Industrial Autolube International Inc.

Field Troubleshooting Guide

Bravo Pump | UltraSensor 2 | SMX/SMO/nPR Divider Valves

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Industrial Autolube International Inc.

Field Troubleshooting Guide

Introduction

This guide will walk you through identifying, diagnosing, and resolving alarm codes displayed on the Dropsa Bravo pump series. The diagnostic procedures and flowcharts contained within this document are applicable to both grease and oil lubrication applications, as all Dropsa Bravo pumps share a common base platform. Variations between configurations are limited to a small number of application-specific components, such as the low level sensor and external filler assembly.

The content within this guide is based on the official Dropsa Bravo Operation Manual, supplemented with expanded technical explanations and diagnostic flowcharts to facilitate more thorough issue identification and resolution.

1. Safety & Escalation Notice

If you are in any doubt about the correct solution to a problem, do not dismantle parts of the Bravo pump. Contact Industrial Autolube for technical assistance.

2. Diagnostic Flow

Step 1. **Check Bravo Pump** Confirm motor runs, display lit, no low-level alarm. Read any active flash code (Page 4).

Step 2. **Check Pump Output** Disconnect primary tubing, run a lubrication cycle, verify clean air-free grease flows. (Page 6).

Step 3. **Check UltraSensor 2 (if installed)** Verify LED diagnostics (Green and Orange lights). If the sensor shows no pulses, the issue is upstream (divider not cycling) — not the sensor itself. (See page 9 for more details).

Step 4. **Check SMX/SMO Divider** Inspect for blockage, verify check valve and O-rings, confirm correct metering element is installed. (Page 7).

For more details, please see page 9.

3. A Note on Contamination

The single most common cause of failure in any automated lubrication system is contamination. Due to the precision manufacturing tolerances of these components, which exceed those of standard hydraulic components, the introduction of foreign debris can result in accelerated wear, premature component failure, mechanical jamming, and the generation of false or recurring alarm codes.

Proper lubricant handling and strict cleanliness standards must be always maintained. All lubricants must be introduced exclusively through the designated fill points provided for the specific application. Failure to do so risks introducing contamination directly into the system and may result in significant damage.

4. Bravo Pump Manual References

The following sections of the official Dropsa Bravo Operation Manual are directly referenced throughout this guide.

Section	Title	Pages
6.8.1	Connector Types	10 - 11
7.5.2	Operation mode: Automatic version	14
7.6	Programming the Electrical Controller	15 - 16
8	Troubleshooting	17 - 18

5. Bravo Alarm Codes

Alarm codes 7.6 on page 18 for the Dropsa Bravo pump series are divided into two categories based on the complexity of the required corrective action.

Field-Serviceable Alarm Codes

The following alarm codes are straightforward to diagnose and can most likely be resolved on-site.

Flashes	Code	Alarm Name	Description	Remedy
1	A LL	Alarm Low Level	Low lubricant level in reservoir	Refill with clean lubricant
2	A CS	Alarm Cycle Switch	The cycle sensor signal was not received within the specified time	Ensure "Timer overrun" is set to an appropriate value and confirm there is no problem on the lubrication circuit
3	A tO	Alarm Pause Timer Overrun	Pause phase exceeded the expected duration	Verify input pause sensor
5	A OL	Alarm Pump Overload	Motor drawing excess current, likely from thermal or mechanical strain	Remove outlet hoses, check output element configuration, and allow pump to cool. If problem persists, see advanced codes.
6	A CO	Alarm Couter Over	Cycle counter parameter mismatch in Pulse Mode operation	Check your Cycle counts and confirm you are supposed to be in pulse mode (C.Cou and Node). This is not a common setup, but it can be used to take a pulsed input from a prox or PLC to run the pump with an overrun timer. See section 7.5.2 Example 5 in the Bravo pump manual

Low Level Alarm

Check the lubricant level in the reservoir and confirm there is no trapped air bubble. Second, there is a magnet mounted on the wiper arm actuating a reed switch as the arm passes by. The location of the magnet differs between oil and grease:

Oil – The magnet is mounted in a float within the plastic portion of the wiper arm

Grease - The magnet is mounted directly to the plastic portion of the wiper arm, no float

Advanced Alarm Codes

The following three alarm codes are likely to require further service of the unit, including replacement parts, and may be subject to repair and warranty consideration:

4	A LP	Alarm Pump Motor Blocked	Motor is jammed or unable to turn	Replace the motor unit
5	A OL	Alarm Pump Overload	Motor drawing excess current, likely from thermal or mechanical strain	Allow system to cool; if the problem persists, replace the motor unit
7	A EE	Alarm EPROM Error	Electronic board memory error	Motherboard requires replacement

6. Bravo Troubleshooting

Problem	Possible Cause	Remedial Action
Pump motor does not operate	Power missing	Check power lines; ensure any installed fuse is intact (MCC)
	Electronic controller	Replace electronics board (return for service)
	Gear motor no longer works	Replace gear motor assembly (return for service)
Pump is operating but no lubricant reaches points	Tubing is disconnected or blocked	Check tubing condition; ensure correctly secured and not blocked (ex. by hardened grease)
	Distributor valves are blocked	Clean or replace, see page 8
	Air present in lower casing of pump	Detach the pump fitting, run pump until grease flows cleanly, reattach fitting, verify distribution
	Pump blocked	Clean the pump reservoir and confirm stirring paddle is free. Return for service
Lubricant does not reach lubrication points on each pump cycle, or irregularly	Distributor valves incorrectly connected or sized	Check valves and system schematic
	Incorrect Pause/Cycle settings	Confirm system design/settings to verify approximate cycle rate at lube point (may be 2 cycles of primary to 1 cycle of secondary)
No lubricant from pump	Reservoir is empty	Refill and verify any low-level alarms
	Air bubble in grease	Disconnect primary tubing from pump, run a lubrication cycle, confirm clean grease flows, then reconnect tubing
	Incompatible lubricant	Confirm oil is 32–6000 cSt or grease is NLGI 000–2
	Worn or blocked pumping element	Replace pump element (drain oil pump before replacement)
Display is not lit	Incorrect power/voltage	Check power and voltage; ensure proper power supply to pump, replace motherboard
Pump starts but then immediately stops	Defective or blocked pump motor	Allow pump to cool, retry lubrication cycle. If problem persists, replace pump motor assembly

7. Proximity Switch/ Ultrasensor 2 Troubleshooting

Symptom	Likely Cause	Corrective Action
Green diagnostic LED shows 0 pulses at power-on	Wiring installed incorrectly	Check wiring pinout (Pin 1: V+ 8–28VDC, Pin 2: NPN out, Pin 3: GND, Pin 4: PNP out)
	Faulty sensor	Replace prox
Green LED pulses more or less than 5 (normal)	Weak/excessive magnetic flux reading	Reposition/reseat sensor; verify correct part number for valve type
Orange monitoring LED not responding	Wiring installed incorrectly	Check wiring pinout
	Spool not moving	See page 8
	Faulty sensor	Test prox against a piece of ferrous metal (steel), if there is no orange light, replace prox.
No output signal	Wrong voltage; wiring fault; connector damage	Confirm 8–28VDC supply; inspect M12 connector/cable; verify NPN/PNP wiring matches control input
Erratic/intermittent output	Cycle speed exceeds capability; interference	Confirm within 1000 max cycles/min; check shielding/grounding
Sensor damaged after overpressure	Front surface pressure exceeded	Confirm system doesn't exceed 400 bar at sensor face; replace if damaged
Bravo not registering cycle confirmation (PULSE mode)	NPN/PNP output mismatch with Bravo's cycle sensor input	Confirm Bravo's cycle sensor input matches sensor's output type

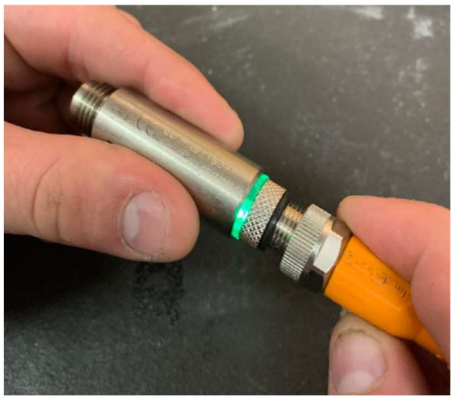
8. SMX / SMO / nPR Divider valve Troubleshooting

Symptom	Likely Cause	Corrective Action
No lubricant at one or more outlets	Single VS Twin	Change the middle plug to Single if only one outlet. See Page 12 for explanation
	Metering elements out of time	Remove inspection ports and confirm smooth spool movement. Reset all spools to one side and test.
	Downstream blockage	Check Pin indicators or Auto Reliefs for line overpressure. Remove hoses and confirm flow. Inspect lube points and lines
	Metering element blocked or worn	Replace metering element (no pipework removal needed)
	Wrong flow rate installed	Confirm correct SMX metering volume (ex. 5T = 0.005 cu. in. element)
Divider not cycling / spool stuck	Contamination	Remove inspection ports and confirm smooth spool movement. Replace metering element
	Incorrect lubricant grade	Confirm oil is 32–6000 cSt or grease is NLGI 000–2
System pressure exceeds rated max	Downstream blockage	Inspect lube points and lines, clear blockages with grease gun/oil gun, retest
Leaking at base joints	O-ring damaged during element replacement	Replace O-rings
Divider overheating / lubricant degrading	Operating outside rated temperature	Confirm within -25°C to +80°C (standard), up to +100°C (low pressure Viton version)

9. Detailed Troubleshooting Steps

Step 1 - Proximity Switch

Check that power is reaching the proximity switch by removing the sensor cable and reinstalling it. Observe the sensor for a green flashing light, which confirms that power is present at the sensor.



If the green flashes <u>ARE NOT</u> observed:

1. Check that the connector is fully seated and undamaged

2. Inspect the wiring for any signs of damage, corrosion, broken pins, or loose connections

- Refer to Bravo pump manual Section 6.8.1 *(pages 10 — 11)* for the connector type

3. Replace the proximity sensor (pn. 1655305)

4. Replace the sensor cable (pn. EVC003)

If the green flashes <u>ARE</u> observed:

Press the Reset Button on the pump controller

Observe the proximity sensor during pump operation.

- A yellow/orange light on the prox sensor indicates that a correct cycle is being detected
- A red light on the bottom right of the pump screen indicates that the cycle is detected by the pump.
    - If there is a switching prox light and no switching red bravo light, inspect the wiring as per step 2 above.

Step 2 - Confirm Pump is Dispensing Lubricant

- Remove the hose at the pump outlet and press the Reset Button to initiate a cycle
- Observe whether lubricant is being dispensed from the pump outlet

If NO lubricant is observed:

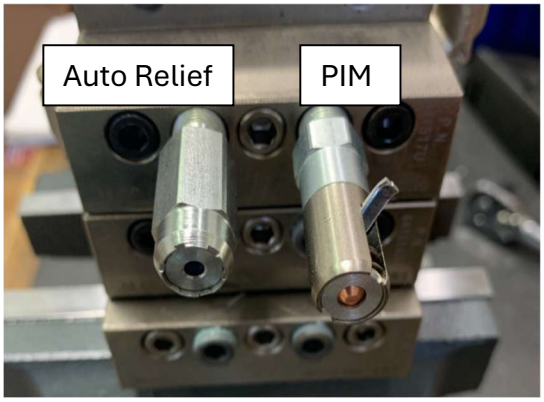
- Allow the pump to continue cycling through several complete rotations of the paddle
- The issue may be an air bubble in the system that requires bleeding — this is particularly common with grease after a refill or if the reservoir was allowed to run too low before refilling
- Continue cycling until lubricant flow is confirmed before proceeding
    - Replace pumping element if no flow is confirmed.

If lubricant IS observed:

- Install a 5000psi pressure gauge at the pump outlet and initiate a cycle
- Purge the air from the line and build pressure over a couple of cycles.
- Note the pressure developed

Pressure Reading	Interpretation	Action
2,000 - 3,800 PSI	Pump element is functioning correctly	Proceed to Step 3 to investigate downstream blockage
Below 1,000 PSI	Pump element is worn or faulty	Replace the pump element and test pressure

Step 3 - Inspect the Primary (First) Divider Valve



Check the Auto-Relief and/or Pin Indicators:

- An auto relief will vent lubricant on a plugged line
- A popped-out pin indicator with memory (PIM) is a sign of excessive pressure at that point in the system, indicating a potential downstream blockage

To reset a popped pin indicator with memory:

- Pull up on the reset tab to reset the pin
- If the pin resets and remains in, proceed with system operation
- If the pin pops out again upon cycling, a blockage is confirmed downstream of that point

Step 4 - Cycle Test the Divider Valve

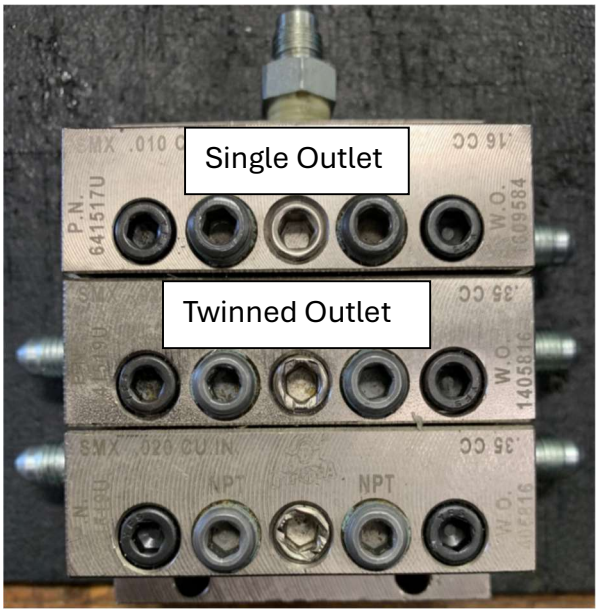
- Remove the outlet lines connected to the divider valve
- Initiate a pump cycle and observe whether the divider valve cycles freely without the lines connected
- If the divider **cycles correctly** with the lines removed, press the **Reset Button** and confirm system operation - the blockage is within the removed lines or downstream components
- If the divider **will not cycle**, proceed to Step 5

Step 5 - Verify Metering Element Configuration

When inspecting or replacing metering elements, it is critical to confirm that each element is correctly configured for its intended application. Incorrect configuration will cause the divider valve to hydraulically lock up and prevent system operation.

Determining the Configuration:

Inspect the center plug on the metering element. The Allen head plug will have one of the following markings:



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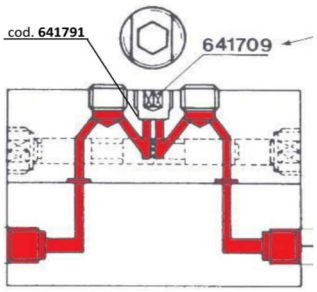
Understanding the Configuration Plugs:

The configuration plugs control how flow is directed through the metering element:

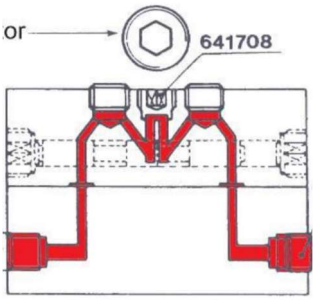
- **Twin Outlet Configuration**

  Flow is isolated between the two ends of the metering element, with each end supplying a separate outlet point. The Twin Outlet Adapter includes an aluminum disc which also acts as a seal for the two ports to prevent leakage.



- If a Twin Outlet configured element has one of its outlet ports blocked off, the divider valve will not function and will hydraulically lock up. Always confirm that all outlet ports are open and correctly plumbed for the configured outlet type.

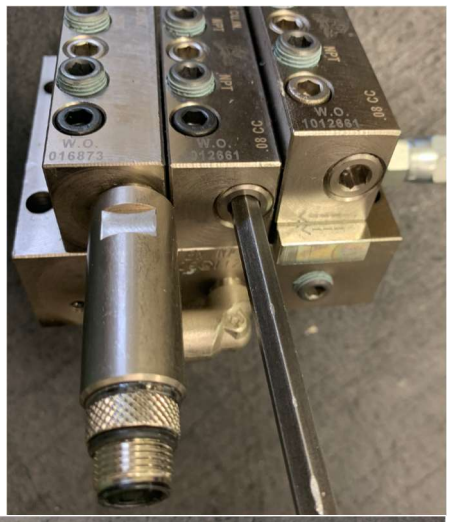
- **Single Outlet Configuration** — Flow from both ends of the metering element is combined into a single outlet point.
- When converting a Twin Outlet element to Single Outlet configuration, the aluminum disc must be removed from the adapter. Failure to remove the aluminum disc when converting to single outlet will block flow and prevent correct operation.



Step 6 - Inspect the Metering Element Spools

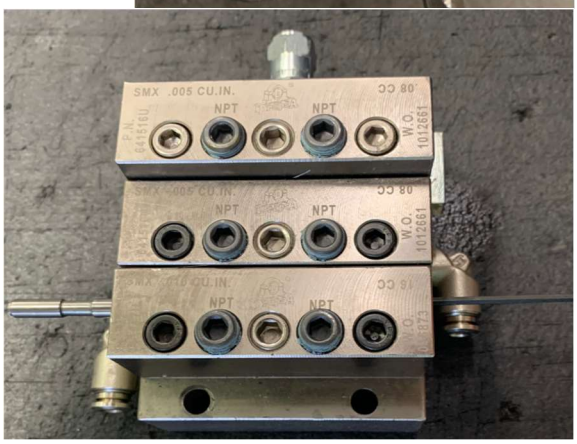
RELIEVE ALL SYSTEM PRESSURE BY LOOSENING ALL LINES BEFORE OPENING ANY VALVE COMPONENTS.

FAILURE TO DO SO CAN RESULT IN INTERNAL METERING SPOOLS BEING FORCIBLY EJECTED FROM THE METERING ELEMENTS, CAUSING SYSTEM FAILURE AND POTENTIAL INJURY.



Once all pressure has been relieved:

- Remove the end plugs from the metering elements
- Using a very small clean rod, carefully push each spool inward to verify that it moves smoothly in both directions
- Do not allow the spools to fall out of the metering element
- If the spool moves smoothly in both directions, it is serviceable. If the spool is stiff, sticky, or will not move, replace the metering element



Re-Timing the Divider Valve:

If all spools are confirmed as cycling smoothly:

- Install all end plugs on one side of the divider valve
- Push all spools toward that same end so they are all aligned on the same side — this resets the timing of the divider valve
- Reinstall all plugs, press the Reset Button, and confirm the system is operating correctly