## 5.1 INTRODUCTION

This section identifies all of the programmable functions of the IQ DP-4000. You program the IQ DP-4000 by specifying setpoint values for functions you want monitored. Set the Select Switch to 0 when you are finished programming the DP-4000.

You use the Select and Setpoint switches to program setpoint values specific to your needs. Table 5.A, Setpoint Master Record Sheet, lists all of the possible functions that may be set. The left column lists the 15 Select Switches and the top row lists the Setpoint Switches. Appendix B contains a blank Master Setpoint Record Sheet for you to use to record your setpoint values. Use the details in this section to define your setpoint values and record the values in the blank Setpoint Master Record Sheet.

In this section, the available functions are broken into

three categories -- general system (Table 5.B), alarm

<table>
<tr><th rowspan="2">Select Switch</th><th colspan="8">Setpoint Switches</th></tr>
<tr><th>No. 1</th><th>No. 2</th><th>No. 3</th><th>No. 4</th><th>No. 5</th><th>No. 6</th><th>No. 7</th><th>No. 8</th></tr>
<tr><td>SW0</td><td colspan="8">Test Position—When you are not programming the unit, turn the setpoint switch to 0.</td></tr>
<tr><td>SW1</td><td>System Configuration</td><td>Frequency</td><td colspan="4">Nominal AC Line Voltage</td><td>Voltage Transformer Ratio</td><td>Current Transformer Primary</td></tr>
<tr><td>SW2</td><td colspan="8">Voltage Transformer Ratio</td></tr>
<tr><td>SW3</td><td colspan="8">Current Transformer Primary</td></tr>
<tr><td>SW4</td><td>Phase Sequence</td><td>Power Demand Fixed/Sliding</td><td colspan="3">Power Demand Time Interval</td><td colspan="3">Current Demand Time Interval</td></tr>
<tr><td>SW5</td><td>Reset Energy</td><td>Energy Resolution</td><td colspan="3">Not Used</td><td>Var/Power Factor Sign</td><td>Discrete Input</td><td>Sync Pulse</td></tr>
<tr><td>SW6</td><td>Alarm 1 Relay Mode</td><td>Alarm 1 Latch/Unlatch</td><td>Alarm 1 Overvoltage</td><td>Alarm 1 Undervoltage</td><td>Alarm 1 Voltage Phase Loss</td><td>Alarm 1 Voltage Phase Unbalance</td><td>Alarm 1 Voltage Phase Reversal</td><td>Alarm 1 Current Phase Loss</td></tr>
<tr><td>SW7</td><td>Alarm 2 Relay Mode</td><td>Alarm 2 Latch/Unlatch</td><td>Alarm 2 Overvoltage</td><td>Alarm 2 Undervoltage</td><td>Alarm 2 Voltage Phase Loss</td><td>Alarm 2 Voltage Phase Unbalance</td><td>Alarm 2 Voltage Phase Reversal</td><td>Alarm 2 Current Phase Loss</td></tr>
<tr><td>SW8</td><td>Alarm 1 Disable/Enable</td><td colspan="3">Alarm 1 Trip Delay</td><td colspan="3">Alarm 1 Reset Delay</td><td>Alarm 1 Overvoltage Detection</td></tr>
<tr><td>SW9</td><td colspan="2">Alarm 1 Overvoltage Detection</td><td colspan="3">Alarm 1 Undervoltage Detection</td><td colspan="3">Alarm 1 Voltage Phase Unbalance Detection</td></tr>
<tr><td>SWA</td><td>Alarm 2 Disable/Enable</td><td colspan="3">Alarm 2 Trip Delay</td><td colspan="3">Alarm 2 Reset Delay</td><td>Alarm 2 Overvoltage Detection</td></tr>
<tr><td>SWB</td><td colspan="2">Alarm 2 Overvoltage Detection</td><td colspan="3">Alarm 2 Undervoltage Detection</td><td colspan="3">Alarm 2 Voltage Phase Unbalance Detection</td></tr>
<tr><td>SWC</td><td colspan="3">Alarm 1 Reset Threshold</td><td colspan="3">Alarm 2 Reset Threshold</td><td>IMPACC Prgmble</td><td>DP-4000 / DP - 2 Mode</td></tr>
<tr><td>SWD</td><td>Pulse Initiator Load Shed</td><td colspan="3">Pulse Initiator Parameter</td><td colspan="4">Load Shed /Restore Load Range Settings</td></tr>
<tr><td>SWE</td><td colspan="8">Load Shed /Restore Load Range</td></tr>
<tr><td>SWF</td><td colspan="4">Load Shed Parameter</td><td colspan="4">Pulse Initiator Rate</td></tr>
</table>

***Table 5.A Setpoint Master Sheet***

(Table 5.C) and optional I/O (Table 5.D). In each table, the functions are listed in alphabetical order. The second column of the table identifies the corresponding section that describes valid setpoint values.

| General System Functions | Section |
|---|---|
| System Configuration 3/4 Wire | 5.3 |
| Frequency Selection - 50/60 Hz | 5.4 |
| Nominal AC Line Voltage setting | 5.5 |
| Voltage Transformer Ratio | 5.6 |
| Current Transformer Primary | 5.7 |
| Phase Sequence - ABC/CBA | 5.8 |
| Demand Parameters | |
| Power Demand, Fixed/Sliding | 5.9.1 |
| Power Demand Time Interval | 5.9.2 |
| Current Demand Time Interval | 5.9.3 |
| Energy Setpoints | |
| Reset Energy - Enable/Disable | 5.10.1 |
| Energy Resolution | 5.10.2 |
| Var/Power Factor sign convention (+ or -) | 5.11 |
| INCOM Programmable | 5.13 |
| DP-4000/DP-2 Mode | 5.14 |

***Table 5.B General System Functions***

| Alarm Functions | Section |
|---|---|
| Relay Mode 1/Mode 2 | 5.12.1 |
| Latched/Unlatched Alarm | 5.12.2 |
| Activate on Overvoltage | 5.12.3 |
| Activate on Undervoltage | 5.12.4 |
| Activate on Voltage Phase Loss | 5.12.5 |
| Activate on Voltage Phase Unbalance | 5.12.6 |
| Activate on Voltage Phase Reversal | 5.12.7 |
| Activate on Current Phase Loss | 5.12.8 |
| Enable/Disable Alarm | 5.12.9 |
| Alarm Delay | 5.12.10 |
| Alarm Reset Delay | 5.12.11 |
| Overvoltage Detection Level | 5.12.12 |
| Undervoltage Detection Level | 5.12.13 |
| Voltage Phase Unbalance Detection | 5.12.14 |
| Alarm Reset Threshold | 5.12.15 |

***Table 5.C Alarm Functions***

| Optional I/O Functions | Section |
|---|---|
| Discrete Input Setup | 5.15.1 |
| Sync Pulse Setpoints | 5.15.2 |
| Pulse Initiator/Load Shed | |
| Pulse Initiator Settings, Parameter | 5.15.3.1 |
| Load Shed Range | 5.15.3.2 |
| Load Shed Parameter | 5.15.3.3 |
| Pulse Initiator Settings, Rate Selection | 5.15.3.4 |

***Table 5.D Optional I/O Functions***

### 5.2 SETTING SETPOINT SWITCHES

To program the IQ DP-4000, you must determine which setpoints you want and then **record and verify all the setpoints before starting any entry**. Appendix B contains both a blank Setpoint Master Record Sheet for recording your setpoint values and, for each function, a table displaying the required Select Switch and Setpoint Switches. *A software utility for setpoint configuration has been developed to aid in programming the IQ DP-4000 and is available from the Cutler-Hammer web site at www.cutlerhammer.eaton.com*

**WARNING**

**BE CAREFUL WHEN REPROGRAMMING THE IQ DP-4000. WHEN YOU CHANGE THE VALUES FOR ONE SETPOINT, BE SURE THAT THE SETPOINT SWITCHES FOR THAT SELECT SWITCH ARE SET TO THE PROPER SETTINGS. WHEN YOU PRESS THE SAVE BUTTON, ALL OF THE SETTINGS FOR THAT SWITCH CHANGE TO THE NEW SETTINGS.**

The Setpoint Switches (DIP Switches) are located on a strip at the rear right portion of the chassis just below the Setpoint Display LED bank. Directly below them is the Select Switch and the Save button.

***It is essential that all of the desired Setpoint Switch settings for each Select Switch are recorded in the Master Setpoint Record Sheet before programming!***

To program the Setpoint Switches:

1. **Use the Master Setpoint Record Sheet** as a guide for the settings.
2. Turn Select Switch to the desired position SW(A-F).
3. Set the Setpoint Switches based on the information in the **Master Setpoint Record Sheet** by sliding the Setpoint Switch to the left to turn the switch off, or to the right to turn it on.

4. Press the Save button briefly to see if the LED's light properly. The corresponding LED will light if the switch is turned on.
5. When the Setpoint Switches for that Select Switch are all in the proper location, press and hold the Save button until the tenth LED lights. The settings are now stored permanently in the device's non-volatile memory.
6. Repeat steps 1 to 5 for each Select Switch.
7. When you are done, set the Select Switch to the 0 position.

### *5.2.1 Setpoint Switch Programming Example*

As an example, let us program the device to accept 100:5 current transformers (CT’s). To do this:

1. Turn to Appendix A of this manual and look for the size of CT’s that are being used (100:5).

   ■= OFF ❑ = ON ▒ = Not Applicable

   **Select SW** **Setpoint Switch Number**

   | Position | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
   |---|---|---|---|---|---|---|---|---|
   | 1 | ▒ | ▒ | ▒ | ▒ | ▒ | ▒ | ▒ | ■ |
   | 3 | ❑ | ❑ | ■ | ■ | ❑ | ■ | ■ | ■ |

   ***Table 5.E Setpoint Switch Settings***

2. Turn the Select Switch to position 1. As stated in Appendix A, set the Setpoint Switches as shown in Table 5.E (gray indicates reserved for other setpoints, black indicates OFF and white indicates ON).
3. Push the eighth Setpoint Switch to the left (off).When you press the Save button in step 9, you will lose any previous settings made for SW1 1-7.
4. Briefly press the Save button to confirm the settings. The 8th LED will not light indicating the off position.
5. Press and hold the Save button until the tenth LED lights. The setting for Select Switch 1 is now permanently stored in the device's long-term memory.
6. Turn the Select Switch to position 3.
7. Push the first, second and fifth Setpoint Switches to the right (on). Push the third, fourth, sixth, seventh, and eighth to the left (off).
8. Briefly press the Save button to confirm the settings. The first, second, and fifths LEDs light indicating they are in the on position.
9. Press and hold the Save button until the tenth LED lights. The setting for Select Switch 3 is now permanently stored in the device's long-term memory.
10. Place the Select Switch to the 0 position.

## 5.3 SYSTEM CONFIGURATION SETPOINT

The IQ DP-4000 monitors either a 3-conductor or 4-conductor AC line. For example, in a 4-wire system, a transformer’s secondary winding is wired in a wye configuration, with the XO neutral terminal ground as the fourth wire. In this case, the XO fourth wire connects to the screw terminal on the power supply. Refer to figures 4.9 and 4.15.

Set Switch **SW1 No. 1** to correspond to the chosen wiring configuration. Set this switch to the:

- OFF position for a 3-wire wiring configuration
- ON position for a 4-wire wiring configuration

When you choose the OFF position for the 3-wire configuration, the front panel will not display the 3 line-to-neutral AC line measurements. The measurements not displayed are:

- $V_{A-N}$ Volts
- $V_{B-N}$ Volts
- $V_{C-N}$ Volts

## 5.4 FREQUENCY SELECTION SETPOINT

The IQ DP-4000 accepts a nominal line frequency of either 50 or 60 Hz. Place switch **SW1 No. 2**. in the:

- OFF position for a 50 Hz system
- ON position for a 60 Hz system

## 5.5 NOMINAL AC LINE VOLTAGE SETPOINT

The IQ DP-4000 measures AC line voltage in one of two ways:

- Line-to-line (3 Phase 3 Wire)
- Line-to-neutral (3 Phase 4 Wire)

Based on the wiring configuration for the system, you must set switches to indicate the nominal AC line voltage applied to the AC line terminals. Line-to-neutral voltages will not be displayed if the IQ DP-4000 is configured as a 3-wire system.

*Note: When external voltage transformers are used, the nominal AC line voltage setting indicates the voltage present on the secondary terminals of the PTs. Also, L-N voltages will not be displayed if the unit is configured as a three-wire.*

Switch **SW1 Nos. 3, 4, 5, and 6** specify the nominal AC line voltage. Set the switches according to Table 5.F. Follow the table's line-to-line column when the wiring configuration of the AC line is 3-wire. Use the line-to-neutral column when the AC line configuration is 4-wire.

■= OFF ❑ = ON

| Voltages (Nominal) | | SW1 Switch Settings | | | |
|---|---|---|---|---|---|
| Line-to-Line | Line-to-Neutral | No. 3 | No. 4 | No. 5 | No. 6 |
| 110 | 64 | ■ | ■ | ■ | ■ |
| 120 | 69 | ❑ | ■ | ■ | ■ |
| 208 | 120 | ■ | ❑ | ■ | ■ |
| 220 | 127 | ❑ | ❑ | ■ | ■ |
| 240 | 138 | ■ | ■ | ❑ | ■ |
| 380 | 219 | ❑ | ■ | ❑ | ■ |
| 416 | 240 | ■ | ❑ | ❑ | ■ |
| 460 | 266 | ❑ | ❑ | ❑ | ■ |
| 480 | 277 | ■ | ■ | ■ | ❑ |
| 575 | 332 | ❑ | ■ | ■ | ❑ |
| 600 | 336 | ■ | ❑ | ■ | ❑ |
| 600 | 336 | Any other selection | | | |

***Table 5.F AC Line Voltage***

## 5.6 VOLTAGE TRANSFORMER RATIO SETPOINT

Some systems may include optional, user-provided potential voltage transformers (this is required above 600V). You must take these ratios into account by using switch **SW1 No. 7**, and the eight switch settings for **SW2 Nos. 1 to 8**. See Appendix A for a listing of the available PT ratios, and their corresponding settings.

## 5.7 CURRENT TRANSFORMER PRIMARY SETPOINT

The primary winding of the user-provided external current transformers can vary from 5 amps to 12,800 amps; the secondary winding is assumed to be 5 amps. Switch **SW1 No. 8**, and the eight switch settings **SW3 Nos. 1 to 8**, must correspond to the external current transformer's primary rating. See Appendix A for a listing of the available CT primary ratings, and their corresponding settings.

## 5.8 PHASE SEQUENCE SETPOINT

The IQ DP-4000 can be programmed to correspond to either a nominal ABC or CBA sequence, by a single switch **SW4 No. 1**. A power system with an ABC sequence has phase A leading phase B by 120 degrees, and phase B leading phase C by 120 degrees. A system with a CBA sequence has phase C leading phase B by 120 degrees, and phase B leading phase A by 120 degrees.

Set switch **SW4 No. 1** in the:

- OFF position for an ABC sequence
- ON position for a CBA sequence

## 5.9 DEMAND SETPOINTS

If you set up the IQ DP-4000 to use an internal sync pulse (see Section 5.15.2), you must determine the type of demand, and time interval for the demand window. The present demand and peak demand are computed for the following parameters:

- Current Related Parameters. For the current related parameters, the demand calculation is always based on a fixed window. Section 5.9.3 describes programming the current demand times. The current related parameters are:

  - $I_A$ Amps
  - $I_B$ Amps
  - $I_C$ Amps

- Power Related Parameters. For the power related parameters, the demand can be based on either a fixed or sliding window. See Section 5.9.1 for selecting a fixed or sliding demand window and Section 5.9.2 for programming the power related demand times. The power related parameters are:

  - Watts
  - Vars
  - VA

### *5.9.1 Power Demand, Fixed/Sliding*

The IQ DP-4000 is programmed for the power related demand to correspond to either a fixed or sliding window.

- Fixed Power Demand. With a fixed demand window, the demand calculation is based on, and updated at, the user-selected time interval. For example, if you select a 15-minute demand window, a new demand will compute every 15 minutes, based on the energy used during the last 15 minutes.
- Sliding Power Demand. For a sliding window, the demand calculation is based on the user-selected interval time, and is updated every minute. For example, if you select a 15-minute demand window, the calculated demand is based upon the previous 15 minutes, but is updated every minute.

Set the power related demand by using **SW4 No. 2**.

Place the switch in the:

- OFF position for the sliding power demand window
- ON position for the fixed power demand window

### *5.9.2 Power Demand Time Interval*

Switch **SW4 Nos. 3, 4, and 5** determine the time interval, in minutes, that the consumption sampling for the power related demand calculations are based. Table 5.G shows the settings for selecting the power demand interval.

■= OFF ❑ = ON ░ = Not Applicable

| Time Interval (minutes) | SW4 Settings | | |
|---|---|---|---|
| | No. 3 | No. 4 | No. 5 |
| 5 | ■ | ■ | ■ |
| 10 | ❑ | ■ | ■ |
| 15 | ■ | ❑ | ■ |
| 20 | ❑ | ❑ | ■ |
| 25 | ■ | ■ | ❑ |
| 30 | ❑ | ■ | ❑ |
| 45 | ■ | ❑ | ❑ |
| 60 | ❑ | ❑ | ❑ |

***Table 5.G Power Demand Intervals for Watts, Vars and VA***

### *5.9.3 Current Demand Time Interval*

Switch **SW4 Nos. 6, 7, and 8** determine the time interval, in minutes, that the consumption sampling for the current related demand calculations are based. Table 5.H shows the settings for selecting the current demand time intervals.

■= OFF ❑ = ON

| Time Interval (minutes) | SW4 Settings | | |
|---|---|---|---|
| | No. 6 | No. 7 | No. 8 |
| 5 | ■ | ■ | ■ |
| 10 | ❑ | ■ | ■ |
| 15 | ■ | ❑ | ■ |
| 20 | ❑ | ❑ | ■ |
| 25 | ■ | ■ | ❑ |
| 30 | ❑ | ■ | ❑ |
| 45 | ■ | ❑ | ❑ |
| 60 | ❑ | ❑ | ❑ |

***Table 5.H Demand Sampling Interval for $I_A$, $I_B$, and $I_C$***

## 5.10 ENERGY SETPOINTS

### *5.10.1 Reset Energy from Faceplate Setpoint*

This setpoint enables or prevents you from resetting the energy values (Watt-hours, Var-hours, and VA-hours) from the faceplate. Set Switch **SW5 No. 1** in the:

- OFF position to prevent resetting an energy value from the faceplate
- ON position to enable resetting at the faceplate. To reset an energy value from the faceplate, you select the parameter (Metered Watt-hours, Var-hours, or VA-hours), and then hold down the Reset button until the value is 0.

### *5.10.2 Energy Resolution*

The IQ DP-4000 can be programmed to display energy readings in KILO or MEGA energy units. A single switch **SW5 No. 2** sets the energy resolution. The energy value rolls-over to zeros when it exceeds 999999.

Set switch **SW5 No. 2** in the:

- OFF position for KILO energy units
- ON position for MEGA energy units

## 5.11 VAR/POWER FACTOR SIGN CONVENTION SETPOINT

This setpoint selects the sign convention (+ or -) for the Var and the Power Factor values. The sign conventions can be either negative or positive.

- A negative sign convention corresponds to:
  - Inductive Load = Negative Var and Power Factor Values (Lagging Power Factor)
  - Capacitive Load = Positive Var and Power Factor Value(Leading Power Factor)
- A positive sign convention corresponds to:
  - Inductive Load = Positive Var and Power Factor Values (Lagging Power Factor)
  - Capacitive Load = Negative Var and Power Factor Values (Leading Power Factor)

Power engineers typically use the positive sign convention as the standard convention; the negative sign convention is mathematically correct.

Figures 3.2 and 3.3 illustrate the two Var and Power Factor sign conventions.

Set Switch **SW5 No. 6** in the:

- OFF position for a negative sign convention
- ON position for a positive sign convention

## 5.12 ALARM FUNCTIONS - GENERAL

The DP-4000 has two independent alarms, Alarm 1 and Alarm 2. The faceplate of the IQ DP-4000 has two LEDs to indicate the state of each of these alarms. A "steady-on" LED indicates an active alarm. If the optional I/O module is installed, the relays will change state when the corresponding alarm LED is illuminated. Both of the alarms have the features outlined in Table 5.C.

### *5.12.1 Relay Modes Alarm Setpoint*

This setpoint is used only if the IQ DP-4000 is equipped with the optional I/O module. Select one of two different alarm relay reaction modes in response to a number of operating conditions. These are:

- Mode 1. Alarm relay is de-energized normally and energizes during an alarm condition
- Mode 2. Alarm relay is energized normally and de-energizes during a loss of AC control power

You must select one of these two modes for each alarm. Your choice depends on the desired effect of an AC power loss on an application, as described in Paragraphs 5.12.13.1 and 5.12.13.2. See Table 5.I for setting the alarm modes for the relays.

#### *5.12.1.1 Mode 1*

When alarm mode 1 is selected, the alarm relay will energize only on an alarm condition. The alarm relay is in the de-energized state:

- When the IQ DP-4000 is not powered
- During normal operation, with no alarms active (the corresponding Alarm LED is not "steady-on" when viewing from the faceplate)

During **normal operation**, when the alarm relay is in the de-energized state, the **normally-closed contacts are closed**.

When an alarm occurs, the normally-closed contacts open, and the normally open contacts close. The advantage of this mode of operation is that if a failure of the IQ DP-4000 occurs (a loss of power), the relay will remain in the same state, as if no alarms are active.

*Note: It is your responsibility to choose the NO/NC pair of Alarm Relay contact to perform the desired operation.*

#### *5.12.1.2 Mode 2*

When alarm mode 2 is selected, the alarm relay will energize after initial power up and de-energize on a trip condition. The alarm relay is in the energized state. This occurs when:

- After the normal AC power-up sequence
- During normal operation, with no alarms active (the corresponding Alarm LED is not "steady-on" when viewing from the faceplate)

During **normal operation**, when the alarm relay is in the energized state, the **normally-closed contacts are open**.

When an alarm occurs, the normally-closed contacts close, and the normally-open contacts open.

The advantage of this mode of operation is that if a failure of the IQ DP-4000 occurs (a loss of power), the relay will change state, as if an alarm occurs.

| Alarm 1 | Alarm 2 | Position |
|---|---|---|
| SW6 No. 1 | SW7 No. 1 | OFF for Mode 1<br>ON for Mode 2 |

***Table 5.I Alarm Relay Mode Setting***

### *5.12.2 Latched/Unlatched (Auto-reset) Alarm Setpoint*

This setpoint allows the IQ DP-4000 to operate in one of two ways - the latched mode or the unlatched mode.

See Table 5.J for setting this option.

- Latched Mode. In the latched mode, you can only reset an active alarm manually (either from the faceplate, the reset input, or over IMPACC). The alarm **will not** automatically clear once the reset conditions are met. If the alarm condition still exists, you cannot reset the alarm unless you disable it.
- Unlatched Mode (auto-reset). If an alarm occurs, the DP-4000 will automatically reset the alarm when the reset conditions are met, based on the program settings (for example, reset thresholds and reset delays). The DP-4000 will not reset if the alarm condition still exists.

| Alarm 1 | Alarm 2 | Position |
|---|---|---|
| SW6 No. 2 | SW7 No. 2 | OFF for Unlatched |
| | | ON for Latched |

***Table 5.J Latched/Unlatched Settings***

### *5.12.3 Activate on Overvoltage Alarm Setpoint*

This setpoint activates the selected alarm on an overvoltage condition. When enabled, the IQ DP-4000 compares the metered line-to-line voltage of each phase to the overvoltage detection level (see Section 5.12.12), and activates the alarm if the threshold is exceeded for a time greater than the alarm delay on any phase (see Section 5.12.10). See Table 5.K for setting this option.

| Alarm 1 | Alarm 2 | Position |
|---|---|---|
| SW6 No. 3 | SW7 No. 3 | OFF disables Activate on Overvoltage |
| | | ON enables Activate on Overvoltage |

***Table 5.K Activate on Overvoltage Settings***

### *5.12.4 Activate on Undervoltage Alarm Setpoint*

This setpoint activates the selected alarm on an undervoltage condition. If enabled, the IQ DP-4000 compares the metered line-to-line voltage of each phase to the undervoltage detection level (see Section 5.12.13), and activates the alarm if the metered voltage is below the threshold for a time greater than the alarm delay on any phase (see Section 5.12.10). See Table 5.L for setting this option.

| Alarm 1 | Alarm 2 | Position |
|---|---|---|
| SW6 No. 4 | SW7 No. 4 | OFF disables Activate on Undervoltage |
| | | ON enables Activate on Undervoltage |

***Table 5.L Activate on Undervoltage Settings***

### *5.12.5 Activate on Voltage Phase Loss Alarm Setpoint*

This setpoint activates the selected alarm on a voltage phase loss condition. A voltage phase loss occurs when the line-to-line voltage on any phase is less than 50% of the nominal line voltage.

When this alarm is set, the IQ DP-4000 compares the metered voltage to 50% of the selected nominal voltage (see Section 5.5), and activates the alarm if a voltage phase loss exists for a time greater than the alarm delay (see Section 5.12.10). See Table 5.M for setting this option.

| Alarm 1 | Alarm 2 | Position |
|---|---|---|
| SW6 No. 5 | SW7 No. 5 | OFF disables Activate on Voltage Phase Loss |
| | | ON enables Activate on Voltage Phase Loss |

***Table 5.M Activate on Voltage Phase Loss Settings***

### *5.12.6 Activate on Voltage Phase Unbalance Alarm Setpoint*

This setpoint activates the alarm on a voltage phase unbalance condition. The IQ DP-4000 compares the metered voltage to the voltage phase unbalance detection level (see Section 5.12.14), and activates the alarm if the maximum deviation between any two phases of the metered voltage exceeds the threshold for longer than the alarm delay (see Section 5.12.10). Table 5.N shows the settings for this option.

| Alarm 1 | Alarm 2 | Position |
|---|---|---|
| SW6 No. 6 | SW7 No. 6 | OFF disables Activate on Voltage Phase Unbalance |
| | | ON enables Activate on Voltage Phase Unbalance |

***Table 5.N Activate on Voltage Phase Unbalance Settings***

### *5.12.7 Activate on Voltage Phase Reversal Alarm Setpoint*

This setpoint activates the alarm on a voltage phase reversal condition. The IQ DP-4000 compares the phase rotation of the metered voltages to the selected phase sequence of the system (see Section 5.8), and activates the alarm if the order of the phases does not correspond for longer than the alarm delay (see Section 5.12.10). See Table 5.O for setting this option.

| Alarm 1 | Alarm 2 | Position |
|---|---|---|
| SW6 No. 7 | SW7 No. 7 | OFF disables Activate on Voltage Phase Reversal |
| | | ON enables Activate on Voltage Phase Reversal |

***Table 5.O Activate on Voltage Phase Reversal Settings***

### *5.12.8 Activate on Current Phase Loss Alarm Setpoint*

This setpoint allows the selected alarm to activate on a current phase loss condition. A current phase loss occurs when the current on any one phase is less than 6.25% of the largest current of the other 2 phases. The IQ DP-4000 activates the alarm if a current phase loss exists for longer than the alarm delay (see Section 5.12.10). Table 5.P shows the settings for this option.

| Alarm 1 | Alarm 2 | Position |
|---|---|---|
| SW6 No. 8 | SW7 No. 8 | OFF disables Activate on Current Phase Loss |
| | | ON enables Activate on Current Phase Loss |

***Table 5.P Activate on Current Phase Loss Settings***

### *5.12.9 Enable/Disable Alarm Setpoint*

The alarms disable or enable with a single switch (see Table 5.Q). When you select OFF, the alarm will not activate on any of the six conditions, regardless of the other setpoints. An IMPACC external alarm will, however, activate the alarm.

| Alarm 1 | Alarm 2 | Position |
|---|---|---|
| SW8 No. 1 | SWA No. 1 | OFF to disable alarm<br>ON to enable alarm |

***Table 5.Q Enable/Disable Alarm***

### *5.12.10 Alarm Delay Setpoint*

To determine how long a condition exists before an alarm activates, you must set the alarm delay. Both alarms have an independent alarm delay; however, the delay setting is common to all six alarm conditions.

The alarm delay times how long the condition is continuously above any active alarm threshold, and activates the alarm when the preset time is exceeded. The timer resets when the condition is below the alarm threshold. See Table 5.R for setting the alarm delays.

■= OFF ❑ = ON

| Alarm 1 | | | Alarm 2 | | | Delay |
|---|---|---|---|---|---|---|
| SW8 No. 2 | SW8 No. 3 | SW8 No. 4 | SWA No. 2 | SWA No. 3 | SWA No. 4 | **Time** (seconds) |
| ■ | ■ | ■ | ■ | ■ | ■ | 1 |
| | ■ | ■ | | ■ | ■ | 2 |
| ■ | | ■ | ■ | | ■ | 3 |
| | | ■ | | | ■ | 4 |
| ■ | ■ | | ■ | ■ | | 5 |
| | ■ | | | ■ | | 10 |
| ■ | | | ■ | | | 15 |
| | | | | | | 20 |

***Table 5.R Alarm Delay Settings***

### *5.12.11 Alarm Reset Delay Setpoint*

For the reset delay, the IQ DP-4000 determines how long the condition must be corrected before the corresponding alarm is reset. Both alarms have an independent reset delay; however, the delay setting is common to all six alarm conditions.

The reset delay measures how long the condition is continuously within the reset threshold, and clears the alarm only when the preset delay time is exceeded. The delay timer resets to zero when the condition is no longer within the alarm reset threshold. See Table 5.S to set the alarm reset delays.

■= OFF ❑ = ON

| Alarm 1 | | | Alarm 2 | | | Delay |
|---|---|---|---|---|---|---|
| SW8 No. 5 | SW8 No. 6 | SW8 No. 7 | SWA No. 5 | SWA No. 6 | SWA No. 7 | **Time** (seconds) |
| ■ | ■ | ■ | ■ | ■ | ■ | 1 |
| | ■ | ■ | | ■ | ■ | 5 |
| ■ | | ■ | ■ | | ■ | 10 |
| | | ■ | | | ■ | 20 |
| ■ | ■ | | ■ | ■ | | 30 |
| | ■ | | | ■ | | 60 |
| ■ | | | ■ | | | 90 |
| | | | | | | 120 |

***Table 5.S Reset Delay Settings***

### *5.12.12 Overvoltage Detection Level Alarm Setpoint*

This setpoint activates the alarm on an overvoltage condition (see Section 5.12.3). You must determine the overvoltage detection level. The overvoltage detection level is selected as a larger percentage of the nominal AC line voltage (see Section 5.5).

If the sampled voltage is greater than the overvoltage detection level for longer than the alarm delay (see Section 5.12.10), the enabled alarm activates. See Table 5.T for setting the overvoltage detection level.

■= OFF ❑ = ON

| Alarm 1 | | | Alarm 2 | | | Detection Level |
|---|---|---|---|---|---|---|
| SW8 No. 8 | SW9 No. 1 | SW9 No. 2 | SWA No. 8 | SWB No. 1 | SWB No. 2 | % |
| ■ | ■ | ■ | ■ | ■ | ■ | 105 |
| ❑ | ■ | ■ | ❑ | ■ | ■ | 110 |
| ■ | ❑ | ■ | ■ | ❑ | ■ | 115 |
| ❑ | ❑ | ■ | ❑ | ❑ | ■ | 120 |
| ■ | ■ | ❑ | ■ | ■ | ❑ | 125 |
| ❑ | ■ | ❑ | ❑ | ■ | ❑ | 130 |
| ■ | ❑ | ❑ | ■ | ❑ | ❑ | 135 |
| ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | 140 |

*Table 5.T Overvoltage Detection Level Settings*

### 5.12.13 Undervoltage Detection Level Setpoint

The undervoltage detection level is a lower percentage of the nominal AC line voltage. When the alarm is set to activate on an undervoltage, you must determine the detection level. See Sections 5.5 and 5.12.4.

The alarm activates when the sampled voltage is less than the undervoltage detection level for longer than the alarm delay (see Section 5.12.10).

■= OFF ❑ = ON

| Alarm 1 | | | Alarm 2 | | | Detection Level |
|---|---|---|---|---|---|---|
| SW9 No. 3 | SW9 No.4 | SW9 No. 5 | SWB No. 3 | SWB No. 4 | SWB No. 5 | % |
| ■ | ■ | ■ | ■ | ■ | ■ | 60 |
| ❑ | ■ | ■ | ❑ | ■ | ■ | 65 |
| ■ | ❑ | ■ | ■ | ❑ | ■ | 70 |
| ❑ | ❑ | ■ | ❑ | ❑ | ■ | 75 |
| ■ | ■ | ❑ | ■ | ■ | ❑ | 80 |
| ❑ | ■ | ❑ | ❑ | ■ | ❑ | 85 |
| ■ | ❑ | ❑ | ■ | ❑ | ❑ | 90 |
| ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | 95 |

*Table 5.U Undervoltage Detection Level Settings*

### 5.12.14 Voltage Phase Unbalance Detection Level Alarm Setpoint

If the selected alarm has been set to activate on a voltage phase unbalance (see Section 5.12.6), you must determine the voltage phase unbalance detection level. A voltage phase unbalance is calculated by taking the maximum voltage deviation between any two phases and comparing that voltage to a percentage of the nominal AC line voltage.

If the sampled voltage deviation is greater than the voltage phase unbalance detection level for longer than the alarm delay (see Section 5.12.10), the alarm activates. See Table 5.V for setting the voltage phase unbalance detection level.

■= OFF ❑ = ON

| Alarm 1 | | | Alarm 2 | | | Detection Level |
|---|---|---|---|---|---|---|
| SW9 No. 6 | SW9 No. 7 | SW9 No. 8 | SWB No. 6 | SWB No. 7 | SWB No. 8 | % |
| ■ | ■ | ■ | ■ | ■ | ■ | 5 |
| ❑ | ■ | ■ | ❑ | ■ | ■ | 10 |
| ■ | ❑ | ■ | ■ | ❑ | ■ | 15 |
| ❑ | ❑ | ■ | ❑ | ❑ | ■ | 20 |
| ■ | ■ | ❑ | ■ | ■ | ❑ | 25 |
| ❑ | ■ | ❑ | ❑ | ■ | ❑ | 30 |
| ■ | ❑ | ❑ | ■ | ❑ | ❑ | 35 |
| ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | 40 |

*Table 5.V Voltage Phase Unbalance Detection Level Settings*

### 5.12.15 Alarm Reset Threshold Setpoint

The IQ DP-4000 has three alarm conditions with programmable thresholds:

- overvoltage
- undervoltage
- voltage phase unbalance

You must set the levels for the IQ DP-4000 alarm to reset. Both alarms have an independent reset threshold; however, the reset threshold is common to all three alarm conditions.

The reset threshold is based on the detection levels set for the alarm conditions, as well as the nominal AC line voltage. The reset thresholds are described for each of the three programmable alarm conditions. See Table 5.W for setting the reset threshold.

■= OFF ❑ = ON

| Alarm 1 | | | Alarm 2 | | | Reset Level, |
|---|---|---|---|---|---|---|
| SWC No. 1 | SWC No. 2 | SWC No. 3 | SWC No. 4 | SWC No. 5 | SWC No. 6 | % |
| ■ | ■ | ■ | ■ | ■ | ■ | 0 |
| ❑ | ■ | ■ | ❑ | ■ | ■ | 10 |
| ■ | ❑ | ■ | ■ | ❑ | ■ | 20 |
| ❑ | ❑ | ■ | ❑ | ❑ | ■ | 30 |
| ■ | ■ | ❑ | ■ | ■ | ❑ | 40 |
| ❑ | ■ | ❑ | ❑ | ■ | ❑ | 50 |
| ■ | ❑ | ❑ | ■ | ❑ | ❑ | 75 |
| ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | 100 |

***Table 5.W Reset Threshold Settings***

### *5.12.15.1 Overvoltage Reset Threshold*

To determine the threshold level to reset the overvoltage, find the voltage when an overvoltage alarm will occur. This is the nominal AC line voltage (see Section 5.5) multiplied by the overvoltage detection level (see Section 5.12.12). Figure 5.1 illustrates the overvoltage set and reset levels.

The reset voltage is a percentage of the difference (0 to 100%) between the nominal voltage and the overvoltage detection level, as determined by the reset threshold. You can calculate this by:

OVR = OVDL - RST x (OVDL - NOM)

where

OVR = Overvoltage Reset (Volts)

RST = Reset Threshold

OVDL = Overvoltage Detection Level (Volts)

NOM = Nominal AC line Voltage (Volts)

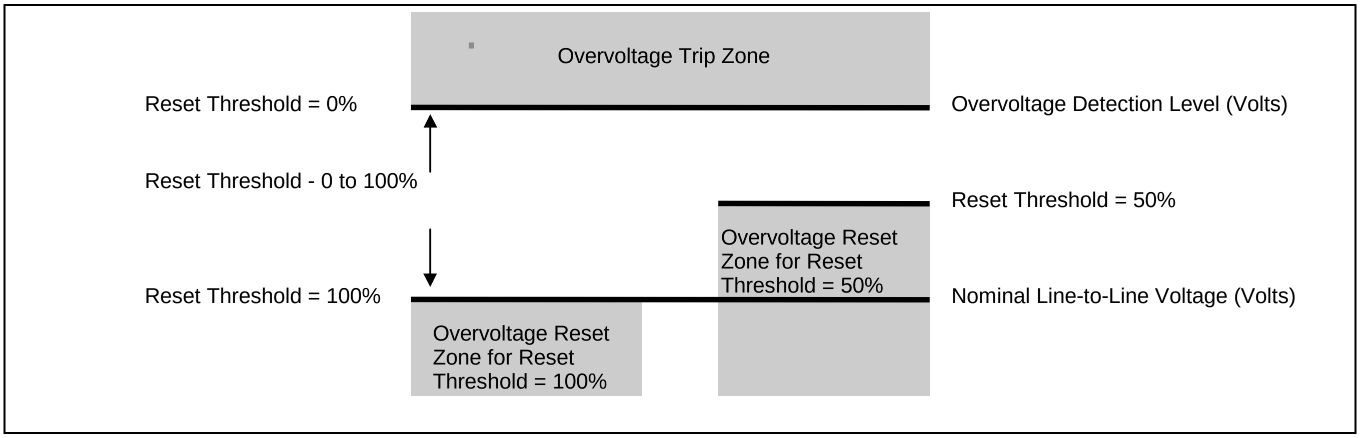


***Figure 5.1 Overvoltage Detection and Reset Levels***

**Example 1**

A system has the following settings:

Nominal AC Line Voltage = 208 V

Overvoltage Detection Level = 125%

Reset Threshold = 75%

For this system an overvoltage alarm will occur at:

208V x 125% = 260V

The overvoltage alarm will reset at:

260V - 75% x (260V - 208V)

= 260V - 75% x (52V)

= 260V - 39V = 221V

In this example, the overvoltage alarm will not reset until the system voltage is below 221V.

**Example 2**

A system has the following settings:

Nominal AC Line Voltage = 480 V

Overvoltage Detection Level = 110%

To determine the Reset Threshold setting for the overvoltage alarm to reset below 504 V:

The overvoltage alarm will occur at

480V x 110% = 528 V

504V = 528V - RST% x (528V - 480V)

504V = 528V - RST% x (48V)

RST% x (48V) = 528V - 504V = 24V

RST% = 24V / 48V = 0.50

In this case, set the reset threshold to 50%

*5.12.15.2 Undervoltage Reset Threshold*

To determine where to reset an undervoltage alarm, find the voltage where the undervoltage alarm occurs. This voltage is the nominal AC line voltage (see Section 5.5) multiplied by the undervoltage detection level (see Section 5.12.13).

The reset voltage is a percentage of the difference (0 to 100%) between the nominal Voltage and the undervoltage detection level, as determined by the reset threshold. Compute this by:

UVR = UVDL+ RST x (NOM - UVDL)

where

UVR = Undervoltage Reset (Volts)

UVDL = Undervoltage Detection Level (Volts)

RST = Reset Threshold

NOM = Nominal AC line Voltage (Volts)

Figure 5.2 illustrates the undervoltage detection and reset levels.

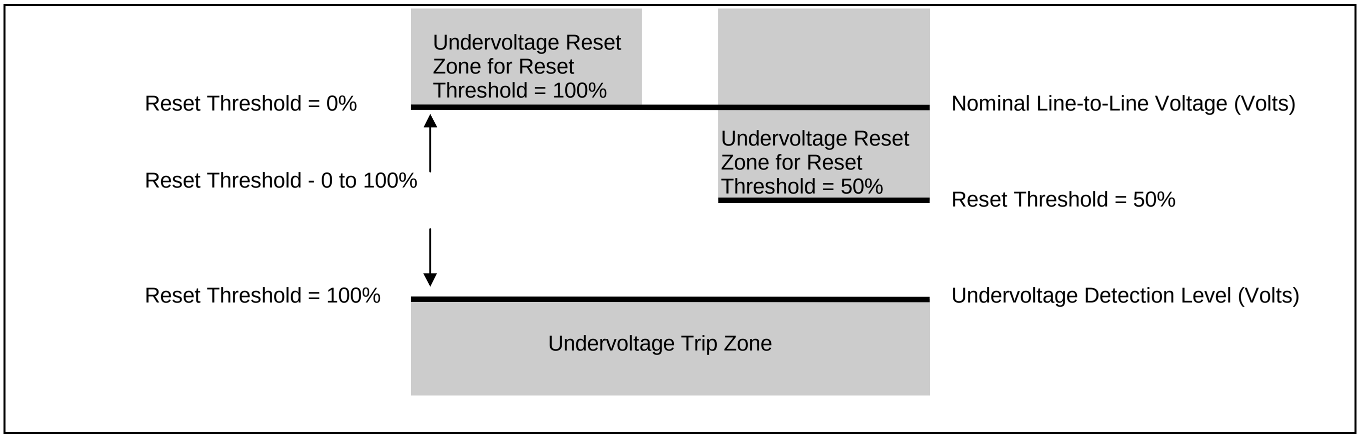


***Figure 5.2 Undervoltage Detection and Reset Levels***

**Example 1**

A system has the following settings:

Nominal AC Line Voltage = 208 V

Undervoltage Detection Level = 80%

Reset Threshold = 75%

For this system: An undervoltage alarm will occur at

208V x 80% = 166V

The undervoltage alarm will reset at

166V + 75% x (208V - 166V)

= 166V + 75% x (42V)

= 166V + 32V = 198V

In this example, the undervoltage alarm will not reset until the system voltage is above 198V.

**Example 2**

A system has the following settings:

Nominal AC Line Voltage = 480 V

Undervoltage Detection Level = 75%

Determine the reset threshold setting for the undervoltage alarm to reset above 420 V. The undervoltage alarm occurs at:

480V x 75% = 360 V

420V = 360V + RST% x (480V - 360V)

420V = 360V + RST% x (120V)

RST% x (120V) = 420V - 360V = 60V

RST% = 60V / 120V = 0.50

In this case, set the reset threshold to 50% .

*5.12.15.3 Voltage Phase Unbalance Reset Threshold*

A voltage phase unbalance occurs when the maximum voltage deviation between two phases is greater than a percentage of the nominal AC line voltage. To find the voltage level, calculate where a voltage phase unbalance alarm will occur. To do this, multiply the nominal AC line voltage (see Section 5.5) by the voltage phase unbalance detection level (see Section 5.12.14).

The reset voltage is a percentage of the difference (100 to 0%) between zero volts (all of the phases being equal in voltage) and the voltage phase unbalance detection level, as determined by the reset threshold. Compute this by:

VPU = MVD - MVD x RST

where

VPU = Voltage Phase Unbalance Reset (Volts)

MVD = Maximum Voltage Deviation where a Phase Unbalance Alarm occurs (Volts)

RST = Reset Threshold

Figure 5.3 illustrates the voltage phase unbalance detection and reset levels.

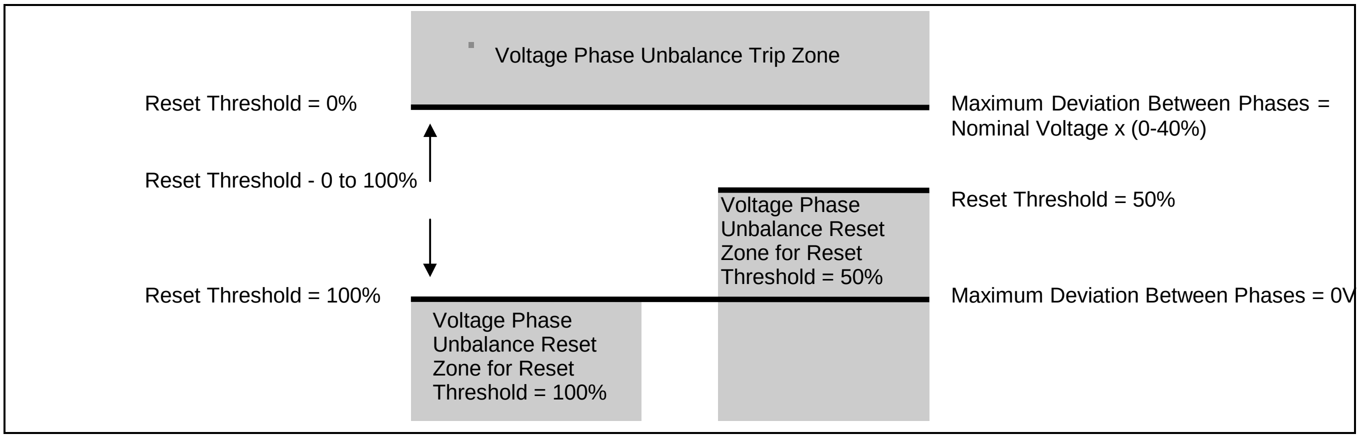


***Figure 5.3 Voltage Phase Unbalance Detection and Reset Levels***

**Example 1**

A system has the following settings:

Nominal AC Line Voltage = 208 V

Voltage Phase Unbalance Detection Level = 15%

Reset Threshold = 75%

For this system a voltage phase unbalance alarm occurs when any 2 phases have a voltage difference greater than:

208V x 15% = 31V

The voltage phase unbalance alarm resets when all 3 phases are within:

31V - ( 31V x 75%) = 8V of each other

**Example 2**

A system has the following settings:

Nominal AC Line Voltage = 480 V

Voltage Phase Unbalance Detection Level = 25%

Determine the reset threshold setting for the voltage phase unbalance alarm to reset when all 3 phases of voltage are within 84V of each other: The voltage phase unbalance alarm will occur when any 2 phases have a voltage difference greater than:

480V x 25% = 120V

84V = 120V - 120V x RST

120V x RST = 120V - 84V

120V x RST = 36V

RST = 36V / 120V = 0.3

In this case, set the reset threshold to 30% .

## 5.13 IMPACC PROGRAMMABLE SETPOINT

You can allow programming of the IQ DP-4000 using IMPACC with this setpoint. You must enable this setpoint in order to download information to the IQ DP-4000 from Cutler Hammer's Series III software. Set Switch **SWC No. 7** in the:

- OFF position to disable programming of the DP-4000 via IMPACC
- ON position to enable programming of the DP-4000 via IMPACC

If disabled, the DP-4000 will continue to communicate over IMPACC, although you cannot change the setpoints remotely.

## 5.14 DP-4000 / DP-2 MODE SETPOINT

This setpoint allows the DP-4000 to communicate over Cutler-Hammer's Integrated Monitoring, Protection and Control Communications System (IMPACC) either as a DP-4000 or as a Data Plus II (DP2). This setpoint affects communications only. It does not affect the operation of the unit. This allows DP-4000 compatibility with older, existing systems. Set Switch **SWC No. 8** in the:

- OFF position to communicate as a Data Plus II
- ON position to communicate as a DP-4000

## 5.15 OPTIONAL I/O SETPOINTS

These setpoints are relevant only if the IQ DP-4000 is equipped with the optional I/O module.

### *5.15.1 Discrete Input Setup Setpoint*

*Note: This setpoint is relevant only if the IQ DP-4000 is equipped with the optional I/O module.*

The IQ DP-4000 discrete input is configured to either a sync pulse input or a reset input. Set Switch **SW5 No. 7** in the:

- OFF position to function as a sync pulse
- ON position to have the discrete input function as a reset input

If the discrete input is set up as a sync pulse input, a dry contact closure across the terminal blocks of the discrete input will cause the start of a new demand window. The sync window time can be variable or fixed, determined by setting the sync pulse setpoint (see 5.15.3).

If the discrete input is set up as a reset input, a dry contact closure across the terminal blocks of the discrete input will attempt to reset an active alarm. (This is identical to using the Reset pushbutton when resetting an alarm.)

### *5.15.2 Sync Pulse Setpoint*

*Note: This setpoint is relevant only if the IQ DP-4000 is equipped with the optional I/O module.*

The IQ DP-4000 is designed to calculate the demand either by an internal synchronizing timer or by an external signal.

Set Switch **SW5 No. 8** in the:

- OFF position to calculate demand based on an external signal (see Section 5.15.1 - Discrete Input Setup)
- ON position to calculate demand based on a pre-programmed time (see Section 5.9 - Demand Parameters)

### *5.15.3 Pulse Initiator/Load Shed Setpoint*

The IQ DP-4000 has a relay which can be programmed based on the amount of power and energy measured. The pulse initiator function tracks the amount of energy measured and the load shed function changes the state of a relay when a predetermined power threshold is exceeded.

Set Switch **SWD No. 1** in the:

- OFF position to use relay for the pulse initiator function (see Section 5.15.3.1)
- ON position to use relay for the load shed function (see Section 5.15.3.4)

#### *5.15.3.1 Pulse Initiator Settings, Parameter Selection*

The pulse initiator changes the state of the pulse initiator relay at a rate proportional to the amount of energy the IQ DP-4000 measures, based on a user-selected energy parameter and pulse rate. Select one of the following parameters to track with the pulse initiator:

- Watt-hours (positive or negative)
- Var-hours (positive or negative)
- VA-hours

See Table 5.X for selecting the energy parameter.

■= OFF ❑ = ON

| Energy Parameter | SWD Settings | | |
|---|---|---|---|
| | No. 2 | No. 3 | No. 4 |
| Positive Watt-hours | | ■ | ■ |
| Negative Watt-hours | ■ | | ■ |
| Positive Var-hours | | | ■ |
| Negative Var-hours | ■ | ■ | |
| VA-hours | | ■ | |
| Invalid | Any Other Selection | | |

***Table 5.X Pulse Initiator Parameter Selection Settings***

*5.15.3.2 Load Shed Settings, Range Selection*

Two ranges are associated with the load shed feature: a Load Shed range and a Restore Load range. Both ranges are set as a percentage of the nominal values for the system. When the Load Shed range is exceeded, the relay activates. This relay remains active until the value of the selected parameter drops below the Restore Load range.

The nominal system voltage is explained in Section 5.5.

The nominal system current is the value selected for the CT primary (Section 5.7).

The nominal system power is the product of the nominal system voltage and nominal system current. See Table 5.Y for setting the load shed and restore load ranges.

■= OFF ❑ = ON

| Ranges | Switch Settings | | | | | |
|---|---|---|---|---|---|---|
| Load Shed, % of nominal | Select Switch | SWE | SWE | SWE | SWE | SWD | SWD |
| | Setpoint Switch | No. 1 | No. 2 | No. 3 | No. 4 | No. 5 | No. 6 |
| Restore Load, % of nominal | Select Switch | SWE | SWE | SWE | SWE | SWD | SWD |
| | Setpoint Switch | No. 5 | No. 6 | No. 7 | No. 8 | No. 7 | No. 8 |
| 10 | | ■ | ■ | ■ | ■ | ■ | ■ |
| 12 | | ❑ | ■ | ■ | ■ | ■ | ■ |
| 14 | | ■ | ❑ | ■ | ■ | ■ | ■ |
| 16 | | ❑ | ❑ | ■ | ■ | ■ | ■ |
| 18 | | ■ | ■ | ❑ | ■ | ■ | ■ |
| 20 | | ❑ | ■ | ❑ | ■ | ■ | ■ |
| 22 | | ■ | ❑ | ❑ | ■ | ■ | ■ |
| 24 | | ❑ | ❑ | ❑ | ■ | ■ | ■ |
| 26 | | ■ | ■ | ■ | ❑ | ■ | ■ |
| 28 | | ❑ | ■ | ■ | ❑ | ■ | ■ |
| 30 | | ■ | ❑ | ■ | ❑ | ■ | ■ |
| 32 | | ❑ | ❑ | ■ | ❑ | ■ | ■ |
| 34 | | ■ | ■ | ❑ | ❑ | ■ | ■ |
| 36 | | ❑ | ■ | ❑ | ❑ | ■ | ■ |
| 38 | | ■ | ❑ | ❑ | ❑ | ■ | ■ |
| 40 | | ❑ | ❑ | ❑ | ❑ | ■ | ■ |
| 42 | | ■ | ■ | ■ | ■ | ❑ | ■ |
| 44 | | ❑ | ■ | ■ | ■ | ❑ | ■ |
| 46 | | ■ | ❑ | ■ | ■ | ❑ | ■ |
| 48 | | ❑ | ❑ | ■ | ■ | ❑ | ■ |
| 50 | | ■ | ■ | ❑ | ■ | ❑ | ■ |
| 52 | | ❑ | ■ | ❑ | ■ | ❑ | ■ |
| 54 | | ■ | ❑ | ❑ | ■ | ❑ | ■ |
| 56 | | ❑ | ❑ | ❑ | ■ | ❑ | ■ |
| 58 | | ■ | ■ | ■ | ❑ | ❑ | ■ |
| 60 | | ❑ | ■ | ■ | ❑ | ❑ | ■ |
| 62 | | ■ | ❑ | ■ | ❑ | ❑ | ■ |
| 64 | | ❑ | ❑ | ■ | ❑ | ❑ | ■ |
| 66 | | ■ | ■ | ❑ | ❑ | ❑ | ■ |
| 68 | | ❑ | ■ | ❑ | ❑ | ❑ | ■ |
| 70 | | ■ | ❑ | ❑ | ❑ | ❑ | ■ |
| 72 | | ❑ | ❑ | ❑ | ❑ | ❑ | ■ |
| 74 | | ■ | ■ | ■ | ■ | ■ | ❑ |
| 76 | | ❑ | ■ | ■ | ■ | ■ | ❑ |
| 78 | | ■ | ❑ | ■ | ■ | ■ | ❑ |
| 80 | | ❑ | ❑ | ■ | ■ | ■ | ❑ |
| 82 | | ■ | ■ | ❑ | ■ | ■ | ❑ |

***Table 5.Y Load Shed and Restore Load Settings (continued on next page)***

■= OFF ❑ = ON

| Ranges | Switch Settings | | | | | | |
|---|---|---|---|---|---|---|---|
| Load Shed, % of nominal | Select Switch | SWE | SWE | SWE | SWE | SWD | SWD |
| | Setpoint Switch | No. 1 | No. 2 | No. 3 | No. 4 | No. 5 | No. 6 |
| Restore Load, % of nominal | Select Switch | SWE | SWE | SWE | SWE | SWD | SWD |
| | Setpoint Switch | No. 5 | No. 6 | No. 7 | No. 8 | No. 7 | No. 8 |
| 84 | | ❑ | ■ | ❑ | ■ | ■ | ❑ |
| 86 | | ■ | ❑ | ❑ | ■ | ■ | ❑ |
| 88 | | ❑ | ❑ | ❑ | ■ | ■ | ❑ |
| 90 | | ■ | ■ | ■ | ❑ | ■ | ❑ |
| 92 | | ❑ | ■ | ■ | ❑ | ■ | ❑ |
| 94 | | ■ | ❑ | ■ | ❑ | ■ | ❑ |
| 96 | | ❑ | ❑ | ■ | ❑ | ■ | ❑ |
| 98 | | ■ | ■ | ❑ | ❑ | ■ | ❑ |
| 100 | | ❑ | ■ | ❑ | ❑ | ■ | ❑ |
| 102 | | ■ | ❑ | ❑ | ❑ | ■ | ❑ |
| 104 | | ❑ | ❑ | ❑ | ❑ | ■ | ❑ |
| 106 | | ■ | ■ | ■ | ■ | ❑ | ❑ |
| 108 | | ❑ | ■ | ■ | ■ | ❑ | ❑ |
| 110 | | ■ | ❑ | ■ | ■ | ❑ | ❑ |
| 112 | | ❑ | ❑ | ■ | ■ | ❑ | ❑ |
| 114 | | ■ | ■ | ❑ | ■ | ❑ | ❑ |
| 116 | | ❑ | ■ | ❑ | ■ | ❑ | ❑ |
| 118 | | ■ | ❑ | ❑ | ■ | ❑ | ❑ |
| 120 | | ❑ | ❑ | ❑ | ■ | ❑ | ❑ |
| 122 | | ■ | ■ | ■ | ❑ | ❑ | ❑ |
| 124 | | ❑ | ■ | ■ | ❑ | ❑ | ❑ |
| 126 | | ■ | ❑ | ■ | ❑ | ❑ | ❑ |
| 128 | | ❑ | ❑ | ■ | ❑ | ❑ | ❑ |
| 130 | | ■ | ■ | ❑ | ❑ | ❑ | ❑ |
| 132 | | ❑ | ■ | ❑ | ❑ | ❑ | ❑ |
| 134 | | ■ | ❑ | ❑ | ❑ | ❑ | ❑ |
| 136 | | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |

***Table 5.Y Load Shed and Restore Load Settings***

*5.15.3.3 Load Shed Settings, Parameter Selection*

The load shed feature activates the pulse initiator relay when a user-selected parameter exceeds a preprogrammed range (see Section 5.15.3.2). Select one of the following parameters to monitor:

- Watts - Metered or Demand
- VA - Metered or Demand
- Metered Currents - $I_A$, $I_B$, $I_C$, or average
- Demand Currents- $I_A$, $I_B$, $I_C$, or average

See Table 5.Z for selecting the parameter to monitor with the load shed feature.

■= OFF ❑ = ON

| Parameter Selection | SWF Settings No. 1 | No. 2 | No. 3 | No. 4 |
|---|---|---|---|---|
| Watts, metered | ■ | ■ | ■ | ■ |
| Watts, demand | ❑ | ■ | ■ | ■ |
| VA, metered | ■ | ❑ | ■ | ■ |
| VA, demand | ❑ | ❑ | ■ | ■ |
| $I_A$ Current, metered | ■ | ■ | ❑ | ■ |
| $I_B$ Current, metered | ❑ | ■ | ❑ | ■ |
| $I_C$ Current, metered | ■ | ❑ | ❑ | ■ |
| Ave. Current, metered | ❑ | ❑ | ❑ | ■ |
| $I_A$ Current, demand | ■ | ■ | ■ | ❑ |
| $I_B$ Current, demand | ❑ | ■ | ■ | ❑ |
| $I_C$ Current, demand | ■ | ❑ | ■ | ❑ |
| Ave. Current, demand | ❑ | ❑ | ■ | ❑ |
| Invalid | Any other selection | | | |

***Table 5.Z Load Shed Parameter Selection Settings***

*5.15.3.4 Pulse Initiator Settings, Rate Selection*

For this function, select the rate at which the relay changes state as a value of energy to track with the pulse initiator. For example, if you choose Watt-hours as the parameter to track with the pulse initiator, the IQ DP-4000 will change the state of the relay at every specified interval of Watt-hours. If 50 Watt-hours per Pulse is selected, the relay changes state every time 50 Watt-hours accumulate.

The energy per pulse corresponds to the energy (in units), at the ***secondary*** winding of the PTs and CTs. Therefore, you must consider the user-selected CT and PT ratios when selecting the Energy per Pulse value. See Table 5.AA for selecting the rate at which the pulse initiator relay changes state.

Example: A system has the following configuration:

CT = 1400:5 PT = 240:120

The IQ DP-4000 is monitoring a constant power of 16,800 Watts.

Watt-hours is selected as the parameter for the pulse initiator setting.

The CT ratio is 1400 / 5 = 280

The PT ratio is 240 / 120 = 2

The power at the secondary of the CTs and PTs is:

16,800 Watts / 280 x 2 =

16,800 Watts / 560 =

30 Watts (or 30 Watt-hours in 1 hour)

- If the energy per pulse is set to 1, each pulse will equal 560 Watt-hours.

$$\frac{1400}{5} \times \frac{240}{120} \times 1 = 560 \text{ Watt-hours per pulse.}$$

- If the energy per pulse is set to 7, each pulse will equal 3,920 Watt-hours.

$$\frac{1400}{5} \times \frac{240}{120} \times 7 = 3920 \text{ Watt-hours per pulse.}$$

■= OFF ❑ = ON

| Energy per Pulse | SWF Settings No. 5 | No. 6 | No. 7 | No. 8 |
|---|---|---|---|---|
| 1 | ■ | ■ | ■ | ■ |
| 2 | ❑ | ■ | ■ | ■ |
| 3 | ■ | ❑ | ■ | ■ |
| 4 | ❑ | ❑ | ■ | ■ |
| 5 | ■ | ■ | ❑ | ■ |
| 6 | ❑ | ■ | ❑ | ■ |
| 7 | ■ | ❑ | ❑ | ■ |
| 8 | ❑ | ❑ | ❑ | ■ |
| 9 | ■ | ■ | ■ | ❑ |
| 10 | ❑ | ■ | ■ | ❑ |
| 20 | ■ | ❑ | ■ | ❑ |
| 40 | ❑ | ❑ | ■ | ❑ |
| 50 | ■ | ■ | ❑ | ❑ |
| 60 | ❑ | ■ | ❑ | ❑ |
| 80 | ■ | ❑ | ❑ | ❑ |
| 100 | ❑ | ❑ | ❑ | ❑ |

***Table 5.AA Pulse Initiator Rate Selection Settings***