

## **MFT B-Series Event Codes**

The MFT B-series status information is contained in a 4-byte long word (32-bit) Event Code. This Event Code provides a bit-wise mapping of the status of the flow meter with each bit corresponding to a specific meter status event as shown in Figures AV-1 and AV-2 below.

Figure AV-1 Lower Word Event Code bit mapping.

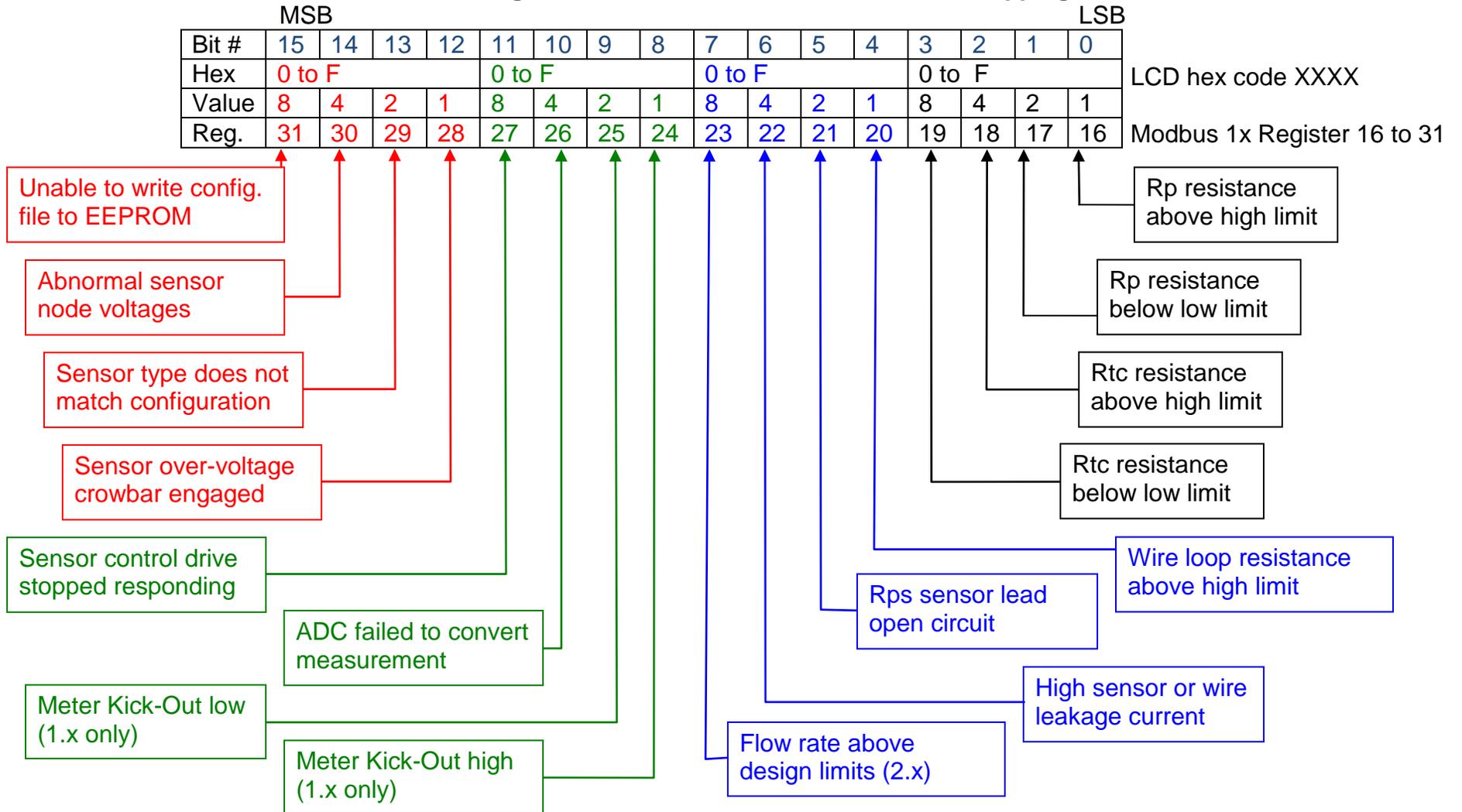
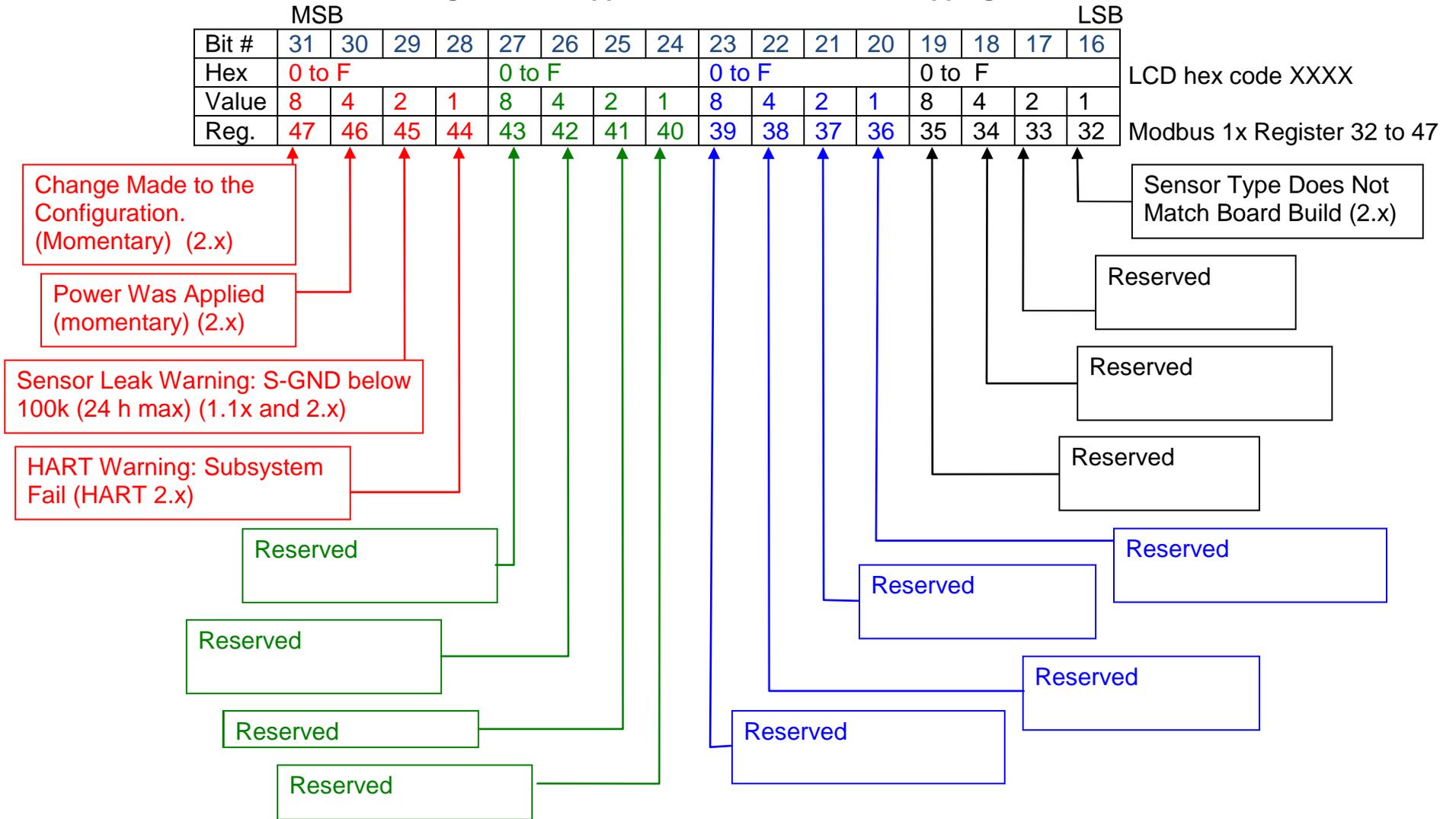


Figure AV-2 Upper Word Event Code bit mapping.



**Table AV-1. MFT B-Series Diagnostic Error limits**

Parameter	Low Limit	High Limit	Comments
Vps	0.150 V	17.6 V	Sensor drive voltage. (used for code 4xxx)
Vll	0.009 V	2.30 V	Sensor wire voltage (used for code 4xxx)
Viph	0.004 V	0.765 V	Sensor current sense voltage (used for code 4xxx)
Vrtch	0.4136 V	2.55 V	Rtc high side voltage (used for code 4xxx)
Vrtcl	0.310	2.55 V	Rtc low side voltage (used for code 4xxx)
Rp, velocity sensor 9/27 FD2  9/300 FD 9/100 MD 20/20 CD	Ohms 5.0 5.0  5.0 10.0	Ohms 30.0 30.0 (32.0)  30.0 60.0	Rp sensor resistance, sensor and temperature dependent. 600 °C mode, 1.1x or higher firmware.
Rtc, process temperature sensor 9/27 FD2 9/300 FD 9/100 MD 20/20 CD	Ohms 14.0 150 50 9	Ohms 100.0 1000.0 350.0 50.0	Rtc sensor resistance, Sensor and temperature dependent
Rwire	0.020 Ohms	5.00 Ohms	Sensor wire loop resistance (total)
Rleak	100 kOhms  20 kOhms		Sensor/wire leakage to ground  for first 24 h in 600 °C mode
Rtc/Rp ratio	-10%	+10 %	Sensor Rtc/Rp ratio. Used to know the sensor type "Sensor Type Does Not Match"

**Table AV-2. Event Code Meaning. (leading zeros are not shown in event codes)**

Message/code	Meaning
<p>Rp resistance above high limit</p> <p>Code: xxxxxxx1</p>	<p>Velocity sensor resistance is above the normal range for the sensor type configured.</p> <p>This accounts for sensor core temperature up to ~650 °C before setting the error. ~720 °C in 600 °C mode.</p> <p>Open circuit on the sensor wiring            Defective sensor or SC electronics board</p>
<p>Rp resistance below low limit</p> <p>Code: xxxxxxx2</p>	<p>Velocity sensor resistance is below the normal range for the sensor type configured.</p> <p>This accounts for sensor down to -112 °C before setting the error.</p> <p>Short in the sensor wiring            Defective sensor or SC electronics board</p>
<p>Rtc resistance above high limit</p> <p>Code: xxxxxxx4</p>	<p>The process temperature sensor resistance is above the normal range for the sensor type configured.</p> <p>This accounts for sensors up to 650 °C for the metal sensors, FD, FD2 and MD and 460 °C on the CD sensor</p> <p>Open circuit on the sensor wiring.            Defective sensor or SC electronics board</p> <p>When this limit is reached, the meter will turn the drive off until it cools. This can cause the sensor to regulate at this temperature and set multiple errors in the log as it goes below and above the limit.</p>
<p>Rtc resistance below low limit</p> <p>Code: xxxxxxx8</p>	<p>The process temperature sensor resistance is below the normal range for the sensor type configured.</p> <p>This accounts for sensor down to -120 °C in normal operation before setting an error</p> <p>Short circuit on the sensor wiring.            Defective sensor or SC electronics board.</p>
<p>Wire loop resistance above high limit</p> <p>Code: xxxxxx1x</p>	<p>The sensor wire resistance from the sensor to its electronics board is too high, &gt; 5.0 ohms. Loop resistance is from the electronics out to a sensor and back.</p> <p>Wire is too long for the gage being used            Loose wire joint connection (but not too loose, see code 20)            Defective sensor or SC electronics board</p>
<p>Sensor Rps lead open circuit</p> <p>Code: xxxxxx2x</p>	<p>The sensor wire Rps is open circuit or not connected.</p> <p>Open circuit on the Rps wire, pin 1 of TB1.            Open on the Rp lead will also set this, Pin 3,</p>

	<p>TB1          Defective Sensor or SC electronics board</p>
<p>High Sensor or wire leakage           Code: xxxxxx4x</p>	<p>The sensor or wiring is showing too much leakage current to ground. The trip point of this error is the equivalent of 100 kOhms leakage resistance<sup>1</sup>.          Wet or contaminated wiring or a junction box          Water in the backend of a sensor          Corroded front sided to a sensor          Sensor above temperature limit          Defected SC electronics board          At normal temperatures, three 10 minute leakage updates are required before the error is set.</p>
<p>Flow Rate Above Design Limits          (2.x firmware)           Code xxxxxx8x</p>	<p>Under high heat flow conditions (very high flow rates), the demand to heat the sensor may exceed the drive limits of the SC electronics board.          The reported flow readings at this point will be compressed and lower than the true flow readings.</p>
<p>Meter Kick-Out High          (1.x firmware only)           Code: xxxxx1xx</p>	<p>If the flow rate or temperature is above the high kick-out limit in the meter, it will set this error code.          This is a normal alarm if the flow rate or temperature is above the kick-out set point which is user programmable.          Condensate on the velocity sensor can cause high heat flow and will set this also.          A change in gas composition to high heat flow gases like H2 can cause this alarm.</p>
<p>Meter Kick-Out Low          (1.x firmware only)           Code: xxxxx2xx</p>	<p>If the flow rate or temperature is below the low kick-out limit in the meter, it will set this error code.          This is a normal alarm if the flow rate or temperature is below the kick-out set point which is user programmable.          Drop in process pressure at very low flow rates can cause a loss in heat flow and will set this alarm.          A change in gas composition to low heat flow gases like Ar can cause this alarm, or from CH4 to Air.</p>
<p>ADC failed to convert measurement           Code: xxxxx4xx</p>	<p>The circuits on the SC board which measures the input signals are not working properly.          The SC board is defected and needs to be replaced.</p>
<p>Sensor Control Drive</p>	<p>The sensor drive voltage to heat the velocity sensor</p>

<sup>1</sup> Firmware version newer than 1.09 have a factory configuration option to allow operation up to 600 °C for the FD2 Sensor and the event code may be preceded by the warning code 2xxxxxxx.

stopped responding Code: xxxxx8xx	is not matching the set point. Short or miss-wiring of the sensor. The SC board is defective and needs replacement.
Sensor Over voltage crowbar engaged Code: xxxx1xxx	The sensor drive voltage was not matching the set point and would not fall to low drive on command. The crowbar SCR was engaged to clamp the sensor drive voltage to zero. Sensor field wiring short to a DC power supply (4-20 mA) or 24 V supply Defective SC board which needs replacement.
Sensor type does not match configuration Code: xxxx2xxx	The sensor resistance ratio, $R_{tc}/R_p$ exceeds 10% of the normal value for the sensor the meter was configured for. Wrong sensor is connected to the electronics. Double check the SN matching Upset to the process temperature causing the two sensors ( $R_p$ and $R_{tc}$ ) to not match in temperatures Defective sensor or SC board.
Abnormal Sensor node voltages Code: xxxx4xxx	This fault is often a redundant error to the above entries on sensor and wiring faults. It is looking at the sensor wire voltages only, not just the resistance values. Miss-wired sensor. Short or Open circuit. Defective sensor or SC board.
Unable to write config. File to EEPROM Code: xxxx8xxx	The sensor and meter configuration data can not be verified after a memory write. Defective sensor control (SC) board Any EEPROM read/write fault may set this.
Sensor Type Does Not Match Board Build. (2.x firmware) Code: xxx1xxxx	The version of the SC board hardware is not compatible with the connected sensor type. Board mix-up in production or field service Sensor failure, Board Failure
Code: xxx2xxxx	Reserved
Code: xxx4xxxx	Reserved
Code xxx8xxxx	Reserved
Code xx1xxxxx	Reserved
Code xx2xxxxx	Reserved
Code xx4xxxxx	Reserved
Code xx8xxxxx	Reserved
Code x1xxxxxx	Reserved

Code x2xxxxxx	Reserved
Code x4xxxxxx	Reserved
Code x8xxxxxx	Reserved
Code 1xxxxxx (HART 2.x firmware)	The subsystem responsible for communicating via the HART protocol is not responding. The unit will not communicate via HART.
Code 2xxxxxx (1.1x and 2.x firmware)	<p>The sensor is in a process above 100 °C and is leaking current. It has 24 hours to recover to a leakage resistance above 100 k ohms before the warning is converted to an error. Note that if the leakage resistance is below 20 k or the process temperature is below 100 °C, it will automatically convert to an error without delay.<sup>2</sup></p> <p>During the warning the meter will continue to output readings, but upon converting to an error the NE-43 alarms will be set and the meter will no longer output readings. This is designed to allow the sensor to operate while drying out its MI cable.</p> <ul style="list-style-type: none"> <li>Wet or contaminated wiring or a junction box</li> <li>Water in the backend of a sensor</li> <li>Corroded front sided to a sensor</li> <li>Sensor above temperature limit</li> <li>Defected SC electronics board</li> </ul>
Power On or power Cycle (2.x firmware)  Code: 4xxxxxx	This is a momentary code which occurs every time the unit boots up or there is a power cycle. It is logged in the event logs for diagnostics purposes.
Configuration Change (2.x firmware)  Code: 8xxxxxx	<p>This is a momentary code which is logged in the event log any time the meter programming or configuration has been changed. This is for diagnostics purposes. If other errors or meter trouble started after a configuration change, this will support identifying this issue.</p> <p>The type of change is not recorded, only that a change was made and the meter's run time for the change.</p>

<sup>2</sup> Firmware version newer than 1.09 have a factory configuration option to allow operation up to 600 °C for the FD2 Sensor and the warning code may be followed by the error xxxxxx4x.