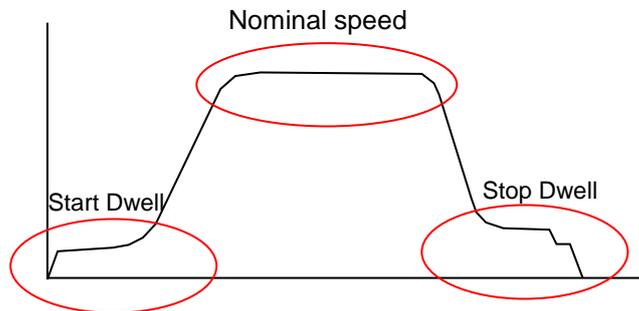# Fine Tuning

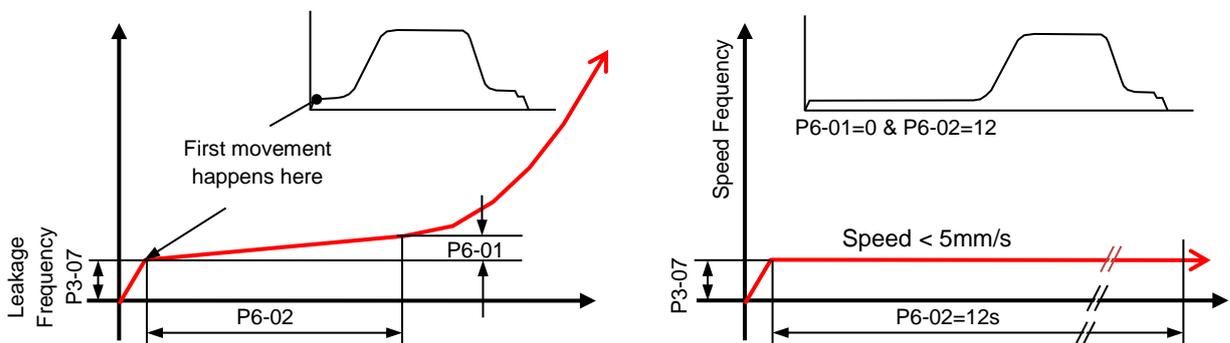## Fine tuning can be done at three points.

1)   START UP: As motor starts running at first the lift moves suddenly up then accelerates smoothly

Reason: **P3-07 (leakage frequency) set too high**

Do! Set leakage frequency (P3-07) correctly

a) **Note down set values of P6-01 and P6-02 from programming menu.**
b) **Set P6-01 to 0.0Hz and P6-02 to 12.0s.**
c) **Run the lift <u>EMPTY</u> in up direction at nominal speed.** Lift will stay at floor standing or move slowly for 12 seconds and then will start to travel.

d) **Adjust P3-07** (leakage frequency) so that lift moves upwards (EMPTY) very slowly about **5mm/s (=0.005m/s)** or less during the initial 12s.
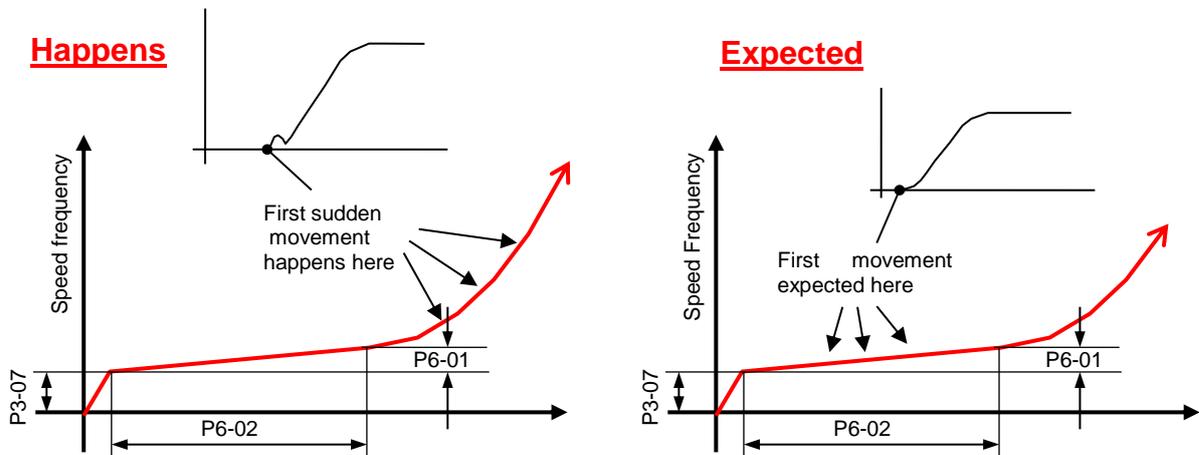
How? Give nominal speed signal to run the lift upwards empty. Observe the lift movement for the first 10 seconds. After 10 seconds cancel the up run (not to allow the lift to have a full travel):
-   If lift stays at the floor standstill then increase **P3-07** by 20% at a time until lift starts moving at very slow speed (<**5mm/s =0.005m/s**).
-   If lift moves at a speed above **5mm/s** then reduce **P3-07** by 20% at a time until speed is lower than **5mm/s.**
-   Note down the frequency at which the lift moves about **5mm/s** (e.g. 2.50Hz). Reduce 0.30Hz from the value and set it to P3-07 (e.g. P3-07 =2.50 – 0.30 = 2.20Hz).

e) **Set P6-01** (default is 2.0 Hz) **and P6-02** (default is 2.0 s) **to their initial values.**

2) START UP: After motor starts the car stays at the floor for a while (3 to 10 second) and moves up with a jerk

Reason: P3-07 (leakage frequency) set too low and therefore take off happens during acceleration stage. It should take place during start dwell.

Do! Determine leakage frequency correctly (See item 1, in start up above)

If problem persists do the followings at a time;

1) **Increase P8-02 (Torque compensation gain) and P8-01 (Temperature compensation gain) by 20%**
2) **Increase P6-01 parameter by 0.20Hz at a time.**

3) VIBRATION in the car during take off

Reason 1: Wrong motor parameter settings

Do! Check the complete motor parameters (see pages 55 in EV4 User Manual) and pay paticular attention to the motor parameters below.
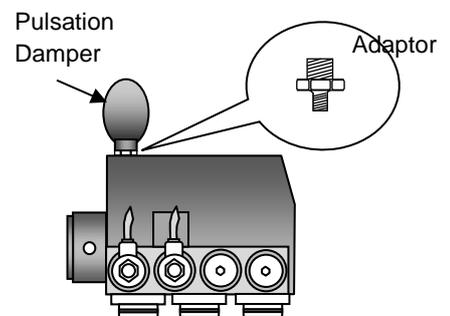
E2-01: nominal current

E2-02: slip frequency (set it to 1.80Hz)

If slip frequency is reduced then increase P3-07 (leakage frequency) by 30% of the reduced amount. (e.g. slip freq. reduced from 3.20Hz to 1.80Hz. Reduced amount =3.10-1.60=1.30Hz. 30% of the reduced amount is; 0.30 x 1.30= 0.39Hz. Increase P3-07 by 0.39Hz)

E2-03: for submersible motors no load current should be set between 55% to 60% of the nominal current (E2-03= 0.55 to 0.6 x E2-01)

If no load current is changed more than 3% teaching procedure should be repeated.

Reason 2: Low motor or/and pump performance

Do! Connect the pulsation damper at the EV4 valve (Use Z1 port at the back of the valve)

Make sure that pre-fill pressure of the pulsation damper is:-

$P_{\text{pre-fill}}$ = 0.6 to 0.7 x Empty car pressure.

(e.g. Empty car pressure =20bar then $P_{\text{pre-fill}}$ = 0.65 x 20 = 13bar)

How? Close the ball valve→ Turn emergency lowering to relive the pressure → Remove the plug from the **Z1** port→ Connect the pulsation damper to the EV4 valve by using ¼" to ½" adaptor with copper washers.

If problem persists do the followings;

1) **Shorten the start dwell ramp (P6-01=0.5Hz) and time (P6-02=0.5s).**
2) **Change the pump with a better one or/and use a motor with a fly-wheel.**

4) VIBRATION in the car at nominal speed

Reason 1: Wrong motor parameter settings

Do! Check the complete motor parameters (see pages 55 in EV4 User Manual) and pay paticular attention to the motor parameters below:

E2-01: nominal current

E2-02: reduce slip frequency by 50%

> *If slip frequency is reduced then increase P3-07 (leakage frequency) by 30% of the reduced amount. (e.g. slip freq. reduced from 3.20Hz to 1.80Hz. Reduced amount =3.10-1.60=1.30Hz. 30% of the reduced amount is; 0.30 x 1.30= 0.39Hz. Increase P3-07 by 0.39Hz)*

E2-03: no load current (= 0.55 to 0.6 x E2-01)

If no load current is changed more than 3% teaching should be repeated.

Reason 2: Motor is overloaded

Do! Check U7-08 (minimum overload frequency) parameter from the monitor menu. It should be 20% below P3-01 (nominal speed frequency). To decrease U7-08, increase C1-02 or/and decrease C2-03 and C2-04 (see page 49 in EV4 User Manual).

Reduce P8-08 overload detection time to 0.1s

5) HIGH AUDITABLE noise at nominal speed

Reason : Wrong motor parameter settings (E1-xx & E2-xx)

Do! Decrease *E2-02* (motor slip) value by 50% or decrease **C3-01** (slip compensation gain) by 20%. (Decreasing E2-02 or C3-01 requires proportional increase of **P3-07**).

Lower **E2-03** (motor no load current) down to 45% of motor nominal current (E2-01). (Decreasing E2-03 requires repeating the teaching).
Reduce nominal speed (P1-15) by 15%. Repeat teaching again.

If these precautions do not help change the pump. Call Blain Hydraulis for suggestions.

6) VIBRATION in the car at low speeds

<u>Reason 1:</u> Wrong motor parameter settings

Do! Check the complete motor parameters (see pages 55 in EV4 User Manual) and pay paticular attention to the motor parameters below:

E2-01: nominal current

E2-02: slip frequency (set it to 1.80Hz)

> *If slip frequency is reduced then increase P3-07 (leakage frequency) by 30% of the reduced amount. (e.g. slip freq. reduced from 3.20Hz to 1.80Hz. Reduced amount =3.10-1.60=1.30Hz. 30% of the reduced amount is; 0.30 x 1.30= 0.39Hz. Increase P3-07 by 0.39Hz)*

E2-03: no load current (= 0.55 to 0.6 x E2-01)

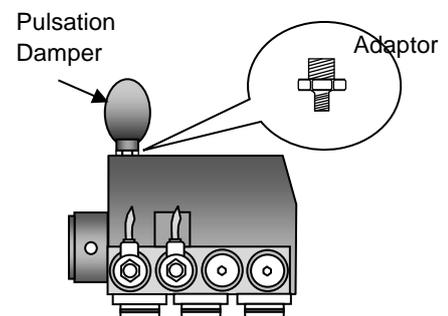<u>If no load current is changed more than 3% teaching should be repeated.</u>

<u>Reason 2:</u> Low motor or/and pump performance

Do! Connect the pulsation damper at the EV4 valve (Use Z1 port at the back of the valve)

Make sure that pre-fill pressure of the pulsation damper is:-

$P_{pre-fill}$ = 0.6 to 0.7 x Empty car pressure.

(e.g. Empty car pressure =20bar then $P_{pre-fill}$ = 0.65 x 20 = 13bar)

Pulsation Damper

Adaptor

How? Close the ball valve→ Turn emergency lowering to relive the pressure → Remove the plug from the **Z1** port→ Connect the pulsation damper to the valve by using ¼" to ½" adaptor with cupper washers.

If problem persists do the following:-

Increase levelling speed as high as 0.1m/s. If the drive is bigger than 15kW change P1-19 to 0.1 m/s. Speed frequency P3-04 will change automatically. If the drive is 15kW or smaller than increase P3-04 by 0.40Hz at a time manually.
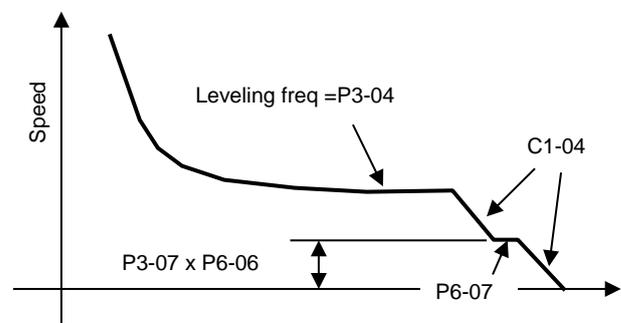
7) SOFT STOP: the car overshoots the floor level

<u>(make sure that location of the stop switch distances is correct and at the same at every floor)</u>

<u>Reason:</u> Stop dwell parameters set incorrectly

Do! the followings sequentially

a) Decrease **C1-04** by 0.2s at a time
b) Decrease **P6-06** by 0.1 unit at a time
c) Decrease **P6-07** by 0.1s at a time

Speed

Leveling freq =P3-04

C1-04

P3-07 x P6-06

P6-07

8) SOFT STOP: the car undershoots the floor level

(Make sure that location of the stop switch distances is correct and at the same at every floor)

Reason: Stop dwell parameters set incorrectly

Do! the followings sequentially

a) Check if stop switch is located too far away from the floor level
b) Increase **C1-04** by 0.2s at a time.
c) Increase **P6-06** by 0.1 unit at a tim
d) Increase **P6-07** by 0.1s at a time

9) LEVELING SPEED is too low with loaded car

Do! Increase *Torque Compensation Gain P8-02 by 20% at a time*

10) LEVELING SPEED is too low with empty car at elevated oil temperature

Do! Increase *Temperature Compensation Gain P8-01 by 20% at a time*

11) Leveling speed for overload situation is low

Do! the followings sequentially

a) Set **L3-01** to **0**.
b) Set **P8-08** (Overload detection time) to **0.1**s
c) Decrease **P8-06** (Torque reference overload gain) parameter by **0.05** unit at a time

12) The car stops too hard

Reason 1: Motor contactors de-energized immediately after S1 signal (the car reaches the stop switch) is removed.

Do! Delay de-energizing the motor contactors about 1 second after stop switch is reached.

Reason 2: Soft stop parameter (C1-04) set too small

Do! Increase C1-04 20% at a time.

How to change parameters?

Go to Programming menu → Select the parameter (e.g. *C1-04=1.80s*) parameter → Press ENTER → Decrease/increase its value by using arrow keys (e.g. *C1-04=1.80 – 0.2 =1.6s*) → Press ENTER.

Select Monitor menu for Ux-xx parameters. The rest parameters can be reached from the programming menu.

How to readjust speed parameters when oil temperature is above 30°C?

Here we shall normalize the teaching data at elevated temperature (e.g. 35°C) to 22°C.

1) Do the teaching procedure at the elevated oil temperature (e.g.35°C) and save it.
2) Do an up travel.
3) Go to Programming menu and note down values of the following parameters: **P3-16, P3-10, P3-11, P3-12, P3-13, P8-01** and **P8-02**.
4) Remove the sensor connection **A1** from the inverter terminal
5) Go to Programming mode and set **H3-04** to **+22.00**
6) Set **P4-01=1** (basic calculation)
7) Recalculate **P3-10** parameter as follows;
   Find H constant; **H** = 1+(**P3-16** - 22)x0.004 = 1+(35°C – 22°C)x0.004 = 1.052
   Multiply **P3-10** with **H**; **P3-10** x **H** = 84% x 1.052 = 88,4%
8) Go to Programming menu and set **P3-10** to the calculated value (e.g. P3-10= 88,4%)
9) Repeat the steps **7** and **8** for **P3-11**, **P3-12** and **P3-13**.
10) Reconnect the sensor cable to the terminal **A1**.
11) Go to Programming mode and set **H3-04** to **-51.00**
12) Go to Programming mode and set **P8-01** and **P8-02** 10% higher than their noted values at step **3**.

Note: Above calculation is only approximate. It is adviceble to repeat teaching procedure when oil temperature is below 30°C.