Use Cases for point 5:

Use Case 1: Starting Insulin Delivery

Name: Starting Insulin Delivery
Primary Actor(s): User
Stakeholders:
User- Initiates and monitors insulin delivery.
Healthcare Provider- Relies on accurate insulin delivery for patient care.
Control IQ Technology- Monitors glucose levels and adjusts insulin delivery.
Pre-condition(s):

- The pump is powered on and unlocked.
- A personal profile with basal rates is configured.
- The pump is not currently delivering insulin.

Success guarantee(s) (Post-conditions):

- Insulin delivery is active.
- The current status screen displays the active basal rate.
- The system logs the start of insulin delivery.

Main success scenario:

1. The user navigates to the "Basal Rate" screen via the options menu.
2. The user selects a basal rate from their active personal profile or manually configures a new rate.
3. The user confirms the selected basal rate.
4. The pump begins delivering insulin at the specified rate.
5. The system logs the start of insulin delivery.

Extensions:

1a. Invalid Basal Rate Configuration

1a1. The user inputs an invalid basal rate (e.g., negative value). The system displays an error and prompts for correction.

4a. Low Glucose Detected

4a1. Control IQ technology detects low glucose levels (below 3.9 mmol/L). The system automatically suspends insulin delivery and logs the event.

Use Case 2: Stopping Insulin Delivery

Name: Stopping Insulin Delivery
Primary Actor(s): User or Control IQ Technology
Stakeholders:
User: Stops insulin delivery manually or monitors automatic stops.
Healthcare Provider: Relies on accurate insulin delivery logs for patient care.
Control IQ Technology: Automatically stops insulin delivery based on glucose levels.
Pre-condition(s):

- The pump is powered on and unlocked.
- Insulin delivery is currently active.

Success guarantee(s) (Post-conditions):

- Insulin delivery is stopped.
- The current status screen reflects the stopped state.
- The system logs the stop event.

Main success scenario:

1. Manual Stop
   1a. The user navigates to the "Basal Rate" screen.
   1b. The user selects the option to stop insulin delivery.
   1c. The pump stops delivering insulin.
   1d. The system logs the stop event.
2. Automatic Stop (Control IQ)
   2a. Control IQ technology detects low glucose levels (below 3.9 mmol/L).
   2b. The pump automatically suspends insulin delivery.
   2c. The system logs the suspension event and displays an alert to the user.

Extensions:

1c. Pump Fails to Stop Delivery

1c1. The pump fails to stop insulin delivery. The system displays an error message and logs the failure.

Use Case 3: Resuming Insulin Delivery

Name: Resuming Insulin Delivery

Primary Actor(s): User

Stakeholders:

User: Resumes insulin delivery after it has been stopped.

Healthcare Provider: Relies on accurate insulin delivery logs for patient care.

Pre-condition(s):

- The pump is powered on and unlocked.
- Insulin delivery was previously stopped (manually or automatically).

Success guarantee(s) (Post-conditions):

- Insulin delivery is active.
- The current status screen reflects the resumed state.
- The system logs the resumption of insulin delivery.

Main success scenario:

1. The user navigates to the "Basal Rate" screen.
2. The user selects the option to resume insulin delivery.
3. The pump resumes delivering insulin at the previously active basal rate or a newly configured rate.
4. The system logs the resumption of insulin delivery.

Extensions:

3a. Pump Fails to Resume Delivery

3a1. The pump fails to resume insulin delivery. The system displays an error message and logs the failure.

Use Cases for point 7:

Use Case 4: Handling Low Battery Alert

Name: Handling Low Battery Alert
Primary Actor(s): User
Stakeholders:
User: Responds to low battery alerts.
Healthcare Provider: Relies on uninterrupted insulin delivery for patient care.
Pre-condition(s):

- The pump is powered on and unlocked.
- The battery level is critically low.

Success guarantee(s) (Post-conditions):

- The pump is charging.
- The low battery alert is cleared once the battery level is sufficient.
- The system logs the low battery event and charging status.

Main success scenario:

1. The pump detects a low battery level and displays an alert on the screen.
2. The user connects the pump to a power source using the provided USB cable.
3. The pump begins charging, and the battery indicator updates in real-time.
4. The system logs the low battery event and charging status.

Extensions:
2a. Pump Not Connected to Power Source
2a1. The pump is not connected to a power source. The alert persists, and the pump may shut down.

Use Case 5: Handling Occlusion Alert

Name: Handling Occlusion Alert
Primary Actor(s): User
Stakeholders:
User: Responds to occlusion alerts.
Healthcare Provider: Relies on accurate insulin delivery logs for patient care.
Pre-condition(s):

- The pump is powered on and unlocked.
- An occlusion (blockage) is detected in the infusion set.

Success guarantee(s) (Post-conditions):

- The occlusion alert is cleared.
- Insulin delivery resumes normally.
- The system logs the occlusion event and resolution.

Main success scenario:

1. The pump detects an occlusion and displays an alert on the screen.
2. The user checks the infusion site for blockages or kinks in the tubing.

3. The user resolves the issue (e.g., replaces the infusion set).
4. The pump resumes normal operation.
5. The system logs the occlusion event and resolution.

Extensions:

3a. Issue Not Resolved

3a1. The issue is not resolved. The alert persists, and insulin delivery remains suspended.

Use Case 6: Handling CGM Disconnection Alert

Name: Handling CGM Disconnection Alert

Primary Actor(s): User

Stakeholders:

User: Responds to CGM disconnection alerts.

Healthcare Provider: Relies on accurate glucose data for patient care.

Pre-condition(s):

- The pump is powered on and unlocked.
- The CGM is disconnected or not transmitting data.

Success guarantee(s) (Post-conditions):

- The CGM disconnection alert is cleared.
- The pump resumes receiving CGM data.
- The system logs the disconnection event and resolution.

Main success scenario:

1. The pump detects a CGM disconnection and displays an alert on the screen.
2. The user checks the CGM device and connection.
3. The user reconnects or troubleshoots the CGM device.
4. The pump resumes receiving CGM data.
5. The system logs the disconnection event and resolution.

Extensions:

3a. CGM Remains Disconnected

3a1. The CGM remains disconnected. The alert persists, and Control IQ technology may not function optimally.

Use Case 7: Handling Pump Shutdown

Name: Handling Pump Shutdown

Primary Actor(s): User

Stakeholders:

User: Responds to critical pump shutdowns.

Healthcare Provider: Relies on accurate insulin delivery logs for patient care.

Pre-condition(s):

- The pump is powered on and unlocked.
- A critical failure (e.g., hardware malfunction) occurs.

Success guarantee(s) (Post-conditions):

- The pump is either restarted or remains shut down.
- The system logs the shutdown event and restart attempts.

Main success scenario:

1. The pump detects a critical failure and shuts down.
2. The system displays a shutdown message and guidance for restarting or contacting support.
3. The user attempts to restart the pump.
4. If the restart is successful, the pump resumes normal operation.
5. If the restart fails, the user contacts technical support.
6. The system logs the shutdown event and restart attempts.

Extensions:

4a. Pump Cannot Be Restarted

4a1. The pump cannot be restarted. The user must switch to manual insulin delivery methods.