BENSHAW
ADVANCED CONTROLS & DRIVES

# SERVICE NOTES

**Service Notes SN0021-00**

## VFD Troubleshooting Guide

## 1. Information:

Customer Name: _____ Tested By: _____
Serial # _____ Model #_____
Temperature of Drive _____ °C Operating Ambient Temperature _____ °C

## 2. Power System:

Voltage _____ Transformer Size _____ KVA
Secondary Connection ☐Star with Solid Ground
☐Star with Neutral Ground Resistor (NGR) _____ ohms
☐Star with Neutral Ground Inductor _____% Imp.
☐Delta
☐Delta with ZIGZAG transformer & NGR

## 3. Motor Data:

NEMA Design _____ Motor RPM _____
FLA of Motor _____ A Service Factor of Motor _____
Load: $WK^2$ _____ Load RPM _____
Breaker: Thermal Magnetic_____ Magnetic _____
Fusible: Type _____ Fuse Part # _____
Power Factor Caps _____ * Must be on line side KVAR _____
Meter using: Manufacturer _____ Calibration Date _____
Application _____

## 4. Power Off Tests:

Is motor in circuit? Y N
Motor Insulation Test: Completed By _____ Megger Resistance _____ Scale _____

## 4.1 Visual Inspection:

Visible burn marks? Y N
Loose connection? Y N
Smell test (burnt smell)? Y N

## 4.2 Buss and Wiring:

Check all power connections (customer and internal) for proper fastener torque. Examine all power connections for signs of burning or other damage indicating a poor connection.

## 4.3 Resistance Checks:

Disconnect wiring from R, S, T, U, V, and W when checking devices

## 4.4 INPUT DIODE MODULE:

DMM set to Diode Check Mode

| Probe + | Probe - | Display |
|---|---|---|
| R | DCN | INFINITE |
| R | DCP | 0.3 – 0.4 |
| S | DCN | INFINITE |
| S | DCP | 0.3 – 0.4 |
| T | DCN | INFINITE |
| T | DCP | 0.3 – 0.4 |

DMM set to Resistance Check Mode

R – DCP+ _____ ohms > 50K ohms
S – DCP+ _____ ohms > 50K ohms
T – DCP+ _____ ohms > 50K ohms
R – DCN _____ ohms > 50K ohms
S – DCN _____ ohms > 50K ohms
T – DCN _____ ohms > 50K ohms

## 4.5 IGBT MODULE:

DMM set to Diode Check Mode

| Probe + | Probe - | Display |
|---|---|---|
| U | DCN | INFINITE |
| DCN | U | 0.3 ~ 0.4 |
| U | DCP | 0.3 ~ 0.4 |
| DCP | U | INFINITE |
| V | DCN | INFINITE |
| DCN | V | 0.3 ~ 0.4 |
| V | DCP | 0.3 ~ 0.4 |
| DCP | V | INFINITE |
| W | DCN | INFINITE |
| DCN | W | 0.3 ~ 0.4 |
| W | DCP | 0.3 ~ 0.4 |
| DCP | W | INFINITE |

DMM set to Resistance Check Mode

U – DCP _____ ohms > 50K ohms
V – DCP _____ ohms > 50K ohms
W – DCP _____ ohms > 50K ohms
U – DCN _____ ohms > 50K ohms
V – DCN _____ ohms > 50K ohms
W – DCN _____ ohms > 50K ohms

All gate to emitters should read the same resistance, ~2kΩ or ~ 10kΩ depending on the drive horsepower.

## 4.6 PRECHARGE CIRCUITRY:

| Status | Display |
|---|---|
| Contactor open | Ω of the precharge resistor |
| Contactor closed | Zero Ω |

## 4.7 DB and Dynamic braking IGBT's:

DMM set to Diode Check Mode
Collector - emitter

| Probe + | Probe - | Display |
|---|---|---|
| DB2 | DCN | 0.3 ~ 0.4 |
| DCN | DB2 | INFINITE |

Freewheeling diode, (DB resistor disconnected)

| Probe + | Probe - | Display |
|---|---|---|
| B2 | B1 | 0.3 ~ 0.4 |
| B1 | B2 | INFINITE |

DMM set to Resistance Check Mode
DB2 – DCN _____ ohms > 50 K ohms
G – DCN _____ ohms (few Kilo ohms)

## 4.8 Fuses OK:

| | | |
|---|---|---|
| DC Bus Fuse | Y | N |
| Control Power Fuses | Y | N |
| Power Fuses | Y | N |