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# PRODUCT DATASHEET

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**Product Datasheet**
October 2015

## Metering System

# DanPac™ Measurement and Control System

DANIEL™

EMERSON™
Process Management

# DanPac™ Measurement and Control System

## A Smart Fiscal Metering Solution

Power and flexibility have made DanPac the process acquisition controller of choice by major oil and gas companies worldwide. This robust, scalable smart fiscal metering solution has proven to reduce measurement uncertainty by providing unsurpassed control of oil and gas custody transfer and fiscal flow metering installations. Built around Emerson Process Management technologies, the DanPac system easily integrates into existing DCS, SCADA and other third-party control systems to reduce complexity and simplify implementation.

Available in four scalable configurations to ensure a cost-effective solution regardless of the size of the metering operation, the system includes a logic control panel with analog and digital I/O, virtual I/O modules (VIM) and serial communication. The flow metering panel includes one or more Daniel S600+ flow computers, Ethernet switches and a Microsoft® Windows®-based HMI system. An integrated HART® interface facilitates monitoring of multiple devices, including flow meters and field transmitters. In addition, DanPac offers built-in communications and controller redundancy to ensure reliability for offshore installations or when remote location monitoring is required.

The enhanced DanPac reporting package is now web-based, making reports easily accessible to further facilitate operations. This flexible solution also enables configuration of multiple devices, skids and reports from a single web page. The new CalPac Software Suite provides at-a-glance views of critical system data and brings visual clarity to overall system health to ensure operators are quickly alerted of abnormal system performance. It also helps automate online validation of metering data in accordance with ISO, API and/or AGA to streamline audit trail requirements.

Designed to provide rapid detection of measurement variability, the DanPac system puts operators in control by providing the data necessary to monitor and control all key metering parameters, proving and sampling from one location.

**Figure 1: Standard Two-Bay DanPac**

## Applications

- Custody transfer
- Off-shore production
- Loading / off-loading
- Pipelines
- Refinery

## Features and Benefits

- DanPac offers a true DCS-based architecture and communicates with DCS/SCADA hosts over serial, Ethernet and fiber optic to simplify integration and provide information to refineries, LNG termals, etc.
- System supports multiple meter runs, batching, all prover types, gas and liquid sampler systems, and analog transmitters per the validation feature
- System logs a comprehensive, easily accessible library of graphics, reports, communications and alarms/events based on user specifications
- 100% audit traceability ensures tracking of system alarms, events and reports
- CalPac Metering Software Suite provides gas and liquid calculations and provides flow instrument validation to alert users of any abnormal system performance
- Reporting Web Application (RWA) enables users to generate customizable reports for authorities or for internal reconciliation
- Condition Based Monitoring (CBM) provides historical trending of key performance indicators on a real-time basis, including flow rate, pressure transmitter, temperature transmitter, meter factor and signal-to-noise ratio
- Easy and standard architectures are simple to use and maintain
- Emerson's Sure Services Guardian Support protects against cyber attacks by ensuring all software and anti-virus definitions are updated automatically on an ongoing basis
- Web-based Operator Training Solutions enable users to easily train on DanPac modules as needed
- DanPac system meets all major agency requirements and/or certifications, including MID, NMI, OIML, PEMEX MODBUS, SCADA, GOST and CSA

# Standard DanPac Metering System

**Plant**

**Field Instrumentation**

**Transmitters**

**Coriolis Meter**

**Ultrasonic Meter**

**Orifice Fitting**

**Liquid Turbine Meter**

**Gas and Liquid Quality Samplers**
(i.e. gc)

**DanPac Cabinet**

**DeltaV Professional Plus (required)**

**Specs:**
- 4 dual redundant network cards
- DeltaV 12.3.1 software
- Microsoft® Windows® Server 2008

**Functions:**
- Contains main database of HMI
- Data backup capacity with dual hard drive option
- Main machine for development and maintenance

**DeltaV Operator Workstation**

**Specs:**
- 3 network cards
- DeltaV 12.3.1 software
- Microsoft Windows 7 and later

**Functions:**
- Dedicated for daily operation
- Can have more than one operator workstation per Professional Plus

Notes: Dimensions (for PP & OWS) changes based on model selection

# Specifications

Improved performance, other product and material offerings may be available depending on the application. Please consult Daniel if your requirements are outside the specifications noted below.

## DanPac System Hardware

- Logic Control Panel:
  - DeltaV M-series and S-series Controllers
  - Virtual I/O Modules: TCP/IP and/or serial communication
  - Standard fast Ethernet switches with available fiber optic connections
- Flow Computer Panel:
  - Daniel S600+ Flow Computer
  - Customizable with I/O and HART communication
- HMI Workstation with Multiple Security Capabilities
- Optional Operator Workstation and Engineering Workstation
- Laser Report Printer

## DanPac System Software

- DeltaV System Software running on Microsoft Windows Servers and PC Platform
- Daniel S600+ built-in web browsing capability to view live parameters remotely

## DanPac Power Requirements

- @120 VAC: <22 Amps (<2.64 kW)
- @220 VAC: <10 Amps (<2.20 kW)

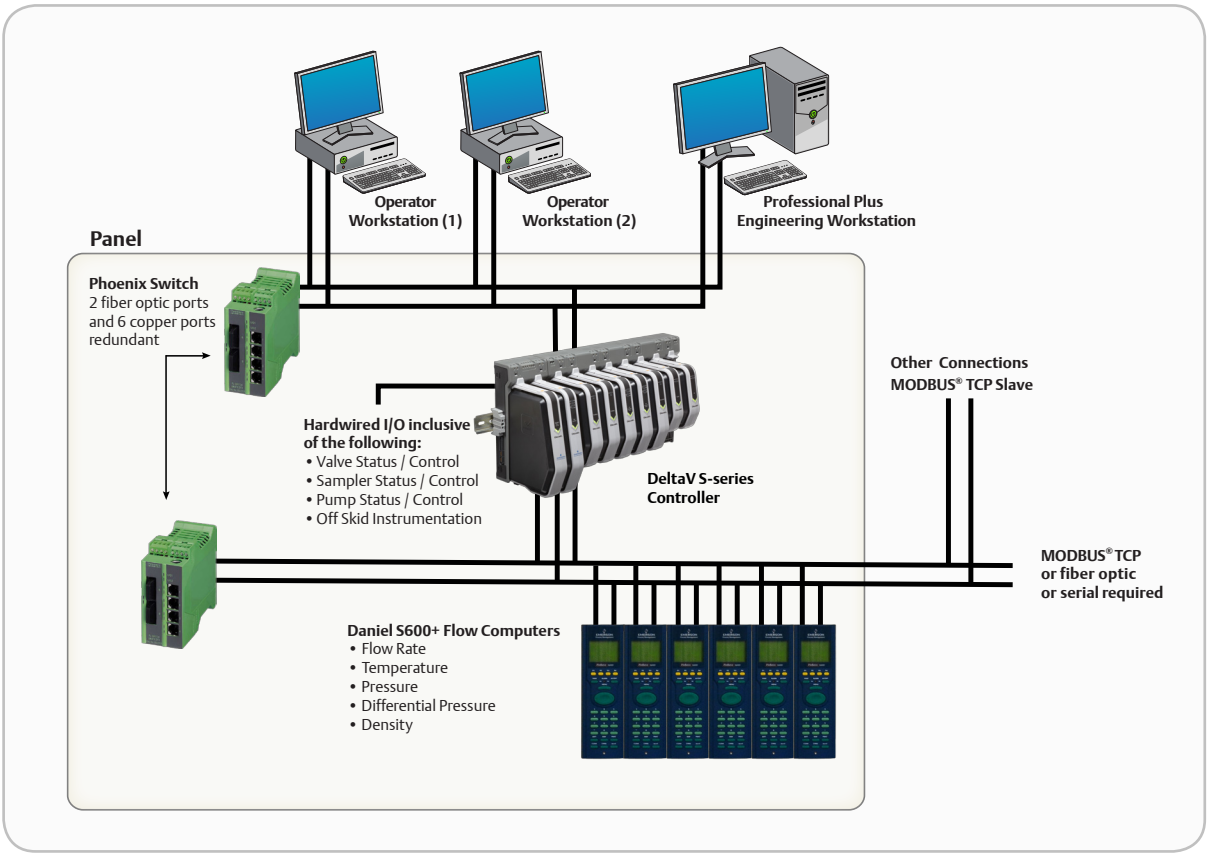



**Figure 2: DanPac system architecture with two operator workstations**

## Daniel S600+ Flow Computer

- Increased communication connectivity:
  - 2 Ethernet ports as standard (Full Duplex and 100MB/s)
  - 9 serial ports as standard
  - USB port for instant report and alarm/event archival
- Dedicated analog and digital I/O
- Increased processing power with running Linux Operating System
- Extended data logging and archiving with up to one year of hourly, daily and prover reports
- 5 to 7 years of CPU battery life with status indication of usage
- Multi-station and stream capability with liquid and gas meter lines together
- Support for “dual prover”; physical prover (compact/ball) with logical prover (master meter)
- Capacity to store 20 project configurations in a single S600+ CPU board
- 10 meter runs with analog, prover and HART support
- Network printing
- Continuous, volumetric and product-based batching with recalculations
- Network time protocol hot duty standby
- Prover Functionality Support:
  - Compact
  - Uni-directional
  - Bi-directional
  - Master Meter
  - Dual Chronometry
  - Up to 4 sphere switch
- Environmental:
  - Operating Temperature:
    0°C to +60°C (+32°F to +140°F)
  - Storage Temperature:
    - 40°C to +70°C (-40°F to +158°F)
  - Operating Humidity:
    To 90%, non-condensing

**Liquid Calculations:**

- API CH 11.1 – 2004 / ASTM D 1250-04 / IP 200/04 and Addendum 1 2007
- ASTM D 1250-1980 and API MPMS Chapter 11.1 – 1980 (Tables 5, 5A, 5B, 5D, 6, 6A, 6B, 6C, 6D, 23, 23A, 23B, 23D, 23E, 24, 24A, 24B, 24C, 24D, 24E, 53, 53A, 53B, 54, 54A, 54B, 54C, 54D, 59A, 59B, 60A, 60B)
- ASTM/API 1952 (Tables 5, 6, 23, 24, 53 and 54)
- API 11.1, 11.2.1, 11.2.1M, 11.2.2, 11.2.2M, 11.2.4
- API 12.2.1, 12.2.1M, 12.2.2, 12.2.2M, 12.2.3, 2540
- ASTM D1555 and D1555M
- GPA TP15, TP16, TP25, TP27
- Propylene API 11.3.2.2
- Ethylene IUPAC, NIST 1045 and API 11.3.2.1
- ISO 91/1 (IP2), ISO 91/2 (IP3)
- STO 5.9 08 B1, B2, B3
- Steam and Water IAPSW 1967, NPD, Downer
- Densitometer algorithms Solartron/Micro Motion, Thermo Scientific Sarasota/PEEK

**Gas Calculations:**

- AGA 3 (volume and mass), AGA 5, AGA 7, AGA 8, AGA 10
- GPA 2172 and 2145
- ISO 5167, ISO 6976, ISO 12213 – 2 and 3
- GOST 8.563.1 and 2 (97), GOST 8.586, GOST 30319
- PR 50.2.019, NX 19, NX 19 Mod, SGERG, MGERG, VDI/VDE 2040, PTZ, Annubar, V-Cone


**Figure 3: Daniel S600+ Flow Computer**

## Logic Controller and I/O Subsystem

- DeltaV M or S-series Controller
- Discrete Input Cards: 32 Channels, 24VDC Dry Contact, 4 to 8 cards
- Discrete Output Cards: 32 Channels, 24VDC High Side, 3 to 6 cards
- Analog Input Card: 8-16 Channels, 4-20mA HART® (included)
- Serial Card
- Environmental:
  - Operating Temperature: +0°C to +60°C (+32°F to +140°F)
  - Storage Temperature: -40°C to +85°C (+40°F to +185°F)
  - Relative Humidity: 5% to 95%, non-condensing

**Figure 4: DeltaV S-Series Controller**

## Virtual I/O Modules

- Virtual I/O Module Capacity:
  - 4 Emulated Serial Cards
- Environmental:
  - Operating Temperature: +0°C to +60°C (+32°F to +140°F)
  - Storage Temperature: - 40°C to +70°C (-40°F to +158°F)
  - Operating Humidity: To 95%, non-condensing

**Figure 5: DeltaV Virtual I/O Module (VIM2)**

## DanPac Network Switch

- 8 port fast Ethernet switch, programmable managed, for faster communication of data traffic; software layer 2 enhanced, for DIN rail
- Fiber optic support
- VLAN capable
- 2 uplink 100BASE-FX, SM-SC 6 Standard 10/100 BASE-TX, RJ45
- Download/upload switch configuration with USB thumb drive
- Environmental:
  - Operating Temperature: -40°C to +70°C (-40°F to +158°F)
  - Storage Temperature: -40°C to +85°C (-40°F to +185°F)
  - Operating Humidity: 10% to 95%, non-condensing

# CalPac Metering Software Suite

The system-independent CalPac software suite simplifies flow condition monitoring by enabling users to make smart decisions based on overall system health. Applications within the CalPac suite provide at-a-glance views of critical system data and help validate and verify flow measurement data as well as the uncertainty of the system.

## Liquid and Gas Calculations Application

It is a best practice to validate reports for fiscal metering or custody transfer flow computing against standalone validation software. The Liquid and Gas Calculations Application simplifies data processing by enabling this report data to be fed manually or automatically. All periodic and event-based report data can be processed using specific start and finish dates, simplifying audit trail requirements per API Chapter 21.1 and 21.2. Depending on user requirements, the suite or individual calculations can be purchased.

## Flow Instrument Validation Application

Integrated metering systems require a wide range of instruments to work in unison. The Flow Instrument Validation Application allows users to keep instruments in peak operating condition by validating the analog range of pressure and temperature transmitters and the densitometer frequency of density transmitters. Users can also validate gas chromatograph (GC) compositions with the response factor. Validation procedures can be performed automatically (online) or manually (offline) with the results of each validation stored in a secure database. Authorized users can easily export reports from multiple sessions in PDF or csv format.

## Meter Curve Application

The Meter Curve Application displays curves based on the meter factor or the meter K-factor. It complements the existing HMI and provides graphical representation of the base curve, the average of accepted factors and the tolerance bands around the current factor. Users can also customize statistical meter performance reports based on proving history.

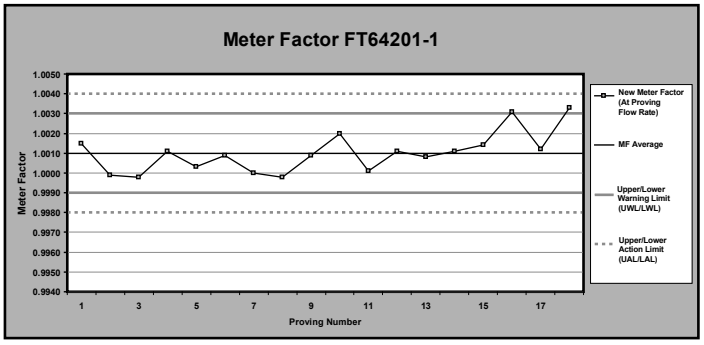



**Figure 7: Meter Factor Trending Report**

* The term "uncertainty," as used herein, reflects the industry's understanding of accepted deviation in measurement.

## Reporting Web Application (RWA)

To enhance accessibility and audit traceability, DanPac's Reporting Web Application is specifically designed to run from any machine over the plant network.

### RWA Reports

- Maintenance
- Periodic – Hourly, Daily, Weekly and Monthly
- Compact, Ball and Master Meter Prover
- Alarm History
- Event History
- Constant Log
- Configuration
- Wire
- Display

### Features and Benefits

- Provides one place to browse and maintain multiple skid and flow computer reports
- Ensures each report prints to dedicated printer over the network
- Offers a completely web-based architecture that allows users to access metering data over any GUI-based OS device, including smart phones, tablets and touch pads
- Enables truly customized reporting content and layout
- Supports OPC connectivity
- Includes an easy backup and restore facility
- Supports event based as well periodic reports
- Offers 100% secure and encrypted PDF reporting format
- Allows user to search historical record content with defined criteria
- Enhances security and diagnostics with fully API and AGA aligned reports

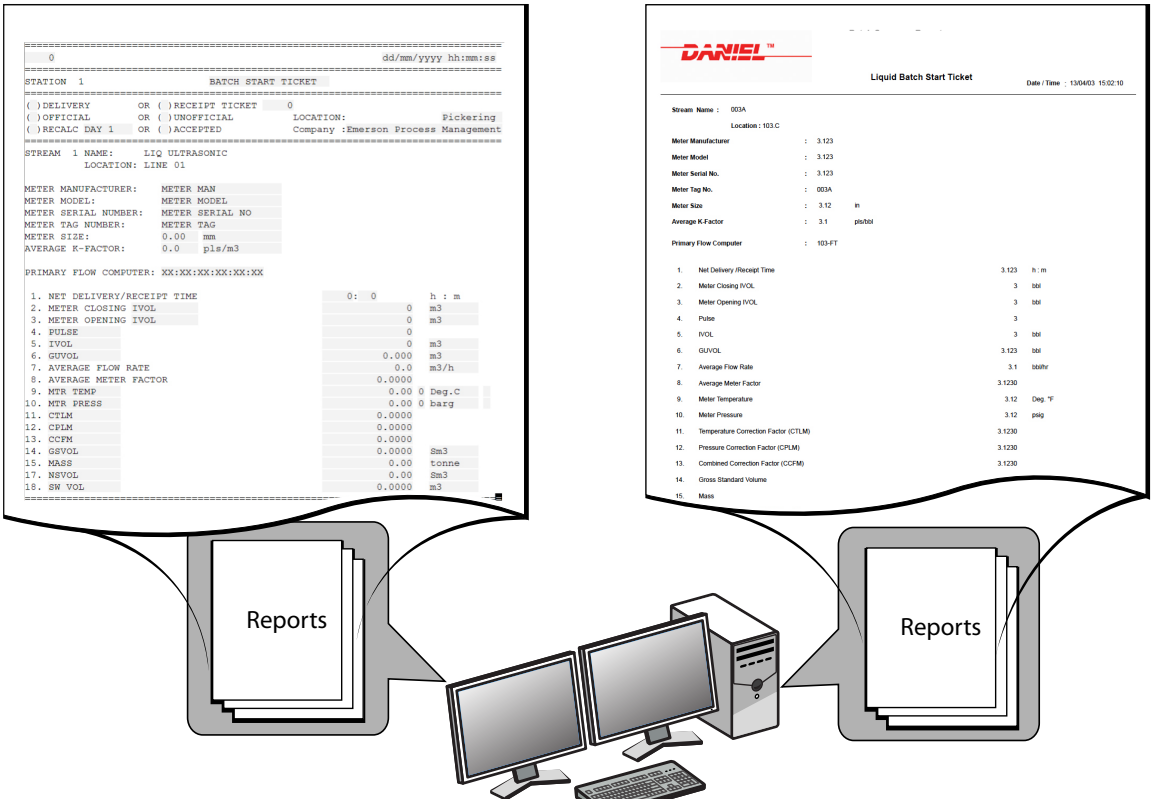



**Figure 8: Example of base time and alarm reports.**

# Control Panel Elevations

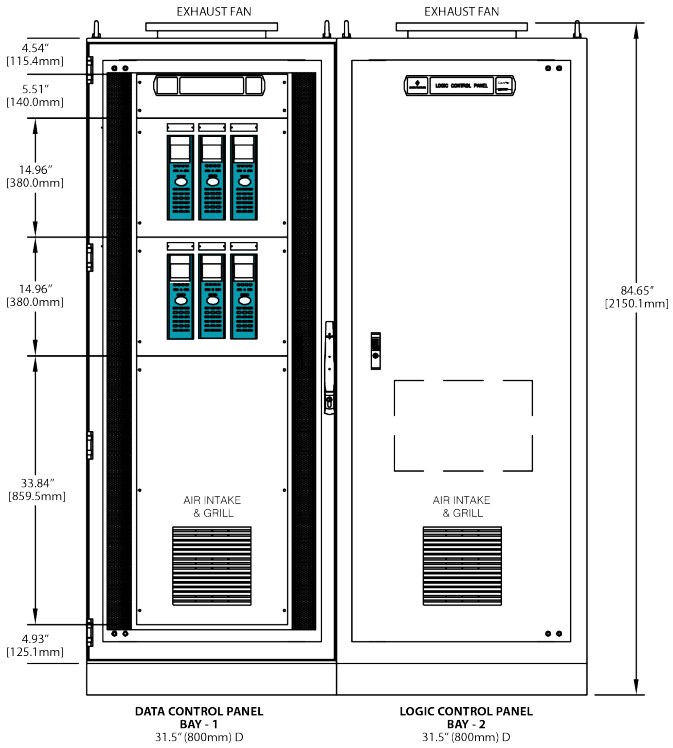



Figure 9: Standard DanPac

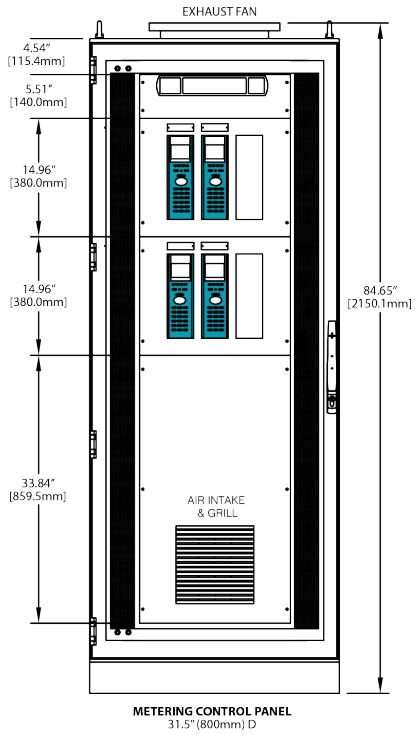



Figure 10: Compact / SDK DanPac

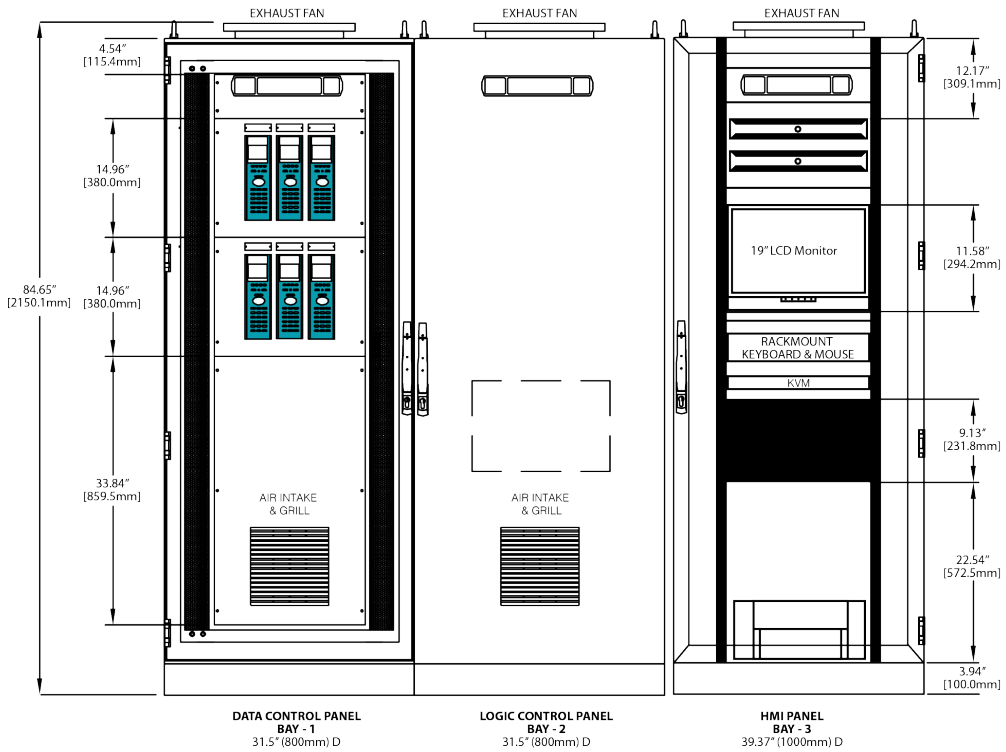



Figure 11: Standard DanPac with Built-in HMI

# Project Execution

From the simplest of flow measurement solutions to mega projects with significant complexity and bespoke requirements, Emerson offers an unparalleled depth of expertise. Every DanPac Express project is carefully managed by experienced engineers who have a full understanding of the nuances of software project development, its iterative nature and the fact that early client engagement is a critical step to successful implementation. Client engagement includes design meetings, remote demonstrations of displays, reports and logic sequences, and even remote client-witnessed testing to ensure all requirements have successfully been met. At Emerson, we implement a project management process to ensure open communication and a clear path of execution from beginning to end.

## Global Service and Support

At Emerson, project execution excellence is coupled with exceptional Lifecycle Services.

With a legacy that spans more than 80 years, we are highly regarded for providing unprecedented oil and gas flow measurement expertise. We also have an unparalleled ability to provide the most comprehensive global support package available for metering systems.

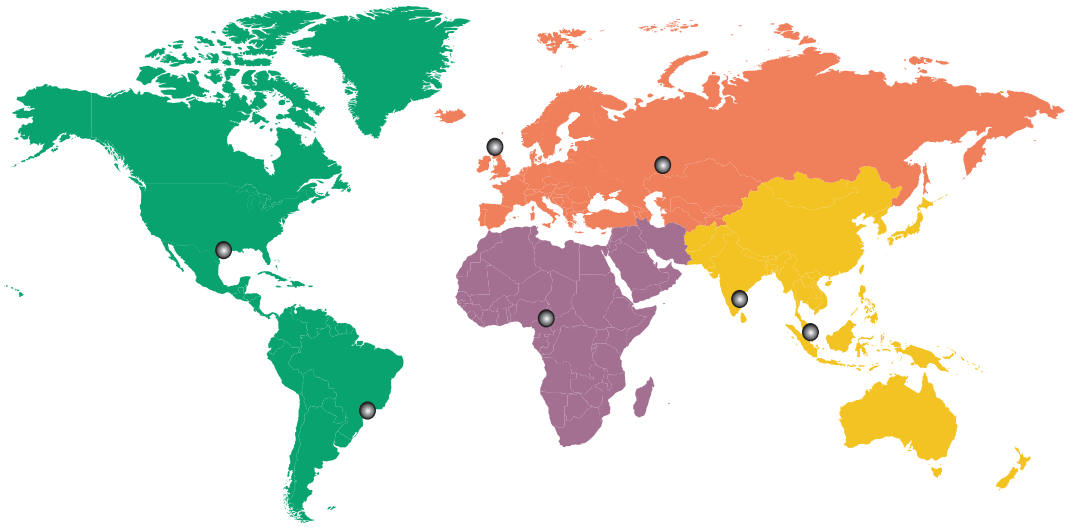
Support begins with a call or email to our Emerson Customer Service Center where a 24-hour helpline is available 365 days a year. Often times, remote diagnosis and in-house shadow systems can be used to resolve many problems quickly and conveniently.

## Training, On- or Off-Site

To realize the full potential of a metering system, we strongly encourage customers to have operators participate in in-depth training to heighten skills, ensure system optimization and maximize the return on investment. Courses for Emerson systems and technologies are held at regional Emerson training facilities or can be conducted at a customer site.

## DanPac Express Upgrade Program

An optional upgrade program is recommended to all DanPac Express customers. With a subscription to this program, a package of benefits will automatically be issued, including annual software upgrades. Details on this upgrade package as well as information on additional maintenance programs are available upon request.



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