



**Sensorless Field-Oriented-(Motor)-Control Algorithm:**

- Phase current & BEMF monitoring, and current & flux regulators execute at 16 kHz and speed regulator executes at 1 kHz.
- Dedicated high-performance motor control timer with break inputs connected to hardware over-current and over-temperature detectors.
- Safety loops monitoring all critical voltages, currents, power consumption, and temperatures.
- Precise measurement of discharge & suction pressures and temperatures, and super-heat calculation.

**Sensorless Field-Oriented-(Motor)-Control Algorithm:**

- Phase current & BEMF monitoring, and current & flux regulators execute at 12 kHz and speed regulator executes at 500 Hz.
- Dedicated high-performance motor control timer with break inputs connected to hardware over-current and over-temperature detectors.
- Safety loops monitoring all critical voltages, currents, power consumption, and temperatures.
- Safety loops monitoring HVAC compressor operation (suction and discharge pressure, temperature, super-heat).

This isolation barrier is present on the UDCMC in all designs (common design for all voltages), but in the 48V design, SGND and PGND are tied together (same net/circuit) on the Mezzanine Card - see above.

**48 Volt 150 model (3000W) eDrive Compressor**  
Applicable model: UD150-48 V

Nominal supply:  
- Voltage: 42 - 54 Vdc  
- Power: 3000 W  
- Current: 62.5 A

**Integrated motor safety:**  
Maximum continuous power consumption is 4.0 kW. If this is exceeded for a continuous period of 10 seconds, the motor is stopped, and a restart is attempted following an idle period (typically 2 minutes). If power consumption exceeds 4.5 kW, the motor is immediately stopped, and a restart is attempted following an idle period (typically 2 minutes). The number of restarts is limited in number, after which time operator intervention is required. The values of 4.0 kW, 4.5 kW, and 10 seconds, can be configured to suit the application.

**Maximum Continuous Current (MCC):**  
83.3 A @ 48 Vdc, 95.2 A @ 42 Vdc

**Service Duty:**  
Ambient Temperature < 45°C  
Ambient Temperature < 55°C  
(refer Unicla Operations Manual for additional requirements)

**Motor Thermal Protection:**  
Two, independent systems provide motor thermal protection:  
1. Linear PTC (embedded into stator windings). This is used to monitor the temperature of the motor. The motor is stopped at 120°C, and restarts at 90°C.  
2. Triplex non-linear PTC (embedded into stator windings), connected to a dedicated circuit that disables motor operation. Motor is stopped at 130°C.

**LRA (Locked Rotor Amperage):**  
The nature of BLDC Field Oriented Control means that a locked rotor scenario is not possible. The current, flux, and speed regulator control loops continuously monitor the operation of the motor and flag a fault condition if the motor is not rotating. Power delivery to the motor is stopped.

**Enclosure class:**  
Controller housing & motor IP55

LS: Low-Side  
HS: High-Side  
ICL: Inrush Current Limit (ing)  
NTC: Negative Temperature Coefficient (Resistive Temperature Sensor)  
OC: Over-Current (Fault)  
PCBA: Printed Circuit Board Assembly  
PTC: Positive Temperature Coefficient (Resistive Temperature Sensor)  
PWM: Pulse Width Modulation  
V/A: Volts/Amp (Measurement of Current)

LV: Voltage Classification (Low Voltage)  
ELV: Voltage Classification (Extra Low Voltage)  
SELV: Voltage Classification (Safety Extra Low Voltage)

UDCMC: eDrive Compressor Motor Controller  
UDFMC: eDrive Fan Motor Controller  
UDPC: eDrive Power Card  
UDPC-MEZZ: eDrive Power Card Mezzanine (48 Vdc & 72 Vdc only)  
UDXC: eDrive Communication and Interface Card