internally sources, dry contact single ended inputs
- Input Voltage Range: internally sourced dry contact input – 3.3 Vdc
- On-state > 1.6 V; off-state < 1.3 V
- Input current:
  - 4 DI selectable 60 μA for low power applications or 2 mA for in-plant noise immunity
  - 2 DI/DO selectable 200 μA or 2.2 mA
  - 2 DI/HSC selectable 200 μA or 2.2 mA
- Input filtering: 15 ms time constant (contact bounce)
- Power consumption
  - All inputs on: 0.0005 watt (4 inputs @ 66 μA and 4 inputs @ 2.2 mA)
  - All 8 inputs on: 0.075 watt (4 inputs @ 2 mA and 4 inputs @ 2.2 mA)

Digital Outputs

- Number of points: 2 dedicated, 2 selectable DO (2 DI/DO)
- Output type: solid state open drain MOSFET
- Operating voltage range: 10-31 Vdc
- Maximum operating frequency: 20 Hz
- Current sink capability: 400 mA at 16 V (6 V system) or 400 mA at 30 V (12/24 V system)
- Power consumption: not applicable to DOs

Analog Inputs

- Number of points: 3 AI optional
- AI resolution: 14 bit
- Input Configuration: Externally sourced. Single-ended inputs, jumper selectable 4-20 mA or 1-5 Vdc. Terminal block connections provided for external source.
- Input Impedance: 1 megΩ – 1-5 Vdc; 250 Ω - 4-20 mA
- Input filtering: 12 Hz
- Channel settling time: 600 ms to be within 0.01% of input signal
- Input accuracy: 0.1 % of span at 25 °C; 0.2 % of span - 40 °C to 70-°C
- Power consumption: not applicable to AIs

Analog Outputs

- Number of channels: 1 AO optional
- Output configurations: selectable externally sourced 4-20 mA or 1-5 Vdc:
  - 250 ohm with 12 V external source
  - 650 ohm with 24 V external source
  - 1-5 Vdc @ 5 mA max
- D/A resolution: 12 bit
- Accuracy:
  - 0.1 % of span @ 25 °C for current output;
  - 0.1 % + 3% of span @ 25 °C for voltage;
  - 0.3 % of span @ -40 to 70 °C for current;
  - 0.3 % + 3% of span @ -40 to 70 °C for voltage
- Power consumption – 1 output:
  - Analog current output: 0.1 watt

- Analog voltage output: 0.1 wat

High Speed Counter

- Number of points: 2 selectable as HSC or DI
- Frequency Range: 0-10 kHz
- Input Voltage range:
  - Internally sourced: 3.3 Vdc
  - Externally sourced: 3 Vdc to 24 Vdc
- On-state: > 1.6 V; off-state: < 1.3 V
- Input filter: 20 microSec for 10 kHz HSC; 1 microSec for 300 Hz LSC
- Input current: selectable 200 μA for low power applications or 2.2 mA for in-plant noise immunity
- Accumulator: 16 bit
- Power consumption:
  - 200 μA input, all inputs on: 0.004 watt
  - 2.2 mA input, all input on: 0.039 watt

Power System, Charge Regulator, and AUX Output

The ControlWave ExpressPAC offers a variety of internal power systems that includes lithium batteries and rechargeable, lead acid cell batteries. The lead acid batteries are matched with solar panels as charging sources.

Related to the power system, a charge regulator circuit and – in the 12 Vdc versions only – an auxiliary output (AUX Output) is available in the ControlWave ExpressPAC (except models with Ethernet). The AUX Output is typically used to control power to the radio.

Specifications: Charge Regulator and AUX Output

- Input Voltage Range: 5.0 to 18.0 Vdc
- Fused: 1.5 A from charge regulator; 3.5 A for each battery input; 1.0 A to the CPU assembly
- Surge suppression: 18 V transorb; meets ANSI/IEEE C37.90-1978
- Charge regulator: Temperature-compensated charge control with cut-off
- Standby charging circuit limits: 6.33 V max; 6.09 V for 6V battery; and 12.4 V max and 11.9 V min for a 12 V battery
- Threshold voltage for shunt at 23 °C: 7.3 V for a 6 V battery and 14.6 V for a 12 V battery.
- AUX Output Max Load Current: 1.8 A continuous; 2.5 A momentary.
- AUX Output "on" resistance: 0.37 Ohms typical; 0.5 Ohms max.

Available Power Options

- 7.2 Vdc lithium battery (single or dual)
- 6 Vdc, 1-watt solar panel, 7 AH lead acid battery
- 6 Vdc, 4.3-watt solar panel, 7 AH lead acid battery
- 12 Vdc, 4.5-watt solar panel; 7 AH lead acid battery.

Power systems are sized for operation with all I/O but without powering field devices. The 12 Vdc supply is sized to operate a radio in "slow duty cycle" mode.

Modem Specifications

The optional auto-dial auto-answer modem provides a sleep mode that conserves power while allowing it to wake up when a call comes in.

- Function: provides Public Switched Telephone Network (PSTN) communications
- Operating Modes: Sync or Async 2-wire switched network, half or full duplex.
- Line type: two-wire loop start lines
- Modem configuration: "AT" based commands
- Data Rates:
  - V.32 bis – 9600 bps
  - V. 32 – 9600 bps
  - V.22 bis – 2400 bps
  - V.22 – 1200 bps or 600 bps
  - V.21 – 300 bps; Bell 103J – 300 bps; Bell 212A – 1200 bps
- Telephone functions: dialing and answering by AT commands; automatic answering is also programmable
- Approvals: Telephone – FCC, Part 68 (also suitable for approval within Canada)
- Transmission Output Levels: -10 dBm fixed (USA) – (0-15 dBm adjustable – firmware dependent)
- PSTN arrangements: loop start arrangement (transmission output does not exceed -10 dBm); allow s connection with any voice telephone jack
- Isolation: Data Access Arrangement (DAA) with 1000 Vac (modem to PSTN)
- Sleep Mode Current: 0.5 mA (max) @ 12 V (input voltage); 1.0 mA (max) @ 6 V (input voltage)
- Surge capability: Withstand surge of 100A with 10 x 160 microsecond waveform.

- Temperature: Operating Range: -40 to 60 °C (-40 to 140 °F); Storage Range: -40 to 85 °C (-40 to 185 °F)
- Relative Humidity: 15 to 90% RH Non-condensing.

Radio Option

The ControlWave ExpressPAC is available with one optional FreeWave or MDS radio. Since some users prefer to procure the radios separately, Emerson offers "radio-ready" configurations for each of the standard radio models.

Radio-ready models include everything except for the radio. The mounting bracket as well as all cables and connections are in place. The installer just mounts the radio to the bracket and make connections.

It is important to match the radio-ready configuration with the specific radio the user expects to install because cables and connections for the antenna RS-232 port and power all vary by radio model.

Emerson recommends the optional PolyPhaser surge protector with any radio selected.

Power Consumption for the Radio

Note: To conserve power, the ControlWave ExpressPAC turns power to the radio ***completely off*** instead of operating it in sleep mode.

- Freewave FGR Spread Spectrum Radio with figures at 12 Vdc: Receive: 75 mA; Transmit: 500 mA; Idle: 20 mA
- MDS TransNET 900™ Spread Spectrum Radio with figures at 13.8 Vdc: Receive: 115 mA; Transmit: 510 mA
- MDS models 4710 and 9710 Licensed, UHF Radio with figures at 13.8 Vdc: Receive: 125 mA; Transmit: 2000 mA
- MDS entraNET™ 900 IP Radio with figures at 13.8 Vdc: Receive: 100 mA; Transmit: 510 mA
- MDS iNET 900™ Ethernet/IP Radio with figures at 13.8 Vdc: Receive: 203 mA; Transmit: 580 mA

OpenBSI

Simply Creative

Emerson's OpenBSI (Open **B**ristol **S**ystem **I**nterface) is a set of network setup, communication diagnostic, and data viewing utilities that provide access to ControlWave controllers, flow computers and RTUs. OpenBSI is the only product available in the industry to bring such unique functionality and ease of use to the network level. At the core is the communication interface, written as a Windows communication server API through which other client applications communicate with the Emerson networks.

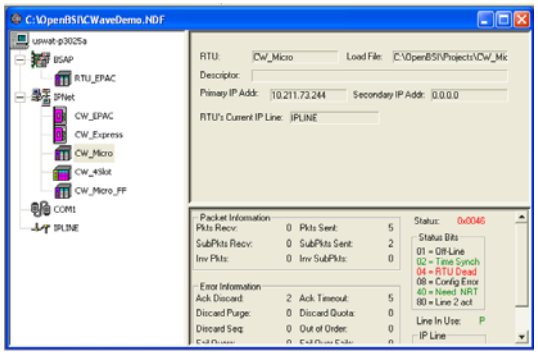
OpenBSI supports both serial BSAP protocol and Ethernet Internet Protocol communication to ControlWave controllers, flow computers, and RTUs.

OpenBSI Utilities

Above this communication layer is a group of applications known as the OpenBSI Utilities. These client utilities communicate through the server to collect and manage data gathered from the network, generate files based on collected historical data, collect alarms, and monitor and control OpenBSI communications.

- Communication engine for PC applications
- Supports ControlWave serial and IP protocols
- RS-232, dial-line, cellular, radio, satellite, and Ethernet connections
- Provides online download and signal variable changes
- Allows network configuration through NetView
- PC and Network communication diagnostics
- OPC Server for interfacing to most HMI software
- Harvester collects historical data on request or scheduled basis

NetView is the basic configuration and application interface for all network operations. NetView uses a tree structure for network graphical display in the Windows Explorer style. Network nodes can be added online by simply dragging the node icon into the tree.



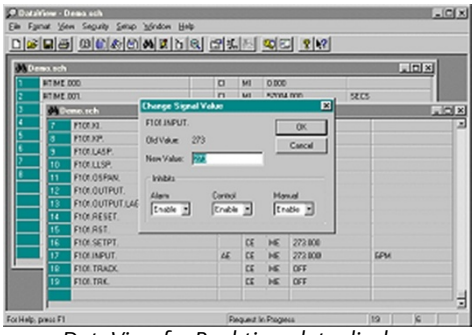
Netview - Network configuration and application Launchpad

This initiates a configuration wizard to simplify network setup. Through the NetView wizard, the necessary network parameters are entered for node and IP address, alarm and message routing, and network communication media. Once configured, selecting any node allows direct access to the common OpenBSI utilities to reprogram, download a new application to the node, review communication statistics, view real-time data through DataViewer, and edit controller/RTU properties.

Local Configuration Wizard allows local communication with any attached ControlWave controller or RTU to download system flashware upgrades, configure cold download parameters, and configure IP and soft-switch parameters.

Configuration Wizard simplifies Network setup

DataView is an online utility used to collect and display several types of process data, including signal values, data array values, signal lists, and audit trail information.



DataView for Real-time data display

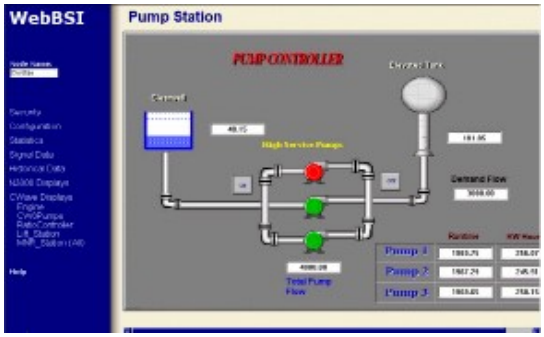
DataView enables operators to alter signal values. Multiple DataView windows may be open simultaneously.

WebBSI is a powerful and flexible software product bringing web technology to all ControlWave automation products. WebBSI includes a set of ActiveX controls for reading and writing real-time and historical data, trending, recipe editing, and custom display generation. Through these controls, you can use the standard Microsoft Internet Explorer® web browser to access ControlWave products through a set of supplied HTML web pages.

Real-time ActiveX Controls

One of the many benefits OpenBSI brings to you is the use of open standards such as ActiveX Controls. ActiveX, another of the Microsoft standards, allows plug- and-play with any ActiveX container that uses Microsoft ActiveX container technology such as Visual Basic®, HTML web pages, and Microsoft Excel®.

The set of available ActiveX Controls provides the basic functions necessary to communicate and collect data from ControlWave.



Custom built web page interface using a standard web browser

ActiveX Controls

- Security – 56-bit encryption, which allows you to sign on to the RTU
- Signal Value – displays signal values in various formats
- Comm Statistics – works with a standard page that displays the RTU's communication statistics.
- Configuration Information – works with a standard page that displays and allows you to change RTU configuration information.
- Historical – collects and displays historical archive and audit files

The IP-compliant ControlWave opens the door for owner-controlled access via Web Pages. Any generic web page builder can be employed to create user-defined pages to access ControlWave. The web pages are populated with these pre-configured ActiveX controls.

Required Software

- Microsoft Internet Explorer
- OpenBSI-specific ActiveX Controls
- OpenBSI LocalView or NetView

Historical Data Collection

High Historical Data Integrity

The ControlWave Historical Data Collection system offers exceptional historical data integrity by providing time-stamped historical data storage in ControlWave flash memory. The historical data is collected through OpenBSI on a scheduled or demand basis and converted to .CSV and ODBC compliant file formats for use in spreadsheets and reports. If data is missed due to a communication

failure, it is collected when the communication is reestablished and the PC historical database is backfilled with the missing data. This distributed historical database architecture provides the greatest data reliability and integrity during communication or PC failure.

Another important historical feature is the Audit storage and collection system. The Audit Trail is a file stored in ControlWave flash memory containing significant events and time-stamped alarms. The alarms stored in the Audit system provide a historical archive in addition to the real-time alarm reporting system.

This file is also collected through OpenBSI and presented as a text file in the PC. This functionality is extremely useful in providing an event trail during communication or PC downtime or other system problem.

- Archive Collection – collection and storage to disk of the ControlWave archive data
- Audit Collection - collection and storage to disk of the ControlWave audit data.
- Exports data files to third party, .CSV & ODBC applications
- DDE compliant for use with other popular Windows applications

OPC Server

With industry demand for open standards, ControlWave answers the call by embracing technologies that open the door for maximizing your efficiency and productivity. The OPC standard was developed by the OPC Foundation comprised of hardware and software suppliers from the process control community. OPC allows the engineer to select best-in-class hardware and software with confidence in their interoperability. Our OpenBSI OPC Server was among the first to comply with the OPC Foundation alarm and event server specification:

- OPC Data Access 1.0a & 2.0 compatible
- Windows XP
- Compatible with ControlWave systems
- 32-bit multi-threading, multi-processor design
- Automatic database builder
- Integrated real-time data monitor
- Supports OPC Browse interface
- Supports both serial comm and IP Ethernet connections
- Supports COM/DCOM & OLE Automation
- Primary and Background polling scheme
- OPC Alarm & Event Server support

ControlWave Open Network Connectivity

By embracing the open system network technologies available through TCP/IP, Ethernet, OPC, and Microsoft DNA, as well as pseudo-standards such as Modbus and Open Modbus, ControlWave can provide a total Process Automation Management Solution for in-plant LAN based networks and Wide Area Network SCADA systems.

With the exceptional connectivity provided by the ControlWave network, access to real-time data and operating conditions, historical data, maintenance and performance data are all available to the global network. ControlWave provides the needed information to the plant floor technician, operator, engineer, supervisor and corporate management, even external customers.

Communication Protocols

Like all of Emerson's ControlWave products, ControlWave ExpressPAC supports BSAP (Bristol Standard Asynchronous Protocol), Modbus, DFI, CIP, DNP3, and serial ASCII as standard functions.

These protocols are implemented in flashware so no additional hardware is required to use any one or a combination of all protocols.

BSAP Protocol

BSAP is widely accepted as providing exceptional data integrity and greatly simplifies communication between controllers. BSAP is provided with interfaces for Master/Slave, vertical networks, and Client/Server, horizontal networks. In either case, variable lists are created in each controller that are easily passed from server to client or slave to master.

BSAP meets the definition of an industry-standard, open-architecture protocol because it conforms to ISO standards 2629, 1745, and 2111, and is not proprietary since Emerson does not charge a license fee and makes the protocol and documentation available to anyone.

While BSAP is an open protocol, the added functionality of the messages provide much more capability than is found in other networks.

- Global time-synchronization
- Time-stamped Alarm reporting
- Historical archive data transfer
- Audit file transfer
- On-line program editing
- Diagnostics
- Communication statistics

Modbus Protocol

Modbus is often considered a *de-facto* standard protocol because of its broad usage as either the primary or a secondary offering in many measurement and control

related products. Even with its common use, Modbus protocol actually has many variations. Consider Modbus RTU and Modbus ASCII, Master & Slave, Serial and TCP/IP Open Modbus. In addition there are considerations regarding supported function codes, floating point values and byte order. ControlWave products support the following:

- Modbus serial and TCP/IP Open Modbus (Ethernet)
- Master and Slave
- Modbus RTU and ASCII
- Modes 1 - 7, 8, 15 & 16
- IP modes 51, 52, & 53
- Integer and IEEE 4-byte floating point

Generic Serial Interface

The Generic Serial Interface is a user programmable Master and Slave protocol used to send and receive messages typically with third party serial ASCII devices. This protocol can be used to interface with such devices and message boards, card readers and many measurement devices.

Multi-user Security Access

Security is an essential element of any open system, particularly those with Internet access. ControlWave employs a User Name/Password access system protected by a 56-bit encryption technique through the TCP connection. There can be up to 32 users, who sign-in using their name and password. Both the name and the password can be up to 16 characters.

The security system provides for up to 64 access rights to read and write data values and files via FTP, access and configure historical and audit data information, edit configuration, run internal diagnostics, read and reset system status. It further allows the programming software to read, write and download the ControlWave ExpressPAC.

The Secure Data Advantage

ControlWave sets a new standard for providing intelligent control at the point where control is needed. Whether you need control on the plant floor or at a remote site in the “middle of nowhere,” ControlWave is the solution for control, communication and secure data to help you make the right operating decisions.

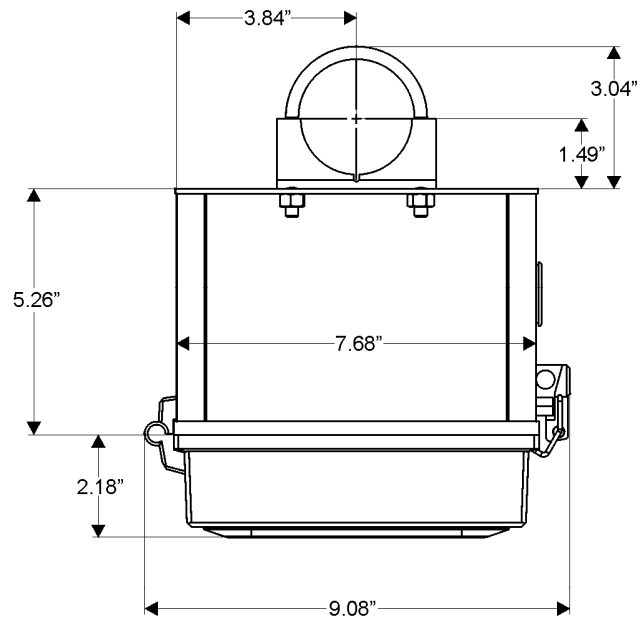
ControlWave was designed to provide the optimum level of data security using a distributed database architecture. All data including time- and date-stamped alarms, alarm limits, and historical data are stored locally in each industrially rugged ControlWave, thereby distributing your data integrity risk. To further ensure that the data is always current and historically accurate, the historical data is stored in non-volatile flash memory within ControlWave. Historical data is even maintained during and after program downloading.

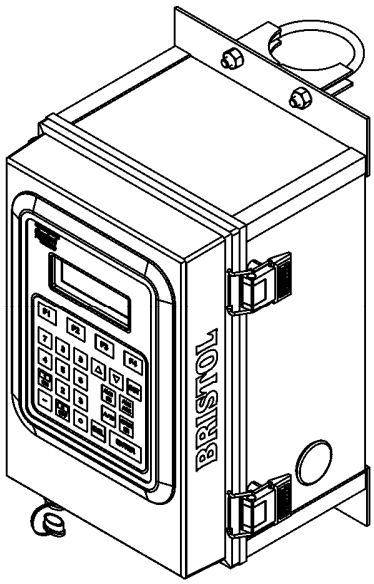
When historical data is collected from ControlWave, it is converted and appended to .CSV and/or ODBC compliant databases but does not destroy the original historical data stored in ControlWave, thus providing a flexible and secure historical data system that is clearly recognized as a benefit to virtually every industrial application.

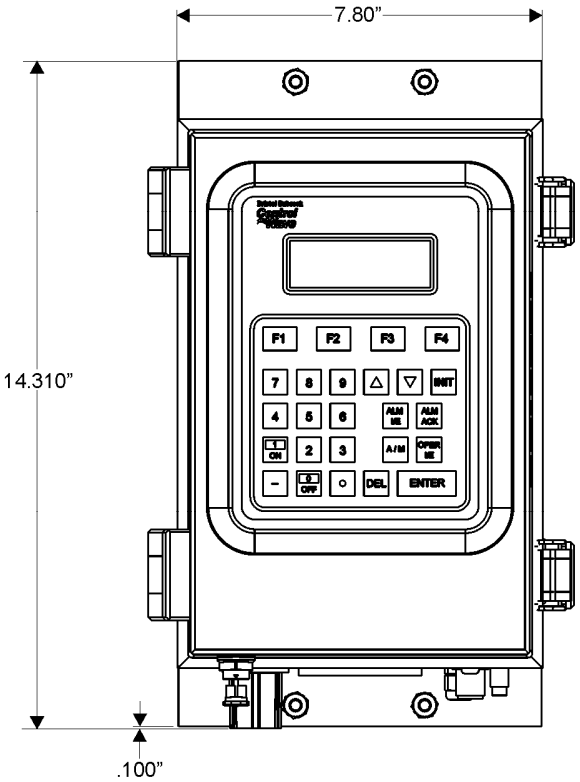
The Bridge Between Systems

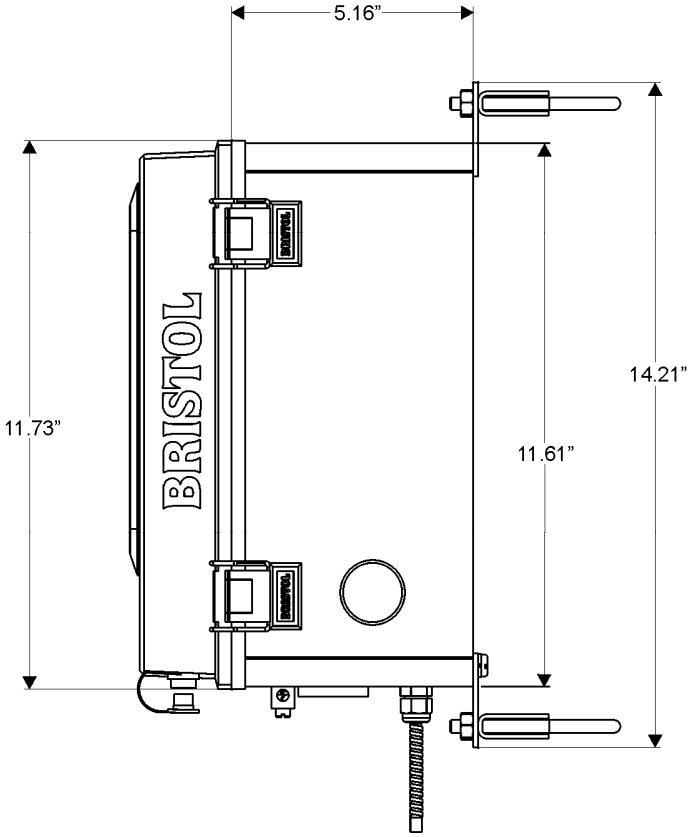
Continuing our tradition of introducing innovative new solutions while maintaining compatibility with existing systems, Emerson again provides a migration path for existing customers by bridging the new ControlWave system with Network 3000 systems already in place. The network bridge is enabled by employing the open architecture technologies afforded by TCP/IP and OPC in both networks. TCP/IP allows seamless Ethernet connectivity to both networks as well as the corporate Intranet so both ControlWave and Network 3000 controllers can reside and communicate on the same LAN. Emerson’s OpenBSI OPC Server facilitates the merging of the two networks for technical, engineering and operator data access. The data source, configuration and path are completely transparent to the OPC client. Real-time data can also be passed between the two communication networks making this a total plant automation management solution.

ControlWave ExpressPAC Dimensions









Approvals		
Miscellaneous Approvals	RoHS2	RoHS (2) EU Directive 2011/65/EU: This product may be considered out-of-scope when used for the intended design purpose in a Large Scale Fixed Installation (LSFI). Consult https://www.emerson.com/compliance for up-to-date product information.
	RoHS (China)	

For customer service and technical support,
visit *www.EmersonProcess.com/Remote/Support*.

Global Headquarters,
North America, and Latin America:
Emerson Process Management
Remote Automation Solutions
6005 Rogerdale Road
Houston, TX 77072 U.S.A.
T +1 281 879 2699 | F +1 281 988 4445
www.EmersonProcess.com/Remote

Europe:
Emerson Process Management
Remote Automation Solutions
Unit 8, Waterfront Business Park
Dudley Road, Brierley Hill
Dudley UK DY5 1LX
T +44 1384 487200 | F +44 1384 487258

Middle East/Africa:
Emerson Process Management
Remote Automation Solutions
Emerson FZE
P.O. Box 17033
Jebel Ali Free Zone – South 2
Dubai U.A.E.
T +971 4 8118100 | F +971 4 8865465

Asia-Pacific:
Emerson Process Management
Remote Automation Solutions
1 Pandan Crescent
Singapore 128461
T +65 6777 8211 | F +65 6777 0947

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