

HIGH TEMPERATURE & HIGH PRESSURE ALTERNATORS FOR OIL AND GAS EXPLORATION



ALTERNATORS

Ducommun's permanent magnet alternators for downhole exploration tools are used worldwide as a constant source of power replacing batteries. The performance of our highly reliable alternators has been continuously improved over the last 20 years to provide unsurpassed lifetimes in extremely harsh operating environments at high temperatures-high pressures (HTHP) up to 232°C (450°F) and 2068 bar (30,000 psi).

The available designs range from size 16 (OD 1.6") to size 40 (OD 4.0").

The success of high temperature/pressure alternators frequently requires units with exceptionally long and thin motor designs from 1.5" dia x 9" long without gear heads. Ducommun has invested to acquire the required tooling and expertise to routinely meet these requirements.

OPTIONS

- Control wires going through the motor
- Hollow shaft designs
- Framed or frameless versions
- Custom Designs

FEATURES & BENEFITS

- High Temperatures-High pressures (HTHP) up to 232°C (450°F) and 2068 bar (30,000 psi)
- Power: 50 – 350 watts
- Size 16 (OD 1.6") to size 40 (OD 4.0")
- Designed to Operate While Immersed in Hydraulic Oil per MIL-H-83282C
- Driving Speed Range: 2,000-12,000 rpm
- Designed to meet Voltage/RPM requirements

We offer a complete line of permanent magnet alternators that are designed for the severe environments experienced during oil drilling operations.

APPLICATIONS

- Oil & Gas exploration tools
- Drilling tools
- MWD and LWD tools

SPECIFICATIONS

MODEL	DRIVING SPEED (RPM)	OUTPUT VOLTAGE AT MIN RPM (MIN VRMS L-L)	OUTPUT POWER AT MIN RPM (MIN WATTS)
16WP1	3000 TO 9000	32	50
22WP1	3500 TO 5600	24	200
22WP2	3500 TO 5600	24	200
22WP3	3500 TO 10,000	19	220
22WP4	2000 TO 7000	23	220
22WP5	2000 TO 7000	26	220
22WP6	2000 TO 10,000	19	220
40WP2	4000 TO 12,000	TBD	350

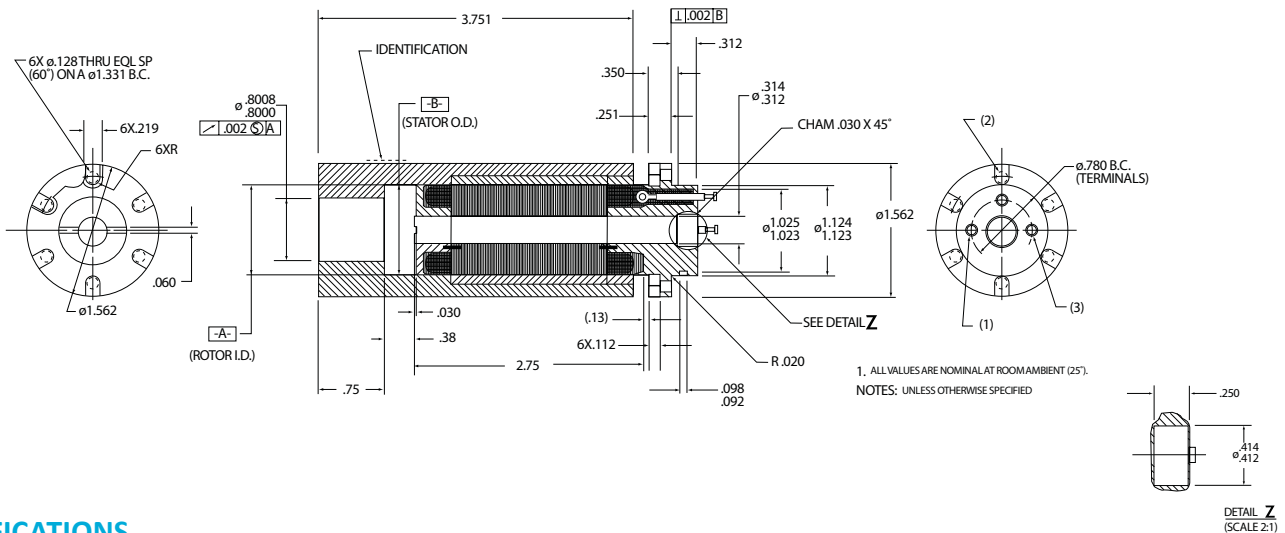
PART NUMBER CONFIGURATION

The following part number configurations are based on current configurations. For custom design solutions, please contact Ducommun at 310.513.7200 or mcdsales@ducommun.com.

<u>16</u> Motor size 16: OD 1.6 inches	<u>WP</u> ALTERNATOR	<u>1</u> Ducommun Design Number
---	-------------------------	------------------------------------

HIGH TEMPERATURE GENERATOR FOR DOWN HOLE APPLICATIONS 16WP1 SERIES

OUTLINE DRAWING



SPECIFICATIONS

ELECTRICAL AND PERFORMANCE DATA (ROOM AMBIENT)

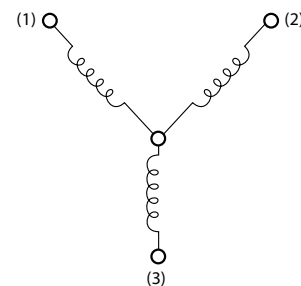
NUMBER OF PHASES	3
OUTPUT VOLTAGE (VRMS) (MAX) AT 3,000 RPM, NO LOAD	48
OUTPUT VOLTAGE (VRMS) (MIN) AT 3,000 RPM WITH 30 OHM RESISTOR LOAD	28
POWER OUTPUT AT 3,000 RPM (WATTS MIN AT P.F. = 1)	50
DC WINDING RESISTANCE (OHMS)	5.4 ± 10%
INDUCTANCE, STATOR (MH)	TDB

GENERAL DATA

ROTOR MOMENT OF INTERIA (OZ-IN)	19.2
OPERATING TEMPERATURE RANGE (°C)	0 TO 200
STATIC FRICTIONAL TORQUE (IN-OZ) AT +25 ± 5°C (MAX)	12.0
DRIVING SPEED (RPM)	3,000 TO 9,000
WEIGHT (OUNCES) (MAX)	30.0

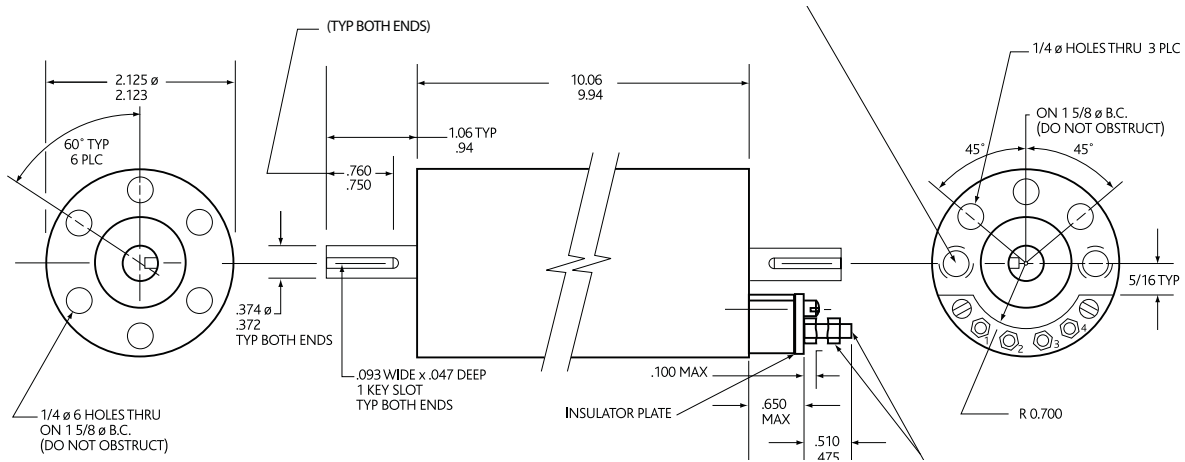
CIRCUIT DIAGRAM

END PHASE SEQUENCE IS 1,2,3 FOR CW ROTATION AS VIEWED FROM TERMINAL END.



HIGH TEMPERATURE ALTERNATOR FOR DOWN HOLE APPLICATIONS 22WP1 SERIES

OUTLINE DRAWING



SPECIFICATIONS

ELECTRICAL AND PERFORMANCE DATA (ROOM AMBIENT)

DRIVING SPEED (RPM)	3500 TO 5600
LOAD	PURE RESISTIVE
OUTPUT AT	3500 RPM
TOTAL POWER (WATTS)	200 MIN
VOLTAGE L-L (VRMS)	24 MIN
CURRENT / LINE (ARMS)	4.8 MIN
FREQUENCY (Hz)	116.65
CURRENT PER PHASE AT 5600 RPM (ARMS)	7.5 MAX
WAVE SHAPE	SINUSOIDAL
TOTAL HARMONICS DISTORTION (%)	8 MAX

GENERAL DATA

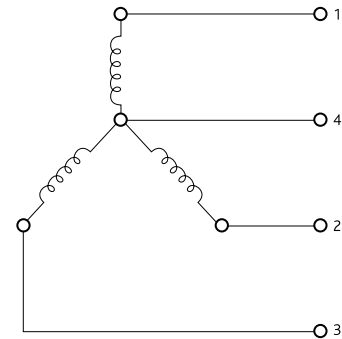
ENVIRONMENT	
UNIT FULLY IMMERSED IN CAPELLA "B" OIL AT 200°C MAX TEMPERATURE AND 20,000 PSI MAX	
DUTY (MAX)	CONTINUOUS FOR 200 HOURS
LIFE EXPECTANCY	1000 HOURS MIN WITH SCHEDULED MAINTENANCE

INSTALLATION

THE UNIT MUST BE SUPPORTED BY THE O.D. (2.125 ϕ) INSIDE A CLOSE FITTING METAL TUBE OVER THE ENTIRE LENGTH OF THE UNIT BODY.

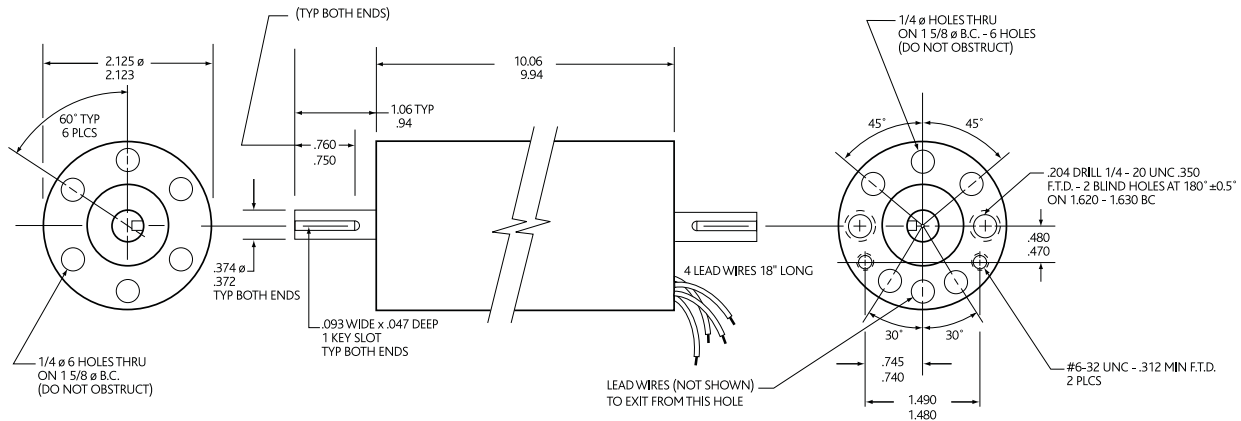
CIRCUIT DIAGRAM

FOR CW ROTATION VIEWING FROM TERMINALS END PHASE SEQUENCE IS 1,2,3.



HIGH TEMPERATURE ALTERNATOR FOR DOWN HOLE APPLICATIONS 22WP2 SERIES

OUTLINE DRAWING



SPECIFICATIONS

ELECTRICAL AND PERFORMANCE DATA (ROOM AMBIENT)

DRIVING SPEED (RPM)	3500 TO 5600
LOAD	PURE RESISTIVE
OUTPUT AT	3500 RPM
TOTAL POWER (WATTS)	200 MIN
VOLTAGE L-L (VRMS)	24 MIN
CURRENT / LINE (ARMS)	4.8 MIN
FREQUENCY (HZ)	116.65
CURRENT PER PHASE AT 5600 RPM (ARMS)	7.5 (MAX)
WAVE SHAPE	SINUSOIDAL
TOTAL HARMONICS DISTORTION (%)	8 MAX

GENERAL DATA

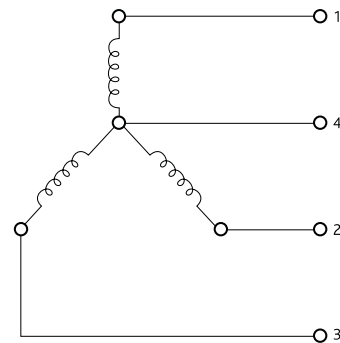
ENVIRONMENT	
UNIT FULLY IMMERSED IN CAPELLA "B" OIL AT 200°C MAX TEMPERATURE AND 20,000 PSI MAX	
DUTY (MAX)	CONTINUOUS FOR 200 HOURS
LIFE EXPECTANCY	1000 HOURS MIN WITH SCHEDULED MAINTENANCE

INSTALLATION

THE UNIT MUST BE SUPPORTED BY THE O.D. (2.125 ϕ) INSIDE A CLOSE FITTING METAL TUBE OVER THE ENTIRE LENGTH OF THE UNIT BODY.

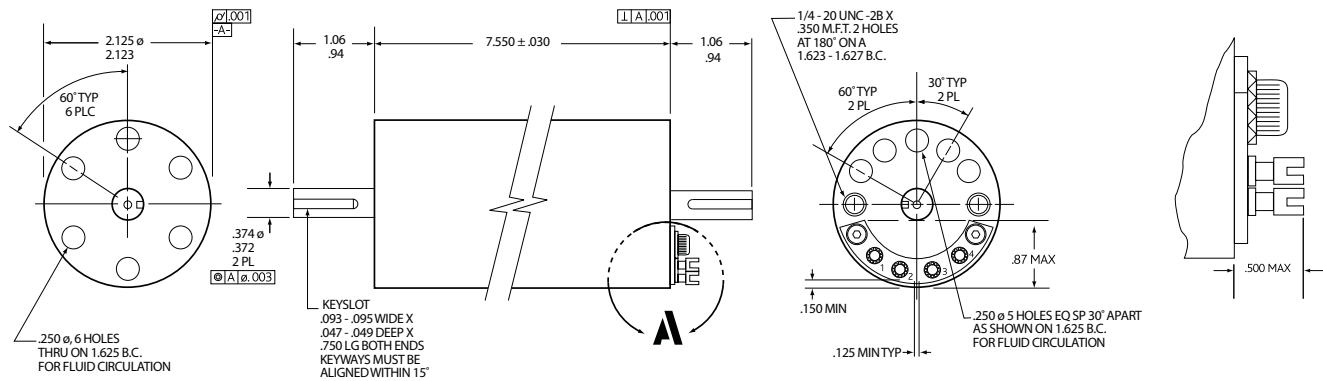
CIRCUIT DIAGRAM

FOR CW ROTATION VIEWING FROM LEAD END PHASE SEQUENCE IS 1,2,3.



HIGH TEMPERATURE ALTERNATOR FOR DOWN HOLE APPLICATIONS 22WP3 SERIES

OUTLINE DRAWING



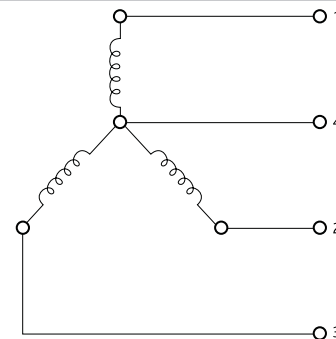
SPECIFICATIONS

ELECTRICAL AND PERFORMANCE DATA (ROOM AMBIENT)

POWER OUTPUT (WATTS MAX AT P.F. = 1 OVER SPEED AND TEMPERATURE RANGE BELOW)	220
OUTPUT VOLTAGE LEVEL (V.R.M.S., L-L, AT 3,500 RPM, +0, -50 RPM AT ANY TEMPERATURE WITHIN THE RANGES BELOW) 19 MIN AT 220 WATTS LOAD 31 MAX AT NO LOAD	
OUTPUT VOLTAGE REGULATION (% MAX AT ANY ONE FIXED SPEED AND AT ANY ONE OIL TEMPERATURE WITHIN THE RANGES BELOW)	19
THE UNIT IS FULLY IMMERSSED IN CAPELLA "B" OIL PER MIL-H-83282C, PRESSURIZED UP TO:	20,000 P.S.I.
OIL TEMPERATURE RANGE:	0°C TO +200°C
TORQUE TRANSMITTED THROUGH SHAFT (LB-IN MAX)	50
DRIVING SPEED RANGE (RPM)	3,500 TO 10,000

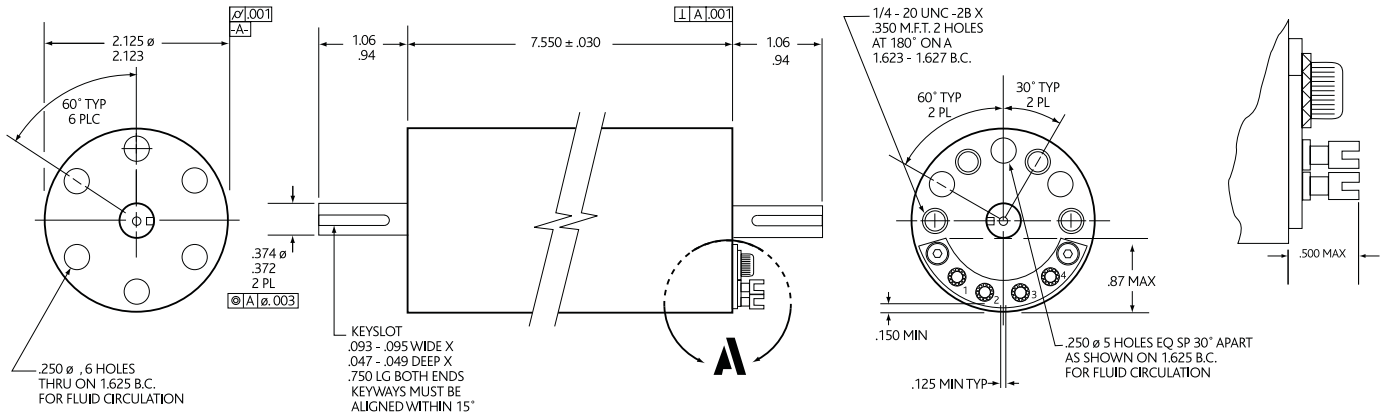
CIRCUIT DIAGRAM

FOR CW ROTATION VIEWING FROM TERMINALS END PHASE SEQUENCE IS 1,2,3.



HIGH TEMPERATURE ALTERNATOR FOR DOWN HOLE APPLICATIONS 22WP4 SERIES

OUTLINE DRAWING



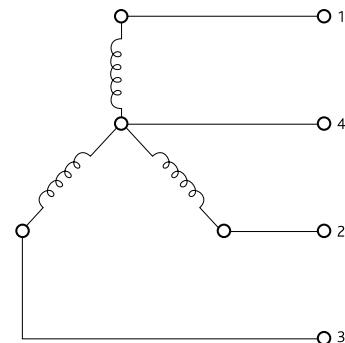
SPECIFICATIONS

ELECTRICAL AND PERFORMANCE DATA (ROOM AMBIENT)

POWER OUTPUT (WATTS MAX AT P.F. = 1 OVER SPEED AND TEMPERATURE RANGE BELOW)	220
OUTPUT VOLTAGE LEVEL (V.R.M.S., L-L, AT 2,000 RPM, +0, -50 RPM AT ANY TEMPERATURE WITHIN THE RANGES BELOW) 26 MIN AT 220 WATTS LOAD 31 MAX AT NO LOAD	
OUTPUT VOLTAGE REGULATION (% MAX AT ANY ONE FIXED SPEED AND AT ANY ONE OIL TEMPERATURE WITHIN THE RANGES BELOW)	19
THE UNIT IS FULLY IMMERSED IN CAPELLA "B" OIL PER MIL-H-83282C, PRESSURIZED UP TO:	20,000 P.S.I.
OIL TEMPERATURE RANGE:	0°C TO +200°C
TORQUE TRANSMITTED THROUGH SHAFT (LB-IN MAX)	50
DRIVING SPEED RANGE (RPM)	2,000 TO 7,000

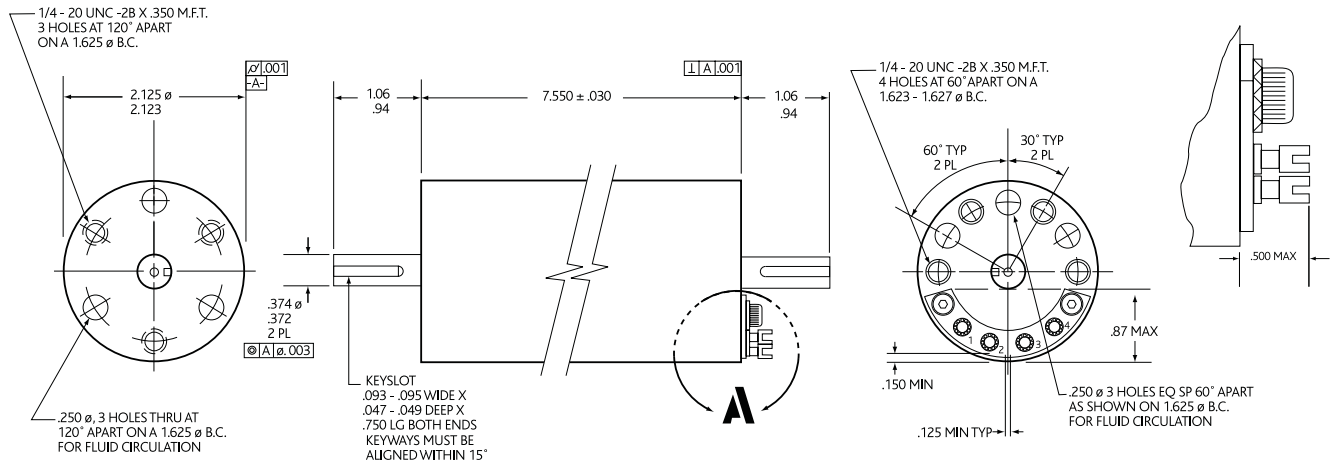
CIRCUIT DIAGRAM

FOR CW ROTATION VIEWING FROM TERMINALS END PHASE SEQUENCE IS 1,2,3.



HIGH TEMPERATURE ALTERNATOR FOR DOWN HOLE APPLICATIONS 22WP5 SERIES

OUTLINE DRAWING



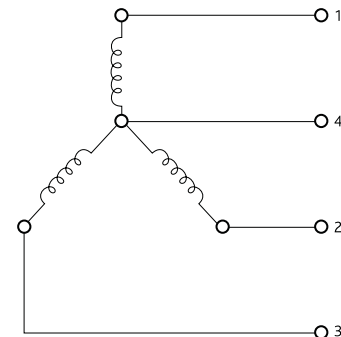
SPECIFICATIONS

ELECTRICAL AND PERFORMANCE DATA (ROOM AMBIENT)

POWER OUTPUT (WATTS MAX AT P.F. = 1 OVER SPEED AND TEMPERATURE RANGE BELOW)	220
OUTPUT VOLTAGE LEVEL (V.R.M.S., L-L, AT 2,000 RPM, +0, -50 RPM AT ANY TEMPERATURE WITHIN THE RANGES BELOW) 26 MIN AT 220 WATTS LOAD 31 MAX AT NO LOAD	
OUTPUT VOLTAGE REGULATION (% MAX AT ANY ONE FIXED SPEED AND AT ANY ONE OIL TEMPERATURE WITHIN THE RANGES BELOW)	19
THE UNIT IS FULLY IMMERSSED IN CAPELLA "B" OIL PER MIL-H-83282C, PRESSURIZED UP TO	20,000 P.S.I.
OIL TEMPERATURE RANGE:	0°C TO +200°C
TORQUE TRANSMITTED THROUGH SHAFT (LB-IN MAX)	50
DRIVING SPEED RANGE (RPM)	2,000 TO 7,000

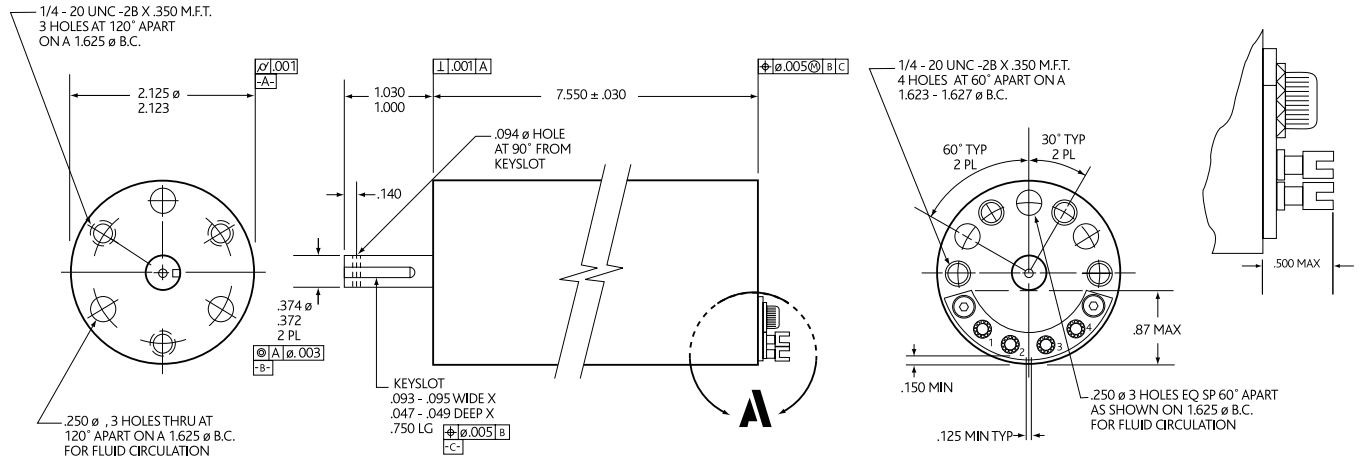
CIRCUIT DIAGRAM

FOR CW ROTATION VIEWING FROM TERMINALS END PHASE SEQUENCE IS 1,2,3.



HIGH TEMPERATURE ALTERNATOR FOR DOWN HOLE APPLICATIONS 22WP6 SERIES

OUTLINE DRAWING



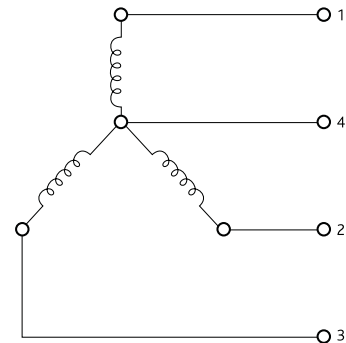
SPECIFICATIONS

ELECTRICAL AND PERFORMANCE DATA (ROOM AMBIENT)

POWER OUTPUT (WATTS MAX AT P.F. = 1 OVER SPEED AND TEMPERATURE RANGE BELOW)	220
OUTPUT VOLTAGE LEVEL (V.R.M.S., L-L, AT 2,000 RPM, +0, -50 RPM AT ANY TEMPERATURE WITHIN THE RANGES BELOW) 26 MIN AT 220 WATTS LOAD 31 MAX AT NO LOAD	
OUTPUT VOLTAGE REGULATION (% MAX AT ANY ONE FIXED SPEED AND AT ANY ONE OIL TEMPERATURE WITHIN THE RANGES BELOW)	19
THE UNIT IS FULLY IMMERSED IN CAPELLA "B" OIL PER MIL-H-83282C, PRESSURIZED UP TO	20,000 P.S.I.
OIL TEMPERATURE RANGE:	0°C TO +200°C
TORQUE TRANSMITTED THROUGH SHAFT (LB-IN MAX)	50
DRIVING SPEED RANGE (RPM)	2,000 TO 7,000

CIRCUIT DIAGRAM

FOR CW ROTATION VIEWING FROM TERMINALS END PHASE SEQUENCE IS 1,2,3.



HIGH TEMPERATURE ALTERNATOR FOR DOWN HOLE APPLICATIONS 40WP2 SERIES

OUTLINE DRAWING

