FR-E800 VFD

ANTI-SWAY CONTROL QUICK SETUP FOR CRANE & HOIST

1. Preparation

- Ensure you have the crane's specifications: rope length min/max, load weight min/max, and trolley weight (rope length being most important).
- Confirm the VFD model is E800 and supports anti-sway control.

2. Parameter Setup

Pr.1072: DC Brake Judgment Time
- Set the time (0–10 s) from when output frequency drops below DC injection brake frequency to when brake/servo lock starts. (Default: 3 s)

Pr.1073: Anti-Sway Control Operation
- Set to 1 to enable anti-sway control. (Set to 0 to disable)

Pr.1074: Anti-Sway Control Frequency
- Set swinging frequency (0.05–3 Hz) if known.
  (If unknown, set to 9999 to let the inverter estimate based on other parameters)

Pr.1075: Anti-Sway Control Depth
- Adjust notch filter depth (0–3).
  - *0 = Deep (-14 dB)*
  - *3 = Shallow (-4 dB)*
- Start with shallowest value and increase if needed (See 5. Testing and Adjustment Below).

Pr.1076: Anti-Sway Control Width
- Adjust notch filter width (0–3).
  - *0 = Narrow*
  - *3 = Wide*
- Avoid setting too wide; may destabilize system (See 5. Testing and Adjustment Below).

Pr.1077: Rope Length
- Enter actual rope length (0.1–100 m).

Pr.1078: Trolley Weight
- Enter trolley weight (0–50,000 kg).

Pr.1079: Load Weight
- Enter load weight (0–50,000 kg).

3. Operation Notes

- Anti-sway control is disabled during DC injection brake, zero speed control, or servo lock.
- Travel distance may be longer under anti-sway; input stop command earlier to avoid collisions.
- Assign X54 signal to an input terminal (Pr.178–Pr.189) to allow disabling anti-sway via external signal.
- Emergency stops and communication errors will bypass anti-sway control.

4. Special Considerations

- Do not use anti-sway and droop control together.
- Anti-sway disables regeneration avoidance, shortest accel/decel, traverse, and deceleration check functions.
- Under torque or position control, anti-sway is disabled.
- If trolley or load weight is set to 0, inverter estimates swinging frequency using rope length only.

5. Testing & Adjustment

- Test crane movement and observe swinging.
- Adjust depth and width parameters for optimal performance.
  - *Depth = how strong the anti-sway is.*
    - 1075 Depth – Deep (zero) hard/strong reduction, slow response
    - 1075 Depth – Shallow (three) soft/weak reduction, fast response
  - *Width = how wide the anti-sway zone is.*
    - 1076 Width – Narrow (zero) precise stable response.
    - 1076 Width – Wide (three) large range but slow response.
- Ensure safety and stability before full operation.
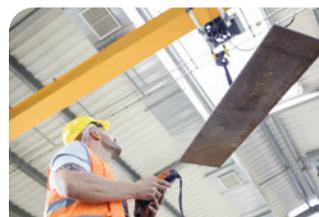
If the desired response is still not achieved, calculate the Anti-Sway Control Frequency using the reverse side of this page.

CALCULATING ANTI-SWAY CONTROL FREQUENCY

The Pendulum Effect

When you lift a load on a crane and it starts swinging, that swing behaves like a **pendulum**. The frequency of the swing tells us **how many times per second the load moves back and forth**.

The swing depends mainly on the **length of the rope or hoist cable**, not the weight of the load.

- Longer rope → slower swing (lower frequency).
- Shorter rope → faster swing (higher frequency).

Example:

If the hoist rope is 5 m long using the simple pendulum equation:

$$f = \frac{1}{2\pi}\sqrt{\frac{9.81}{5}} \approx 0.22 \text{ Hz}$$

That means the load swings about **once every 4.5 seconds**. (1 cycle divided by 0.22hz = 4.5 seconds)

Simple Pendulum Equation

Period (T) :
$$T = 2\pi\sqrt{\frac{L}{g}}$$

Frequency (f) :
$$f = \frac{1}{T} = \frac{1}{2\pi}\sqrt{\frac{g}{L}}$$

Variables:

T = period (seconds)

L = length of string/rod (meters)

g = acceleration due to gravity (approx. 9.8 m/s^2 on Earth)

Key Idea: For small angles, the period is independent of the mass and the amplitude (how far it swings)

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