Streamlined for Rapid Deployment

Engineered to fulfill the growing demand for a reliable, scalable metering control solution, the Daniel DanPac Express system provides operators with real-time access to critical metering information, including alarms and events. The system’s robust software package provides a user-friendly interface, historical trending capabilities, a powerful reporting package, user-specific alarms and system-wide security. A streamlined hardware configuration helps further reduce complexity and minimize cost.

Designed for rapid deployment in both green and brown fields, the DanPac Express system offers a simple yet extensive plug-in architecture and is engineered to seamlessly interface with Emerson technologies as well as many third party devices and protocols. The standard configuration consists of a flow metering panel that includes Daniel S600+ flow computers, Ethernet switches and a Microsoft® Windows®-based engineering workstation. Optional operator workstations can be added.

With its familiar Windows Explorer®-type environment and drag-and-drop functionality, operators with basic computer skills will quickly learn how to leverage the advanced software for maximum return on investment. The built-in display editor simplifies configuration of reports and provides easy access to a library of high-resolution graphics, offering operators the flexibility to significantly enhance the presentation of metering control data. Intuitive navigation further ensures ease of operation and, if needed, rapid troubleshooting is always available via Emerson’s worldwide service and support network.

Applications: Fiscal and Non-Fiscal

- Pipeline measurement
- Batch/truck loading
- Blending
- Onshore wellhead measurement

Features and Benefits

- Powerful, scalable metering control solution that integrates data from multiple Emerson and/or third party devices for real-time access to critical information, including alarms and events
- Extensive plug-in architecture allows for simple to highly complex metering control solutions that support a variety of functions, including batching, proving, flow switching, well testing and sampling
- Built-in software features streamline access to critical metering information and intuitive navigation increases visibility to alarms and events
- User-friendly operator interface and a library of standard graphics simplify creation and customization of displays and reports
- Powerful fiscal reporting package that combines all key metering parameters to streamline audit trail requirements
- Integrated historical trending support with drag-and-drop functionality that simplifies customization of detailed trends and enables exports into Microsoft Excel® or CSV format to facilitate enterprise-wide report distribution
- Software includes multiple security levels to ensure data integrity as well as an audit trail of user changes is maintained
- Emerson’s Sure Services Guardian Support protects against cyber attacks by updating all software and anti-virus definitions on an ongoing basis
- All DanPac Express systems are designed, built and supported by Emerson and use Emerson software and flow computer platforms, providing a turnkey solution with a single point of contact for hardware and/or software support
Typical DanPac Express Metering System

**DanPac Express Engineering Workstation**
- **Specs:**
  - 3 network cards
  - DanPac Express software
  - Microsoft Windows 7 and later
- **Functions:**
  - Contains main database of HMI
  - Main machine for development, operation and maintenance

**DanPac Express Operator Workstation**
- **Specs:**
  - 3 network cards
  - DanPac Express software
  - Microsoft Windows 7 and later
- **Functions:**
  - Dedicated for daily operation
  - Can have multiple operator workstations per system

**Field Instrumentation**
- Transmitter
- Coriolis Meter
- Ultrasonic Meter
- Orifice Fitting
- Liquid Turbine Meter
- Gas and Liquid Quality Samplers (i.e. gc)

**DanPac Express Flow Computer Panel**
Standard Specifications
Improved performance via other product and material offerings may be available depending on the application. Please consult Daniel if requirements are outside the specifications noted below.

Hardware
- Flow Computer Panel:
  - Daniel S600+ Flow Computer(s)
  - Customizable with I/O and HART® communication
- Engineering Workstation
- Operator Workstations (optional)
- Laser Report Printer

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

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

Figure 2: DanPac Express Dimensional Diagram
Specifications

Flow Computers(1)

Daniel S600+ Flow Computer

- Increased communication connectivity:
  - 2 Ethernet ports standard (Full Duplex and 100 MB/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 switches
- 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:

- 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), 5, 7, 8 and 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, MGGERG, VDI/VDE 2040, PTZ, Annubar, V-Cone

Communications

Network Switch

- 8-port fast Ethernet switch
- DIN rail mounted, 24 VDC
- Store-and-forward switch complies with IEEE 802.3, 2 priority classes according to IEEE 802.1p, TCP/IP protocol, BootP-compatible, port mirroring, integrated web server function, multicast filtering, IGMP snooping, VLAN, Rapid Spanning Tree (RSTP), DHCP server, PTCP filter

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:
  - 30% to 95%, non-condensing

(1) A number of Emerson flow computer models are compatible with the DanPac Express system, including Daniel S600+, FloBoss103/104, 407 and 503/504, ROC 800 Series 1 and 2, and DL8000. Several third party flow computers are also compatible with the system, including Omni® flow computers.
# Workstation Requirements

## Table 1: Hardware Requirements

<table>
<thead>
<tr>
<th></th>
<th>Engineering Workstation</th>
<th>Operator Workstation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor</td>
<td>Intel Xeon Processor E5-1650, 12MB Cache or better</td>
<td>Intel Xeon Processor E5-1650, 12MB Cache or better</td>
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<tr>
<td>Memory</td>
<td>4GB or better</td>
<td>4GB or better</td>
</tr>
<tr>
<td>Hard Drive</td>
<td>120 GB or larger</td>
<td>120 GB or larger</td>
</tr>
<tr>
<td>Communication</td>
<td>Ethernet: up to 6 NICs</td>
<td>Ethernet: up to 6 NICs</td>
</tr>
<tr>
<td>Video requirements</td>
<td>1GB NVIDIA® Quadro k600 or better</td>
<td>1GB NVIDIA® Quadro k600 or better</td>
</tr>
<tr>
<td>Video RAM</td>
<td>32 MB or better</td>
<td>32 MB or better</td>
</tr>
<tr>
<td>Preferred/suggested hardware manufacturer</td>
<td>Dell®</td>
<td>Dell®</td>
</tr>
</tbody>
</table>

## Table 2: Operating System Requirements

<table>
<thead>
<tr>
<th></th>
<th>Engineering Workstation</th>
<th>Operator Workstation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering Workstation</td>
<td>Microsoft Windows 7 SP1 (64-bit)</td>
<td>Microsoft Windows 7 SP1 (64-bit)</td>
</tr>
<tr>
<td></td>
<td>Microsoft Windows Server 2008 R2 SP1</td>
<td>Microsoft Windows Server 2008 R2 SP1</td>
</tr>
<tr>
<td></td>
<td>Microsoft Windows Server 2012 R2</td>
<td>Microsoft Windows Server 2012 R2</td>
</tr>
</tbody>
</table>

## Figure 3: DanPac Express system architecture with remote operator workstation
Engineering Workstation

The DanPac Express engineering workstation is powered by a robust software package that offers a complete set of high performance tools, including a built-in display editor, alarm management and multi-level security.

User-Friendly Interface

The standard operating interface is specifically designed for metering control and includes navigation for alarms, graphics and other applications in an intuitive display that simplifies daily use. Each user interface is divided into the following sections:

- **Alarm Banner** at the top of the screen that displays a subset of the current active alarms
- **Toolbar** for single-click access to important applications and options
- **Main Display** that can incorporate a range of graphics from typical process line graphics and artistic skid renderings to actual photographs of the metering skid
- **Navigation Tree** with a familiar Windows Explorer navigation pane that provides rapid access to all displays in the system and allows users to easily create folders.

Built-In Display Editor

The easy-to-use, built-in display editor ensures rapid development of additional displays. These displays can be collated from various flow computers and other devices into one central interface, facilitating overall management.

Extensible Plugin Architecture

The system’s plugin architecture allows users to customize content and displays for maximum functionality. Overall system health is monitored by a central management system that presents diagnostic information and provides a logical launching point for system configuration.

To start, users can custom configure the display by adding deviation checking, flow and time weighted averaging, station functions and more by selecting this content from a library of standard components. The next step is to apply simple scripting language using “Calculation And LogiC” (CALC) blocks. With simple commands and syntax, any existing system point and process can be incorporated using a multitude of mathematic and logic operators.

To achieve maximum flexibility and power, advanced users can create .Net components using the DanPac Express API. The control studio application allows users to combine inputs and outputs to create the most advanced solution.
**Logic Sequences**
From simple scripts to full blown application software, the system’s plugin architecture allows for highly complex sequence control solutions. DanPac Express is designed to support most typical and standard control sequences, including:

- Batching
- Proving
- Flow Switching
- Well Testing
- Sampling
- Valve Control
- Gas Chromatograph Control
- Deviation Checking.

Operators can suppress alarms, based on user rights, to temporarily remove these alarms from the list. The standard suppressed alarm display ensures these alarms can be accessed as needed.

Operators with additional user rights can also change individual alarm priorities, limits, conditional alarm settings, and/or enable/disable alarms based on process requirements. Six alarm levels ranging from ‘critical’ to ‘very low’ allow operators to assign the appropriate level to any alarm in the configuration. In addition, each alarm can be assigned to one or more of fifteen alarm groups. Alarms can also be individually disabled from the system with a time delay for generation and clearance.

The alarm banner in the main user interface can be docked either at the top or the bottom of the screen and displays a subset of the currently active alarms. Alarm presentation is identical across all operator workstations for system-wide consistency.

**Events**
DanPac Express event handling is designed to meet global standards and regulations, including NORSOK requirements for storing both old and new values in the event record. The event handling application maintains a full audit trail by logging all changes, including date, time and active user, to a SQL database.

**Alarms**
DanPac Express enables users to manage alarms with exceptional versatility. The system centrally stores all alarms in a SQL database on the engineering workstation. The alarm history is limited only by available disk space.

The convenient alarm viewer provides operators with visibility to alarms in various states, including active, global and suppressed. Each alarm is listed with its major attributes and is color coded to its current state. The alarm viewer also offers the ability to edit properties and acknowledge alarms via one interface.

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Reporting Tools and Security

Trending
The versatile trending application supports real-time and historical trends and gives operators the flexibility to simply drag-and-drop content from any point in the database onto the appropriate design template. Further trend customization can be achieved by utilizing the eight pen colors offered by the application.

Each point can be sampled at a user defined period of time and all logging automatically defaults at two years. The only limitation to the amount of data storage is the medium being used. The application also enables trends to be exported into Microsoft Excel and/or CSV format, ensuring this information can be easily shared locally and across the network.

Reports
The powerful yet simple reports application puts an abundance of trigger and destination operations at the user’s fingertips. It allows any point to be added to a user customizable report and any point to be used to trigger reports. The application enables all templates, displays and folders to be easily and efficiently organized. In addition, standard Microsoft Windows printing functionality allows any local or network printer to be utilized.

Defense-in-Depth Security
A comprehensive Defense-in-Depth security approach is used within the DanPac Express system to provide a series of hardened layers. All aspects of software, hardware, network and physical security are taken into consideration.

In addition to data accuracy, the integrity and security of vital metering information are of primary focus. To build the appropriate infrastructure, experienced Emerson system engineers work alongside client IT engineers to customize a highly secure system that protects against viruses and other malicious threats.

DanPac Express also supports customizable role-based user security. Individual points on the display can be set by the user to one of eleven access levels.
Network Connectivity

Third Party Interfaces
A basic requirement of any control system is open connectivity. DanPac Express easily interfaces with all Emerson flow computer models as well as many third party flow computers. The system is built on a simple plug-in architecture, enabling it to support third-party protocols ‘out of the box’ as well as the development of custom protocols. Modbus, OPC, HART, SQL and ECMA24 have already been deployed for interfacing with numerous devices, distributed control systems (DCS) and business systems. This unique interfacing capability makes DanPac Express an ideal solution for both green and brown field metering system projects.

To streamline data compilation from multiple interfaces, a powerful Microsoft Excel add-in is an optional component that embeds the DanPac Express OPC browser within Excel. By employing this add-in, drag-and-drop functionality allows content anywhere in the system to be easily added into user-created spreadsheets. It also allows for live updates and write capability.

The easy-to-use engineering design interface facilitates configuration of additional interfaces, enabling users to quickly change and customize configurations to meet various requirements.

Distributed System Architecture
The extremely flexible DanPac Express system supports distributed processes across multiple sites, providing a common and seamless user interface. Backed by a wealth of experience, Emerson system engineers implement complex architectures with stringent IT security requirements across networks using thick and thin clients.

Thin client access is achieved through Remote Desktop Protocol (RDP). Installation of a dedicated Express Remote Client (ERC) provides the opportunity for a full-featured operator workstation anywhere on the network. Operator workstations can read and write data, depending on user security, but cannot make any engineering configuration changes. In addition, reports can be automatically saved to a remote operator workstation to aid in disaster recovery.
Applications

The system-independent CalPac software suite consists of a group of applications that simplify 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.

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.

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 4: Meter Factor Trending Report
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.

Features and Benefits
- Provides one place to browse and maintain multiple skid and flow computer reports
- Ensures each report prints to a dedicated printer over the network
- 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 a 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

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