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1. UNPACKING THE DPW
1.1 - Inspect Package for External Damage
Your DPW Digital Paddle Wheel was carefully packed in a sturdy cardboard carton, with antistatic cushioning materials to withstand shipping shock. Upon receipt, inspect the package for possible external damage. In case of external damage to the package contact the shipping company immediately.

1.2 - Unpack the DPW meter
Open the carton carefully from the top and inspect for any sign of concealed shipping damage. In addition to contacting the shipping carrier please forward a copy of any damage report to your distributor or Dwyer® directly. When unpacking the instrument please make sure that you have all the items indicated on the Packing List. Please report any shortages promptly.

1.3 - Returning Merchandise for Repair
MAINTENANCE/REPAIR
Upon final installation of the Series DPW, no routine maintenance is required. The Series DPW is not field serviceable and should be returned if repair is needed. Field repair should not be attempted and may void warranty.

WARRANTY/RETURN
Refer to “Terms and Conditions of Sales” in our catalog and on our website. Contact customer service to receive a Return Goods Authorization number before shipping the product back for repair. Be sure to include a brief description of the problem plus any additional application notes.

2. DPW FLOW METERS TECHNICAL DATA
2.1 - Principles of Operation
DPW liquid flow meters consist of a meter body that is installed in-line in a conduit system. Inside, between the inlet and the outlet connections is a rotary wheel with permanent magnets embedded at 180 degrees in paddles. Fluid flowing through the meter causes the paddle to spin. A magnetic sensor picks up the frequency of pulses, and the readings are proportional to the liquid flow taking place. The number of pulses per unit time interval and a K-factor (pulses/unit of flow) facilitate determining the volumetric rate of flow through the meter.

Additionally, the DPW Flow Meter incorporates a Microcontroller driven circuitry and non-volatile memory that stores all hardware specific variables. The flow rate can be displayed in 29 different volumetric or mass flow engineering units. Flow meter parameters and functions can be programmed remotely via the RS-232/RS-485 interface or locally via optional LCD/KeyPad. DPW flow meters support various functions including: two programmable flow totalizers, low, high or range flow and temperature alarms, 2 programmable optically isolated outputs, 0 to 5 Vdc / 4 to 20 mA analog outputs (jumper selectable) for each process (flow and temperature) variable, self diagnostic alarm. Optional local 2x16 LCD readout with adjustable back light provides flow rate, temperature, total volume reading in currently selected engineering units, diagnostic events indication and feature a password protected access to the process parameters to ensure against tampering or resetting.

2.2 - Electrical Connections
DPW flow meter is supplied with ‘M16’ cylindrical 12 pin connector. Pin diagram is presented in Figure b-1. The (+) and (-) power inputs are each protected by a 300 mA M (medium time-lag) resettable fuse. If a shorting condition or polarity reversal occurs, the fuse will cut power to the flow transducer circuit. Disconnect the power to the unit, remove the faulty condition, and reconnect the power. The fuse will reset once the faulty condition has been removed.

Use of the DPW flow meter in a manner other than that specified in this manual or in writing from Dwyer®, may impair the protection provided by the equipment.

2.2.2 Analog Output Signals Connections
When connecting the load to the output terminals, do not exceed the rated values shown in the specifications. Failure to do so might cause damage to this device. Be sure to check if the wiring and the polarity of the power supply is correct before turning the power ON. Wiring error may cause damage or faulty operation.

To avoid risk of serious injury or death, make sure power is OFF when connecting or disconnecting any cables in the system.

Do not apply power voltage above 2 Vdc. Doing so will cause DPW damage or faulty operation.

The (+) and (-) power inputs are each protected by a 300 mA M (medium time-lag) resettable fuse. If a shorting condition or polarity reversal occurs, the fuse will cut power to the flow transducer circuit. Disconnect the power to the unit, remove the faulty condition, and reconnect the power. The fuse will reset once the faulty condition has been removed.

WARNING
Do not apply power voltage above 2 Vdc. Doing so will cause DPW damage or faulty operation.

To avoid risk of serious injury or death, make sure power is OFF when connecting or disconnecting any cables in the system.

The (+) and (-) power inputs are each protected by a 300 mA M (medium time-lag) resettable fuse. If a shorting condition or polarity reversal occurs, the fuse will cut power to the flow transducer circuit. Disconnect the power to the unit, remove the faulty condition, and reconnect the power. The fuse will reset once the faulty condition has been removed.

WARNING
Do not apply power voltage above 2 Vdc. Doing so will cause DPW damage or faulty operation.

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Do not apply power voltage above 2 Vdc. Doing so will cause DPW damage or faulty operation.

WARNING
Do not apply power voltage above 2 Vdc. Doing so will cause DPW damage or faulty operation.
To eliminate the possibility of noise interference, use a separate cable entry for the DC power and analog signal lines (pins L, M, K on “M16” connector).

2.2.3 Flow Sensor Pulse Output Signals Connections

Pin C —— (+) Flow Sensor Pulse Output (active), 3.3Vdc
Pin B —— DC Power (-), Digital Common

**WARNING** The flow sensor pulse output is self-powered (open drain, pulled up with 10K resistor to internal 3.3Vdc rail). Do NOT connect an external voltage source to the pulse output signals. Use load with input impedance more than 30K is recommended.

2.2.4 Programmable Optically Isolated Output Signals Connections

Optocoupler #1 (pins F and G):
- Pin G —— Plus (-) (passive)
- Pin F —— Plus (+) (passive)

Optocoupler #2 (pins H and J):
- Pin H —— Plus (+) (passive)
- Pin J —— Plus (-) (passive)

**WARNING** Optically isolated outputs require application of DC voltage across terminals. Do not exceed maximum allowed limits for voltage and current provided below:

**PULSE OUTPUT OPTOCOUPLER**

INTERNAL

F

G

EXTERNAL

R*

24V+

*Rs ≥ \( \frac{U_{CE}}{I_{CE}} \)

2.2.5 Communication Parameters and Connections

The digital interface operates via RS485 (optional RS-232) and provides access to applicable internal data including: flow, temperature, totalizers and alarm settings, flow linearizer table, fluid density and engineering units selection.

**Communication Settings for RS-485/RS-232 communication interface:**

- Baud rate: 9600 baud
- Stop bit: 1
- Data bits: 8
- Parity: None
- Flow Control: None

**RS-485 communication interface connection:**

- Pin E —— RS-485 T(+) or R(+)
- Pin D —— RS-485 T(-) or R(-)
- Pin B —— RS-485 GND (if available)

**RS-232 communication interface connection:**

- Pin E —— RS-232 TX (pin 3 on the DB9 connector)
- Pin D —— RS-232 RX (pin 2 on the DB9 connector)
- Pin B —— RS-232 SIGNAL GND (pin 5 on the DB9 connector)

2.3 - SPECIFICATIONS

**Service:** Liquids compatible with wetted materials.

**Wetted Materials:**
- DPW-XP: Polypropylene and fluoroelastomer O-rings, PVDF and nickel tungsten carbide paddlewheel, acrylic lid.
- DPW-XT: PVDF and fluoroelastomer O-rings, PVDF and zirconia ceramic paddlewheel, PVDF lid; Bearings: PVDF sapphire.

**Accuracy:** ±1% FS.

**Repeatability:** ±0.25% FS.

**Response Time:** 1 second above 10% of FS, 2 seconds below 10% of FS.

**Output Signal:** Linear 0 to 5 VDC (3000 Ω min. load impedance); 4 to 20 mA (500 Ω max. loop resistance).

**Pulse Output:** 3.3 VDC, 3K min. load impedance.

**Digital Interface:** RS-232; RS-485.

**Temperature Limits:** 14 to 140°F (-10 to 60°C).

**Pressure Limit:** 10 bar (150 psig).

**Power Requirements:** 11 to 26 VDC.

**Display:** 2 row, 16 character LCD with backlight (optional).

**Weight:** 1.60 lb (0.73 kg).

**Example Series**

- **DPW**
- **DPW-05-ELN-A2**

**Orifice Size**

<table>
<thead>
<tr>
<th>Orifice Size</th>
<th>DPW</th>
<th>P</th>
<th>E</th>
<th>L</th>
<th>A</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Flow Range)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05</td>
<td>0.04 to 5 gal/min (0.15 to 18.9 L/min)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>0.08 to 10 gal/min (0.3 to 37.6 L/min)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>0.15 to 17 gal/min (0.6 to 64.4 L/min)</td>
<td></td>
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</tr>
<tr>
<td>35</td>
<td>0.35 to 35 gal/min (1.3 to 132.5 L/min)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>35</td>
<td>Polypropylene</td>
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<td>17</td>
<td>PVDF</td>
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<tr>
<td>05</td>
<td>EPDM</td>
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<td>10</td>
<td>PTFE</td>
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<tr>
<td>17</td>
<td>Buna-N</td>
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<tr>
<td>35</td>
<td>Fluorelastomer</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>17</td>
<td>No Display/No Keypad</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>LCD/Keypad</td>
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<td></td>
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<td>No RTD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>RTD</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Output Signal**

- A: 0 to 5 VDC
- B: 4 to 20 mA

**Digital Interface**

- 2: RS-232
- 6: RS-485

**WARNING**

Optically isolated outputs require application of DC voltage across terminals. Do not exceed maximum allowed limits for voltage and current provided below:
3. LCD KEYPAD OPERATION: DATA ENTRY AND CONFIGURATION
(applicable for LCD options only)

3.1 - Display Indications

Initially, after the power is first turned on, the flow meter model number is shown in
the first line of the display and the revisions for EPROM table and firmware in the
second line. Subsequently the actual process information is displayed. The
instantaneous flow rate is displayed on the first line in percent or in direct reading
units with flow alarm status indication. For flow meters without RTD option, the
main totalizer value, up to 9 digits (including decimal), is displayed in the second
line with its corresponding units.

For flow meters with RTD option, the temperature reading value in deg C, is
displayed in the second line with temperature alarm status indication. This display
is designated as process information (PI) screen throughout the remainder of this
manual.

The temperature value (applicable for RTD option only) in deg F can be displayed
in the PI screen by pressing the ENT pushbutton. The temperature indication can
be switched from deg C to deg F and back by pressing ENT push button.

Fw: A001 Tbl: A001

Figure 3.1: DPW First Banner Screen

5.001 Gl/min AD
20.1 C TA: D

Figure 3.2: DPW with RTD Option Initial Process Information Screen

Note: Actual content of the LCD screen may vary depending on the model and
device configuration.

5.001 Gl/min AD
MT: 60639.38 Gal

Figure 3.3: DPW without RTD option initial Process Information Screen

Based on flow meter configuration (with or without RTD option), different
parameters may be displayed in the PI screen by pressing the UP or DN
pushbuttons.

3.1.1 - DPW with RTD option Process Information Screens

Pressing UP and DN buttons from initial PI screen will switch display as following:

[Initial PI screen]

Action: Keypad UP

5.001 Gl/min AD
MT: 60639.38 Gal

Figure 3.4: DPW with RTD Option Process Information
Screen with Main Totalizer

Action: Keypad UP

5.001 Gl/min AD
PT: 65.81 Gal

Figure 3.5: DPW with RTD Option Process Information
Screen with Pilot Totalizer

Pressing UP button, pages through the PI screens in the forward direction.
Pressing DN button, pages through the PI screens in the reverse direction. When
the last PI screen is reached, the firmware "wraps around" and scrolls to the initial
PI screen once again.
3.1.2 DPW without RTD option Process Information Screens

Pressing UP and DN buttons from initial PI screen will switch display as following:

```
Initial PI screen
Action: Keypad UP
```

```
5.001 Gl/min AD
PT: 65.81 Gal
```

Figure 3.10: DPW Without RTD option PI Screen with Main and Pilot Totalizer

```
5.001 Gl/min AD
PT: 65.81 Gal
```

Figure 3.11: DPW Without RTD Option Initial PI Screen with Main and Pilot Totalizer

```
5.001 Gl/min AD
MT: 60639.38 Gal
```

Figure 3.12: DPW Without RTD Option Initial PI Screen With Flow Rate and Main Totalizer

3.2 Menu Sequence

The listing below gives a general overview of the standard top-level display menu sequence when running firmware version A002. The ESC pushbutton is used to toggle between the process mode (PI screens) and the menu.

The listing in Section 3.2 shows the standard display menu sequence and submenus using the UP button to move through the menu items. The first message displayed the first time the ESC button is pressed after the converter is powered up is "Prog. Protection ON". Thereafter, pressing the ESC button while the flow meter is in monitoring mode (PI screens) will display the parameter that was last exited.

Program Protection may be turned "off" by pressing the ENT button when the Prog. Protection menu is displayed. The firmware will prompt with "Change Prog Prot". Pressing UP or DN button will toggle current protection status. If password is set to any value more than zero, the firmware will prompt with "Enter Prot Code". User has to enter up to 3 digits program protection code, in order to be able to access password protected menus. Once correct password is entered, program protection id turned off until unit is powered up again.

When the last menu item is reached, the firmware "wraps around" and scrolls to the first item on the menu once again (see Figure 3.12). The menu items in the first column are upper-level configuration mode functions. Submenu selections (shown indented in the second column) only appear if the associated upper level is selected by pressing the ENT push button. The allowable selections of sub-menu items which are selected by tabular means are shown in detail in Section 3.3.

```
Configuration Data
Prog. Protection on/off
Prog. Prot. Code old/new
Submenu Flow Meter Info
Submenu Measuring Units
Submenu Temp. Alarm
Submenu Main Totalizer
Submenu Pilot Totalizer
Submenu Optical Outputs
Submenu FlowMeter Config
LCD Back Light 50% FS
Submenu Alarm Events Log
Submenu Diagnostic
```

Figure 3.12 Upper Level Menu Structure
3.3 Parameter Summary and Data Entry

**Low Flow Alarm**
- 10.0% FS
- 90.0% FS

**MT Flow Start**
- 5.0% FS

Enter the program protection code (0-999). The default program protection has been turned off parameters may be changed.
4. PARAMETER ENTRY

There are two methods of data entry:
• Direct numerical number entry
• Tabular Input from a table menu.

If menu with direct numerical entry is selected use Up button to increment digit value from 0 to 9. Use Dn button to move cursor to another digit position. When desired value is entered use ENT button to accept (save in the EEPROM) new value.

If menu with tabular entry is selected, the available menu options can be set with the Up and Dn buttons and are accepted by pressing ENT button.

Note: During data entry the input values are checked for acceptability. If data is not acceptable, it is rejected and a message is generated indicating that the new data has not been accepted.

4.1 - Submenu Program Protection

After power has been turned on, programming parameters may only be changed by turning program protection "OFF". There are two ways to turn off the program protection:

1. If program protection code (PP-code) is on "0" (factory default), the program protection is turned off by pressing ENTER key.
2. If a PP-code (1 to 255) other than "0" has been entered, this code must be entered in order to turn the program protection "OFF".

The PP-code can be changed after the program protection has been turned off.

In order to protect device configuration parameters when changing the PP-code the old PP-code must be entered after ENTER has been pressed.

Old PP-code? ----------------------------------------------- 0

Press ENTER key after entry of old PP-code.

New PP-code ----------------------------------------------- 0

Now enter the new PP-code (0-255) and press ENTER key. The new PP-code is now valid to turn off the program protection. If the PP-code is forgotten, it can be restored only via digital communication interface.

4.2 - Submenu Flow Meter Info

This submenu contains information about the meter main configuration parameters. These items are informational only and may not be changed (read only).

4.2.1 - Full Scale Flow

This display indicates the full scale range of the meter in L/min. The full scale range of the flow meter is related to the lower block inside diameter. It is set on the factory during calibration procedure. The full scale range of the meter is not user changeable. A typical display is shown below.

Full Scale Flow: 18.92706 L/min

4.2.2 - Communication Interface

This display indicates type of the digital communication interface (RS-232 or RS-485) and device address (two hexadecimal characters of the address will be displayed only for RS-485 interface option). All flow meters are shipped from the factory with default address 11. A typical display for device with RS-485 option is shown below.

Comm. Interface:
RS-485 ADD: 11

4.2.3 - RTD Hardware Option

This display indicates presence of the RTD hardware. If second line of the screen indicates "Installed", then flow meter is equipped with RTD with signal processing circuitry and ready for temperature measurement. A typical display for device with RTD option is shown below.

RTD Option: Installed

4.2.4 - Analog Flow Output Settings

This display indicates which type of the jumper selectable Flow analog output is currently active. The device can be set for 0 to 5 Vdc or 4 to 20 mA output. A typical display for device with jumper configuration for 0 to 5 Vdc Flow output is shown below.

Analog Flow Out:
0-5 Vdc

4.2.5 - Analog Temperature Output Settings

This display indicates which type of the jumper selectable Temperature analog output is currently active. The device can be set for 0 to 5 Vdc or 4 to 20 mA output. A typical display for device with jumper configuration for 0 to 5 Vdc Temperature output is shown below.

Analog Temp Out:
0-5 Vdc

Note: Analog Temperature Output settings screen will be available on the devices which are not equipped with RTD option as well. In this case user should not be under impression that unit supports temperature measurement.

4.2.6 - Flow Meter EEPROM Data Base Version

This display indicates current version of the EEPROM data base. The EEPROM stores all flow meter configuration parameters. The Flow Meter EEPROM data base version is not user changeable. A typical display with EEPROM version is shown below.

EEPROM Version:
A001

4.2.7 - Flow Meter Firmware Version

This display indicates current version of the flow meter firmware. The Flow Meter Firmware version is not user changeable. A typical display with firmware version is shown below.

Firmware Version
A002
This display indicates the serial number of the flow meter. This number is generated by the factory and is unique to the instrument. The flow meter serial number is not user-changeable. A typical display with flow meter serial number is shown below.

Serial Number: 245893-1

This display indicates the model number of the flow meter. The flow meter model number is not user-changeable. A typical display with flow meter model number is shown below.

Model Number: XXXXXXX

This display indicates the name of the fluid the flow meter was calibrated for. The fluid name may be changed by user via digital communication interface. A typical display with fluid name is shown below.

Fluid Name: WATER

This display indicates the date when most recent calibration of the flow meter was performed. The calibration date may be changed by user via digital communication interface. A typical display with flow meter calibration date is shown below.

Calibration Date: 08/01/2009

This display indicates the date when next calibration of the flow meter has to be performed. The calibration date due may be changed by user via digital communication interface. A typical display with flow meter calibration date due is shown below.

Calib. Date Due: 08/01/2010

Flow meter Tag is the quickest and shortest way of identifying and distinguishing between multiple flow meters. Flow meters can be tagged according to the requirements of your application. The tag may be up to 16 characters long and is user-defined. A typical display with flow meter Tag Name is shown below.

User Tag Name: NOT ASSIGNED

4.3 Submenu Measuring Units

This submenu allows selection of units for flow rate and Totalizer reading. Units should be selected to meet your particular metering needs.

Note: Once Flow Unit of Measure is changed the Totalizer’s Volume based Unit of Measure will be changed automatically.

The listed units in the table above can be set with the Up and Dn buttons and are accepted by pressing ENT button.

4.3.1 - User Defined Measuring Unit

This function enables user defined configuration of any engineering unit in the converter. The following three parameters are available for this function:

a) Unit volume factor (defined in Liters)
b) Unit time base (defined in Seconds)
c) Unit with or without density support

Note: The entry of the listed parameters a), b) and c) is only necessary in case the required engineering unit is not available in the table above, (see Section 4.3).

4.3.1.a - User Defined Unit Factor Numeric Entry

This parameter indicates the factor of the new unit with respect to one liter. The default entry is 1.00 Liter.

UD Unit Factor

1.00 Liter

4.3.1.b - User Defined Unit Time Base Tabular Entry

This parameter indicates the time base for User Defined Unit. The following selections are available: 1 second, 60 seconds (1 minute), 3600 seconds (1 Hour).

UDU Time Base

60 Seconds

The listed time based selections above can be set with the Up and Dn buttons and are accepted by pressing ENT button.
4.3.1.c - User Defined Unit Density Support Tabular entry

This function determines whether the newly entered user defined engineering unit is a mass unit (with density) or a volumetric unit (without density). The following selections are available: Enabled or Disabled. The default entry is Disabled.

The listed above density support selections can be set with the Up and Dn buttons and are accepted by pressing ENT button. If density was selected, also refer to section 4.9.8.

4.4 Submenu Flow Alarm

DPW provides the user with a flexible alarm/warning system that monitors the fluid flow for conditions that fall outside configurable limits as well as visual feedback for the user via the LCD (only for devices with LCD option) or via an optically isolated outputs.

The flow alarm has several attributes which may be configured by the user via optional LCD/keypad or digital communication interface. These attributes control the conditions which cause the alarm to occur and to specify actions to be taken when the flow rate is outside the specified conditions.

Flow alarm conditions become true when the current flow reading is equal or higher/lower than corresponding values of high and low flow alarm levels. Alarm action can be assigned with preset delay interval (0 to 3600 seconds) to activate the optically isolated output (separate for high and low alarm). Latch mode control feature allows each optical output to be latched on or follow the corresponding alarm status.

4.4.1 Flow Alarm Mode Tabular Entry

This function determines whether flow alarm is Enabled or Disabled. The following selections are available: Enabled or Disabled. The default entry is Disabled.

The listed above alarm mode selections can be set with the Up and Dn buttons and are accepted by pressing ENT button.

4.4.2 - Low Flow Alarm Numerical Entry

The limit of required Low Flow Alarm value can be entered in increments of 0.1% from 0 to 100% FS.

Note: The value of the Low Flow Alarm must be less than the value of the High Flow Alarm.

A typical display with flow meter Low Flow Alarm is shown below.

If a Low Alarm occurs, and one of the two optical outputs is assigned to the Low Alarm Event (see Section 4.8) the optically isolated output will be activated when the flow is less than the Low Flow Alarm value. The Flow Alarm condition is also indicated on the display Process Information Screen by displaying L character. A typical display with flow meter Process Information Screen and activated Low Flow Alarm is shown below.

- **UFD Use Density**
  - **Disabled**

- **MT: 65.81 Gal**
  - **0.401 Gl/min AL**

4.4.3 - High Flow Alarm Numerical Entry

The limit of required High Flow Alarm value can be entered in increments of 0.1% from 0 to 100% FS.

Note: The value of the High Flow Alarm must be more than the value of the Low Flow Alarm.

If a High Alarm occurs, and one of the two optical outputs is assigned to the High Alarm Event (see Section 4.8) the optically isolated output will be activated when the flow is more than the High Flow Alarm value. The Flow Alarm condition is also indicated on the display Process Information Screen by displaying H character. A typical display with flow meter Process Information Screen and activated High Flow Alarm is shown below.

- **High Flow Alarm**
  - **90.0% FS**

A typical display with flow meter High Flow Alarm settings is shown below.

- **4.641 Gl/min AH**
  - **MT: 67.81 Gal**

4.4.4 - Flow Alarm Action Delay Numerical Entry

The Flow Alarm Action Delay is a time in seconds that the Flow rate value must remain above the high limit or below the low limit before an alarm condition is indicated. Valid settings are in the range of 0 to 3600 seconds. A typical display with flow meter Flow Alarm Delay settings is shown below.

- **Flow Alarm Delay**
  - **1 Second**

4.4.5 - Flow Alarm Action Latch Tabular Entry

The Flow Alarm Action Latch settings controls Latch feature when optically isolated outputs are assigned to Flow Alarm event. Following settings are available: Disable or Enabled.

By default, flow alarm is non-latching. That means the alarm is indicated only while the monitored flow value exceeds the specified set conditions. If optically isolated output is assigned to the Flow Alarm event, in some cases, the Flow Alarm Latch feature may be desirable.

The listed above Flow Alarm Action Latch selections can be set with the Up and Dn buttons and are accepted by pressing ENT button.

4.5 - Submenu Temperature Alarm (*optional)

DPW with RTD option provides the user with a flexible alarm/warning system that monitors the fluid temperature for conditions that fall outside configurable limits as well as visual feedback for the user via the LCD (only for devices with LCD option) or via an optically isolated outputs.

The temperature alarm has several attributes which may be configured by the user via optional LCD/keypad or digital communication interface. These attributes control the conditions which cause the alarm to occur and to specify actions to be taken when the temperature value is outside the specified conditions. Temperature Alarm conditions become true when the current temperature reading is equal or higher/lower than corresponding values of high and low temperature alarm levels. Alarm action can be assigned with preset delay interval (0 to 3600 seconds) to activate the optically isolated output (separate for High and Low alarm). Latch Mode control feature allows each optical output to be latched on or follow the corresponding alarm status.

4.5.1 - Temperature Alarm Mode Tabular Entry

This function determines whether Temperature Alarm is Enabled or Disabled. The following selections are available: Enabled or Disabled. The default entry is Disabled.

The listed above Temperature Alarm Mode selections can be set with the Up and Dn buttons and are accepted by pressing ENT button.
4.5.2 - Low Temperature Alarm Numerical Entry
The limit of required Low Temperature Alarm value can be entered in increments of 0.1°C from -9.9 °C to 99.9 °C.

A typical display with flow meter Low Temperature Alarm is shown below.

Note: The value of the Low Temperature Alarm must be less than the value of the High Temperature Alarm. The value of the temperature can be entered only in °C units.

A typical display with flow meter Low Temperature Alarm is shown below.

Low Temp Alarm
0.0 C

If a Low Temperature Alarm occurs, and one of the two optical outputs is assigned to the Low Alarm Event (see Section 4.8) the optically isolated output will be activated when the temperature is less than the Low Temperature Alarm value.

The Temperature Alarm condition is also indicated on the display Process Information Screen by displaying L character. A typical display with flow meter process information screen and activated Low Temperature Alarm is shown below.

5.001 Gl/min AD
-0.5 C TA: L

4.5.3 - High Temperature Alarm Numerical Entry
The limit of required High Temperature Alarm value can be entered in increments of 0.1°C from -9.9 °C to 99.9 °C.

Note: The value of the High Temperature Alarm must be more than the value of the Low Temperature Alarm.

A typical display with flow meter High Temperature Alarm settings is shown below.

Note: The value of the Low Temperature Alarm must be less than the value of the High Temperature Alarm. The value of the temperature can be entered only in °C units.

High Temp Alarm
50.0 C

If a High Temperature Alarm occurs, and one of the two optical outputs is assigned to the High Alarm Event (see Section 4.8) the optically isolated output will be activated when the flow is more than the High Temperature Alarm value.

The Temperature Alarm condition is also indicated on the display Process Information Screen by displaying H character. A typical display with flow meter Process Information Screen and activated High Temperature Alarm settings is shown below.

5.001 Gl/min AD
51.4 C TA: H

4.5.4 - Temperature Alarm Action Delay Numerical Entry
The Temperature Alarm Action Delay is a time in seconds that the Temperature value must remain above the high limit or below the low limit before an alarm condition is indicated. Valid settings are in the range of 0 to 3600 seconds. A typical display with flow meter Temperature Alarm Delay settings is shown below.

Temp Alarm Delay
1 Second

4.5.5 - Temperature Alarm Action Latch Tabular Entry
The Temperature Alarm Action Latch settings controls Latch feature when optically isolated outputs are assigned to Temperature Alarm event. Following settings are available: Disable or Enabled.

By default, flow alarm is non-latching. That means the alarm is indicated only while the monitored Temperature value exceeds the specified set conditions. If optically isolated output is assigned to the Temperature Alarm event, in some cases, the Temperature Alarm Latch feature may be desirable.

Temp Alarm Latch
Disabled

The listed above Temperature Alarm Action Latch selections can be set with the Up and Dn buttons and are accepted by pressing ENT button.

4.6 - Submenu Main Totalizer
The total volume of the liquid is calculated by integrating the actual liquid flow rate with respect to time. The Main Totalizer value is stored in the EEPROM and saved every 1 second. In case of power interruption the last saved Totalizer value will be loaded on the next power on cycle, so Main Totalizer reading will not be lost. The optional LCD/keypad and digital communication interface commands are provided to:
- reset the totalizer to ZERO
- start the totalizer at a preset flow rate
- assign action at a preset total volume
- start/stop totalizing the flow

Note: Before enabling the Main Totalizer, ensure that all totalizer settings are configured properly. Totalizer Start values have to be entered in % FS engineering unit. The Totalizer will not totalize until the flow rate becomes equal to or more than the Totalizer Start value. Totalizer Stop values must be entered in currently active volume / mass based engineering units. If the Totalizer Stop at preset total volume feature is not required, then set Totalizer Stop value to zero (default settings).

4.6.1 - Main Totalizer Mode Tabular entry
This function determines whether Main Totalizer is Enabled or Disabled. The following selections are available: Enabled or Disabled. The default entry is Disabled.

Main Total Mode
Disabled

The listed above Main totalizer Mode selections can be set with the Up and Dn buttons and are accepted by pressing ENT button.

4.6.2 - Main Totalizer Flow Start Numerical Entry
The Main Totalizer Start Flow value can be entered in increments of 0.1% from 0.0 – 100.0% FS. A typical display with flow meter Main totalizer Start Flow settings is shown below.

MT Flow Start
5.0% FS

4.6.3 - Main Totalizer Event Volume Numerical Entry
Main Totalizer Event Volume value must be entered in currently active volume / mass based engineering units. Totalizer action event become true when the totalizer reading and preset "Event Volume" values are equal.

If the Totalizer Event at preset total volume feature is not required, then set Totalizer Event Volume value to zero (default settings).

A typical display with flow meter Main Totalizer Event Volume settings is shown below.

MT Event Volume
0.0 Gal

This function determines whether Main Totalizer is Enabled or Disabled. The following selections are available: Enabled or Disabled. The default entry is Disabled.

Before enabling the Main Totalizer, ensure that all totalizer settings are configured properly. Totalizer Start values have to be entered in % FS engineering unit. The Totalizer will not totalize until the flow rate becomes equal to or more than the Totalizer Start value. Totalizer Stop values must be entered in currently active volume / mass based engineering units. If the Totalizer Stop at preset total volume feature is not required, then set Totalizer Stop value to zero (default settings).
4.6.4 - Main Totalizer Reset Tabular Entry
The Main Totalizers reading can be reset by pressing ENTER button. A typical display with flow meter Main Totalizer Reset screen is shown below.

Reset Main Total Value?

The next confirmation screen will appear only for 2 seconds.
Press Ent key to reset Totalizer!

If during these 2 seconds user will press ENTER button again, the Main Totalizer volume will be reset to 0. Following screen will appear for 2 seconds.
The Totalizer has been reset!

4.7 - Submenu Pilot Totalizer
The total volume of the liquid is calculated by integrating the actual liquid flow rate with respect to time. The Pilot Totalizer value is stored in the flow meter volatile memory (SRAM) and saved every 100 ms. In case of power interruption the Pilot Totalizer volume will be lost (reset to zero). The optional LCD/keypad and digital communication interface commands are provided to:
- reset the totalizer to ZERO
- start the totalizer at a preset flow rate
- assign action at a preset total volume
- start/stop totalizing the flow

Note: Before enabling the Pilot Totalizer, ensure that all totalizer settings are configured properly. Totalizer Start values have to be entered in % FS engineering unit. The Totalizer will not total until the flow rate becomes equal to or more than the Totalizer Start value. Totalizer Stop values must be entered in currently active volume / mass based engineering units. If the Totalizer Stop at preset total volume feature is not required, then set Totalizer Stop value to zero (default settings).

4.7.1 - Pilot Totalizer Mode Tabular Entry
This function determines whether Pilot Totalizer is Enabled or Disabled. The following selections are available: Enabled or Disabled. The default entry is Disabled.

Pilot Total Mode Disabled

The listed above Pilot totalizer Mode selections can be set with the Up and Dn buttons and are accepted by pressing ENT button.

4.7.2 - Pilot Totalizer Flow Start Numerical Entry
The Pilot Totalizer Start Flow value can be entered in increments of 0.1% from 0.0 to 100.0% FS. A typical display with flow meter Pilot totalizer Start Flow settings is shown below.

PT Flow Start 10.0% FS

4.7.3 - Pilot Totalizer Event Volume Numerical Entry
Pilot Totalizer Event Volume value must be entered in currently active volume / mass based engineering units. Totalizer action event become true when the totalizer reading and preset "Event Volume" values are equal.

If the Totalizer Event at preset total volume feature is not required, then set Totalizer Event Volume value to 0 (default settings). A typical display with flow meter Pilot Totalizer Event Volume settings is shown below.

PT Event Volume 0.0 Gal

4.7.4 - Pilot Totalizer Reset Tabular Entry
The Pilot Totalizers reading can be reset by pressing ENTER button. A typical display with flow meter Pilot Totalizer Reset screen is shown below.

Reset Pilot Total Value?

The next confirmation screen will appear only for 2 seconds.
Press Ent key to reset Totalizer!

If during these 2 seconds user will press ENTER button again, the Pilot Totalizer volume will be reset to 0. Following screen will appear for 2 seconds.
The Totalizer has been reset!

4.8 - Submenu Optical Outputs Numerical Entry
Two sets of optically isolated outputs are provided to actuate user supplied equipment. These are programmable via digital interface or optional LCD/keypad such that the outputs can be made to switch when a specified event occurs (e.g. when a low or high flow alarm limit is exceeded or when the totalizer reaches a specified value) or may be directly controlled by user.

The user can configure each output action from 11 different options:
- Disabled: No Action (output is not assigned to any events and not energized)
- Low Flow Alarm
- High Flow Alarm
- Range between H&L Flow alarm settings
- Main Totalizer reading exceed set limit
- Pilot Totalizer reading exceed set limit
- Low Temperature alarm (*RTD option only)
- High Temperature alarm (*RTD option only)
- Range between High and Low Temperature alarm (*RTD option only)
- Diagnostic: Output will be energized when any of the Diagnostic events are active
- Manual On Control: Output will be energized until Disabled option will be selected.

A typical display with Optical Output Function selection is shown below.

Opt #1 function
Disabled

The listed above Optical Output selections can be set with the Up and Dn buttons and are accepted by pressing ENT button.

4.9 - Submenu Flow Meter Configuration

4.9.1 - Submenu Flow Meter Low Flow Cut-off Numerical Entry
The Low Flow Cut-off can be selected between 0.0 and 10.0 % of the FS range. Flows less than the cut-off value are internally driven to zero and not totalized. The analog 0 to 5 vdc or 4 to 20 mA current outputs are set to 0.0 Vdc and 4.00 mA correspondently. The switching threshold for the low flow cut-off has 1.0% FS hysteresis. A typical display with Low Flow Cut-off selection is shown below.

Low Flow Cut–off
1.000% FS

4.9.2 - Submenu Pulse Number Measure Interval Numerical Entry
Signal Processing software algorithm can be set to calculate flow rate based on two different methods (see Section 4.9.4):
- number of pulses over preset measure interval
- pulse width measurement

Both methods calculates frequency of the pulses from the flow meter sensor. The number of pulses over preset measure interval method convenient when pulsating flow or especially noisy signals are encountered.
This method allows to get stable average flow rate if pulse measure interval is set to values more than 4000 ms. This parameters effects the flow update rate. With lower settings the response time of the meter will be shorter, but resolution and stability will degrade.

The pulse measure interval settings are only related to the number of pulses over preset measure interval method. Pulse measure interval can be selected between 500 and 60000 ms. A typical display with pulse measure interval selection is shown below.

Measure Interval
4000 ms

4.9.3 - Submenu Flow Meter Calibration Factor Numerical Entry

Calibration Factor is defined as the number of pulses from flow sensor per one gallon of fluid passing through the meter. This is the parameter by which the factory calibrates the flow meter. Change of this parameter is rarely needed by customers. It is only necessary if you believe the DPW flow meter is no longer accurate.

Note: Your DPW Flow Meter was calibrated at the factory for the specified fluid and full scale flow range (see device's label or calibration data sheet). There is no need to adjust the Flow Meter calibration factor, unless adjustment for specific installation or fluid is needed. Any alteration of the flow meter calibration factor will VOID calibration warranty supplied with instrument.

A typical display with Calibration Factor selection is shown below.

Calibration-Fact
1366 Pulse/Gal

4.9.4 - Submenu Flow Meter Measure Mode Tabular Entry

Signal Processing software algorithm can be set to calculate flow rate based on two different methods:
   a) number of pulses over preset measure interval
   b) pulse width measurement

First method (a) was explained earlier (see Section 4.9.2). Second method (b) allows get quick response time and best resolution of the flow rate, but with pulsating or especially noisy flow environment the stability of the flow rate reading may be compromised. A digital filter (noise reduction algorithm) is available in the flow meter when pulsating flow or especially noisy signals are encountered (see Sections 4.9.5 and 4.9.6). The digital filter improves the displayed instantaneous flow values.

The digital filter only works with pulse width measurement method and is not applicable for flow measurement mode (a) – “number of pulses over measure interval”. A typical display with Measure Mode selection is shown below. By default unit shipped from the factory with Measure Mode set to “Pulse Width”.

Measure Mode
Pulse Width

4.9.5 - Submenu Noise Reduction Filter Damping Time Numerical Entry

A noise reduction filter algorithm (running average of the individual flow inputs) is available in the flow meter when pulsating flow or especially noisy signals are encountered. There are two parameters that make up Signal Processing Control: Damping Time and Number of Samples. They are described individually below.

Damping Time: The damping value can be selected between 0 and 99 seconds. The value represents the response time of the running average flow rate change. The higher the damping value the longer the response time of the filter. If noise reduction filter is not desired it may be disabled by setting Damping Time parameter to zero. By default unit shipped from the factory with Damping Time value set to 5. A typical display with Damping Time selection is shown below.

NRF Damping Time
05 Seconds

4.9.6 - Submenu Noise Reduction Filter Sample Number Numerical Entry

This is the second parameter that makes up noise reduction filter algorithm. The sample number value can be selected between 1 and 32. The number of samples value represents the number of previous individual inputs used to calculate the average value. Eventually the number of samples in the running average also affects the response time. The more samples are used, the more inertial flow output reading will be to the actual flow change. A suggested nominal number of 5 samples is a good starting point for most applicable process fluids. A typical display with Sample Number selection is shown below.

NRF Sample Numb.
05

4.9.7 - Submenu Flow Linearizer Tabular Entry

The Flow Linearization algorithm may be used to improve linearity of the flow measurement. The Flow Linearization table is built during factory calibration procedure and stored in the device EEPROM. The Flow Linearizer can be used with both flow measurement algorithms. By default unit shipped from the factory with enabled Flow Linearizer. A typical display with Flow Linearizer selection is shown below.

Flow Linearizer
Enabled

The listed above Flow Linearizer selections can be set with the Up and Dn buttons and are accepted by pressing ENT button.

4.9.8 - Submenu Fluid Density Numerical Entry

When the flow is displayed in gravimetric (mass based) units (e.g: g, kg, t, pound) a density value of the actual fluid must be entered for the flow rate and total calculation. The translation conversion to mass flow is settable between 0.01 and 5.00000 g/cm³. A typical display with Fluid Density selection is shown below.

Fluid Density
1.12500 g/cm³

4.9.9 - Submenu Pilot Calibration Timer Tabular Entry

The Pilot Calibration timer accumulates operational hours since last time unit was calibrated. The value of the timer may be reset by the user by pressing Ent button. A typical display with Calibration timer selection is shown below.

Pilot Cal. Timer
70.0 Hours

Once Ent button is pressed the next confirmation screen will appear only for 2 seconds.

Press Ent key to reset Cal. Timer

If during these 2 seconds user will press ENTER button again, the Calibration Timer value will be reset to zero.

4.10 - Submenu LCD Back Light Numerical Entry

This parameter indicates the level (intensity) of the LCD back light. The value of the LCD back light level can be entered in increments of 1% from 0 to 80% FS. If LCD back light is not desired, it can be turn off by setting back light level to zero. A typical display with LCD Back Light selection is shown below.

LCD Back Light
50% FS
4.11 - Submenu Alarm Events Log

DPW series Flow Meters are equipped with a self-diagnostic alarm event log which is available via digital interface and on screen LCD indication (for devices with optional LCD). A typical display with Alarm Events Log selection is shown below.

The following diagnostic events are supported:

<table>
<thead>
<tr>
<th>Event Number</th>
<th>Diagnostic Alarm Event Description</th>
<th>LCD bit Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CPU Temperature Too High</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>Flow Rate More Than 125% FS</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>High Flow Alarm</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Low Flow Alarm</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>High Fluid Temperature Alarm</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>Low Fluid Temperature Alarm</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>Fluid Temperature Above Measurement Limit</td>
<td>6</td>
</tr>
<tr>
<td>8</td>
<td>Fluid Temperature Below Measurement Limit</td>
<td>7</td>
</tr>
<tr>
<td>9</td>
<td>Main Totalizer Exceed Set Event Volume Limit</td>
<td>8</td>
</tr>
<tr>
<td>10</td>
<td>Pilot Totalizer Exceed Set Event Volume Limit</td>
<td>9</td>
</tr>
<tr>
<td>11</td>
<td>EEPROM Failure</td>
<td>10</td>
</tr>
<tr>
<td>12</td>
<td>DC/DC Converter Voltage Too High</td>
<td>11</td>
</tr>
<tr>
<td>13</td>
<td>DC/DC Converter Voltage Too Low</td>
<td>12</td>
</tr>
<tr>
<td>14</td>
<td>Communication Error</td>
<td>13</td>
</tr>
<tr>
<td>15</td>
<td>Reserved</td>
<td>14</td>
</tr>
<tr>
<td>16</td>
<td>FATAL ERROR (Reset or Maintenance Service is Required for Return in to the Normal Operation)</td>
<td>15</td>
</tr>
</tbody>
</table>

Any alarm events that may have occurred (Event 0 to Event F) are stored in the internal register. All detected events remain stored until the register is manually reset (by pressing ENTER key or by means of the digital communication interface). The Alarm Event Log register is mapped to the SRAM (volatile memory). In case of power interruption the Alarm Event Log register will be automatically reset.

4.11.1 - Submenu Alarm Events Log Status

Each alarm event has fixed designated position on the LCD screen. Most significant event code (F) is set on the right side of the LCD and least significant event code (0) is set on the left side of the LCD. If event is not present (not active) it is represented on the LCD as dot (.) character. If event is present (or was detected in the past) it is represented on the LCD with corresponding character. A typical display with Alarm Events Log Status without any detected events is shown below.

Event Log Status

In the example shown below, event 1 (Flow rate more than 125% FS) and event 2 (High Flow Alarm) have occurred since the last reset.

Event Log Status

Note: Each Alarm Event can be individually masked (disabled) using Event Log Mask menu selection (see Section 4.11.3) if alarm event is masked (disabled) it will not be registered in the Event Status Log even actual event has occurred.

In order to reset (clear) Event Log press Ent button. Following screen will appear just for two seconds.

Press Ent key to Clear events Log

If during these two seconds user will press Ent button again, the Alarm Event Log will be cleared.

4.11.2 - Submenu Alarm Events List

This menu selection provides list of the descriptions and corresponding code for all supported events.

Events List

Press Enter Key

If ENTER is pressed again, the description for each error is displayed.

Events List

0-CPU Temp. High

The shown above Event List selections can be scrolled with the Up and Dn buttons. By pressing ENT or Esc buttons user may exit from scrolling mode.

4.11.3 - Submenu Alarm Events Log Mask

With this menu selection user may individually mask (disable) any Alarm Event. A typical display with Alarm Events Mask selection is shown below.

Event Log Mask

0*23456789ABCDEF

In the example shown above, event 1 (Flow rate more than 125% FS) is masked with asterisk. In order to change event mask settings user should press Ent button. The flashing cursor will appear on the left of the LCD screen (on the 0 event position). Use Dn button to move to desired event code. Use Up button to change mask status (asterisk represent masked event). Use Ent button to accept and save new mask settings.

4.12 - Submenu Diagnostic

This submenu provides troubleshooting information about the meter internal variables. These items are informational only and may not be changed (read only).

4.12.1 - Submenu Raw Pulses Count

This menu selection provides number of pulses from the flow sensor within specific measurement interval.

Raw Pulses Count

400  T= 4000mS

In the example shown above the raw pulses count is 400 within 4000 ms measuring interval, which represents pulse frequency of 100 Hz.

4.12.2 - Submenu Pulse Frequency

This menu selection provides raw value of the frequency from the pulse width measurement circuitry.

Pulse Frequency

100.00 Hz

4.12.3 - Submenu Raw RTD reading (RTD option only)

This menu selection provides raw value of the ADC counts for RTD circuitry. The reading only applicable for DPW meters with optional RTD functionality.

Raw RTD Reading

1250 Counts
4.12.4 - Submenu DAC_A Flow Output
This menu selection provides current value of the DAC register for analog flow output circuitry.

\[
\text{DAC_A Output (F)} \\
3125 \text{ Counts}
\]

4.12.5 - Submenu DAC_B Temperature Output
This menu selection provides current value of the DAC register for analog temperature output circuitry.

\[
\text{DAC_B Output (T)} \\
1358 \text{ Counts}
\]

4.12.6 - Submenu CPU Temperature
This menu selection provides current value of the PCB and CPU temperature in °C.

\[
\text{CPU Temperature} \\
35.8 \text{ C}
\]

4.12.7 - Submenu Raw VCC Reading
This menu selection provides current normalized value of the DC/DC converter output in counts. The typical values are in the range between 2800 and 3200 counts.

\[
\text{Raw VCC Reading} \\
3065 \text{ Counts}
\]

5. Analog Output Signals

5.1 - Analog Output Signals Configuration
DPW series Flow Meters are equipped with calibrated 0 to 5 Vdc and/or 4 to 20 mA output signals for flow and temperature* process variables. The set of the jumpers (J3A, J3B, J3C, J3D, J3E, J3F) located on the top of the flow meter, inside of the maintenance access window (see Figure 5-1 “DPW configuration jumpers”) are used to switch between 0 to 5 Vdc or 4 to 20 mA output signals. Jumpers J3A, J3B, J3C are used to set flow analog output type and jumpers J3D, J3E, J3F are used to set temperature* analog output type (see Table 5-1). Jumper J3G is used to configure RS-485 termination resistor (by default is off).

Note: It is recommended to use the Dwyer Instruments, Inc. supplied calibration and maintenance software for analog output calibration. The software includes an automated calibration procedure which may radically simplify calculation of the offsets and spans variables and, the reading and writing for the EEPROM table.

The DPW analog output calibration involves calculation and storing of the offset and span variables in the EEPROM for each available output. The 0 to 5 Vdc output has only scale variable and 20 mA output has offset and scale variables. The following is a list of the EEPROM variables used for analog output computation:

Analog Flow Output variables

<table>
<thead>
<tr>
<th>Index</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>39</td>
<td>FoutScaleV</td>
<td>DAC 0 to 5 Vdc Flow Analog Output Scale</td>
</tr>
<tr>
<td>41</td>
<td>FoutScale_mA</td>
<td>DAC 4 to 20mA Flow Analog Output Scale</td>
</tr>
<tr>
<td>42</td>
<td>FoutOffset_mA</td>
<td>DAC 4 to 20mA Flow Analog Output Offset</td>
</tr>
</tbody>
</table>

Analog Temperature Output variables*

<table>
<thead>
<tr>
<th>Index</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>43</td>
<td>ToutScaleV</td>
<td>DAC 0 to 5 Vdc Temperature Analog Output Scale</td>
</tr>
<tr>
<td>45</td>
<td>ToutScale_mA</td>
<td>DAC 4 to 20mA Temperature Analog Output Scale</td>
</tr>
<tr>
<td>46</td>
<td>ToutOffset_mA</td>
<td>DAC 4 to 20mA Temperature Analog Output Offset</td>
</tr>
</tbody>
</table>

5.2.1 - Initial Setup
Power up the DPW Flow Meter for at least 15 minutes prior to commencing the calibration procedure. Make sure absolutely no flow takes place through the meter. Establish digital RS-485/RS-232 communication between PC (communication terminal) and DPW. The commands provided below assume that calibration will be performed manually (w/o Dwyer® supplied calibration and maintenance software) and the device has RS-485 address 11. If Dwyer® supplied calibration and maintenance software is used, skip the next section and follow the software prompts.

Enter Backdoor mode by typing: !11,MW,1000,1[CR]
Unit will respond with: !11,BackDoorEnabled: Y
Disable DAC update by typing: !11,WRITE,4,Y[CR]
Unit will respond with: !11,DisableUpdate: Y

5.2.2 - Flow 0 to 5 Vdc analog output calibration
1. Install jumpers J3A, J3B and J3C on the PC board for 0 to 5 Vdc output (see Table 5-1).
2. Connect a certified high sensitivity multi meter set for the voltage measurement to pins M (+) and K (-) of the DPW 12 Pin “M16” connector.
3. Write 4000 counts to the DAC_A channel: !11,WRITE,0,4000[CR]
4. Read voltage with the meter and calculate FoutScaleV value:

\[
\text{FoutScaleV} = \frac{20000}{\text{Reading[V]}}
\]

5. Save FoutScaleV in to the EEPROM: !11,MW,39,X[CR]

Where: X – the calculated FoutScaleV value.

5.2.3 Flow 4 to 20 mA analog output calibration
1. Install jumpers J3A, J3B and J3C on the PC board for 4-20 mA output (see Table 5-1).
2. Connect a certified high sensitivity multimeter set for the current measurement to pins M (+) and K (-) of the DPW 12 Pin "M16" connector.
3. Write 4000 counts to the DAC_A channel: !11,WRITE,0,4000[CR]
4. Read current with the meter and calculate FoutScale_mA value:

\[
\text{FoutScale}_mA = \frac{4000}{\text{Reading[mA]}}
\]

5. Write zero counts to the DAC_A channel: !11,WRITE,0,0[CR]
6. Read offset current with the meter and calculate FoutOffset_mA value:
7. Save FoutScale_mA in to the EEPROM: !11,MW,41,Y[CR]
Save FoutOffset_mA in to the EEPROM: !11,MW,42,Z[CR]

Where: Y – the calculated FoutScale_mA value.
Z – the calculated FoutOffset_mA value.
5.2.4 - Temperature 0 to 5 Vdc Analog Output Calibration

1. Install jumpers J3D, J3E and J3F on the PC board for 0 to 5 Vdc output (see Table 5-1).
2. Connect a certified high sensitivity multimeter set for the voltage measurement to the pins L (+) and K (-) of the DPW 12 Pin “M16” connector.
3. Write 4000 counts to the DAC_B channel: !11,WRITE,1,4000[CR]
4. Read voltage with the meter and calculate TOutScaleV value:

\[
\text{ToutScaleV} = \frac{20000}{\text{Reading[V]}}
\]

5. Save TOutScaleV in to the EEPROM: !11,MW,43,X[CR]

Where: X – the calculated TOutScaleV value.

5.2.5 - Temperature 4 to 20 mA Analog Output Calibration

1. Install jumpers J3D, J3E and J3F on the PC board for 4 to 20 mA output (see Table 5-1).
2. Connect a certified high sensitivity multimeter set for the current measurement to the pins L (+) and K (-) of the DPW 12 Pin “M16” connector.
3. Write 4000 counts to the DAC_B channel: !11,WRITE,1,4000[CR]
4. Read current with the meter and calculate ToutScale_mA value:

\[
\text{ToutScale\_mA} = \frac{4000}{\text{Reading[mA]}}
\]

5. Write zero counts to the DAC_B channel: !11,WRITE,1,0[CR]

6. DPW Calibration Procedures

**Note:** REMOVAL OF THE FACTORY INSTALLED CALIBRATION SEALS AND/OR ANY ADJUSTMENTS MADE TO THE METER, AS DESCRIBED IN THIS SECTION, WILL VOID ANY CALIBRATION WARRANTY APPLICABLE.

**Note:** All adjustments in this section are made from the outside of the meter via digital communication interface between a PC (terminal) and DPW or via local LCD/keypad. There is no need to disassemble any part of the instrument or perform internal PCB component (potentiometers) adjustment.

### 6.1 - Connections and Initial Warm Up

Power up the DPW Flow Meter for at least 1 minute prior to commencing the calibration procedure. Establish digital RS-485/RS-232 communication between PC (communication terminal) and the DPW. Start Dwyer® supplied calibration and maintenance software on the PC.

### 6.2 - Flow Meter Span Calibration

**Note:** Your DPW Flow Meter was calibrated at the factory for the specified fluid and full scale flow range (see device’s front label). There is no need to adjust the Calibration Factor or Flow linearization table unless linearity adjustment is needed, flow range has to be changed. Any alteration of the Calibration Factor or flow linearization table will VOID calibration warranty supplied with instrument.

Using Dwyer Instruments, Inc. supplied calibration and maintenance software start Set Span procedure by navigating to the Tools/Set Span/PulseCounts menu. The software will display screen with current frequency and calculated Calibration Factor. Using the installation flow regulator, adjust the flow rate to 100% of FS flow. Check the flow rate indicated against the flow calibrator. Once required flow rate is established click Save button. The new Calibration Factor will be saved in to the EEPROM table (index 61) and device linearization table (EEPROM indexes 62-83) will be initialized with default linear values.

**Note:** Described above procedure will initialize entire linearization table. If it is desirable to keep existing linearization table and only minor adjustment of the calibration curve is required it is recommended perform linearization table adjustment starting from 90% FS (see Section 6.3).

Calibration Factor also can be adjusted using local LCD/keypad interface (see Section 4.9.3).

### 6.3 - Flow Meter Linearization Table Calibration

The DPW flow linearization table calibration involves building a table of the actual flow values (EEPROM indexes 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82) and corresponding sensor readings (EEPROM indexes 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83). Actual flow values are entered in normalized fraction format: 100.000% FS corresponds to 1.000000 flow value and 0.000% FS corresponds to 0.000000 flow value. The valid range for flow values is from 0.000000 to 1.000000 (note: DPW will accept up to 6 digits after decimal point). Sensor readings are entered in pulses and should always be in the range of 10 to 4000. There are 11 elements in the table so the data should be obtained at an increment of 10.0% FS (0.0, 10.0, 20.0, 30.0, 40.0, 50.0, 60.0, 70.0, 80.0, 90.0 and 100.0% FS).

**Note:** Do not alter memory index 62 (must be 0.0) and 63 (must be 0 counts). These numbers represent zero flow calibration points and should not be changed.

If a new calibration table is going to be created, it is recommended to start calibration from 100% FS. If only linearity adjustment is required, calibration can be started in any intermediate portion of the gas table.

Using the flow regulator, adjust the flow rate to 100% FS flow. Check the flow rate indicated against the flow calibrator. Observe the flow reading on the DPW. If the difference between calibrator and DPW flow reading is more than 0.5% FS, make a correction in the sensor reading in the corresponding position of the linearization table (see Index 83).

If the DPW flow reading is more than the calibrator reading, the number of counts in the index 83 must be decreased. If the DPW flow reading is less than the calibrator reading, the number of counts in the index 83 must be increased. Once Index 83 is adjusted with a new value, check the DPW flow rate against the calibrator and, if required, perform additional adjustments for Index 83.

If a simple communication terminal is used for communication with the DPW, then “MW” (Memory Write) command from the software interface commands set may be used to adjust sensor value in the linearization table (see section 8.3 for complete software interface commands list). Memory Read “MR” command can be used to read the current value of the index.

Assuming the DPW is configured with RS-485 interface and has address “11”, the following example will first read the existing value of Index 83 and then write a new adjusted value:

111,MR,83[CR] - reads EEPROM address 83
111,MW,83,1200[CR] - writes new sensor value (1200 counts) in to the index 83

Once 100% FS calibration is completed, the user can proceed with calibration for another 9 points of the linearization table by using the same approach.

**Note:** Once memory index 83 is changed the device firmware will automatically update Calibration Factor (EEPROM index 61).

**Note:** It is recommended to use Dwyer® supplied calibration and maintenance software for linearization table calibration. This software includes an automated calibration procedure which may radically simplify reading and writing for the EEPROM linearization table.
7. RS-485/RS-232 SOFTWARE INTERFACE COMMANDS

7.1 - General
The standard DPW comes with an RS-485 interface. For the optional RS-232 interface, the start character (!) and two hexadecimal characters for the address must be omitted. The protocol described below allows for communications with the unit using either a custom software program or a “dumb terminal.” All values are sent as printable ASCII characters. For RS-485 interface, the start character is always (!). The command string is terminated with a carriage return (line feeds are automatically stripped out by the DPW). See Section 2.2.5 for information regarding communication parameters and cable connections.

7.2 - Commands Structure
The structure of the command string:

```
!<Addr>,<Cmd>,Arg1,Arg2,Arg3,Arg4<CR>
```

Where:
- **Start character**
- **Addr** - RS485 device address in the ASCII representation of hexadecimal (00 through FF are valid).
- **Cmd** - The one or two character command from the table below.
- **Arg1 to Arg4** - The command arguments from the table below. Multiple arguments are comma delimited.
- **CR** - Carriage Return character.

** - OMIT FOR RS232 INTERFACE.

7.3 ASCII Commands Set

<table>
<thead>
<tr>
<th>Command Name</th>
<th>Description</th>
<th>No.</th>
<th>Command</th>
<th>Argument 1</th>
<th>Argument 2</th>
<th>Argument 3</th>
<th>Argument 4</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow</td>
<td>Requests the current flow sensor reading in current EU.</td>
<td>1</td>
<td>F</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt;Value&gt; (Actual flow in current engineering units)</td>
</tr>
<tr>
<td>Temperature **</td>
<td>Requests the current temperature reading in current EU (°C or °F).</td>
<td>2</td>
<td>T</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt;Value&gt; (Actual temp. in current engineering units)</td>
</tr>
<tr>
<td>Diagnostic Events</td>
<td>Read/reset current status of Diagnostic Events log register.</td>
<td>3</td>
<td>DE</td>
<td>No Argument (read status)</td>
<td></td>
<td></td>
<td></td>
<td>DE:0x10 0x10 - diagnostic word (16 bits wide)</td>
</tr>
<tr>
<td>Diagnostic Mask</td>
<td>Display/Set Diagnostic Events mask register. See list of the Diagnostic Events below.</td>
<td>4</td>
<td>DM</td>
<td>No Argument (read current Diagnostic Events Mask register)</td>
<td></td>
<td></td>
<td></td>
<td>DM: 0x0FF - diagnostic mask (16 bits wide). Set bit - Enable Clear bit - Disable</td>
</tr>
<tr>
<td>Meter Info</td>
<td>Requests meter configuration info: - full scale range (L/min) - RTD option support(Y,N) - Analog Flow Output configuration (V,C) - Analog Temp. Output configuration (V,C)</td>
<td>5</td>
<td>MI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Mi: 18.92706Y,V,V Y - RTD support N - No RTD support V - 0 to 5 VDC output C - 4 to 20 mA output</td>
</tr>
</tbody>
</table>

Several examples of commands for RS-485 option follow. All assume that the DPW meter has been configured for address 18 (12 hex) on the RS485 bus:

1. To get a flow reading: 112,F<CR>
The device will reply: 112,50.0<CR> (Assuming the flow is at 50.0% FS)

2. To get current Flow Alarm status: 112,FA,R<CR>
The device will reply: 112,FA,N<CR> (Assuming no alarm conditions)

3. To get a Main Totalizer reading: 112,MT,0<CR>
The device will reply: 112,MT:93.05<CR> (Assuming the Main totalizer reading is 93.5)

4. Set the flow high alarm limit to 85% FS flow rate: 112,FA,H,85.0<CR>
The device will reply: 112,FA,H:85.0<CR>

Several examples of commands for RS-232 option follow.

1. To get a flow reading: F<CR>
The device will reply: 50.0<CR> (Assuming the flow is at 50.0% FS)

2. To get current Flow Alarm status: FA,R<CR>
The device will reply: FA,N<CR> (Assuming no alarm conditions)

3. To get a Main Totalizer reading: MT,R<CR>
The device will reply: MT:93.05<CR> (Assuming the Main totalizer reading is 93.5)

4. Set the flow high alarm limit to 85% FS flow rate: A,H,85.0<CR>
The device will reply: FA,H:85.0<CR>

Note: An * indicates power up default settings.
An ** indicates optional feature not available on all models.
<table>
<thead>
<tr>
<th>Command Name</th>
<th>Description</th>
<th>No.</th>
<th>Command</th>
<th>Argument 1</th>
<th>Argument 2</th>
<th>Argument 3</th>
<th>Argument 4</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Alarms</td>
<td>Sets / reads the status of the flow alarms. Note: High and Low limits have to be entered in % FS. High alarm value has to be more than Low alarm value. Alarm conditions: Flow &gt; High Limit = H Flow &lt; Low Limit = L Low &lt; Flow &lt; High = N</td>
<td>6</td>
<td>FA</td>
<td>H (high flow limit)</td>
<td>&lt;Value&gt; (0 to 100% FS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>L (low flow limit)</td>
<td>&lt;Value&gt; (0 to 100% FS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A (action delay in seconds)</td>
<td>&lt;Value&gt; (0 to 3600 sec)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E (enable alarm)</td>
<td></td>
<td></td>
<td></td>
<td>FA:E</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>D (disable alarm)*</td>
<td></td>
<td></td>
<td></td>
<td>FA:D</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R (read current status)</td>
<td></td>
<td></td>
<td></td>
<td>FA:N (no alarm) FA:H (high alarm) FA:L (low alarm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S (read current status)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B Block ( latch mode)</td>
<td>&lt;Value&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FAB: &lt;Value&gt; where:</td>
<td>Value = 0 to 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature Alarms**</td>
<td>Sets/reads the status of the temperature alarms. Note: High and low limits have to be entered in °C. High alarm value has to be more than Low alarm value. Alarm conditions: Temp. &gt; High Limit = H Temp &lt; Low Limit = L Low &lt; Temp &lt; High</td>
<td>7</td>
<td>TA</td>
<td>H (high flow limit)</td>
<td>&lt;Value&gt; (-10.1 to 100°C)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>L (low flow limit)</td>
<td>&lt;Value&gt; (-10.1 to 100°C)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A (action delay in seconds)</td>
<td>&lt;Value&gt; (0 to 3600 sec.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E (enable alarm)</td>
<td></td>
<td></td>
<td></td>
<td>TA:E</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>D (disable alarm)*</td>
<td></td>
<td></td>
<td></td>
<td>TA:D</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R (read current status)</td>
<td></td>
<td></td>
<td></td>
<td>TA:N (no alarm) TA:H (high alarm) TA:L (low alarm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S (read current settings)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B Block (Latch mode)</td>
<td>&lt;Value&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TAB: &lt;Value&gt; where:</td>
<td>Value = 0 to 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optical Outputs</td>
<td>Assigns action of the two optical outputs. The optical output becomes active when the condition specified by an Argument 2 becomes true. Argument 2: D - no action, disabled* FL - low flow alarm FH - high flow alarm FR - Range between High &amp; Low alarms MT - main tot. reading &gt; limit PT - pilot tot. reading &gt; limit TL - low temp. alarm TH - high temp. alarm TR - Range between High &amp; Low temp. alarms MC - Manual On Control DE - Diagnostic Events</td>
<td>8</td>
<td>0</td>
<td>1 (output #1)</td>
<td>D*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 (output #2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FL</td>
<td>01:FL or 02:FL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FH</td>
<td>01:FH or 02:FH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FR</td>
<td>01:FR or 02:FR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>MT</td>
<td>01:MT or 02:MT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td>PT</td>
<td>01:PT or 02:PT</td>
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<td>TL</td>
<td>01:TL or 02:TL</td>
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<td>TH</td>
<td>01:TH or 02:TH</td>
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<td>TR</td>
<td>01:TR or 02:TR</td>
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<td>DE</td>
<td>01:DE or 02:DE</td>
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<td></td>
<td>MC</td>
<td>01:MC or 02:MC</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>S (read current settings)</td>
<td></td>
<td></td>
<td></td>
<td>0x:D</td>
</tr>
<tr>
<td>Main Totalizer</td>
<td>Sets and controls action of the Main flow totalizer. Note: Main Totalizer reading is stored in EEPROM (non volatile) memory. Power cycle will not affect Main Totalizer reading.</td>
<td>9</td>
<td>MT</td>
<td>2 (reset to zero)</td>
<td></td>
<td></td>
<td></td>
<td>MTZ</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>F(start totalizer at flow % FS)</td>
<td></td>
<td></td>
<td></td>
<td>MTF: &lt;value&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>L (limit gas volume in current E.U.)</td>
<td></td>
<td></td>
<td></td>
<td>MTL: &lt;value&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>D (disable totalizer)*</td>
<td></td>
<td></td>
<td></td>
<td>MT:D</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E (enable totalizer)</td>
<td></td>
<td></td>
<td></td>
<td>MTE:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R (read current totalizer volume)</td>
<td></td>
<td></td>
<td></td>
<td>MTR: &lt;value&gt; (in current EU)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>S (setting status)</td>
<td></td>
<td></td>
<td></td>
<td>MTS: Mode, Start, Limit</td>
</tr>
<tr>
<td>Command Name</td>
<td>Description</td>
<td>No.</td>
<td>Command</td>
<td>Argument 1</td>
<td>Argument 2</td>
<td>Argument 3</td>
<td>Argument 4</td>
<td>Response</td>
</tr>
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<td>------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Pilot</td>
<td>Sets and controls action of the Pilot flow totalizer.</td>
<td>10</td>
<td>PT</td>
<td>Z (reset to zero)</td>
<td>&lt;Value&gt; (flow % FS)</td>
<td></td>
<td></td>
<td>PTZ</td>
</tr>
<tr>
<td></td>
<td>NOTE: Pilot Totalizer reading is stored in SRAM (volatile) memory. Power cycle will reset Pilot Totalizer reading to zero.</td>
<td></td>
<td></td>
<td>F (start totalizer at flow % FS)</td>
<td></td>
<td></td>
<td></td>
<td>PTZ: &lt;value&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>L (limit gas volume in current E.U.)</td>
<td>&lt;value&gt; (gas volume)</td>
<td></td>
<td></td>
<td>PTL: &lt;value&gt;</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>D (disable totalizer)*</td>
<td></td>
<td></td>
<td></td>
<td>PTD</td>
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<td></td>
<td></td>
<td></td>
<td>E (enable totalizer)</td>
<td></td>
<td></td>
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<td>PTE</td>
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<td></td>
<td></td>
<td></td>
<td>R (read current totalizer volume)</td>
<td></td>
<td></td>
<td></td>
<td>PTR: &lt;value&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>S (setting status)</td>
<td></td>
<td></td>
<td></td>
<td>PTS: Mode, Start, Limit</td>
</tr>
<tr>
<td>Low Flow Cut Off</td>
<td>Display /Change Meter Low Flow Cut Off settings in % FS.</td>
<td>11</td>
<td>CO</td>
<td>&lt;Cut off Value&gt;</td>
<td>(0 to 10.0%)</td>
<td></td>
<td></td>
<td>CO: &lt;Cut off Value&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No Argument</td>
<td>(Returns current cut off value settings)</td>
<td></td>
<td></td>
<td>Example: CO:2:0</td>
</tr>
<tr>
<td>Fluid Density</td>
<td>Display /Change Meter Low Flow Cut Off settings in % FS.</td>
<td>12</td>
<td>FD</td>
<td>(New Density Value)</td>
<td>0.01 ≤ Density ≤ 5.0 g/cm³</td>
<td></td>
<td></td>
<td>FD: &lt;value&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No Argument</td>
<td>(Returns Current Density in g/cm³)</td>
<td></td>
<td></td>
<td>Example: FD:1.000</td>
</tr>
<tr>
<td>Units</td>
<td>Set the units of measure for gas flow and totalizer reading.</td>
<td>13</td>
<td>U</td>
<td>% (% FS)*</td>
<td></td>
<td></td>
<td></td>
<td>U: %</td>
</tr>
<tr>
<td></td>
<td>Note: The units of the totalizer output are not per unit time.</td>
<td></td>
<td></td>
<td>ml/sec</td>
<td>U:ml/sec</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>For user defined units: k-factor value represents conversion value from L/min.</td>
<td></td>
<td></td>
<td>ml/min</td>
<td>U:mm/min</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>ml/hr</td>
<td>U:mm/hr</td>
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<td>U/sec</td>
<td>U:mm/hr</td>
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<td>U/min</td>
<td>U:mm/hr</td>
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<td>L/sec</td>
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<td>U:mm/hr</td>
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<td>kg/sec</td>
<td>U:mm/hr</td>
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<td>gal/sec</td>
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<td></td>
<td>t/sec</td>
<td>U:mm/hr</td>
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<td>t/min</td>
<td>U:mm/hr</td>
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<td>t/hr</td>
<td>U:mm/hr</td>
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<td>USER</td>
<td>U:mm/hr</td>
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<td>USER</td>
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<td>USER</td>
<td>U:mm/hr</td>
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<td></td>
<td></td>
<td>USER</td>
<td>U:mm/hr</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance Timer</td>
<td>Hours since last time unit was calibrated.</td>
<td>14</td>
<td>C</td>
<td>R (read timer)</td>
<td></td>
<td></td>
<td></td>
<td>CR: &lt;value&gt;</td>
</tr>
<tr>
<td></td>
<td>Note: Has to be reset to zero after calibration.</td>
<td></td>
<td></td>
<td>Z (set timer to zero)</td>
<td></td>
<td></td>
<td></td>
<td>CZ</td>
</tr>
<tr>
<td>Pulse Measure Interval</td>
<td>Display/change meter pulse measure interval settings.</td>
<td>15</td>
<td>I</td>
<td>&lt;new value&gt; in mS</td>
<td></td>
<td></td>
<td></td>
<td>I: &lt;value&gt;</td>
</tr>
<tr>
<td></td>
<td>Note: Pulse measure interval has to be in the range: 500 mS ≤ MI ≤ 60000 mS.</td>
<td></td>
<td></td>
<td>No Argument</td>
<td>(Returns Current MI settings in mS)</td>
<td></td>
<td></td>
<td>Example: I:2000</td>
</tr>
<tr>
<td>Flow Measure Mode</td>
<td>Display/change meter flow measuring mode</td>
<td>16</td>
<td>MM</td>
<td>&lt;New Mode&gt;</td>
<td>W - Pulse Width*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Following measurement modes are supported:</td>
<td></td>
<td></td>
<td>C - # of Pulses</td>
<td>No Argument</td>
<td>(Returns Current settings)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No Argument</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Command Name</td>
<td>Description</td>
<td>No.</td>
<td>Command</td>
<td>Argument 1</td>
<td>Argument 2</td>
<td>Argument 3</td>
<td>Argument 4</td>
<td>Response</td>
</tr>
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<td>-------------------------</td>
<td>------------------------------------------------------------------</td>
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<td>------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Flow Meter Linearizer</td>
<td>Enable/disable flow meter linearizer</td>
<td>17</td>
<td>FL</td>
<td>&lt;New Value&gt;</td>
<td>E or D</td>
<td></td>
<td></td>
<td>FL:&lt;value&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No Argument</td>
<td></td>
<td></td>
<td></td>
<td>Example: FL:E</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Returns current linearizer settings)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LCD Back Light**</td>
<td>Display/change LCD back light settings</td>
<td>18</td>
<td>BL</td>
<td>(New LCD back light value) 0 to 80%</td>
<td></td>
<td></td>
<td></td>
<td>BL:&lt;value&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No Argument</td>
<td></td>
<td></td>
<td></td>
<td>Example: BL:50</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Returns current LCD back light settings)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise Reduction Filter</td>
<td>Noise Reduction Filter parameter settings. Following arguments supported:</td>
<td>19</td>
<td>NR</td>
<td>T (time interval)</td>
<td></td>
<td></td>
<td></td>
<td>NRT:5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N (number of samples)</td>
<td></td>
<td></td>
<td></td>
<td>NRN:5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>S (status)</td>
<td></td>
<td></td>
<td></td>
<td>NR:5,5</td>
</tr>
<tr>
<td>Read EEPROM Memory</td>
<td>Reads the value in the specified memory location. Use Carefully, can cause unit to malfunction. (Note: Some addresses are write protected!)</td>
<td>20</td>
<td>MW</td>
<td>0 to 100 (memory index table)</td>
<td></td>
<td></td>
<td></td>
<td>MW,XXX,&lt;value&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>where: XXX = table index</td>
<td></td>
<td></td>
<td></td>
<td>Example: MW,100,&quot;Meter#6&quot;</td>
</tr>
<tr>
<td>Write EEPROM Memory</td>
<td>Writes the specified value to the specified memory location. Use Carefully, can cause unit to malfunction. (Note: Some addresses are write protected!)</td>
<td>21</td>
<td>MW</td>
<td>20 to 100 (memory index table)</td>
<td>Value</td>
<td></td>
<td></td>
<td>MW,XXX,&lt;value&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>where: XXX = table index</td>
<td></td>
<td></td>
<td></td>
<td>Example: MW,100,&quot;Meter#6&quot;</td>
</tr>
</tbody>
</table>

UART Error Codes:
1 - Not Supported Command or Back Door is not enabled.
2 - Wrong # of Arguments.
3 - Address is Out of Range (MR or MW commands).
4 - Wrong # of the characters in the Argument.
5 - Attempt to Alter Write Protected Area in the EEPROM.
6 - Proper Command or Argument is not found.
7 - Wrong value of the Argument.
8 - Reserved.
9 - Manufacture specific info EE KEY (wrong key or key is disabled).

Diagnostic events codes and bit position:
1. CPU Temp. High 0
2. Flow > 125% FS 1
3. High Flow Alarm 2
4. Low Flow Alarm 3
5. High Temperature Alarm 4
6. Low Temperature Alarm 5
7. Temperature Above Limit 6
8. Temperature Below Limit 7
9. Main Totalizer ≥ Limit 8
10. Pilot Totalizer ≥ Limit 9
11. EEPROM Failure A
12. DC/DC converter Voltage too High B
13. DC/DC converter Voltage too Low C
14. Communication Error D
15. Reserved E
16. Fatal ERROR F
8. Troubleshooting

8.1 - Common Conditions

Your DPW Flow Meter was thoroughly checked at numerous quality control points during and after manufacturing and assembly operations. It was calibrated according to your desired flow and pressure conditions for a given fluid. It was carefully packed to prevent damage during shipment. Should you feel that the instrument is not functioning properly, please check for the following common conditions first:

Are all cables connected correctly? Are there any leaks in the installation? Is the power supply correctly selected according to requirements? When several meters are used a power supply with appropriate current rating should be selected. Were the connector pinouts matched properly? When interchanging with other manufacturers’ equipment, cables and connectors must be carefully wired for correct pin configurations. Is the pressure differential across the instrument sufficient?

<table>
<thead>
<tr>
<th>No.</th>
<th>Indication</th>
<th>Likely Reason</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LCD display remains blank when unit is powered up. No response when flow is introduced from analog outputs 0 to 5 Vdc or 4 to 20 mA.</td>
<td>Power supply is bad or polarity is reversed</td>
<td>Measure voltage on pins A and B of the 12 pin M16 connector. If voltage is out of specified range, then replace power supply with a new one. If polarity is reversed (reading is negative) make correct connection.</td>
</tr>
<tr>
<td>2</td>
<td>LCD display reading and/or flow analog output 0 to 5 Vdc signal fluctuate in wide range during flow measurement. Temperature output 0 to 5 Vdc signal (pin L of the 12 pin M16 connector) is shorted on the GND or overloaded.</td>
<td>PC board is defective.</td>
<td>Return DPW to factory for repair.</td>
</tr>
<tr>
<td>3</td>
<td>LCD display reading and/or temperature analog output 0 to 5 Vdc signal fluctuate in wide range during flow measurement.</td>
<td>Check external connections to pin L of the 12 pin M16 connector. Make sure the load resistance of the equipment connected to the flow 0 to 5 Vdc output is more than 1000 Ω.</td>
<td>Return DPW to factory for repair.</td>
</tr>
<tr>
<td>4</td>
<td>LCD display reading does not correspond to the correct flow range, but 0 to 5 Vdc output signal does not change (always the same reading or around zero).</td>
<td>Analog flow output scale and offset variable are corrupted.</td>
<td>Return DPW to factory for repair.</td>
</tr>
<tr>
<td>5</td>
<td>LCD display reading and/or temperature analog output 0 to 5 Vdc output voltage do correspond to the correct flow range, but 4 to 20 mA output signal does not change (always the same or reading around 4.0 mA).</td>
<td>External loop is open or load resistance more than 500 Ω.</td>
<td>Check external connections to pins L and K of the 12 pin M16 connector. Make sure the loop resistance is less than 500 Ω. Return DPW to factory for repair.</td>
</tr>
<tr>
<td>6</td>
<td>LCD display reading and/or temperature analog output 0 to 5 Vdc output voltage do correspond to the correct flow range, but 4 to 20 mA output signal does not change (always the same or reading around 4.0 mA).</td>
<td>Temperature output 4 to 20 mA schematic is burned out or damaged.</td>
<td>Check external connections to pins M and K of the 12 pin M16 connector. Make sure the loop resistance is less than 500 Ω. Return DPW to factory for repair.</td>
</tr>
<tr>
<td>7</td>
<td>Fluid flows through the DPW meter and Paddle Wheel is turning, but LCD Display reading and the flow output voltage 0 to 5 Vdc signal do not respond to flow. Sensor or PCB board is defective.</td>
<td>The fluid flow rate is below set Low flow cut-off value.</td>
<td>Check settings for Low flow cut-off value and make required adjustment. Return DPW to factory for repair.</td>
</tr>
<tr>
<td>8</td>
<td>Fluid flows through the DPW meter and Paddle Wheel is turning, but LCD Display reading and the flow output voltage 0 to 5 Vdc signal do not respond to flow. There is no pulse output signals from pin C of the 12 pin M16 connector.</td>
<td>OPW magnetic sensor is defective.</td>
<td>Replace DPW magnetic sensor.</td>
</tr>
<tr>
<td>9</td>
<td>The Temperature reading on the LCD and analog output 0 to 5 Vdc or 4 to 20 mA is not correct (out of the device measurement range: -10 to 70°C). RTD connector got loose and is not connected to the PCB board. RTD sensor is defective.</td>
<td>RTD connector, make sure it is firmly attached to the header J2 on the PCB.</td>
<td>Check RTD connector, make sure it is firmly attached to the header J2 on the PCB. Replace RTD sensor.</td>
</tr>
<tr>
<td>10</td>
<td>The DPW Diagnostic Alarm Event with code F - “Fatal Error” is active.</td>
<td>MCU temperature is too high (overload).</td>
<td>Disconnect power from the DPW. Make sure the ambient temperature is within specified range (below 70°C). Let the device cool down for at least 15 minutes. Apply power to the DPW and check Diagnostic Alarm Event. If overload condition will be indicated again the unit has to be returned to the factory for repair.</td>
</tr>
<tr>
<td>11</td>
<td>The DPW Diagnostic Alarm Event with code F - “Fatal Error” is active.</td>
<td></td>
<td>Cycle the power on the DPW. If Diagnostic Alarm Event with code F indicating again the unit has to be returned to the factory for repair.</td>
</tr>
<tr>
<td>No.</td>
<td>Indication</td>
<td>Data Type</td>
<td>Notes</td>
</tr>
<tr>
<td>-----</td>
<td>------------------------------------</td>
<td>-----------------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>0</td>
<td>BlankEEPROM[10]</td>
<td>char[10]</td>
<td>Do not modify. Table Revision [PROTECTED]</td>
</tr>
<tr>
<td>1</td>
<td>SerialNumber[20]</td>
<td>char[20]</td>
<td>Serial Number [PROTECTED]</td>
</tr>
<tr>
<td>4</td>
<td>ManufReservedF1</td>
<td>float</td>
<td>Manufacture Specific float data [PROTECTED]</td>
</tr>
<tr>
<td>5</td>
<td>ManufReservedF2</td>
<td>float</td>
<td>Manufacture Specific float data [PROTECTED]</td>
</tr>
<tr>
<td>6</td>
<td>MeterCalFactorM</td>
<td>float</td>
<td>Manufacture Assigned Number of Pulses per Gallon [PROTECTED]</td>
</tr>
<tr>
<td>7</td>
<td>MeterSize</td>
<td>float</td>
<td>Size of the meter’s flow tube [mm] [PROTECTED]</td>
</tr>
<tr>
<td>9</td>
<td>ManufReservedF3</td>
<td>float</td>
<td>Manufacture Specific float data [PROTECTED]</td>
</tr>
<tr>
<td>10</td>
<td>ManufReservedF4</td>
<td>float</td>
<td>Manufacture Specific float data [PROTECTED]</td>
</tr>
<tr>
<td>11</td>
<td>ManufReservedF5</td>
<td>float</td>
<td>Manufacture Specific float data [PROTECTED]</td>
</tr>
<tr>
<td>12</td>
<td>ManufReservedF6</td>
<td>float</td>
<td>Manufacture Specific float data [PROTECTED]</td>
</tr>
<tr>
<td>13</td>
<td>ManufReservedUI1</td>
<td>uint</td>
<td>Manufacture Specific uint data [PROTECTED]</td>
</tr>
<tr>
<td>14</td>
<td>ManufReservedUI2</td>
<td>uint</td>
<td>Manufacture Specific uint data [PROTECTED]</td>
</tr>
<tr>
<td>15</td>
<td>ManufReservedUI3</td>
<td>uint</td>
<td>Manufacture Specific uint data [PROTECTED]</td>
</tr>
<tr>
<td>16</td>
<td>ManufReservedUI4</td>
<td>uint</td>
<td>Manufacture Specific uint data [PROTECTED]</td>
</tr>
<tr>
<td>17</td>
<td>ManufReservedSI1</td>
<td>int</td>
<td>Manufacture Specific int data [PROTECTED]</td>
</tr>
<tr>
<td>18</td>
<td>ManufReservedSI2</td>
<td>int</td>
<td>Manufacture Specific int data [PROTECTED]</td>
</tr>
<tr>
<td>19</td>
<td>ManufReservedSI3</td>
<td>int</td>
<td>Manufacture Specific int data [PROTECTED]</td>
</tr>
<tr>
<td>20</td>
<td>TimeSinceCalHr</td>
<td>float</td>
<td>Time elapsed since last calibration in hours</td>
</tr>
<tr>
<td>21</td>
<td>ProtectionCode</td>
<td>uint</td>
<td>Program Parameters Protection Code [0-255]</td>
</tr>
<tr>
<td>22</td>
<td>BackLight</td>
<td>uint</td>
<td>Back Light Level [0-4095]**</td>
</tr>
<tr>
<td>23</td>
<td>BackLightMode</td>
<td>int</td>
<td>Back Light Mode (E-Enable/D-Disable)**</td>
</tr>
<tr>
<td>24</td>
<td>LCD_Diagnostic</td>
<td>uint</td>
<td>LCD Diagnostic Mode: [0, 1]</td>
</tr>
<tr>
<td>25</td>
<td>Address485</td>
<td>char[4]</td>
<td>Two hexadecimal characters address for RS485 only [01-FF]</td>
</tr>
<tr>
<td>26</td>
<td>FlowUnits</td>
<td>uint</td>
<td>Current Units of Measure [0-28]</td>
</tr>
<tr>
<td>27</td>
<td>AlarmMode</td>
<td>uint</td>
<td>Flow Alarm Mode (0-Disabled, 1=Enabled)</td>
</tr>
<tr>
<td>28</td>
<td>LowAlarmPFS</td>
<td>float</td>
<td>Low Flow Alarm Setting [%FS] 0-Disabled</td>
</tr>
<tr>
<td>29</td>
<td>HiAlarmPFS</td>
<td>float</td>
<td>High Flow Alarm Setting [%FS] 0-Disabled</td>
</tr>
<tr>
<td>30</td>
<td>AimDelay</td>
<td>uint</td>
<td>Flow Alarm Action Delay [0-3600sec] 0-Disabled</td>
</tr>
<tr>
<td>31</td>
<td>RelaySetting</td>
<td>char[4]</td>
<td>Relays Assignment Setting**</td>
</tr>
<tr>
<td>32</td>
<td>TotalMode</td>
<td>uint</td>
<td>Totalizer Mode [1 - Enabled, 0 - Disabled]</td>
</tr>
<tr>
<td>33</td>
<td>TimeFlowStart</td>
<td>float</td>
<td>Start Main Totalizer at flow [%FS] 0-Disabled</td>
</tr>
<tr>
<td>34</td>
<td>TimeVolStop</td>
<td>float</td>
<td>Main Totalizer Action Limit Volume [%*s] 0- Disabled</td>
</tr>
<tr>
<td>35</td>
<td>TotalContLock</td>
<td>uint</td>
<td>Key Pad Totalizer reset access Lock [0 – Disabled, 1 – Enabled]</td>
</tr>
<tr>
<td>36</td>
<td>UDUnitKfactor</td>
<td>float</td>
<td>K-Factor for User Defined Units of Measure</td>
</tr>
<tr>
<td>37</td>
<td>UDUnitTimeBase</td>
<td>int</td>
<td>K-Factor = UDUnit/[L/min]</td>
</tr>
<tr>
<td>38</td>
<td>UDUnitDensity</td>
<td>uint</td>
<td>User Defined Unit Time Base [1, 60, 3600 sec]</td>
</tr>
<tr>
<td>39</td>
<td>FoutScaleV</td>
<td>float</td>
<td>User Defined Unit Density Flag [0-not used, 1 - used]</td>
</tr>
<tr>
<td>40</td>
<td>FoutOffsetV</td>
<td>float</td>
<td>Flow Analog 0 to 5 Vdc Out Scale</td>
</tr>
<tr>
<td>41</td>
<td>FoutScale_mA</td>
<td>float</td>
<td>Flow Analog 0 to 5 Vdc Out Offset</td>
</tr>
<tr>
<td>42</td>
<td>FoutOffset_mA</td>
<td>float</td>
<td>Flow Analog 4 to 20 mA Out Scale</td>
</tr>
<tr>
<td>43</td>
<td>ToutScaleV</td>
<td>float</td>
<td>Temperature Analog 0 to 5 Vdc Out Scale**</td>
</tr>
<tr>
<td>44</td>
<td>ToutOffsetV</td>
<td>float</td>
<td>Temperature Analog 0 to 5 Vdc Out Offset**</td>
</tr>
<tr>
<td>45</td>
<td>ToutScale_mA</td>
<td>float</td>
<td>Temperature Analog 4 to 20 mA Out Scale**</td>
</tr>
<tr>
<td>46</td>
<td>ToutOffset_mA</td>
<td>float</td>
<td>Temperature Analog 4 to 20 mA Out Offset**</td>
</tr>
<tr>
<td>47</td>
<td>FlowMeasureMode</td>
<td>uint</td>
<td>0-Pulse width measure, 1 - Number of Pulses per measure interval</td>
</tr>
<tr>
<td>48</td>
<td>OptOut1_Config</td>
<td>uint</td>
<td>Optical Output #1 Configuration (function) [0-10]</td>
</tr>
<tr>
<td>49</td>
<td>OptOut2_Config</td>
<td>uint</td>
<td>Optical Output #2 Configuration (function) [0-10]</td>
</tr>
<tr>
<td>50</td>
<td>RTD_LinearMode</td>
<td>uint</td>
<td>RTD Linearizer (0-Disabled, 1-Enabled)**</td>
</tr>
<tr>
<td>51</td>
<td>AlarmLatch</td>
<td>uint</td>
<td>Alarm Latch settings [0-3]</td>
</tr>
<tr>
<td>52</td>
<td>PTotalMode</td>
<td>uint</td>
<td>Pilot Totalizer mode (0-Disabled, 1-Enabled)</td>
</tr>
<tr>
<td>53</td>
<td>Reserved</td>
<td>uint</td>
<td>Reserved</td>
</tr>
<tr>
<td>54</td>
<td>PTotalVolStop</td>
<td>float</td>
<td>Start Pilot Totalizer at flow [%FS] 0 - Disabled</td>
</tr>
<tr>
<td>55</td>
<td>PTotalFlowStart</td>
<td>float</td>
<td>Pilot Totalizer Action Limit Volume [%*s] 0- Disabled</td>
</tr>
<tr>
<td>56</td>
<td>MeterFSRange</td>
<td>float</td>
<td>Meter Full scale range in [L/min]</td>
</tr>
<tr>
<td>57</td>
<td>LowFlowCutOff</td>
<td>float</td>
<td>Low Flow cut off. Must be between 0 and 10.0 %FS</td>
</tr>
<tr>
<td>58</td>
<td>Damping</td>
<td>uint</td>
<td>Flow Reading Damping 1-99 seconds</td>
</tr>
<tr>
<td>59</td>
<td>Density</td>
<td>float</td>
<td>Fluid Density g/cm^3 [0.01 - 5.00000 g/cm^3]</td>
</tr>
<tr>
<td>60</td>
<td>PulseMeasInt</td>
<td>uint</td>
<td>Flow Pulse Measure Interval in mS [500-60000]</td>
</tr>
<tr>
<td>61</td>
<td>MeterCalFactor</td>
<td>float</td>
<td>Calibration Factor: Number of Pulses per Gallon</td>
</tr>
<tr>
<td>62</td>
<td>FlowTbl[0].FlowPFS</td>
<td>float</td>
<td>Flow Linearizer Index 0 PFS (must be 0.0)</td>
</tr>
<tr>
<td>63</td>
<td>FlowTbl[0].LinCounts</td>
<td>uint</td>
<td>Flow Linearizer Index 0 Counts (must be 0)</td>
</tr>
<tr>
<td>64</td>
<td>FlowTbl[1].FlowPFS</td>
<td>float</td>
<td>Flow Linearizer Index 1 PFS [0.0 – 1.0]</td>
</tr>
<tr>
<td>65</td>
<td>FlowTbl[1].LinCounts</td>
<td>uint</td>
<td>Flow Linearizer Index 1 Counts</td>
</tr>
<tr>
<td>66</td>
<td>FlowTbl[2].FlowPFS</td>
<td>float</td>
<td>Flow Linearizer Index 2 PFS [0.0 – 1.0]</td>
</tr>
<tr>
<td>67</td>
<td>FlowTbl[2].LinCounts</td>
<td>uint</td>
<td>Flow Linearizer Index 2 Counts</td>
</tr>
<tr>
<td>68</td>
<td>FlowTbl[3].FlowPFS</td>
<td>float</td>
<td>Flow Linearizer Index 3 PFS [0.0 – 1.0]</td>
</tr>
<tr>
<td>69</td>
<td>FlowTbl[3].LinCounts</td>
<td>uint</td>
<td>Flow Linearizer Index 3 Counts</td>
</tr>
<tr>
<td>70</td>
<td>FlowTbl[4].FlowPFS</td>
<td>float</td>
<td>Flow Linearizer Index 4 PFS [0.0 – 1.0]</td>
</tr>
<tr>
<td>71</td>
<td>FlowTbl[4].LinCounts</td>
<td>uint</td>
<td>Flow Linearizer Index 4 Counts</td>
</tr>
<tr>
<td>72</td>
<td>FlowTbl[5].FlowPFS</td>
<td>float</td>
<td>Flow Linearizer Index 5 PFS [0.0 – 1.0]</td>
</tr>
<tr>
<td>73</td>
<td>FlowTbl[5].LinCounts</td>
<td>uint</td>
<td>Flow Linearizer Index 5 Counts</td>
</tr>
<tr>
<td>No.</td>
<td>Indication</td>
<td>Data Type</td>
<td>Notes</td>
</tr>
<tr>
<td>-----</td>
<td>---------------------------------</td>
<td>-----------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>74</td>
<td>FlowTbl[6].FlowPFS</td>
<td>float</td>
<td>Flow Linearizer Index 6 PFS [0.0 – 1.0]</td>
</tr>
<tr>
<td>75</td>
<td>FlowTbl[6].LinCounts</td>
<td>uint</td>
<td>Flow Linearizer Index 6 Counts</td>
</tr>
<tr>
<td>76</td>
<td>FlowTbl[7].FlowPFS</td>
<td>float</td>
<td>Flow Linearizer Index 7 PFS [0.0 – 1.0]</td>
</tr>
<tr>
<td>77</td>
<td>FlowTbl[7].LinCounts</td>
<td>uint</td>
<td>Flow Linearizer Index 7 Counts</td>
</tr>
<tr>
<td>78</td>
<td>FlowTbl[8].FlowPFS</td>
<td>float</td>
<td>Flow Linearizer Index 8 PFS [0.0 – 1.0]</td>
</tr>
<tr>
<td>79</td>
<td>FlowTbl[8].LinCounts</td>
<td>uint</td>
<td>Flow Linearizer Index 8 Counts</td>
</tr>
<tr>
<td>80</td>
<td>FlowTbl[9].FlowPFS</td>
<td>float</td>
<td>Flow Linearizer Index 9 PFS [0.0 – 1.0]</td>
</tr>
<tr>
<td>81</td>
<td>FlowTbl[9].LinCounts</td>
<td>uint</td>
<td>Flow Linearizer Index 9 Counts</td>
</tr>
<tr>
<td>82</td>
<td>FlowTbl[10].FlowPFS</td>
<td>float</td>
<td>Flow Linearizer Index 10 PFS [0.0 – 1.0]</td>
</tr>
<tr>
<td>83</td>
<td>FlowTbl[10].LinCounts</td>
<td>uint</td>
<td>Flow Linearizer Index 10 Counts</td>
</tr>
<tr>
<td>84</td>
<td>T_InScale</td>
<td>float</td>
<td>Temperature RTD input Scale**</td>
</tr>
<tr>
<td>85</td>
<td>T_InOffset</td>
<td>float</td>
<td>Temperature RTD input Offset**</td>
</tr>
<tr>
<td>86</td>
<td>T_Mode</td>
<td>float</td>
<td>Reserved**</td>
</tr>
<tr>
<td>87</td>
<td>DiagEventMask</td>
<td>uint</td>
<td>Mask for Diagnostic Events: Clear bit-&gt; mask corresponding event.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Default mask is 0xFFFFh</td>
</tr>
<tr>
<td>88</td>
<td>FlowLinearizer</td>
<td>uint</td>
<td>Flow Linearizer (0-Disabled, 1-Enabled)</td>
</tr>
<tr>
<td>89</td>
<td>T_AlarmMode</td>
<td>uint</td>
<td>Temp. Alarm Mode (0=Disabled, 1=Enabled)**</td>
</tr>
<tr>
<td>90</td>
<td>T_AlarmDelay</td>
<td>uint</td>
<td>Delay in seconds 0-3600 for Tem.Alarm action**</td>
</tr>
<tr>
<td>91</td>
<td>T_AlarmLatch</td>
<td>uint</td>
<td>Temp Alarm Latch 0-3**</td>
</tr>
<tr>
<td>92</td>
<td>T_LowAlarm_C</td>
<td>float</td>
<td>Low Temperature Alarm in %FS [-1-1]**</td>
</tr>
<tr>
<td>93</td>
<td>T_HiAlarm_C</td>
<td>float</td>
<td>High Temperature Alarm in %FS [-1-1]**</td>
</tr>
<tr>
<td>94</td>
<td>ReservedF3</td>
<td>float</td>
<td>Reserved</td>
</tr>
<tr>
<td>95</td>
<td>FluidName[20]</td>
<td>char[20]</td>
<td>Name of the Liquid used for Calibration</td>
</tr>
<tr>
<td>96</td>
<td>CalibratedBy[20]</td>
<td>char[20]</td>
<td>Name of person, meter was calibrated by</td>
</tr>
<tr>
<td>97</td>
<td>CalibratedAt[20]</td>
<td>char[20]</td>
<td>Name of the Calibration Lab</td>
</tr>
<tr>
<td>98</td>
<td>DateCalibrated[12]</td>
<td>char[12]</td>
<td>Calibration date</td>
</tr>
<tr>
<td>99</td>
<td>DateCalibrationDue[12]</td>
<td>char[12]</td>
<td>Date calibration due</td>
</tr>
<tr>
<td>100</td>
<td>UserTagName</td>
<td>char[12]</td>
<td>User Defined Device Tag Name or Number</td>
</tr>
<tr>
<td>101</td>
<td>EEPROMagicNumber</td>
<td>uint</td>
<td>Number used to verify EEPROM integrity</td>
</tr>
</tbody>
</table>

** Not supported in some hardware configurations

APPENDIX II

Component Diagram Top Side

Component Diagram Bottom Side
This product is not intended to be used in life support applications!

TRADEMARKS

Dwyer® is a registered trademark of Dwyer Instruments, Inc.

Buna® is a registered trademark of DuPont Dow Elastomers.

Kalrez® is a registered trademark of DuPont Dow Elastomers.

VCR® is a registered trademark of Swaglok Marketing Co.

Viton® is a registered trademark of Dupont Dow Elastomers L.L.C.