

## Diagnostic Trouble Code (DTC) List

The following trouble codes may be displayed by the Hawkeye nozzle control system and should help the operator to identify and correct issues with system during field operations:

Code ID		Description	Recommended Actions
10	.13	VT display is not on-line	<ol style="list-style-type: none"> <li>1. If this error occurs frequently, check the ISOBUS connections and review the VT display troubleshooting procedures.</li> <li>2. Connect the Raven Service Tool to the ISOBus and verify communication.</li> <li>3. Verify power to Product Controller II ECU.</li> </ol>
630	.13	System calibration required	<ol style="list-style-type: none"> <li>1. Complete the calibration wizard to configure all required Hawkeye system settings. Refer to Chapter 3, <i>System Calibration</i> for additional assistance with the calibration wizard.</li> </ol>
	.31	Nozzle Calibration Error	<ol style="list-style-type: none"> <li>1. Complete the calibration wizard to configure all required Hawkeye system settings. Refer to Chapter 3, <i>System Calibration</i> for additional assistance with the calibration wizard.</li> <li>2. Cycle system power and reset defaults.</li> </ol>
1563	.2	Nozzle control valves incompatible with product controller/Hawkeye ECU	<ol style="list-style-type: none"> <li>1. Check for product controller ECU software updates.</li> <li>2. Check for nozzle control valve software updates.</li> <li>3. Cycle system power and reset defaults.</li> </ol>
	.31	Inconsistent nozzle control valve software version	<ol style="list-style-type: none"> <li>1. Update nozzle control valves to a consistent software version. Refer to the Raven Service Tool Operation manual for assistance with the nozzle update procedure.</li> </ol>

Code ID		Description	Recommended Actions
3132	.1	System pressure not detectable.	<ol style="list-style-type: none"> <li>1. Activate product pump.</li> <li>2. Check for system leaks.</li> <li>3. Increase pump output to maintain a boom pressure above 2 PSI [13.8 kPa].</li> </ol>
	.4	Pressure transducer not detected	<ol style="list-style-type: none"> <li>1. Check the pressure transducer connection.</li> <li>2. Check the transducer cabling for damage and replace the cable if necessary.</li> </ol>
	.13	Pressure transducer not calibrated	<ol style="list-style-type: none"> <li>1. Refer to the <i>Tools Menu Settings Definitions</i> section on page 22 for assistance with the pressure transducer calibration.</li> </ol>
	.16	Monitored system pressure higher than the target pressure deadband	<ol style="list-style-type: none"> <li>1. Reduce the equipment speed.</li> <li>2. Refer to the <i>Pressure 1 and 2 Presets</i> section on page 32 for assistance with setting or adjusting the target pressure.</li> <li>3. Refer to the <i>System Settings Tab - Pressure</i> section on page 35 for assistance with setting or adjusting the off pressure percent.</li> </ol>
3132	.18	Monitored system pressure lower than the target pressure deadband	<ol style="list-style-type: none"> <li>1. Increase the equipment speed.</li> <li>2. Refer to the <i>Pressure 1 and 2 Presets</i> section on page 32 for assistance with setting or adjusting the target pressure.</li> <li>3. Refer to the <i>Pressure 1 and 2 Presets</i> section on page 32 for assistance with setting or adjusting the off pressure percent.</li> </ol>
	.15	Monitored system pressure higher than maximum pressure set-point	<ol style="list-style-type: none"> <li>1. Reduce the equipment speed.</li> <li>2. Refer to the <i>System Settings Tab - Pressure</i> section on page 35 for assistance with adjusting the maximum pressure set-point.</li> </ol>
3132	.17	Monitored system pressure lower than minimum pressure set-point	<ol style="list-style-type: none"> <li>1. Increase the equipment speed.</li> <li>2. Refer to the <i>System Settings Tab - Pressure</i> section on page 35 for assistance with adjusting the minimum pressure set-point.</li> </ol>
	4305	.2	Equipment speed is below operational range
4985	.9	No yaw rate	<ol style="list-style-type: none"> <li>1. Recalibrate the ECU gyro. Refer to the <i>If the Hawkeye system came installed on the equipment from the equipment manufacturer, or if a sparge pressure transducer is installed with the Hawkeye control system, check the transducer specifications and refer to the Advanced Transducer Calibration to verify transducer settings before operating the Hawkeye nozzle control system during field applications.</i> section on page 36 for assistance with calibration of the gyro.</li> <li>2. Contact a local Raven dealer for additional assistance.</li> </ol>

Code ID		Description	Recommended Actions
5200	.2	Nozzle indexing error	<ol style="list-style-type: none"> <li>1. Check that all nozzle control valves are connected to the boom harness.</li> <li>2. Verify nozzle counts on left and right booms.</li> <li>3. Check nozzle control valve diagnostics or status LEDs to identify valve is causing error.</li> <li>4. Restart the calibration wizard and complete the nozzle indexing to properly set the nozzle control valve locations across the implement.</li> <li>5. Check the terminator cables for bare or worn wires.</li> <li>6. Check the CAN voltages on the boom cables.</li> <li>7. Reload the object pool and disconnect power to the machine.</li> </ol>
	.3	Nozzle indexing incomplete	<ol style="list-style-type: none"> <li>1. Restart the calibration wizard and complete the nozzle indexing to properly set the nozzle control valve locations across the implement.</li> <li>2. Cycle system power and reset defaults.</li> </ol>
	.16	Too many nozzles detected	<ol style="list-style-type: none"> <li>1. Restart the calibration wizard and verify the number of nozzle control valves connected to the Hawkeye nozzle control system.</li> <li>2. Cycle system power and reset defaults.</li> </ol>
523008	.2	Nozzle calibration tip mismatch/error	<ol style="list-style-type: none"> <li>1. Select the appropriate tip type. Refer to the <i>Injection Pump Efficiency</i> section on page 46 for additional assistance.</li> <li>2. Restart the calibration wizard to reset the tip type setting for the nozzle control system.</li> <li>3. Cycle system power and reset defaults.</li> </ol>
523009	.2	Nozzle calibration spacing mismatch/error	<ol style="list-style-type: none"> <li>1. Restart the calibration wizard to re-enter the tip spacing measurement.</li> <li>2. Cycle system power and reset defaults.</li> </ol>
523010	.18	Some nozzles were not detected during nozzle calibration	<ol style="list-style-type: none"> <li>1. Check that all nozzle control valves are connected to the boom harness.</li> <li>2. Check the nozzle control valve diagnostics or status LED.</li> <li>3. Cycle system power and reset defaults.</li> <li>4. Connect the Raven Service Tool to the ISObus and verify communication to the nozzles.</li> </ol>

Code ID		Description	Recommended Actions
523088	.12	Nozzle memory error (single)	<ol style="list-style-type: none"> <li>1. Restart the calibration wizard.</li> <li>2. Cycle system power and reset defaults.</li> <li>3. Contact a local Raven dealer for additional assistance.</li> </ol>
	.31	Nozzle memory warning (single)	<ol style="list-style-type: none"> <li>1. Restart the calibration wizard.</li> <li>2. Cycle system power and reset defaults.</li> <li>3. Contact a local Raven dealer for additional assistance.</li> </ol>
523089	.12	Nozzle memory error (single)	<ol style="list-style-type: none"> <li>1. Restart the calibration wizard.</li> <li>2. Cycle system power and reset defaults.</li> <li>3. Contact a local Raven dealer for additional assistance.</li> </ol>
	.31	Nozzle memory warning (multiple)	<ol style="list-style-type: none"> <li>1. Restart the calibration wizard.</li> <li>2. Cycle system power and reset defaults.</li> <li>3. Contact a local Raven dealer for additional assistance.</li> </ol>
523090	.1	Nozzle calibration error (single)	<ol style="list-style-type: none"> <li>1. Restart the calibration wizard to recalibrate the nozzle control system.</li> <li>2. Cycle system power and reset defaults.</li> </ol>
523091	.1	Nozzle calibration error (multiple)	<ol style="list-style-type: none"> <li>1. Restart the calibration wizard to recalibrate the nozzle control system.</li> <li>2. Cycle system power and reset defaults.</li> </ol>
523092	.31	No tip information entered for nozzle control valve (single)	<ol style="list-style-type: none"> <li>1. Select the appropriate tip type. Refer to <i>Injection Pump Efficiency</i> section on page 46 for additional assistance.</li> <li>2. Restart the calibration wizard to reset the tip type setting for the nozzle control system.</li> </ol>
523093	.31	No tip information entered for nozzle control valves (multiple)	<ol style="list-style-type: none"> <li>1. Restart the calibration wizard to configure tip information for the Hawkeye nozzle control valves.</li> </ol>
523126	.13	Unable to detect Hawkeye ECU orientation	<ol style="list-style-type: none"> <li>1. Check the ECU mounting position and verify the ECU is securely mounted.</li> <li>2. Recalibrate the ECU gyro. Refer to the <i>If the Hawkeye system came installed on the equipment from the equipment manufacturer, or if a sparge pressure transducer is installed with the Hawkeye control system, check the transducer specifications and refer to the Advanced Transducer Calibration to verify transducer settings before operating the Hawkeye nozzle control system during field applications.</i> section on page 36 for additional assistance.</li> </ol>

Code ID		Description	Recommended Actions
523136	.16	Monitored flow rate is higher than the target rate deadband	<ol style="list-style-type: none"> <li>1. Reduce the equipment speed.</li> <li>2. Review “Avoiding Skips with Hawkeye™ Nozzle Control System” section on page 69.</li> <li>3. Refer to the <i>Hawkeye Upper Home Screen</i> section on page 44 for assistance with setting or adjusting the target rate.</li> <li>4. Refer to the <i>System Settings Tab - Alarm</i> section on page 31 for assistance with setting or adjusting the off rate percent.</li> </ol>
	.18	Monitored flow rate is lower than the target rate deadband	<ol style="list-style-type: none"> <li>1. Increase the equipment speed.</li> <li>2. Refer to the <i>Hawkeye Upper Home Screen</i> section on page 44 for assistance with setting or adjusting the target rate.</li> <li>3. Refer to the <i>System Settings Tab - Alarm</i> section on page 31 for assistance with setting or adjusting the off rate percent.</li> </ol>
523137	.18	Minimum flow not met	<ol style="list-style-type: none"> <li>1. Activate product pump.</li> <li>2. Review “Avoiding Skips with Hawkeye™ Nozzle Control System” section on page 69.</li> <li>3. Increase pump output to maintain the minimum recommended flow rate for each nozzle control valve.</li> </ol>
523154	.16	Target flow too high	<ol style="list-style-type: none"> <li>1. Reduce the equipment speed</li> <li>2. Reduce the target application rate</li> </ol>
	.18	Target flow too high	<ol style="list-style-type: none"> <li>1. Increase the equipment speed</li> <li>2. Increase the target application rate</li> </ol>
523160	.1	Chemical tank is empty	<ol style="list-style-type: none"> <li>1. Refill product and continue field applications.</li> </ol>
	.17	Low tank volume remaining	<ol style="list-style-type: none"> <li>1. Refill product to continue field applications.</li> </ol>
523167	.2	Injection pressure sensor disconnected	<ol style="list-style-type: none"> <li>1. Verify good connection to the pressure sensor on the pump.</li> <li>2. Verify the sensor is getting supply voltage.</li> <li>3. Verify the signal voltage is getting back to the pump ECU.</li> </ol>
523175	.18	Low pump efficiency	<p>Check for:</p> <ol style="list-style-type: none"> <li>1. Fouled pump check valves</li> <li>2. Air leaks on the injection pump inlet plumbing</li> <li>3. Air entrained in the chemical</li> <li>4. Plugged inlet strainer</li> <li>5. Chemical too thick to flow through the pump</li> <li>6. Calculate the volume per minute for the application and verify the rate is within the range of the injection pump.</li> </ol>

Code ID		Description	Recommended Actions
523176	.16	Off rate high	<ol style="list-style-type: none"> <li>1. Check calibration for correct data entry.</li> <li>2. Calculate the volume per minute for the application and verify the rate is within the range of the injection pump.</li> </ol>
	.18	Off rate low	<p>Check for:</p> <ol style="list-style-type: none"> <li>1. Fouled pump check valves</li> <li>2. Air leaks on the injection pump inlet plumbing</li> <li>3. Air entrained in the chemical</li> <li>4. Plugged inlet strainer</li> <li>5. Chemical too thick to flow through the pump</li> <li>6. Calculate the volume per minute for the application and verify the rate is within the range of the injection pump.</li> </ol>
523188	.16	DI high vacuum error	<ol style="list-style-type: none"> <li>1. Disconnect the vacuum switch from the product cable. Test for continuity between pins A and C. If the OHM meter reads a short, the switch is good. If it reads open, the vacuum switch is bad.</li> <li>2. Check for obstructions from the inlet of the pump going back to the chemical tank. There may be debris in the inlet, a plugged filter/strainer, hand valve turned the wrong direction or obstruction in the outlet of the chemical tank.</li> </ol>
523192	.13	Spurge pressure transducer not calibrated	<ol style="list-style-type: none"> <li>1. Refer to the “Tools Menu Settings Definitions” on page 22 for assistance with pressure transducer calibration.</li> </ol>
	.14	New injection pump detected	<ol style="list-style-type: none"> <li>1. A new injection pump was detected.</li> </ol>
	.15	Injection pump lost communication	<ol style="list-style-type: none"> <li>1. A detected injection pump has lost communication. Check the CAN connections of the injection device.</li> <li>2. Connect the Raven Service Tool to the ISObus and verify communication.</li> </ol>
523906	.17	Equipment speed below the speed range (single nozzle)	<ol style="list-style-type: none"> <li>1. Increase equipment speed to the range displayed on the Hawkeye home screen. Refer to the <i>Hawkeye Upper Home Screen</i> section on page 44 and <i>Hawkeye Lower Home Screen</i> section on page 46 for assistance with the information provided on the home screen.</li> </ol>
523907	.17	Equipment speed below the speed range (multiple nozzles)	<ol style="list-style-type: none"> <li>1. Increase equipment speed to the range displayed on the Hawkeye home screen. Refer to the <i>Hawkeye Upper Home Screen</i> section on page 44 and <i>Hawkeye Lower Home Screen</i> section on page 46 for assistance with the information provided on the home screen.</li> </ol>

Code ID		Description	Recommended Actions
523908	.15	Equipment speed above the speed range (single nozzle)	1. Reduce equipment speed to the range displayed on the Hawkeye home screen. Refer to the <i>Hawkeye Upper Home Screen</i> section on page 44 and <i>Hawkeye Lower Home Screen</i> section on page 46 for assistance with the information provided on the home screen.
523909	.15	Equipment speed above the speed range (multiple nozzles)	1. Reduce equipment speed to the range displayed on the Hawkeye home screen. Refer to the <i>Hawkeye Upper Home Screen</i> section on page 44 and <i>Hawkeye Lower Home Screen</i> section on page 46 for assistance with the information provided on the home screen.
523910	.1	Nozzle power/temperature error (single)	1. Nozzle control valve has exceeded safe operating temperature threshold. Check for clogs in valve or associated plumbing.
523911	.1	Nozzle power/temperature error (multiple)	1. Nozzle control valve has exceeded safe operating temperature threshold. Check for clogs or restrictions in valves or associated plumbing.
524080	.31	Lost communication with switch box	1. Check Raven ISOBus switch box connections. 2. Connect the Raven Service Tool to the ISOBus and verify communication. 3. Verify the power LED is on.
524081	.13	Switchbox not calibrated	1. A switchbox was added after calibration was complete. Re-calibrate the system with the switchbox connected.