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# Proposal for Replacement of Electric Hoists

## “From Hoists with Creep Speed Inverter Hoists”

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### 1. Introduction

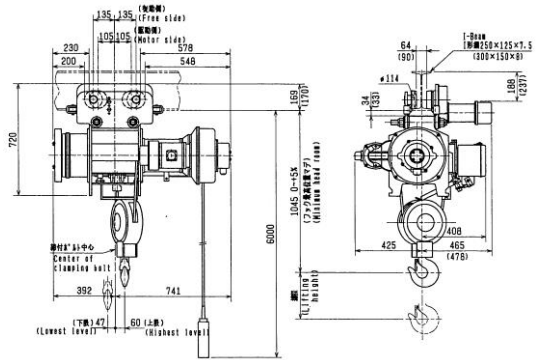
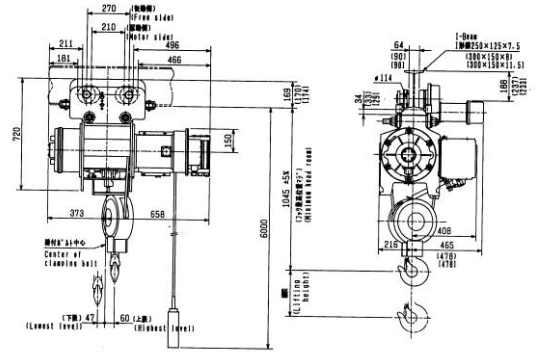
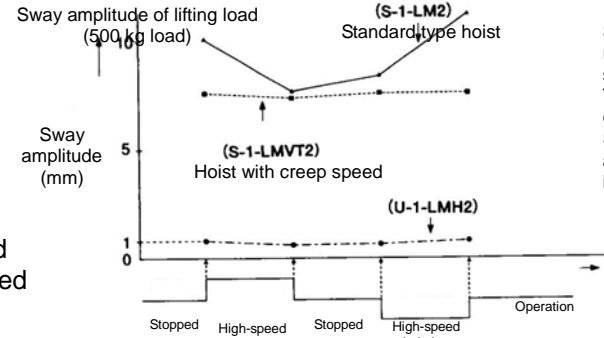
Electric hoists are used for transportation in factories and warehouses as well as precision works such as assembly of industrial machinery. High performance is required for electric hoists, such as stopping at a fixed position and starting and stopping without shock. Increasing demand for easy operation is expected due to the reduction of skilled labor for crane operation.

Hoists with creep speed are useful and have been widely used for precision works. Here, we would like to propose our inverter hoist which is applied to new uses and in new areas and enjoying popularity. In the following sections, differences between a hoist with creep speed and an inverter hoist, a maintenance comparison, and features of the inverter hoist are presented for your consideration.

### 2. Differences between hoist with creep speed and inverter hoist

Figure 1: Comparison between hoist with creep speed and inverter hoist

Models: 2.8ton capacity, monorail type, creep speed hoisting/lowering or inverter hoisting/lowering

Model Item	Hoist with creep speed	Inverter hoist
Mitsubishi function code	S-2.8-LMVT3	U-2.8-LMH3
External dimensions		
Hoisting speed (60 Hz)	0.0167/0.167 m/s 1/10 m/min	0.0167 - 0.167 m/s (0.25 m/s) 1 - 10 m/min (No load high-speed function: 15 m/min)
Weight	520 kg	390 kg
Number of parts (excl. bolts, etc.)	Hoist motor: 94 parts Controller Electro-magnetic switch: 4 for hoisting + 2 relay for changing speed 2 for brake	Hoist motor: 38 parts Controller CPU board, Power board, Drive board: 1 part each Electro-magnetic switch: 1 for brake
Shock of starting and stopping	<div style="display: flex; align-items: flex-start;"> <div style="flex: 1;"> <p style="text-align: center;">Sway amplitude of lifting load (500 kg load)</p>  <p style="text-align: center;">Sway amplitude (mm)</p> </div> <div style="flex: 1; font-size: small;"> <p>Sway amplitude of all models reached a maximum when stopped. The maximum sway of the creep speed hoist and standard S-type hoist were about 9 times and 14 times larger than inverter hoist respectively.</p> </div> </div> <p style="margin-top: 10px;">Note: 1ton rated-load hoists were used for this test.</p>	

### 3. Maintenance

Compared to hoists with creep speed (driven by contactors), inverter hoists can significantly reduce running costs (maintenance expenses). Major reasons are:

- ◎ Soft starting and soft stopping of inverter hoists reduce shock and **lessen the load on structural members.**
  - Especially on wire ropes and hoisting deceleration gears
- ◎ Inverter hoists **basically decelerate to stop by braking control of about 6 Hz.**
  - This considerably improves the durability of brake disks. Note: No load high-speed function may cause brake disks wear due to shock, etc.
- ◎ Non-contact design of inverter hoists **doesn't impose a strain on controllers.**

E.g. 3-year use with replacement of brake discs, electromagnetic contactors and wire ropes at annual inspection (once a year):

		<Hoist with creep speed>	<Inverter hoist>
Replacement of brake disc	Part expense	5,200 yen (main) + 3,900 yen (creep control )	5,200 yen
Clutch brake disc	Part expense	5,200 yen	— yen
	Working expense	3 hr × 5,000 yen	1 hr × 5,000 yen
Replacement of electromagnetic contactor	Part expense	51,200 yen/6 parts	3,400 yen/1 part
	Working expense	2 hr × 5,000 yen	0.2 hr × 5,000 yen
Replacement of wire rope	Part expense	20,000 yen	20,000 yen (per 1.5 years due to longer durability)
	Working expense	1.5 hr × 5,000 yen	1.5 hr × 5,000 yen
	Three years	354,000 yen	98,800 yen

Note: Only condensers have a finite life, and need to be replaced about every 10 years.

**There is a huge gap—approximately 260,000 yen in maintenance expenses in three years (per unit).**

### 4. Features of inverter hoist

- ☆ The inverter is specifically designed for hoists to improve **environmental resistance and maintainability.**
- ☆ **Setting can be changed to suit your operation** and improve ease of use.
  - (1) Adjustable speed setting (1/10 speed to standard speed)
  - (2) No load high-speed function (1.5x faster with 7.5ton or less, 2.0x faster with 10ton or more)
  - (3) The upper and lower limit levels of stop positions are adjustable via electronic limit switches.
  - (4) Failure history Display, the number of starts, and operating hours are included as standard features.



Advanced technologies make it possible to respond to **various situations depending on the use:**

- (1) Speed coordination function – Prevents load tilt and ensures safety when hoisting one load with two hoists
- (2) Light-load high-speed function – When the load is automatically detected to be 25% of the rated load or less, the speed is changed to 1.5x to 2x faster than the standard speed.
- (3) Multiple speed function – Useful in automatic operations using a sequencer
- (4) Position detection 7-point output – Provides operation information via relay output