Specification Sheet

DL8000 Preset

The DL8000 Preset is a rugged electronic preset, that provides precise custody transfer batches for petroleum, industrial chemicals, and other products. It accepts volumetric and mass inputs from turbine, Coriolis, ultrasonic, or other flow measurement devices using single or linearized meter factors. The DL8000 also performs density, temperature, and pressure corrections using the latest standards and accurately calculates delivered volumes at standard conditions (60°F, 15°C, 20°C, or user-selectable) using double precision math. It can measure up to four products simultaneously and control up to six additives using sequential or ratio blending techniques for up to 30 stored recipes, controlling pumps, valves, and injectors as necessary while sensing permission signals.

DL8000 Preset

Density Correction

The DL8000 accepts density signals as a frequency, 4–20 mA, or through a communications device. It accepts inputs from a flowing density meter (such as a Solartron Frequency Densitometer or a MicroMotion Coriolis meter). The DL8000 corrects observed density to standard conditions and calculates the temperature and pressure volume correction factors.

Temperature Compensation

The DL8000 can accept an input from an RTD, 4–20 mA, or thermocouple device. It then calculates a temperature volume correction factor in accordance with industry-standards *API MPMS Chapter 11.1* and *ASTM-D1250 1980* and *2004* tables 5A, 5B, 5D, 6A, 6B, 6C, 6D, 23A, 23B, 23D, 24, 24A, 24B,

24C, 24D, 53A, 53B, 53D, 53E, 54A, 54C, 54D, 54E, 59A, 59B, 59D, 60A, 60B, 60D, ISO 91.1, ISO 91.2, GPA TP25 (1998), and GPA TP27 (draft).

Pressure Compensation

The DL8000 can accept a 4–20 mA signal from a pressure transducer and compensate flow calculations for volumetrics due to pressure in accordance with the following standards and tables API 11.2.1, 11.2.2, 11.2.1(M), and 11.2.2(M).

Pulse Fidelity

The DL8000 monitors dual pulse inputs for integrity in accordance with *ISO 6551-1982* and *BS 6439: 1983* or *API Petroleum Measurement Standard, Chapter 5.5, level B* and *Institute of Petroleum Standard, IP 252.76, Part XIII, Section 1, Level B.*

Meter Factor Linearization

The DL8000 Preset can perform linearization of meter factors and K factors using up to 12 points to ensure accuracy over the entire range of flow.

Reporting

The DL8000 generates reports in compliance with *NIST Handbook 44 – 2006 Edition* and *2003 Update* and *NCWM Publication 14*.

Other Features

- Archival storage of 450 alarms and 200 transactions with up to four batches each.
- Storage of the last 1000 weights & measures events (in accordance with *NIST Handbook 44*).
- Integral Weights & Measures switch.
- Independent permissive sensing AC power.
- Digital valve control with automatic high flow rate recovery.
- Independent temperature compensation methods for individual products.
- Automatically sensing or user-entered values for thermal expansion and linear equation.
- User-entered vapor pressure of light hydrocarbons.

Operations – The DL8000's user-friendly multi-language display prompts the operator through the entire loading sequence, assuring a safe and reliable loading operation. The loading sequence

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starts after the operator connects the safety circuits, selects a recipe, enters a preset quantity, and presses the Start button. The DL8000 automatically turns on the required product pumps and additive injection equipment and opens the digital flow control valves.

A low-flow start sequence can be initiated to reduce static build-up when delivering petroleum products. To keep loading time to a minimum, the DL8000 automatically maintains the highest possible flow rate that the system can deliver. Three different flow profiles for each recipe provide maximum system flexibility regardless of the meter size. When certain recipes require small percentages of one or more components, you can configure the programmable flow profiles to automatically deliver small-percentage component(s) only during the high flow stage of the delivery, pulsing the smaller percentage component(s) to maximize system performance.

As the end of the batch sequence approaches, the component streams slow to a pre-defined low-flow/stop flow rate. The high-speed digital valve control algorithm, working in conjunction with the linear digital control valve, ensures a smooth, repeatable, low-flow stop and final stop without line shock.

To assure product quality, you can program an automatic single product line-flush sequence at the end of the delivery to flush the loading arm with a single base product. The DL8000 is equipped with digital output circuits you can configure for volume/pulse outputs for data acquisition type devices.

Blend Recipes – DL8000 memory allows up to 30 blend recipes. Each recipe has individual totalizers and is highly configurable, providing maximum flexibility.

Linearization – Multi-point linearization is programmable with up to 12 points. The DL8000 automatically interpolates between the 12 meter factor setpoints to assure system accuracy over the required flow ranges.

Alarms – The DL8000 offers comprehensive alarms for blending systems. You can define each alarm action for no action, display only, close relay contact, stop loading process, or lock the unit. Built-in programmable alarm conditions are also user-selectable. You can also configure the reference base temperature for compensation corrections.

Data Communications – The DL8000's base unit has three built-in communication ports. The base unit can support up to three additional ports (via optional communications cards) for a total of six ports. The base unit ports are:

- Local Operator Interface (RS-232D) – LOI.
- Ethernet – Comm1.
- EIA-232 (RS-232) – Comm2.

The Local Operator Interface (LOI) port's standard RJ-45 connector provides an EIA-232 (RS-232D) link between the CPU and a PC. Use ROCLINK™ 800 Configuration software to configure the CPU, extract data, and monitor its operation. All DL8000 ports support Modbus slave protocol; master protocol is supported on all but the LOI and Ethernet ports.

Data Security – DL8000 data is secured with a 4-digit user-defined access code. All calibration data is secured with the access code and a wire-sealable mechanical security switch that is integrally mounted in the DL8000 keypad.

I/O Modules - The DL8000 supports a variety of hot-pluggable I/O modules. You can add up to nine optically isolated I/O modules as needed to satisfy a wide variety of field I/O requirements. Available modules include:

- Alternating Current Input/Output (AC I/O).
- Advance Pulse Module (APM) with densitometer processing.
- Analog Inputs (AI).
- Analog Outputs (AO).
- Discrete Inputs (DI).
- Discrete Outputs (DO).
- Digital Relay Outputs (DOR).
- HART Input/Output.
- Pulse Inputs (PI) – High or Low speed.
- RTD Inputs (RTD).

Communications Modules – You can install up to three additional communication modules in the DL8000 to provide ports for communicating with a host computer or other devices. The DL8000 accommodates the following module types, in any combination:

- EIA-232 (RS-232).
- EIA-422/EIA-485 (RS-422/RS-485).
- Multi-Variable Sensor (MVS) interface.
- Dial-up modem.

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DL8000 Housing Specifications

DIMENSIONS
  Height: 330 mm (13 inches)
  Width: 355 mm (14 inches)
  Depth: 355 mm (14 inches)
  Weight: 34 kg (75 pounds)

ENCLOSURE
  IP66, weatherproof, corrosion resistant.

MATERIALS
  Cast aluminum with stainless steel bolts.

ENVIRONMENT
  Temperature (operating):
    −40°C to 65°C **(**−40°F to 149°F)
    Display (no heater):
    −20°C to 65°C (−4°F to 149°F).

  Temperature (storage, non-operating):
    −40°C to 70°C (−40°F to 158°F).

  Relative Humidity: 5 to 95 percent (non-condensing).

MATERIALS
  Wire Channel Covers: Polypropylene Plastic.
  Modules: Thermoplastic Polyester, solvent-resistant.

ELECTROMAGNETIC COMPATIBILITY (EMC)
  FCC Method (CFR-47) Part 15 – Digital Devices
  CISP Methods: Radiated emissions from 30 MHz to 1000 MHz
  Conducted emissions (mains disturbance) from 150 kHz to 30 MHz
  Susceptibility: 10 volts/meter over the frequency range 80 MHz to 1000 MHz
  Fast transients: Line power and I/O
  Electrostatic Discharge

POWER REQUIREMENTS
  100 to 240 V ac (+ 10%/− 15%), 47 to 63 Hz, 1-phase 30-watt nominal.

CABLE ENTRY
  Center: 50 mm (2 in.) female NPSM; normally used for all DC signal (meter pulse, RTD, analog, status/control) cabling.

  Left: 25 mm (1 in.) female NPSM; normally used for AC power input and AC status/control signals.

  Right: 25 mm (1 in.) female NPSM; normally used for meter pulse, RTD, or analog signals when separate signal routing is required.

DL8000 Base Unit Specifications

PROCESSOR
32-bit microprocessor based on the Motorola MPC862 Quad Integrated Communications Controller (PowerQUICC™) PowerPC processor running at 50 MHz.

PROCESSOR MEMORY
Boot Flash: 256 KB for system initialization and diagnostics.
Flash: 4 MB for firmware image.
SRAM: 1 MB for historical data logs and configuration.
Synchronous DRAM: 8 MB for firmware execution and execution memory.

BATTERY BACKUP (for SRAM)
User-replaceable.
Type: Sanyo 3 V CR2430 lithium.
Normal use life: 10 years while power is applied to unit.
Backup life: 1 year minimum while jumper is disengaged and no power is applied to unit.
Shelf life: 10 years.

I/O MODULES
Note: For further details, refer to spec sheets for individual modules.
Analog Input-12: 4 channels; 12 bits of resolution.
Analog Input-16: 4 channels; 16 bits of resolution.
Alternating Current I/O: 6 channels.
Advance Pulse Module: 4 channels; 2 single, 2 dual (one configurable as a densitometer input and one as a pulse output).
Analog Output: 4 channels.
Discrete Input: 8 channels.
Discrete Output: 5 channels.
Digital Relay Output: 5 channels.
HART Input/Output: 4 channels, each capable of communications with up to 5 HART devices (when in input multi-drop mode).
Pulse Input: 2 channels; user-selectable high speed or low speed per channel.
RTD Input: 2 channels.

COMMUNICATIONS MODULES
Note: For further details, refer to spec sheets for individual modules.
EIA-232 (RS-232):
Type: Single. 57.6K bps maximum data rate.
EIA-422/485 (RS-422/485):
Type: Single. 57.6K bps maximum data rate.
Dial-Up Modem:
Type: Single. 57.6K bps maximum data rate.

COMMUNICATION PORTS (ON BOARD)
EIA-232 (RS-232) PORT
Type: Single. 57.6K bps maximum data rate.
ETHERNET PORT
Type: 10BASE-T twisted pair. IEEE multi-segment 10 MB/second baseband Ethernet
Maximum Segment: 100 m (330 ft).
LOI Port
Type: EIA-232D (RS-232D) Standard. 57.6K bps maximum data rate.

BOARD TEMPERATURE ACCURACY
1% typical, 2% maximum.

VOLTAGE MONITOR ACCURACY
0.75% typical, 1% maximum.

TIME FUNCTIONS
Clock Type: 32 KHz crystal oscillator with regulated supply, battery-backed. Year/Month/Day and Hour/Minute/Second, with Daylight Savings Time control.
Clock Accuracy: 0.01%.
Watchdog Timer: Hardware monitor expires after 3 seconds and resets the processor.

WIRING
Size 12 AWG or smaller for terminal blocks.

APPROVALS
IP66, Class I, Zone 1, Groups IIB flame-proof
Ex d IIB T6, AEx d IIB T6, (Ta=+65°C).
Certified by CSA as Model W40161.

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