



## 25 Hoist Monitor

The HoistMonitor is an electronic device that can be added to the hoist controls to help assure the safe operation of the hoist and crane by monitoring selected functions of the hoist. The HoistMonitor has two additional programming levels where each level has its own purpose. The names of those levels are HoistMonitor Select, and HoistMonitor Elite. The HoistMonitor always comes with the display unit (HS17).

### 25.1 Hoist Monitor – HS11

The basic functions of the HoistMonitor are:

- ❑ Overload protection
- ❑ Run and Fault supervision
- ❑ Starting and stopping through slow speed
- ❑ Sudden loading supervision

#### 25.1.1 Overload Protection – HS03

The load sensor type and motor-torque calculation method are two types of overload protection that can be used with the HoistMonitor. Ordinarily the Spacemaster SX hoists uses the load sensor type with the HoistMonitor. The standard mechanical overload device (MEC) on the Spacemaster SX hoist cannot be used with the HoistMonitor and therefore it is removed from the hoist.

The overload protection device always prevents lifting when the measured load exceeds 110 percent of the rated capacity for a brief period of time and it resets when the measured load decreases below 80 percent of the rated capacity. The overload limit of 110 percent cannot be adjusted with the motor–torque calculation method or the load sensor type.

- **Motor-Torque Calculation Method**

The motor-torque calculation method can only be used with two-speed contactor controls. It uses voltage and the motor's current and temperature to calculate the torque, which is then converted into load information. The current is measured with CT transformers. The temperature is monitored with NTC thermistors, which are embedded in the motor windings. And the voltage is measured at the power supply (L1, L2, L3). In addition to measuring the voltage, the power supply phase is also being checked. The HoistMonitor will continuously check for the existence of the three power supply phases. This function makes sure that none of the phases is dropped and the supply phase order is right. The calculation method only works when the motor is running.

- **Load Sensor Type**

The load sensor type can be used with inverter or contactor controls. The load sensor device must be added separately. The sensor can be either a strain gauge (SG) or a Hall sensor. The Spacemaster® SX hoists uses the SG sensor. The load sensor sends an analog signal to the HoistMonitor. The signal from the SG sensor is amplified with an amplifier (ESD 142). The signal from the Hall sensor does not need to be amplified.

**NOTE:** The strain gauge overload device is calibrated at the factory only when the HoistMonitor is furnished in the hoist electrical panel and the panel is mounted on the hoist. Otherwise the strain gauge overload device is not calibrated at the factory and at start-up the crane builder must calibrate the strain gauge. Calibrating requires test weights of at least 80 percent of the rated hoist capacity.

#### 25.1.2 Run and Fault Supervision

With the Run and Fault supervision, the HoistMonitor directly receives the lifting and lowering signals from the controller. Before the hoist motion begins, the HoistMonitor checks for any active faults from those functions that could be activated. If a fault exists, lifting, lowering or both, depending on the faulted function, will be disabled until the fault is cleared. If no defaults are detected, lifting or lowering will be allowed. One of the safety functions of the Run and Fault supervision is to monitor the hoist motor and the brake. The brake is monitored to make sure the motor does not drive through the brake if it fails to open and the motor is monitored to make sure the brake does not open if the motor does not start.



### 25.1.3 Starting and Stopping through Slow Speed

The HoistMonitor's starting and stopping through slow speed feature is for two-speed contactor hoist controls. (VFD control already does this function through the inverter.) The hoist motion will always start in slow speed before allowing fast speed. This prevents "inching" and "jogging". In addition, the HoistMonitor will initiate slow speed for a brief moment before the hoist motor brake is closed. This helps prevent premature brake wear that usually happens when stopping directly from fast speed.

### 25.1.4 Sudden Loading Supervision

Sudden loading supervision is only available with two-speed contactor controls. Sudden loading supervision has no effect when hoisting in slow speed. It only works when lifting in fast speed. The HoistMonitor is programmed to force lifting into slow speed if it detects a sudden load condition. Sudden load condition could occur if the bottom block or the load snags or catches on a fixed object during lifting.

## 25.2 Optional Features

The HoistMonitor also supports some optional features. Refer to the **Hoist Options** or **Crane Options** sections for more information about these optional features.

- Slack rope supervision – HS16
- 2-step load limiter – LIM07 (overload protection)
- 3-step load limiter – LIM08 (overload protection)
- Load display for one hoist – HS09
- Load display for two hoists on a crane – HS10
- Overload indication light and horn – LOA05
- Overload indication light – LOA07
- Run time and Start counter for bridge drives – BT15 (may restrict other optional features)
- Run time and Start counter for trolley drive – TR15 (may restrict other optional features)

### 25.3 Hoist Monitor Select – HS12

In addition to the basic functions, the HoistMonitor Select level can monitor one or more of these functions.

- Safe Working Period percentage (SWP%) – tracks theoretical lifetime of the hoist according to ISO and FEM regulations. It starts out at 100% and descends towards 0%.
- Starts – tracks the number of starts of the hoist in either direction
- Run time – tracks the total hoist running time in hours in both lifting and lowering directions
- Hoist cycles counter – tracks the number of hoist cycles. Tracks when it detects a load difference of 20%
- Mean load – average load handled during recorded cycles
- Brake SWP% - tracks theoretical lifetime of the hoist brake. It is calculated by using the number of starts and E-stops.

With this level you can more efficiently plan and schedule preventative maintenance and repairs. The monitoring values can be helpful for troubleshooting. This level can also show you the usage of the hoist.

Each monitoring function is activated and set at the factory according to the specific hoist application needed.



## 25.4 HoistMonitor Elite – HS13

The HoistMonitor Elite level can provide one or more of these functions, when specified to do so.

- Common hoist supervision
- Intermediate load limit settings (3-step)
- Summing overload protection
- CAN bus

The HoistMonitor Elite level is used when two or more hoists (5 maximum) operate together on same crane. Each hoist requires a HoistMonitor.

The HoistMonitor Elite functions are only activated at the factory according to the specific hoist application needed.

### 25.4.1 Common Hoist Supervision

The purpose of this feature is to ensure the simultaneous starting and stopping of the hoisting motions. If any one of the hoists would stop driving unexpectedly like from a tripped limit switch, then lifting or lowering of all the hoists on the crane would stop.

### 25.4.2 Intermediate Load Limiting Settings

Allows up to three load steps.

### 25.4.3 Summing Overload Protection

This feature is mainly used to protect the crane from an overload condition where the sum of the lifted loads of the hoists on the crane could be greater than the indicated crane capacity. If this condition would occur, lifting would be prevented.

### 25.4.4 CAN bus

CAN bus links the HoistMonitor of each hoist to one another. This means the HoistMonitor on one hoist can access the status and load information of another hoist or hoists.

## 25.5 HoistMonitor Plus – PE10

HoistMonitor Plus feature adds a display unit to the PBR style pushbutton station. This display unit is identical to the one already furnished on the HoistMonitor. The display on controller gives the operator or maintenance personnel floor-level access to the HoistMonitor's information.

The display on the pendant can show information such as:

- Hoist Status information such as active fault indication, active warning indication
- Tare load: displays only the weight of the load being lifted
- Actual load: displays the weight of the load on the hook plus the bottom block
- Access Life-time values
- Set program or calibration values
- Individual hoist load of multiple hoists (only when two or more hoists are used on a crane)

The accuracy of the displayed load value is approximately  $\pm 5\%$ . It shall not be used as a calibrated weighing scale.



Display Unit for PBR Pendant Station