DANLOAD™ 6000 Electronic Preset
Worksheets and Specifications

The DanLoad 6000 Electronic Preset is an electronic batching, blending and flow measurement device designed to deliver precise quantities of petroleum, chemical and liquid products in a variety of applications (gasolines, antifreeze, fuel oils, fertilizers, solvents, paints, LPG, LNG, lube oils, chemicals, dyes).

Easily accessible plug-in boards with standard hardware and one firmware version accommodating all features provides for ease of maintenance and future expandability.

The DanLoad 6000 can operate in either a "Manual" or "Auto" mode. In "Manuel" mode, the DanLoad 6000 operates as a stand alone unit performing local authorization based on the configured safety circuit inputs and user-configured delivery parameters.

In "Auto" mode, the DanLoad 6000 operates as a slave to the host system, typically a Terminal Automation System, having complete control over loading sequence and authorization of recipes, additives and preset volumes.

Four component blending and additive injection control, measurement, accounting and verification are just a few of the many features that the DanLoad 6000 offers. Please reference the DanLoad 6000 Application Sheets for detailed information on the following topics.

DESIGN FEATURES

- Explosion proof unit with 6-digit preset
- One firmware version accommodates all applications
- In-line proportional/non-proportional or sequential blending, up to 4 components
- Additive control, measurement, verification and accounting, plus additive calibration
- Comprehensive on-line diagnostics
- Dynamic data display allows viewing of 16 user-selected data elements at the press of a key
- Customer training and support
- Related products; Series 1200 Turbine Meters, BiRotor Plus PD Meter, Corolis Meter, (700/500) Control Valve

- Liquid applications including LPG and LNG
- Ability to control multiple loading arms from a single unit; loading one arm at a time.
- User-configurable audit trail, logging and ticket printing
- Temperature/pressure correction per industry standards (API, IP, etc.)
- Multi-language displays and keypads
- Status LEDs for alarm, operation mode and permissive power
- Sealable Weights & Measures switch and password protection for ultimate system security
- Up to 24 digital inputs, 28 digital outputs, 4 dual pulse meter inputs, 4 prover outputs and 12 analog inputs
- Continuous meter calibration monitoring (CALMON) (enhanced "smart" preamp concept)
- Thirty (30) configurable recipes
- Modular I/O for easy expansion
- Loading by mass via coriolis or volumetric meter
- Large, easy-to-read graphics display with auto adjust contrast and backlighting
- User-configurable transaction archiving
- Multiple meter factors for linear calibration
- Two-way data communications using industry standard Modbus RTU protocol, with function codes 65 & 66 (user defined data fields)
- Optional secondary/remote keypad with LCD display
- Optional remote start/stop
- User-configurable alarms and safety circuits with easy system "setup"

EMERSON™
Process Management

TYPICAL LOADING OPERATION

The typical loading operation begins with the operator entering up to a 6-digit preset volume, pressing ENTER and then pressing START. If the DanLoad has more than one recipe configured, the operator first selects the desired recipe using the up and down arrows on the keypad and then presses ENTER.

Once the START key is pressed, the DanLoad verifies that the 8 configured safety circuits (earthing/ground, overfill, ESD, vapor recovery, automation system permissive, etc) are satisfied before allowing loading to begin. If recipe selection inputs are configured, the input associated to the selected recipe is also verified. If the configured inputs are not satisfied, the operator receives a user-defined message describing the problem.

Having verified that the safety circuits are engaged, the DanLoad 6000 determines the component percentages for the selected recipe. The loading sequence is initiated by turning on the associated component pump(s) and waiting the user-defined pump start delay time before opening the block and/or flow control valve(s).

To prevent static build-up of the product, a low-flow start volume can be configured. The DanLoad 6000 dispenses this volume at the user-defined low-flow rate before transitioning to the user-defined high-flow rate, as demonstrated in the flow profile diagram.

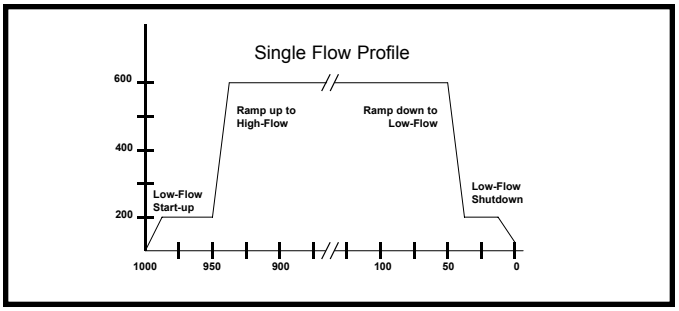


Figure 1

As loading proceeds, pulse per unit outputs can be sent to an automation system for totalizing the loaded product based on meter, component or recipe using either the gross or temperature corrected volume.

Throughout the loading process, the DanLoad display maintains the recipe name, preset volume, loaded and remaining volumes, unit of measure, date and time and a graphical representation of the batch volume loaded.

A message line at the bottom, is also displayed to inform the operator of unit operation and alarm conditions. Safety circuits are continuously monitored throughout the loading process. If any of the safety circuits become disengaged, an alarm message is displayed to the operator and loading is halted. (Fig. 2)

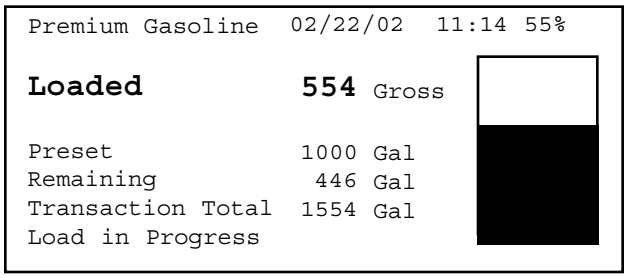


Figure 2

For digital valve operations, the DanLoad 6000 monitors the flow rate and modulates the digital flow control valve to maintain a stable flow rate throughout the loading process. This assures precise and accurate flow measurement.

If additive injection is configured, the DanLoad 6000 controls, totalizes and verifies additive injection based on the user-configured parameters.

At any time, the operator can view configured dynamic data elements on the display without losing vital loading information. Please refer to the Dynamic Data Display section in this brochure.

The operator can halt the loading process at any time by pressing the STOP key. This signals the DanLoad 6000 to close all valve(s). The batch load can be restarted by simply pressing the START key, or ended by pressing the STOP key, again. Optional remote START/STOP function can be incorporated with a push button or remote display. The STOP key is not designed to be used as an emergency stop button.

As demonstrated in Figure 1, a user-defined "low-flow stop volume" can be configured to prevent hydraulic shock when closing the flow control valve(s). The 6000 automatically averages the last five valve closure times to assure a smooth and continuous shutoff at the preset volume.

Clean line flush volumes for blended products and/or additives can be configured to assure product quality by preventing cross-contamination of the next transaction loaded.

When the DanLoad 6000 is in "Auto" mode, all loading functions such as recipe selection, preset volume, additive and transaction authorization are controlled by a host computer such as a terminal automation system. This includes interrogation of the DanLoad 6000 for real-time information before, during and after loading.

The DanLoad 6000 can interface with any manufacturer's metering and valve equipment. However, when the DanLoad 6000 is coupled with the Daniel Meters and Daniel Control Valves, it creates a synergistic environment that offers unbeatable flow control and measurement.

DATA ITEM PROMPTS

Data item prompts are user-configured messages that are displayed to the operator at the beginning of each transaction when the DanLoad 6000 is in Manual mode, (e.g. Enter Driver #, Enter Order #).

Up to five data item prompts can be configured and displayed in multiple languages. The operator can input up to an 8-digit response which is archived in the transaction storage record for retrieval by an automation system and printing on the delivery ticket.

CONFIGURING THE DANLOAD 6000

A user-friendly and top-down approach makes the DanLoad 6000 simple and easy to configure. Password protected, the DanLoad 6000 offers menus and sub-menus that allow the operator to scroll back and forth through configuration groups in a logical, top-down fashion.

Weights & Measures parameters are protected by the external W&M switch located on the front keypad.

In addition, a Windows® based software utility, Daniel Setup 6000 covering all versions of Firmware, is available for remote configuration and interrogation of the DanLoad 6000 presets.

DYNAMIC DATA DISPLAY

A user-configurable dynamic data display allows for over 200 static and real-time data elements (i.e. totalizers, flowrates, component percentages, average temperatures, additive volumes, etc.) to be displayed either during loading or while the unit is idle. Four pages, totaling 16 parameters are displayed in a "pop-up" window by the press of a key.(Fig.3)

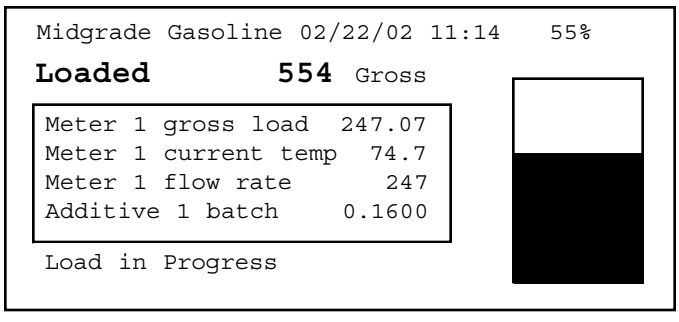


Figure 3

COMMUNICATIONS

When using the communications board (DUART), two serial communications ports (both RS-485 multi-drop or one RS-232 and one RS-485) allow connection to a remote computer and/or data logging to a serial printer.

Utilizing the industry standard Modbus RTU protocol and utilizing function codes 65 & 66 (user defined data fields) the DanLoad 6000 can be remotely controlled and interrogated by a remote computer incorporating secure and efficient binary data transfer. Data formats are configurable and provide data transfer rates up to 38,400 bps.

RS-232 provides data logging options to a serial printer or interface to a remote computer for configuration or terminal management/automation functions. RS-485 provides a multi-drop connection up to 32 DanLoad 6000 presets. This interface allows for remote system configuration, terminal management/automation functions and/or a ticket printing or monitoring system.

All real-time data parameters are available via communications. Reference the DanLoad 6000 Communications Specifications for a complete description.

TRANSACTION STORAGE

Transaction storage has 80 KBytes of battery-backed memory available. The operator configures which batch and transaction parameters to archive and thus the format of each record. Depending on the data archived, the DanLoad 6000 can store over 1000 transactions and 2000 batches.

Any data items stored are available for printing on the delivery ticket and retrieval via the communications link.

MULTI-LANGUAGE SUPPORT

Many user-selectable languages are offered in the standard firmware for ease of operation.

Some languages supported:

- English
- Spanish
- Russian
- German
- Portuguese
- Dutch
- French
- Norwegian
- Slovak
- Polish
- Macedonian
- Greek
- Italian
- Malay
- Croatian
- Vietnamese
- Data Logging In English

Script languages such as Thai and Chinese are available with Firmware version 1.21 functionality. Additional languages can be supported upon request.

EVENT LOGGING/DATA LOGGING

Printing direct from the Danload 6000 using a serial print sharer and printer any of the following reports can be printed.

- Transaction/Delivery ticket
- Batch Summary
- Transaction Summary
- Alarm Logging
- Power Fail Date and Time
- Program Mode Entry and Exit
- Configuration Summary
- Weights & Measures Switch Opened/Closed
- Totalizer Report (Meter, Component, Additive, Recipe)
- Throughput Report (Meter, Component, Additive, Recipe)

Event logs can be directed to any of 4 shared printers using a code-operated switch. This allows for one printer to function as an audit-trail logger, while a second printer functions as a ticket or "BOL" printer. A "Cutoff Hour" can be configured which provides a start point for the totalizer and throughput reports based upon a 24-hour period.

Optional:

- Standard PC based DANTAS Software packages
- DTPS - DANTAS Ticket Printing System (BOL)
- DTSS - DANTAS Transactional Server System BOL, plus security, with data base

USER CONFIGURABLE TRANSACTION TICKET

The transaction or "delivery" ticket printed through the use of the DanLoad 6000 can accommodate existing preprinted forms. Any data archived in the transaction storage record is available for printing on the delivery ticket. The user configures the location (row/column) where each data item is to be printed. Three default formats are provided.

Ticket printing can be implemented via the RS-232 port using the "Printer Sharing System" or via one of the RS-485 ports using Dantas Ticket Printing System (DTPS) for RS-485 multi drop ticket printing.

ON-LINE DIAGNOSTICS

Comprehensive, built-in self-diagnostic and operator invoked diagnostics provides for easy trouble-shooting and maintenance. Some diagnostics tests include:

- Memory (RAM) verification
- Keypad
- Display
- DUART communication channels
- Inputs/Outputs
- Crash analysis
- Show memory
- Print configuration

PULSE SECURITY

Dual pulse comparison is a selectable option which provides for pulse and phase security as well as immediate detection of a pulser or preamp failure. IP252/76, Part 8, Section 1, Level B and API Chapter 5, Section 5, Level B pulse security is implemented.

Special logic has also been incorporated into the Dual Pulse Security module which eliminate erroneous pulses generated by vibrational flow.

FACTORED PROVING OUTPUT

Factored proving output enhances meter proving applications when using a master meter or small volume prover. The meter factor entered in the DanLoad is applied to the raw meter pulse stream sent to the proving device. This confirms that the correct meter factor has been entered into the DanLoad 6000, thus "proving" the entire system and not just the meter.

This feature requires the 4-channel meter and MPMC boards.

METER CALIBRATION MONITORING (CALMON)

CALMON provides automatic, continuous, meter calibration monitoring. Enhancing the "smart" preamp concept, the DanLoad 6000 records the turbine meter(s) characteristic and continually verifies it during the loading operation. When there is a significant change in meter factor due to bent or missing blades, worn or damaged bearings, etc., the DanLoad immediately detects the problem and generates an alarm. This assures accurate flow measurement between provings and quick detection of meter problems during proving.

Advanced, FUZZY logic classification algorithms are used in CALMON to make meaningful decisions based on various meter conditions and prevent spurious meter calibration alarms.

This feature requires the 4-channel meter and MPMC boards.

LCD DISPLAY AND KEYPAD

A single, 8-line by 40 column, super-twist LCD display is utilized for operator interface. The display utilizes a photo sensor and thermistor which automatically adjusts contrast and backlighting for optimal viewing.

Status LEDs identifying alarm, permissive power and operational mode (Manual or Auto) for the unit are located on the front display.

The keypad consists of 18, rugged, Hall-Effect keycaps which are impervious to chemicals commonly associated with petroleum applications. An "ALT" key is used to provide dual-functions for various keys and a sealable Weights & Measures switch is incorporated to provide security to flow measurement parameters.

SECONDARY/REMOTE LCD DISPLAY AND KEYPAD

An identical, shallow enclosure with keypad and LCD display can be connected to the DanLoad 6000 for double-sided loading racks and/or remote-control applications.

A remote enclosure consists of a LCD display, keypad, and interface card.

CENTRAL PROCESSING UNIT (CPU) BOARD

Processing is distributed between two Intel 80C196KBCHMOS microcontrollers; one operates the human interface and communication processes while the other performs the real-time functions such as monitoring safety permissives, valve control and meter pulse inputs.

Included as part of the processor board:

- 500 KByte program storage
- 500 KByte battery backed RAM (10 years life)
- Independent internal watchdog circuit
- Real-time clock with accuracy of one minute per month for an ambient temperature of 77°F (25° C)
- Side detect switches

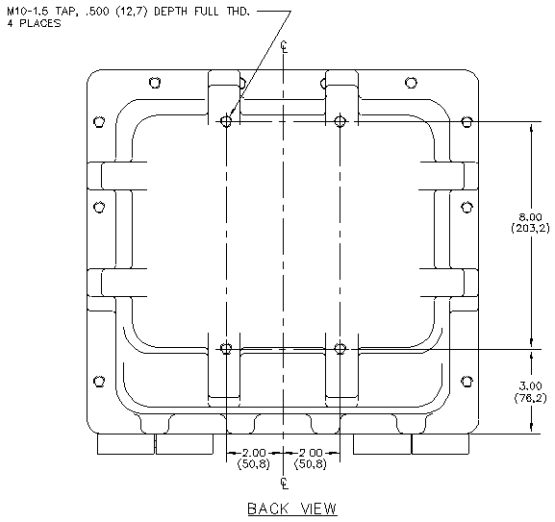
COMMUNICATIONS BOARD (DUART)

- RS-485/RS-232 Allows for a single multidrop communication network and/or remote serial printing.
- RS-485/RS-485 Allows for two multidrop communication networks.

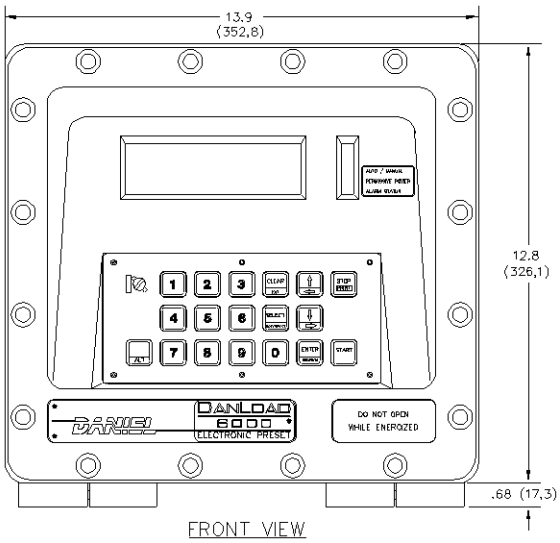
Note: The IEEE specification for RS-485 allows for up to 32 DanLoad 6000s on a RS-485 network.

Surge Protection: built-in, two stage surge protection uses Gas Tubes (to drain high transient currents to ground) and Bidirectional Voltage Suppressors (to clamp voltages to a safe level).

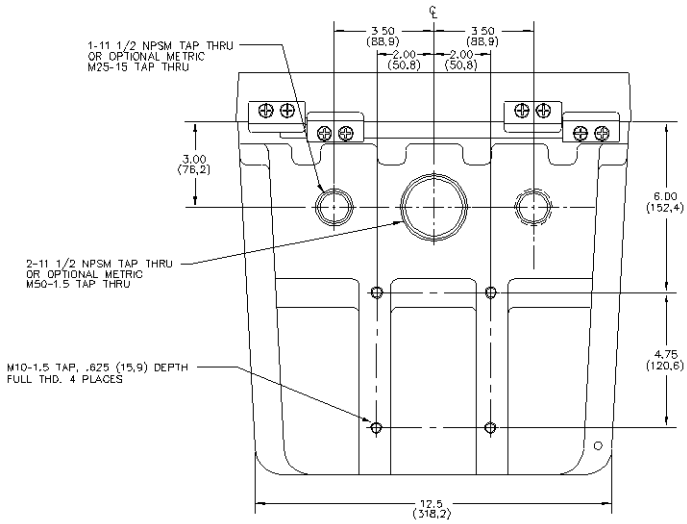
DanLoad 6000 Dimensions



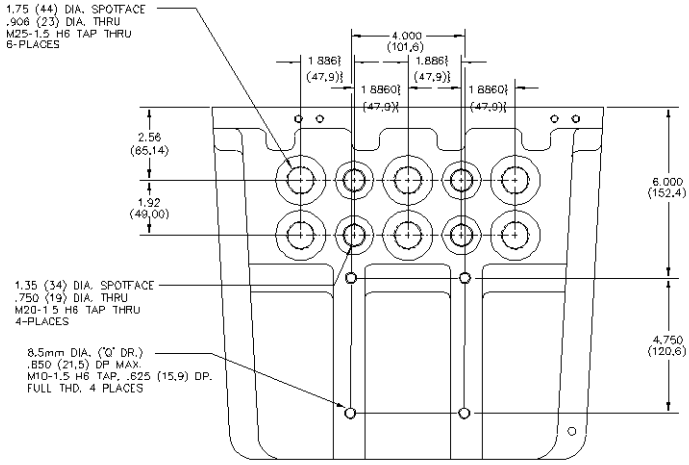
BACK VIEW



FRONT VIEW

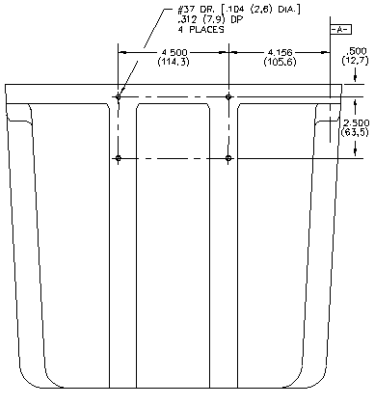


BOTTOM VIEW

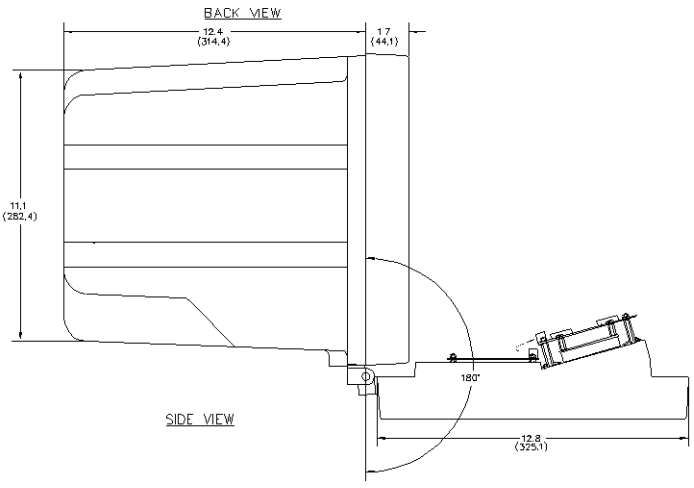


BOTTOM VIEW

(European Unit Only)



TOP VIEW



SIDE VIEW

GENERAL SPECIFICATIONS

⚠ WARNING

Do not operate this instrument in excess of the specifications listed. Failure to heed this warning could result in serious injury and/or damage to the equipment.

Operating Temperature: -4°F to 131°F (-20°C to 55°C)

Storage temperature: -4°F to 158°F (-20°C to 70°C).

Relative humidity: 5 to 95 percent non-condensing.

Radiated emissions:

- FCC (CFR 47) Class A Digital Device
- CCA LMB-EG-08 Section 3.6.3.4
- RF interference: 10V/M for 20 MHZ to 500 MHZ
- CE Mark (European Community) tested to: EN50081 Part 2, 1994 Generic Emissions Standards
  EN50082 Part 2, 1995 Generic Immunity Standards

ENCLOSURE SPECIFICATIONS

Explosion proof (NEMA 7, Class I, Groups C and D) and weatherproof (NEMA 4X).

Size: **Standard Enclosure**
12.78" (325 mm) high, 14" (356 mm) wide, and 14.13" (359 mm) deep

Shallow Enclosure
12.78" (325 mm) high, 14"(356 mm) wide, and 7.93" (202 mm) deep

Weight: **Standard Enclosure**
75 lbs. (34 kg)

Shallow Enclosure
45 lbs. (20.5 kg)

Materials: Cast Aluminum with Stainless Steel fasteners. The display window is of non-glare glass.

Materials meet the guidelines of listed approval agencies and are compatible so as to minimize corrosion in field conditions.

Mounting: Provisions are made for mounting the unit from the back or bottom of the enclosure.

Cable Entries: (located in bottom of enclosure):

Standard Enclosure
1 ea. Threaded 2" NPT or M50 x 1.5 mm
2 ea. Threaded 1" NPT or M25 x 1.5 mm
Note: UL and CENELEC Approved

European Enclosure
4 ea. Threaded 3/4" NPT or M20 x 1.5 mm
6 ea. Threaded 1" NPT or M25 x 1.5 mm
Note: Only CENELEC Approved

Shallow Enclosure
3 ea. Threaded 1" NPT or M25 x 1.5 mm
Note: UL and CENELEC Approved

Shallow Enclosure
3 ea. Threaded 1" NPT or M25 x 1.5 mm
Note: UL and CENELEC Approved

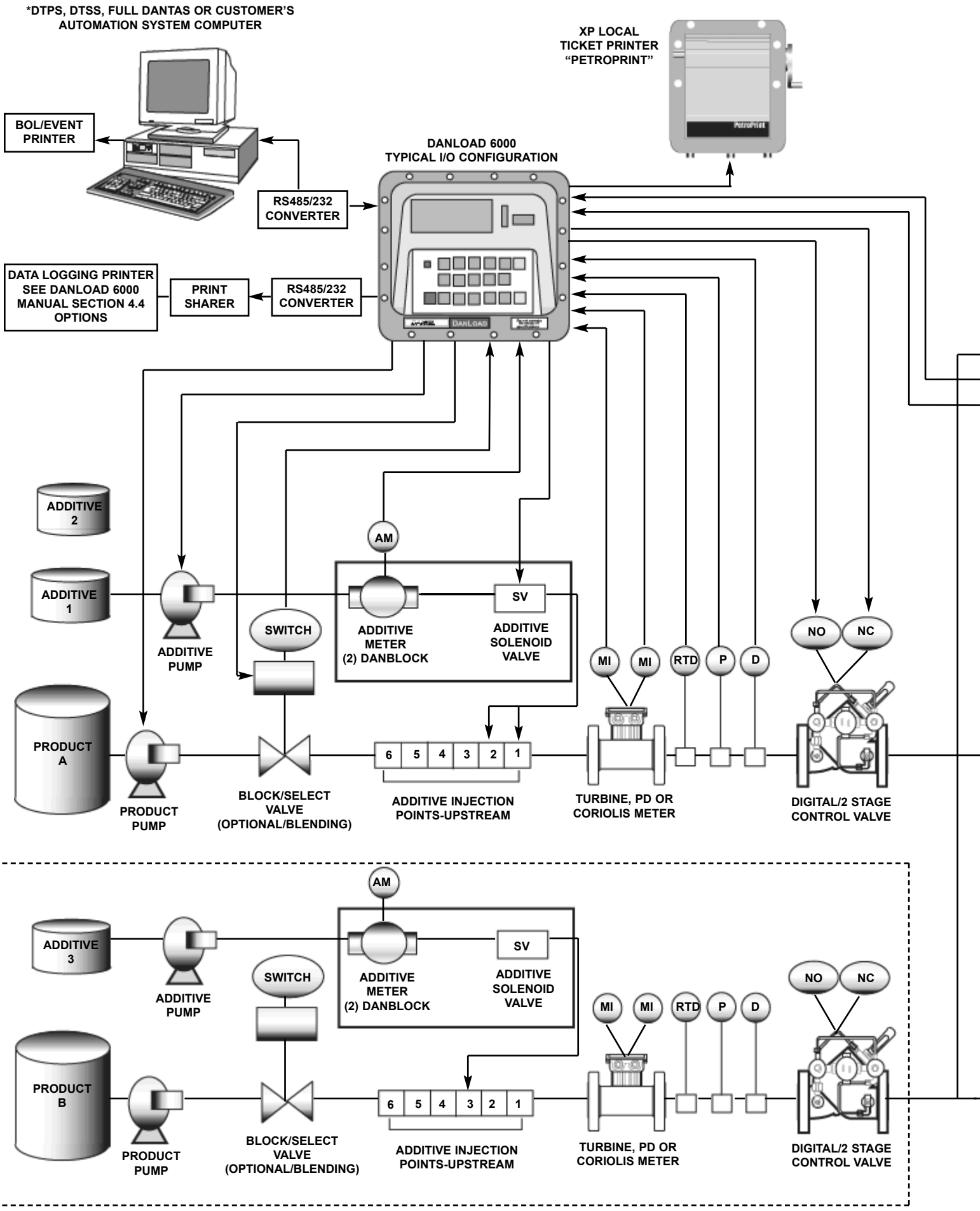
APPROVALS

Electrical
NEMA 7 for Class I, Division 1, Groups C and D areas. Specifically,

- UL (USA): File no. Ex 071295-152246
- CSA: (Canadian): File no. LR96859-9 EExd IIB T6. Specifically,
- CENELEC (European): File no. ISSep.103.1123 EExd IIB T6
- SABS (South Africa): File no. 787/85668/K671
- ATEX approval pending

Type Approvals

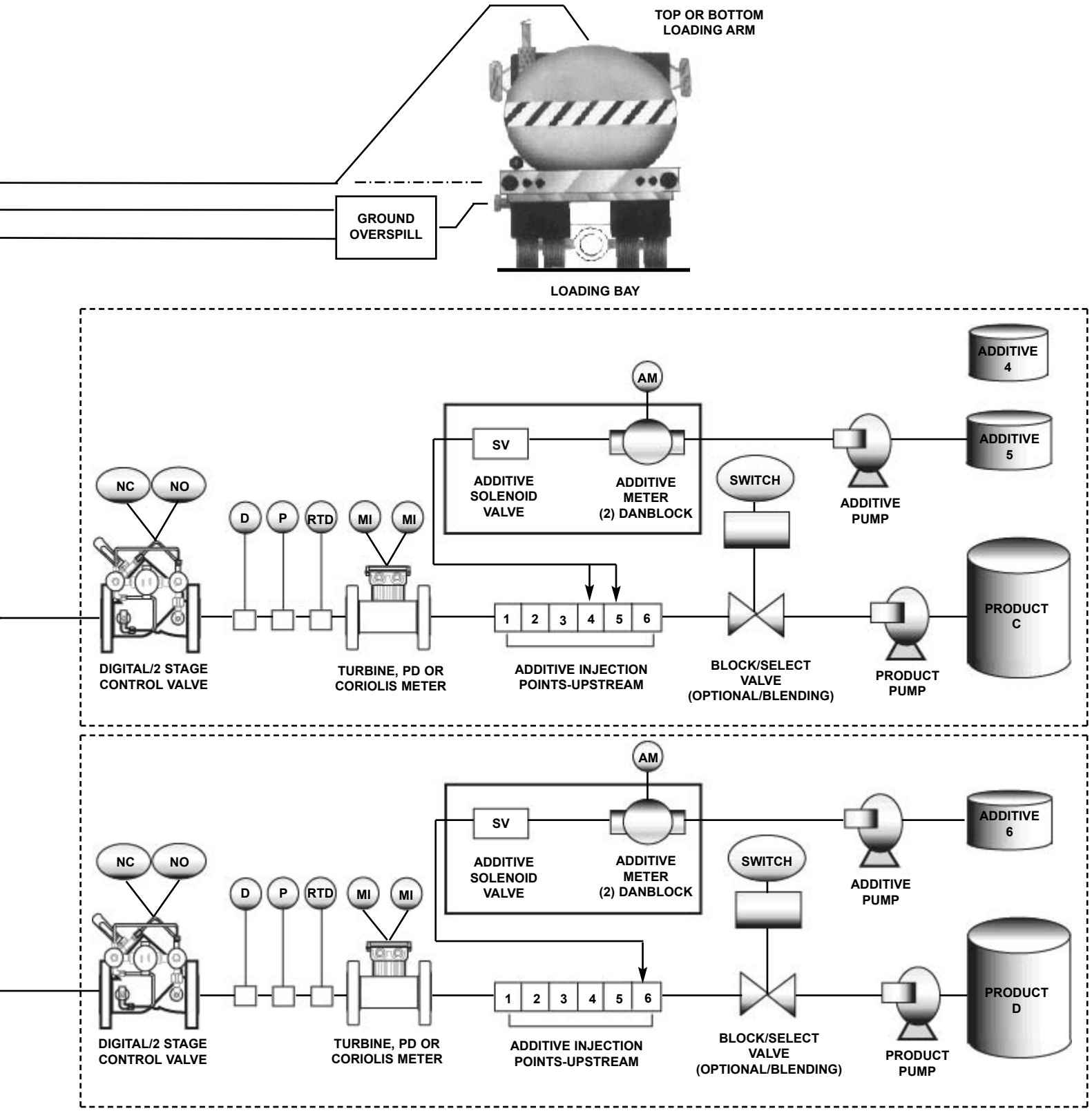
- NIST (USA)
- CCA (Industry Canada)
- NMI (Holland)
- Service de la Metrology (Belgium)
- PTB (Germany)
- EAM (Switzerland)
- GUM (Poland)
- Slovenia
- SABS (South Africa)
- BMD (Belgium)


*DTPS, DTSS, FULL DANTAS OR CUSTOMER'S AUTOMATION SYSTEM COMPUTER
XP LOCAL TICKET PRINTER "PETROPRINT"
BOL/EVENT PRINTER
DANLOAD 6000 TYPICAL I/O CONFIGURATION
RS485/232 CONVERTER
DATA LOGGING PRINTER SEE DANLOAD 6000 MANUAL SECTION 4.4 OPTIONS
PRINT SHARER
RS485/232 CONVERTER
ADDITIVE 2
ADDITIVE 1
AM
SV
SWITCH
ADDITIVE PUMP
ADDITIVE METER (2) DANBLOCK
ADDITIVE SOLENOID VALVE
NO
NC
MI
MI
RTD
P
D
PRODUCT A
6 5 4 3 2 1
PRODUCT PUMP
BLOCK/SELECT VALVE (OPTIONAL/BLENDING)
ADDITIVE INJECTION POINTS-UPSTREAM
TURBINE, PD OR CORIOLIS METER
DIGITAL/2 STAGE CONTROL VALVE
ADDITIVE 3
PRODUCT B

LOADING RACK CONFIGURATION

Notes:

1. Each Danload's I/O cannot exceed 24 digital inputs, 28 digital outputs, 4 dual pulse meter inputs, 4 prover outputs and 12 analog inputs.
2. Each Danload can control, measure, verify and account for (4) four meters in a single unit, but only load one meter at a time.
3. Maximum of 6 additives per Danload.



DANLOAD 6000 I/O Worksheet

The following worksheet is provided to help determine the I/O requirements for your DanLoad 6000 application. The left-hand column identifies the logical I/O functions offered by the DanLoad 6000. Please note that not all functions are required in every application. Explanation of each logical function is listed on the backside of this sheet, for your convenience. You should list the number of I/O (AC or DC) required for your application under the "required" column, making sure that the total for each logical function does not exceed the maximum number listed.

This sheet will help in determining the correct DanLoad 6000 model designation for your application. If you need assistance, or if you require more I/O than listed, please contact your local Daniel Sales Representative.

General Information and Overview		
Blender: Yes: □ No: □	**Meters: 1□ 2□ 3□ 4□ Series 1200 Turbine□ Birotor Plus □ Corolis □ None □ Existing □ Additives 1□ 2□ 3□ 4□ 5□ 6□**	**Temp. (100 □ RTD): 1 □ 2 □ 3 □ 4 □**
Blender Type: Sequential: □ Inline: □ Both: □	**Dual Pulse Security: Yes: □ No: □**	**Pressure Inputs (4-20mA): 1 □ 2 □ 3 □ 4 □**
Components: 1 □ 2 □ 3 □ 4 □	**Factored Proving Outputs (MPMC): & Calmon™ Calibration Monitoring Yes: □ No: □**	**Density Inputs (4-20mA): 1 □ 2 □ 3 □ 4 □**
Remote Start/Stop & Display Interfaces: 1 □ 2 □ 3 □ 4 □	**Remote S/S & RD: DL Only □ RD Only □ Both □**	**Printer: Local □ Remote □ Dantas □**

Discrete Inputs	AC Inputs	DC Inputs	Maximum AC + DC	Required AC	Required DC
Safety Circuits	0-8	0-8	8		
Additive Totalizing: **Meter**: □	N/A	0-6	6		
Additive Totalizing: **Feedback**: □	0-6	0-6			
Additive Selection Inputs	0-6	0-6	6		
Recipe Selection Inputs	0-6	0-6	6		
Valve Close Inputs (LPG)	0-4	0-4	4 (1 per valve)		
Block Valve Inputs (SEQ Blending)	0-4	0-4	4 (1 per component)		
Flow Alarm Inputs (no valve)	0-4	0-4	4 (1 per meter)		
Auto/Manual Switch Over	0-1	0-1	1		
External Alarm Reset	0-1	0-1	1		
End Batch Input (special)	0-1	0-1	1		
Total Inputs (24 or less)			**24**		

Discrete Outputs	AC Outputs	DC Outputs	Maximum AC + DC	Required AC	Required DC
Valve Solenoids Outputs	0-8	0-8	8 (2 per valve)		
Product Pump Outputs	0-4	0-4	4 (1 per component)		
Component Block Valve Outputs	0-4	0-4	4 (1 per component)		
Additive Control Outputs	0-6	0-6	6		
Additive Pump Outputs	0-6	0-6	6		
Additive Block Valve Outputs	0-6	0-6	6		
Pulse per Unit Outputs	N/A	0-2	2		
Trip Outputs	0-3	0-3	3		
Recipe Select Outputs	0-6	0-6	6		
Component Combination Outputs	0-16	0-16	16 (1 per		
End Batch Output (special)	0-1	0-1	1		
Alarm Outputs	0-2	0-2	2		
Total Outputs (28 or less)			**28**		

General	Description
Meters	Number of physical metering elements tied into the system.
Dual Pulse Security	Confirms pulse integrity from the metering element. Requires either dual pickoffs/preamps or pulse transmitters.
Factored Proving Outputs	Recommended when using a master meter or small volume prover. Proves the meter through the DanLoad 6000. Turbine meter calibration monitoring "Calmon" is included with the MPMC option.
Components	Base products used by the system. Components can be tied to single meter, or use individual meters.
RTD Inputs	RTD probes (100 Ohm, (0.003850) required for temperature compensation, typically 1 per meter.
Pressure/Density	Pressure or Density transmitters required for pressure compensation, density readings and alarming.
Remote Start/Stop & Display Interface	Add Remote Start/Stop Push Button and/or 2nd DanLoad Remote Display.
Printer	Requires Local Ticket Printing using PetroPrint, Remote Serial Printer Direct from DanLoad or Multidrop Serial Printer with Dantas(BOL) Ticket Printing System(DTPS). Note: Dantas Transaction Server adds security with (BOL) Ticket Printing.
Discrete Inputs	**Description**
Safety Circuits	Input(s) used to provide permissive for loading. Checked at the start of a batch and monitored throughout the loading process. Each safety circuit has their own user-configurable alarm message.
Additive Totalizing Metering or Feedback	Provides for measurement, verification and/or totalization of additive. Can be interfaced 3 different ways: A.) Direct connection to an additive meter for additive injection control, monitoring, verification and totalization. Eliminates the need for microprocessor based additive systems. (DC inputs only) B.) Factored pulse input from a microprocessor based additive system to totalize volume. (Typically DC) C.) Feedback/Confirmation pulse from either a mechanical or microprocessor based injector (AC or DC)
Additive Selection Inputs	Selects the associated additive when the additive selection method is "input" and the selection input is "high".
Recipe Selection Inputs	Authorizes the first 6 recipes. Typically used for recipe authorization when interfacing with older terminal automation systems using discrete logic. However, can also be used for other applications. Once a recipe is selected by the operator and the "START" button is pressed, the DanLoad verifies that the associated recipe selection input is "high" before loading can begin, else the operator receives a user-configured message.
Valve Close Input (LPG)	Closes the product valve when the input is "high". Used in LPG applications to prevent flashing.
Block Valve Inputs	Verifies the position of the component block valve during sequential blending.
Flow Alarm Inputs	Disables "authorized flow alarms" when the flow alarm input is "low" during product flow. Prevents spurious authorized flow alarms in application where the DanLoad does not have direct control of the product flow.
Auto/Manual Switch Over	Externally switches the operating mode of the DanLoad 6000 preset (Auto/Manual)
External Alarm Reset	Externally clears a primary alarm on the DanLoad 6000. Typically an external key switch or momentary button.
End Batch Input	The End Batch Output is energized if the End Batch Input is open or not configured when a batch ends (not when a batch stops and is restarted). The End Batch Output remains energized until the End Batch Input closes or a "safety circuit 3" alarm is raised. A "safety circuit 3" alarm is raised if the End Batch Input does not close within a user-defined time out.
Discrete Outputs	**Description**
Valve Solenoids Outputs	Used to control the main product control valve during loading. Select 2 outputs per control valve when using either digital or 2-stage valve control . (e.g. a 2-component "in-line" blender will require 4 outputs)
Product Pump Outputs	Activates the product pump(s) during loading. Select 1 output for each component pump controlled.
Component Block Valve Outputs	Opens/closes the component stream(s) before and after loading. Typically used in sequential blending, select 1 output for each component block valve controlled. Should also use associated block valve inputs.
Additive Control Outputs	Activates/controls the additive injection stream(s). Select 1 output per additive stream.
Additive Pump Outputs	Activates the additive pump(s) during loading. Select 1 output per additive pump controlled.
Additive Block Valve Outputs	Opens/closes the additive stream(s) before and after loading. Typically used with additive panels with more than one additive stream. Select 1 output per additive stream/block valve controlled.
Pulse per Unit Outputs	Transmits a pulse per unit signal for remote totalization of gross or net volume. (DC only)
Trip Outputs	Indicates the load phase to another system or device. Trip Output 1: Activated during low-flow start-up, Trip Output 2: Activated during low-flow start-up and high-flow, Trip Output 3: Activated for the duration of the batch
Recipe Select Outputs	Activated when the associated recipe is being delivered (first 6 recipes, only). Typically used for recipe selection indication when interfacing to terminal automation systems. Also used for pulse per unit outputs per recipe.

DanLoad 6000 METER BOARDS

Board Description (Drawing #1)	Part No.	Meter Pulse Board I/O			
		Meter Pulse Inputs *Note 5	Meter Pulse Outputs* Note 6	DC Outputs	Frequency Range
2 Channel Meter Board w/8-15Vdc-15mA P/S (CE-12694) *Notes 1,2,3,8	3-6000-002	2 Single Pulse or 1 Dual Pulse	2	2	0-5 KHz
2 Channel Meter Board w/8-15Vdc-100mA P/S (CE-12694) *Notes 1,2,3,8	3-6000-022	2 Single Pulse or 1 Dual Pulse	2	2	0-5 KHz
4 Channel Meter Board w/200 mA P/S (CE-15532) *Notes 2,3,4,7	3-6000-132 (CE) w/ Surge Protection 3-6000-042 w/o Surge Protection	2 Single Pulse or 2 Dual Pulse	2 (with MPMC Board)	2	0-5 KHz
MPMC Board (Meter Pulse Microcontroller)	3-6000-044	1. Available as an optional piggyback board for 4 channel meter board only. 2. Provides factored pulse outputs (FPO) and meter calibration monitoring (CALMON).			

Notes:

1. Each 2 Channel Meter Pulse Board input can be externally powered with up to 24 VDC source.
2. Dual pulse security is Level "B" IP-252/API Chapter 5, Section 5.
3. Meter pulse inputs are optically isolated.
4. Internal P/S voltage for 4 Chnl. Meter Pulse Board is jumper selectable for 5, 15, or 24 VDC.
5. Meter pulse logic level in DCV: High-min 3, Max-30. Low-Min 0, max-1.5.
6. Prover pulse outputs are optically isolated, open collector and rated for 200 mA load.
7. 4-Channel Meter Board, Part No.-132, has surge protection circuitry and meets the CE mark standard.
8. 2-Channel Meter Board has been replaced by 4 Channel Meter Board. It is available and required for the "Script" language Ver 1.21, DanLoad only. Thai and Chinese.

DanLoad 6000 A/D Boards

Board Description (Drawing #)	Part No.	RTD Input Qty	RTD Temperature Range	4-20mA Analog Input Qty	General RTD Specifications	General Specifications 4-20mA Analog Input
2 Channel A/D Standard Temp. (BE-12707) *Note 1	3-6000-061	1	-40 to 110° C -40 to 230° F	1	RTD Type: 100 ohm, 4wire Platinum probe. RTD Coefficient: 0.00214Ω/Ω/° F or 0.00385Ω/Ω/° C Instrument Accuracy: Is ± 0.5°F (0.3° C) or better over the measured Range -40° F to 158° F (-40° C to 70° C) through the operating range of -40° F to 140° F (-40° C to 60° C). Resolution: 12 bit (or 1 part in 4096).	Input Type: Each input is current sinking type (i.e. all inputs share a common ground). Loop Voltage: 24 Vdc is provided for all inputs. Loop Resistance: Insertion resistance is 225 ohms (i.e. a 5 volt loop drop shall be expected). Accuracy: ± 0.1% of range or better. Resolution: 12 bit (or 1 part in 4096).
2 Channel A/D Hi Temp. Range (BE-12707) Note*1	3-6000-062	1	50 to 200° C 122 to 392° F	1		
2 Channel A/D Lo Temp. Range (BE-12707) Note*1	3-6000-063	1	-50 to 200° C -58 to 328° F	1		
8 Channel A/D Standard Temp. (CD-12698)	3-6000-064	4	-40 to 110° C -40 to 230° F	4		
8 Channel A/D Hi Temp. Range (CE-12698)	3-6000-065	4	50 to 200° C 122 to 392° F	4		
8 Channel A/D Lo Temp. Range (CE-12698)	3-6000-066	4	-50 to 200° C -58 to -328° F	4		

Note: 1.2 Channel A/D Board only meets the CE Mark standard for surge protection and emissions. The 8 ch A/D Board does not meet the CE Mark standard.

DanLoad 6000 Discrete I/O Boards

Board Desc. (Drawings)	Part No.	Discrete Input Characteristics				
		Qty	Operating Voltage	Min. Pulse Width	Input Resistance	On/Off Threshold
AC I/O (CE-12695) Note: 2,3	3-6000-045 (VER.2)	2	24 Vac/Vdc 90-130 Vac 190-280 Vac	10 ms	8.2k 90k 90k	24V-On @ 20V 120/240V-On @ 90V
(3) Lo Speed (3) Hi Speed Enhanced I/O (CE-19027) Note: 3	3-6000-049	3/3	24-30 Vac/dc 102-140 Vac 204-260 Vac	>32 ms	10k 57k 113k	On/Off 24V-20V/12V 120V 95V/60V 240V- 200V/150V
Lo Speed Enhanced I/O (CE-19027) Note: 3	3-6000-036	6	20-30 Vac/dc 102-140Vac 204-260 Vac	> 32 ms	10k 57k 113k	On/Off 24V-20V/12V 120V 95V/60V 240V-
Hi Speed Enhanced I/O (CE-19207) Note: 3	3-6000-048	6	20-30 Vac/dc 102-140Vac 204-260 Vac	6-32 ms	10k 57k 113k	On/Off 24V-20V/12V 120V 95V/60V 240V- 200V/150V
Lo Speed DC I/O (CE-12696) Note: 3	3-6000-006	6	Dry Contact Or 12-30 Vdc	> 32ms	3.6k 1.8k	Dry-Fixed @24V Wet-On @ 12V -Off @ 6V
Hi Speed DC I/O (CE-12696) Note: 3,4	3-6000-058	6	Dry Contact Or 12-30 Vdc	6-32 ms	3.6k 1.8k	Dry-Fixed @24V Wet-On @ 12V -Off @ 6V

Notes:

1. All discrete input and discrete output points are optically isolated.

2. Ver. 2 AC I/O board will work with AC voltage only if inputs are jumpered for 120/240 volts.

3. I/O Boards meet the CE mark standard for surge protection and emissions.

4. DC I/O Board No. 3-6000-057 can be configured with a combination of 3 each Lo and Hi speed inputs.

Board Desc. (Drawings)	Part No.	Discrete Output Characteristics							
		Qty	Type	Operating Voltage	Max. Operating Current	Max. On State Voltage Drop	Max. Off State Leakage	Single Cycle Max. Surge Current	Min. Load Current
AC I/O (CE-12695) Note: 2,3	3-6000-045 (VER.2)	8	Triac	24-280Vac	2 Aac	1.6 Vac	5 mAac	80 Aac	20 mAac
(3) Lo Speed (3) H Speed Enhanced I/O (CE-19027) Note: 3	3-6000-049	6	Triac	24-280Vac	2 Aac	1.6 Vac	5 mAac	80 Aac	20 mAac
Lo Speed Enhanced I/O (CE-19027) Note: 3	3-6000-036	6	Triac	24-280Vac	2 Aac	1.6 Vac	5 mAac	80 Aac	20 mAac
Hi Speed Enhanced I/O (CE-19207) Note: 3	3-6000-048	6	Triac	24-280Vac	2 Aac	1.6 Vac	5 mAac	80 Aac	20 mAac
Lo Speed DC I/O (CE-12696) Note: 3	3-6000-006	4	Open Collector	3-30 Vdc	200 mAdc	2.0 Vdc	1 mAdc		
Hi Speed DC I/O (CE-12696) Note: 3,4	3-6000-058	4	Open Collector	3-30 Vdc	200 mAdc	2.0 Vdc	1 mAdc		

DanLoad 6000 Preset Option Diagram

BASE UNIT INCLUDES: • All software functionality (e.g. in-line/sequential blending, additive control, etc.) in one firmware version • NEMA 7, explosion proof enclosure • Front panel LED status lights • Large LCD display (8 lines by 40 characters) with automatic contrast and backlighting adjustment • Large, rugged, 18-character hall-effect keypad with weights and measures switch • One AC type I/O card, with expansion capabilities up to 28 outputs, and 24 inputs (AC or DC) • One meter pulse card with 2 dual pulse meter inputs, 2 DC outputs, optional high speed proving otuputs, can be expanded up to two (2) meter cards or 4 meters • CPU card (dual Intel 80C196 micro-controllers • Power supply card and cables • Reference Manual

Model # Example, DanLoad 6000 **1 1 1 - 7 1 - 0 0 0 0 0**

Agency Approval/Enclosure Options

- 0 None
- **1 UL / CSA / JIS 3 hole NPT**
- 2 Cenelec 3 hole metric
- 3 Future (NA)
- 4 UL / CSA JIS (CE) 3 hole NPT
- * 5 Cenelec (CE) 3 hole metric
- 6 Cenelec 10 hole metric
- (safe area only) X Lightweight plastic enclosure

Keypad Language Options

- 0 None
- * **1 English**
- 2 Spanish
- 3 French
- X Other

Power Supply Options

- 0 None
- **1 115VAC**
- 2 230VAC
- * 5 115VAC (CE)
- 6 230VAC (CE)

Meter Pulse Board Options

- 0 None
- **7 One 4-CH Meter Board**
- 8 Two 4-CH Meter Boards
- * 9 One 4-CH Meter Board (CE)
- A Two 4-CH Meter Boards (CE)

AC I/O Board Options

- 0 None
- * **1 One AC I/O Board**
- 2 One Enhanced I/O
- 3 Two AC I/O Boards
- 4 Two Enhanced I/O
- 5 One AC I/O & One Enhanced I/O
- 6 One Enhanced Board 3 Lo-, 3 Hi-Speed Inputs
- 7 One Enhanced Board, 6 Hi-Speed Inputs
- 8 Two Enhanced Boards, (1) 6 Lo-Speed (1) 6 Hi-Speed
- 9 Two Enhanced Boards 6 Hi-Speed
- A Two Enhanced Boards (1) 6 Lo-Speed (1) 3 ea. Hi-Lo Speed
- B Two Enhanced Boards (1) 6 Hi-Speed (1) 3 ea. Hi-Lo Speed
- C One AC I/O Board (1) Enhanced Board 3 Lo-Speed 3 Hi-Speed
- D One AC I/O Board (1) Enhanced Board 6 Hi-Speed Inputs
- E One Enhanced Board 6 Lo-Speed Inputs
- F One AC I/O Board (1) Enhanced Board 6 Lo-Speed Inputs
- G Two Enhanced Boards 6 Lo-Speed Inputs ea.
- X Customer Specified

Continued Next Page

Model # Example, DanLoad 6000 1 1 1 - 7 1 - 0 0 0 0 0

DC I/O Board Options

- **0 None**
- 1 One Lo-Speed DC I/O Board
- 2 Two Lo-Speed DC I/O Boards
- 3 One DC I/O Board 3 Lo-, 3 Hi-Speed Inputs
- 4 One DC I/O Board 6 Hi-Speed Inputs
- 5 Two DC I/O Boards 6 Lo-, 6 Hi-Speed
- 6 Two DC I/O Boards Hi-Speed
- 7 Two DC I/O Boards (1) 6 Hi-Speed (1) 3 ea. Hi-Lo Speed
- 8 Two DC I/O Boards (1) Hi-Speed (1) 3 ea. Hi-Lo Speed
- 9 One One Lo-Speed DC I/O Board (CE)
- A Two Lo-Speed DC I/O Boards (CE)
- B One DC I/O Board 3 Lo-, 3 Hi-Speed Inputs (CE)
- C One DC I/O Board 6 Hi-Speed Inputs (CE)
- D Two DC I/O Boards 6 Lo-, 6 Hi-Speed (CE)
- E Two DC I/O Boards Hi-Speed (CE)
- F Two DC I/O Boards (1) 6 Hi-Speed (1) 3 ea. Hi-Lo Speed (CE)
- G Two DC I/O Boards (1) Hi-Speed (1) 3 ea. Hi-Lo Speed (CE)

RTD/Analog Board Options

- **0 None**
- 1 2-CH A/D (-40°/ + 110°C)
- 2 8-CH A/D (-40°/ + 110°C)
- 5 2-CH A/D (+50°/ + 200°C)
- 6 2-CH A/D (-200°/ - 50°C)
- 7 8-CH A/D (+50°/ + 200°C)
- 8 8-CH A/D (-200°/ - 50°C)
- 9 2-CH A/D (-40°/ + 110°C) (CE)
- A 2-CH A/D (+50°/ + 200°C) (CE)
- B 2-CH A/D (-200°/ - 50°C) (CE)

Duart Board Options

- **0 None**
- 1 Duart Board (1) RS-232 port, (1) RS-485 port
- 2 Duart Board (2) RS-485

Interface Options

- **0 None**
- 2 Interface Card for 2nd Display and External Start/Stop Assembly

Meter Pulse Micro-Controller (MPMC Board

- **0 None**
- 1 One MPMC Board (FPO & CALMON)
- 2 Two MPMC Board (FPO & CALMON)

Note: The terms Enhanced I/O and the “replaced” term Additive Injection Board are interchangeable.)

Denotes Base UL Model

*****Denotes Base CE (Conformite Europeenne) Model

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