



Electronic Products

ELECTRONIC MAINTENANCE

SubDrive2W, 75, 100, 150, 300, MonoDrive, and MonoDrive XT

Should an application or system problem occur, built-in diagnostics will protect the system. The "FAULT" light or digital display on the front of the SubDrive/MonoDrive Controller will flash a given number of times or display a number indicating the nature of the fault. In some cases, the system will shut itself off until corrective action is taken. Fault codes and their corrective actions are listed below. See SubDrive/MonoDrive Installation Manual for installation data.

Diagnostic Fault Codes

NUMBER OF FLASHES OR DIGITAL DISPLAY	FAULT	POSSIBLE CAUSE	CORRECTIVE ACTION
1	MOTOR UNDERLOAD	<ul style="list-style-type: none"> - Overpumped well - Broken shaft or coupling - Blocked screen, worn pump - Air/gas locked pump - SubDrive not set properly for pump end 	<ul style="list-style-type: none"> - Frequency near maximum with less than 65% of expected load, 42% if DIP #3 is "on" - System is drawing down to pump inlet (out of water) - High static, light loading pump - reset DIP switch #3 to "on" for less sensitivity if not out of water - Check pump rotation (SubDrive only) reconnect if necessary for proper rotation - Air/gas locked pump - if possible, set deeper in well to reduce - Verify DIP switches are set properly
2	UNDERVOLTAGE	<ul style="list-style-type: none"> - Low line voltage - Misconnected input leads - Dragging or failed cooling fan 	<ul style="list-style-type: none"> - Line voltage low, less than approximately 150 VAC (normal operating range = 190 to 260 VAC) - Check incoming power connection and correct or tighten if necessary correct incoming voltage - check circuit breaker or fuses, contact power company - Disconnect fan. Re-apply system power. If 2-flash goes away, replace fan. If 2-flash continues, replace controller. Check fan with 9 Volt battery.
3	LOCKED PUMP	<ul style="list-style-type: none"> - Motor and/or pump misalignment - Dragging motor and/or pump - Abrasives in pump - Low Insulation to Ground 	<ul style="list-style-type: none"> - Line voltage low, less than approximately 150 VAC (normal operating range = 190 to 260 VAC) - Amperage above max amps at 10 Hz - Remove and repair or replace as required - Check line to ground with a megohmmeter - Are output leads to motor longer than 1000 feet?
4 (MonoDrive & MonoDriveXT only)	INCORRECTLY WIRED	<ul style="list-style-type: none"> - MonoDrive only - Wrong resistance values on main and start 	<ul style="list-style-type: none"> - Wrong resistance on DC test at start - Check wiring, check motor size, and DIP switch setting, adjust or repair as needed
5	OPEN CIRCUIT	<ul style="list-style-type: none"> - Loose connection - Failed motor or drop cable - Wrong motor - Damaged controller 	<ul style="list-style-type: none"> - Open reading on DC test at start - Check drop cable and motor resistance, tighten output connections, repair or replace as necessary, use "dry" motor to check drive functions, if drive will not run and exhibits open circuit fault, replace drive - Check ratings - Replace controller
6	OVER CURRENT	<ul style="list-style-type: none"> - When fault is indicated immediately after power-up, over current is due to short circuit. Check for loose connections, defective cable, defective splice or grounded motor. 	<ul style="list-style-type: none"> - Amperage exceeded 50 amps on DC test at start or max amps during running - Incorrect output wiring, phase to phase short, phase to ground short in wiring or motor - If fault is present after resetting and removing motor leads, replace drive
		<ul style="list-style-type: none"> - When fault is indicated while motor is running, over current due to loose debris trapped in pump 	<ul style="list-style-type: none"> - Check pump
7	OVERHEATED DRIVE	<ul style="list-style-type: none"> - High ambient temperature - Direct sunlight - Obstruction of airflow 	<ul style="list-style-type: none"> - Drive heat sink has exceeded max rated temperature, needs to drop below 85 °C to restart - Fan blocked or inoperable, ambient above 125 °F, direct sunlight, air flow blocked - Replace fan or relocate drive as necessary
8 (SubDrive300 only)	OVER PRESSURE	<ul style="list-style-type: none"> - Improper pre-charge - Valve closing too fast - Pressure setting too close to relief valve rating 	<ul style="list-style-type: none"> - Reset the pre-charge pressure to 70% of sensor setting. Reduce pressure setting well below relief valve rating. Use next size larger pressure tank. - Verify valve operation is within manufacturer's specifications. - Reduce system pressure setting to a value less than pressure relief rating.
RAPID	INTERNAL FAULT	<ul style="list-style-type: none"> - A fault was found internal to drive 	<ul style="list-style-type: none"> - Unit may require replacement. Contact your supplier.
9 (SubDrive2W only)	OVER RANGE (Values outside normal operating range)	<ul style="list-style-type: none"> - Wrong hp/voltage - Internal fault 	<ul style="list-style-type: none"> - Verify motor hp and voltage - Unit may require replacement. Contact your supplier.



Electronic Products

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SubDrive15, 20, 30, MonoDrive, and MonoDriveXT (NEMA 3R)

Diagnostic Fault Codes

NUMBER OF FLASHES	FAULT	POSSIBLE CAUSE	CORRECTIVE ACTION
F1	MOTOR UNDERLOAD	<ul style="list-style-type: none"> - Overpumped well - Broken shaft or coupling - Blocked screen, worn pump - Air/gas locked pump - SubDrive not set properly for pump end - Underload Sensitivity setting incorrect 	<ul style="list-style-type: none"> - Frequency near maximum with load less than configured underload sensitivity (Potentiometer or Wi-Fi) - System is drawing down to pump inlet (out of water) - High static, light loading pump - reset Potentiometer for less sensitivity if not out of water - Check pump rotation (SubDrive only) reconnect if necessary for proper rotation - Air/gas locked pump - if possible, set deeper in well to reduce - Verify DIP switches are set properly - Check Underload Sensitivity Setting (Potentiometer or Wi-Fi setting, whichever is applicable)
F2	UNDERVOLTAGE	<ul style="list-style-type: none"> - Low line voltage - Misconnected input leads - Loose connection at breaker or panel 	<ul style="list-style-type: none"> - Line voltage low, less than approximately 150 VAC (normal operating range = 190 to 260 VAC) - Check incoming power connections and correct or tighten if necessary - Correct incoming voltage - check circuit breaker or fuses, contact power company
F3	OVERCURRENT / LOCKED PUMP	<ul style="list-style-type: none"> - Motor and/or pump misalignment - Dragging motor and/or pump - Motor and/or pump locked - Abrasives in pump - Excess motor cable length 	<ul style="list-style-type: none"> - Amperage above SFL at 30 Hz - Remove and repair or replace as required - Reduce motor cable length. Adhere to Maximum Motor Cable Length table.
F4 (MonoDrive & MonoDriveXT only)	INCORRECTLY WIRED	<ul style="list-style-type: none"> - MonoDrive only - Wrong resistance values on main and start 	<ul style="list-style-type: none"> - Wrong resistance on DC test at start - Check wiring, check motor size and DIP switch setting, adjust or repair as needed
F5	OPEN PHASE	<ul style="list-style-type: none"> - Loose connection - Defective motor or drop cable - Wrong motor 	<ul style="list-style-type: none"> - Open reading on DC test at start - Check drop cable and motor resistance, tighten output connections, repair or replace as necessary, use "dry" motor to check drive functions. If drive will not run and exhibits underload fault replace drive
F6	SHORT CIRCUIT	<ul style="list-style-type: none"> - When fault is indicated immediately after power-up, short circuit due to loose connection, defective cable, splice or motor 	<ul style="list-style-type: none"> - Amperage exceeded 25 amps on DC test at start or SF amps during running - Incorrect output wiring, phase to phase short, phase to ground short in wiring or motor - If fault is present after resetting and removing motor leads, replace drive
F7	OVERHEATED DRIVE	<ul style="list-style-type: none"> - High ambient temperature - Direct sunlight - Obstruction of airflow 	<ul style="list-style-type: none"> - Drive heat sink has exceeded max rated temperature, needs to drop below 194 °F (90 °C) to restart - Fan blocked or inoperable, ambient above 122 °F (50 °C), direct sunlight, air flow blocked - Replace fan or relocate drive as necessary - Remove debris from fan intake/exhaust - Remove and clean optional air screen kit (if installed)
F9	INTERNAL PCB FAULT	<ul style="list-style-type: none"> - A fault was found internal to drive 	<ul style="list-style-type: none"> - Contact your Franklin Electric Service Personnel - Unit may require replacement. Contact your supplier.
F12	OVERVOLTAGE	<ul style="list-style-type: none"> - High line voltage - Internal voltage too high 	<ul style="list-style-type: none"> - Line voltage high - Check incoming power connections and correct or tighten if necessary - If line voltage is stable and measured below 260 VAC and problem persists, contact your Franklin Electric Service Personnel

Power down, disconnect leads to the motor and power up the SubDrive:

- If the SubDrive does not give an "open phase" fault (F5), then there is a problem with the SubDrive.
- Connect the SubDrive to a dry motor. If the motor goes through DC test and gives "underload" fault (F1), the SubDrive is working properly.



Electronic Products

ELECTRONIC MAINTENANCE

SubDrive15, 20, 30, MonoDrive, and MonoDriveXT (NEMA 3R) (Continued)

Diagnostic Fault Codes

NUMBER OF FLASHES	FAULT	POSSIBLE CAUSE	CORRECTIVE ACTION
F14	BROKEN PIPE	<ul style="list-style-type: none"> - Broken pipe or large leak is detected in the system - Drive runs at full power for 10 minutes without reaching pressure setpoint - Large water draw, such as a sprinkler system, does not allow system to reach pressure setpoint 	<ul style="list-style-type: none"> - Check system for large leak or broken pipe - If the system contains a sprinkler system or is being used to fill a pool or cistern, disable the Broken Pipe Detection
F15 (SD15/20/30 only)	PHASE IMBALANCE	<ul style="list-style-type: none"> - Motor phase currents differ by 20% or more. - Motor is worn internally - Motor cable resistance is not equal - Incorrect motor type setting (single- or three-phase) 	<ul style="list-style-type: none"> - Check resistance of motor cable and motor windings - Verify motor type matched drive settings (single- or three-phase)
F16	GROUND FAULT	<ul style="list-style-type: none"> - Motor output cable is damaged or exposed to water - Phase to ground short 	<ul style="list-style-type: none"> - Check motor cable insulation resistance with megger (while not connected to drive). Replace motor cable if needed.
F17	INVERTER TEMPERATURE SENSOR FAULT	<ul style="list-style-type: none"> - Internal temperature sensor is malfunctioning 	<ul style="list-style-type: none"> - Contact your Franklin Electric Service Personnel - If problem persists, unit may require replacement. Contact your supplier.
F18 (SD20/30/MDXT only)	PFC TEMPERATURE SENSOR FAULT	<ul style="list-style-type: none"> - Internal temperature sensor is malfunctioning 	<ul style="list-style-type: none"> - Contact your Franklin Electric Service Personnel - If problem persists, unit may require replacement. Contact your supplier.
F19	COMMUNICATION FAULT	<ul style="list-style-type: none"> - Cable connection between Display/Wi-Fi Board and Main Control Board is loose or disconnected - Internal circuit failure 	<ul style="list-style-type: none"> - Check cable connection between Display/Wi-Fi Board and Main Control Board. - If problem persists, unit may require replacement. Contact your supplier.
F22	DISPLAY/WI-FI BOARD EXPECTED FAULT	<ul style="list-style-type: none"> - Connection between Display/Wi-Fi Board and Main Control Board was not detected at drive start-up 	<ul style="list-style-type: none"> - Check cable connection between Display/Wi-Fi Board and Main Control Board. - If problem persists, unit may require replacement. Contact your supplier.
F23	MAIN BOARD STARTUP FAULT	<ul style="list-style-type: none"> - A fault was found internal to drive 	<ul style="list-style-type: none"> - Contact your Franklin Electric Service Personnel - Unit may require replacement. Contact your supplier.
F24	INVALID DIP SWITCH SETTING	<ul style="list-style-type: none"> - No DIP Switch set or more than one (1) DIP switch set for motor size - No DIP Switch set or more than one (1) DIP switch set for pump size - Invalid combination of DIP switches for drive type (SD or MD mode), motor hp, and pump hp. 	<ul style="list-style-type: none"> - Check DIP switch settings

Power down, disconnect leads to the motor and power up the SubDrive:

- If the SubDrive does not give an "open phase" fault (F5), then there is a problem with the SubDrive.
- Connect the SubDrive to a dry motor. If the motor goes through DC test and gives "underload" fault (F1), the SubDrive is working properly.



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Troubleshooting

CONDITION	INDICATOR LIGHT	POSSIBLE CAUSE	CORRECTIVE ACTION
NO WATER	NONE	- No supply voltage present	- If correct voltage is present, replace drive
	SOLID GREEN	- Pressure sensor circuit	- Verify water pressure is below system set point - Jumper wires together at pressure sensor, if pump starts, replace sensor - If pump doesn't start, check sensor connection at printed circuit board (PCB), if loose, repair - If pump doesn't start, jumper sensor connection at PCB, if pump starts, replace wire - If pump doesn't start with sensor PCB connection jumpered, replace drive
	SOLID RED OR SOLID RED AND GREEN	- Power surge, bad component	- Power system down to clear fault, verify voltage, if repetitive, replace drive
	FLASHING RED	- Fault detected	- Proceed to fault code description and remedy
	FLASHING GREEN	- Drive and motor are operating - Loose switch or cable connection - Gulping water at pump inlet	- Frequency max, amps low, check for closed valve, or stuck check valve - Frequency max, amps high, check for hole in pipe - Frequency max, amps erratic, check pump operation, dragging impellers - This is not a drive problem - Check all connections - Disconnect power and allow well to recover for short time, then retry
PRESSURE FLUCTUATIONS (POOR REGULATION)	FLASHING GREEN	- Pressure sensor placement and setting - Pressure gauge placement - Pressure tank size and pre-charge - Leak in system - Air entrainment into pump intake (lack of submergence)	- Correct pressure and placement as necessary - Tank may be too small for system flow - This is not a drive problem - Disconnect power and check pressure gauge for pressure drop - Set deeper in the well or tank; install a flow sleeve with airtight seal around drop pipe and cable - If fluctuation is only on branches before sensor, flip DIP switch #4 to "on" (07C and newer)
RUN ON WON'T SHUT DOWN	FLASHING GREEN	- Pressure sensor placement and setting - Tank pre-charge pressure - Impeller damage - Leaky system - Sized improperly (pump can't build enough head)	- Check frequency at low flows, pressure setting may be too close to pump max head - Verify precharge at 70% if tank size is larger than minimum, increase precharge (up to 85%) - Verify that the system will build and hold pressure
RUNS BUT TRIPS	FLASHING RED	- Check fault code and see corrective action	- Proceed to fault code description and remedy on reverse side
LOW PRESSURE	FLASHING GREEN	- Pressure sensor setting, pump rotation, pump sizing	- Adjust pressure sensor, check pump rotation - Check frequency at max flow, check max pressure
HIGH PRESSURE	FLASHING GREEN	- Pressure sensor setting - Shorted sensor wire	- Adjust pressure sensor - Remove sensor wire at PCB, if drive continues to run, replace drive - Verify condition of sensor wire and repair or replace if necessary
AUDIBLE NOISE	FLASHING GREEN	- Fan, hydraulic, plumbing	- For excessive fan noise, replace fan - If fan noise is normal, drive will need to be relocated to a more remote area - If hydraulic, try raising or lowering depth of pump - Pressure tank location should be at entrance of water line into house
NO LIGHTS	NONE	- Ribbon cable detached from LED printed circuit board	- Reattach cable - if cable is attached, replace drive
RFI-EMI INTERFERENCE	FLASHING GREEN	- See interference troubleshooting procedure	



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Troubleshooting

CONDITION	INDICATOR LIGHT	POSSIBLE CAUSE	CORRECTIVE ACTION
NO WATER	NONE	<ul style="list-style-type: none"> - No supply voltage present - Display board cable disconnected or loose 	<ul style="list-style-type: none"> - Verify cable connection between main control board and display board - If correct voltage is present, replace drive
	GREEN "---" ON DISPLAY	<ul style="list-style-type: none"> - Pressure sensor circuit 	<ul style="list-style-type: none"> - Verify water pressure is below system set point - If Pressure Input Board break-away tab is removed, ensure auxiliary device is connected and closed circuit - If Pressure Input Board break-away tab is removed and no auxiliary device is being used, manually short-circuit "AUX IN" connections - Jumper wires together at pressure sensor; if pump starts, replace sensor - If pump doesn't start, check sensor connection at Pressure Input Board; if loose, repair - If pump doesn't start, jumper sensor connection at Pressure Input Board. If pump starts, replace wire - If pump doesn't start with sensor Pressure Input Board connection jumpered, replace Pressure Input Board - If pump doesn't start with new Pressure Input Board, replace drive
	RED FAULT CODE ON DISPLAY	<ul style="list-style-type: none"> - Fault detected 	<ul style="list-style-type: none"> - Proceed to fault code description and remedy
	GREEN MOTOR FREQUENCY ON DISPLAY	<ul style="list-style-type: none"> - Drive and motor are operating - Loose switch or cable connection - Incorrect motor or pump settings - Motor may be running backwards - Gulping water at pump inlet 	<ul style="list-style-type: none"> - Verify Maximum Frequency setting. If this setting was reduced below maximum value, increase - Verify motor/pump ratings and match to motor/pump settings on drive (DIP switch or Wi-Fi) - Verify motor connections - Frequency max, amps low, check for closed valve, or stuck check valve - Frequency max, amps high, check for hole in pipe - Frequency max, amps erratic, check pump operation, dragging impellers - This is not a drive problem - Check all connections - Disconnect power and allow well to recover for short time, then retry
PRESSURE FLUCTUATIONS (POOR REGULATION)	GREEN MOTOR FREQUENCY ON DISPLAY	<ul style="list-style-type: none"> - Pressure sensor placement and setting - Pressure gauge placement - Pressure tank size and pre-charge - Leak in system - Air entrainment into pump intake (lack of submergence) 	<ul style="list-style-type: none"> - Correct pressure and placement as necessary - Tank may be too small for system flow - This is not a drive problem - Disconnect power and check pressure gauge for pressure drop - Change tank size configuration - Set deeper in the well or tank; install a flow sleeve with airtight seal around drop pipe and cable - If fluctuation is only on branches before sensor, enable Steady Flow
RUN ON WON'T SHUT DOWN	GREEN MOTOR FREQUENCY ON DISPLAY	<ul style="list-style-type: none"> - Pressure sensor placement and setting - Tank pre-charge pressure - Impeller damage - Leaky system - Sized improperly (pump can't build enough head) 	<ul style="list-style-type: none"> - Check frequency at low flows, pressure setting may be too close to pump max head - Verify precharge at 70% if tank size is larger than minimum, increase precharge (up to 85%) - Verify that the system will build and hold pressure - Enable bump and/or aggressive bump - Increase minimum frequency
RUNS BUT TRIPS	FLASHING RED	<ul style="list-style-type: none"> - Check fault code and see corrective action 	<ul style="list-style-type: none"> - Proceed to fault code description and remedy on reverse side

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Electronic Products

ELECTRONIC MAINTENANCE

SubDrive15, 20, 30, MonoDrive, and MonoDriveXT (NEMA 3R) (Continued)

Troubleshooting

CONDITION	INDICATOR LIGHT	POSSIBLE CAUSE	CORRECTIVE ACTION
LOW PRESSURE	GREEN MOTOR FREQUENCY ON DISPLAY	<ul style="list-style-type: none"> - Pressure sensor setting, pump rotation, pump sizing - High temperature 	<ul style="list-style-type: none"> - Adjust pressure sensor, check pump rotation - Check frequency at max flow, check max pressure - High ambient and/or drive temperature will cause drive to foldback power and run with reduced performance
HIGH PRESSURE	GREEN MOTOR FREQUENCY ON DISPLAY	<ul style="list-style-type: none"> - Pressure sensor setting - Shorted sensor wire 	<ul style="list-style-type: none"> - Adjust pressure sensor - Remove sensor wire at Pressure Input Board, if drive stops running, wire may be shorted - Remove sensor wire at Pressure Input Board, if drive continues to run, replace Pressure Input Board - Remove sensor wire at new Pressure Input Board, if drive continues to run, replace drive - Verify condition of sensor wire and repair or replace if necessary
AUDIBLE NOISE	GREEN MOTOR FREQUENCY ON DISPLAY	<ul style="list-style-type: none"> - Fan, hydraulic, plumbing 	<ul style="list-style-type: none"> - For excessive fan noise, replace fan - If fan noise is normal, drive will need to be relocated to a more remote area - If hydraulic, try raising or lowering depth of pump - Pressure tank location should be at entrance of water line into house
NO DISPLAY	NONE	<ul style="list-style-type: none"> - Display board cable disconnected or loose 	<ul style="list-style-type: none"> - Verify cable connection between main control board and display board
CANNOT CONNECT TO DRIVE WI-FI	FE CONNECT LIGHT ON SOLID	<ul style="list-style-type: none"> - Attempting to connect to incorrect drive - Out of Wi-Fi range of drive 	<ul style="list-style-type: none"> - Ensure the Wi-Fi SSID (hotspot name) you are connecting to matches the drive you wish to connect to - Wi-Fi range is 100 feet line-of-site, must be closer to drive if walls or floors are between you and the drive - Wi-Fi module not responding, cycle power to drive - Cycle Wi-Fi radio on mobile device, refresh Wi-Fi connection list
	FE CONNECT LIGHT OFF	<ul style="list-style-type: none"> - Wi-Fi timeout expired 	<ul style="list-style-type: none"> - If more than fifteen (15) minutes since last power cycle, cycle power to drive - If more than one (1) hour since last disconnection from Wi-Fi, cycle power to drive
RFI-EMI INTERFERENCE	GREEN MOTOR FREQUENCY ON DISPLAY	<ul style="list-style-type: none"> - Poor grounding - Wire routing 	<ul style="list-style-type: none"> - Adhere to grounding and wire routing recommendations - An additional external filter may be needed. See Accessories section for ordering information