

## USER'S MANUAL

**MODEL: 5301**

## SENSOR TEST ELECTROMAGNET

Date Sold \_\_\_\_\_

Serial number: \_\_\_\_\_

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**Section 1**  
**SPECIFICATIONS**  
**Sensor Test Electromagnet Specifications**

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<b>Pole Length:</b>	220 mm (8.66 inch)
<b>Pole Gap:</b>	25 mm (0.98 inch)
<b>Field:</b> (at max current)	50mT (500G)
<b>Field Uniformity:</b> (over region of interest)	+/- 2.5% or 0.5mT
<b>Field Tracking:</b> (center of region of interest to magnetic field probe)	+/- 1% or 0.2mT
<b>Response Time:</b>	
10G step to 1%	< 0.1 Sec
100G step to 1%	< 1.0 Sec
<b>Coil</b>	
coil resistance (20°C)	2.50 Ohm
max resistance (hot)*	2.90 Ohm
max power	2.7A/8.1V (22W)
<b>Self Inductance</b>	
<b>Cooling</b>	Convection
<b>Dimensions</b>	Drawing 11901780 220 mm W x 62.5 mm D x 125 mm H 8.7 inch W x 2.5 inch D x 4.9 inch H
<b>Mass</b>	12 kg (26 lb)

**\*CAUTION - The value of maximum coil resistance given should not be exceeded.  
At this resistance the coils are at maximum safe temperature for continuous operation.**

## Section 2

### WARNINGS

#### REFER TO WARNINGS BELOW BEFORE OPERATING ELECTROMAGNET

##### **1 Personnel Safety**

In operation the magnet fringing field in the vicinity of the pole gap is in excess of 0.5mT (5G).

This can cause malfunctioning of sensitive electronic and magnetic components. We recommend that warning signs are posted indicating that a magnetic field may be present.

##### **2 Ferromagnetic Objects**

During operation the magnet exerts magnetic attraction towards ferromagnetic objects in the near vicinity of its pole gap. Keep ferromagnetic items clear!

##### **3 Arcing**

This magnet stores energy in its field during operation. Do not disconnect any current lead while under load or the magnetic field energy will be discharged across the interruption causing arcing and possible damage to electronic circuits.

##### **4 Coil Hot Resistance**

Do not exceed the maximum coil hot resistance given in the specifications or coil overheating and possible damage may occur

##### **5 Watches, Credit Cards, and Magnetic Disks**

Do not move magnetically sensitive items into the close vicinity of the magnet pole gap. Even some anti-magnetic watches can be damaged when placed in close proximity to the pole gaps during operation. Credit cards, and magnetic disks are affected by magnetic fields as low as 0.5mT (5G). Depending on the previous operating field and the pole gap, the remanent field in the gap can be in excess of 0.5mT (5G) with the magnet power supply off or disconnected.

## Section 3

### INSTALLATION

#### **Mounting Position** (Refer to drawing 11901780)

The magnet can be mounting in any orientation. Four M3 mounting holes are provided on the bottom side of the magnet yoke.

#### **Electrical Circuit** (Refer to drawing 13900400).

Never connect or remove cables from the magnet with the power supply energized. The stored energy in the magnet can cause arcing resulting in damage to sensitive equipment.

The magnet has two coils. The power supply cable is connected to the DC Input connector on the electromagnet. Before applying power to the electromagnet check the DC input connection is mated correctly. Ensure the DC Input plug is fully inserted then secured by rotating the outer sleeve of the plug clockwise until the plug and connector are firmly mated together.

Recommended current cable for the magnet is stranded copper of 0.82 mm<sup>2</sup> cross section (18 AWG).

Because the magnet stores energy in its magnetic field, special care should be taken to insure that the current terminations are secure and cannot work loose in operation. Local heating at the terminations can cause oxidation leading to a high contact resistance and high power dissipation at the terminals. If left unattended this can cause enough local heating to damage the terminals.

#### **Cooling**

This magnet uses convection air cooling only.

## **Section 4**

### **OPERATION**

#### **General**

This magnet operates as a conventional electromagnet.

## **Section 5**

### **EXCITATION CURVES**

**Section 6**

**TEST DATA**

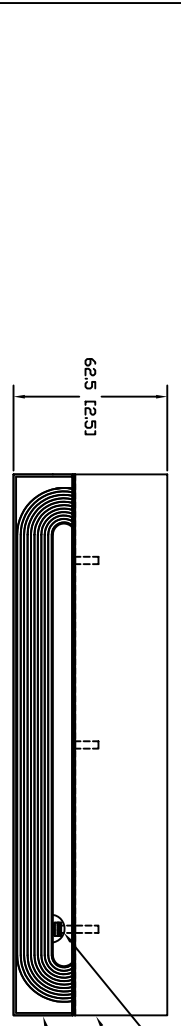


**Section 7**

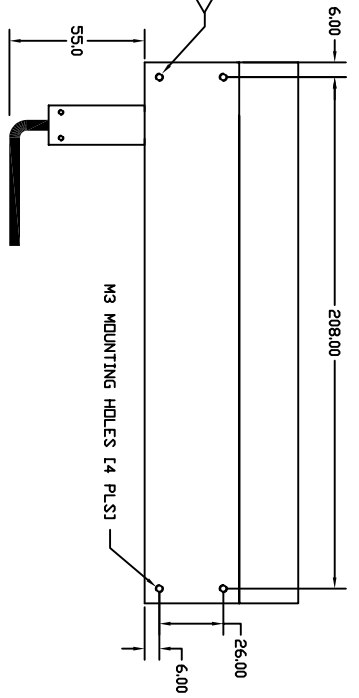
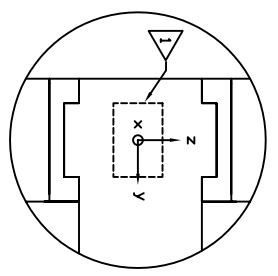
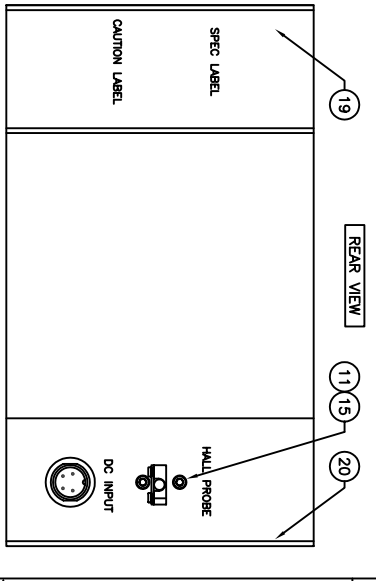
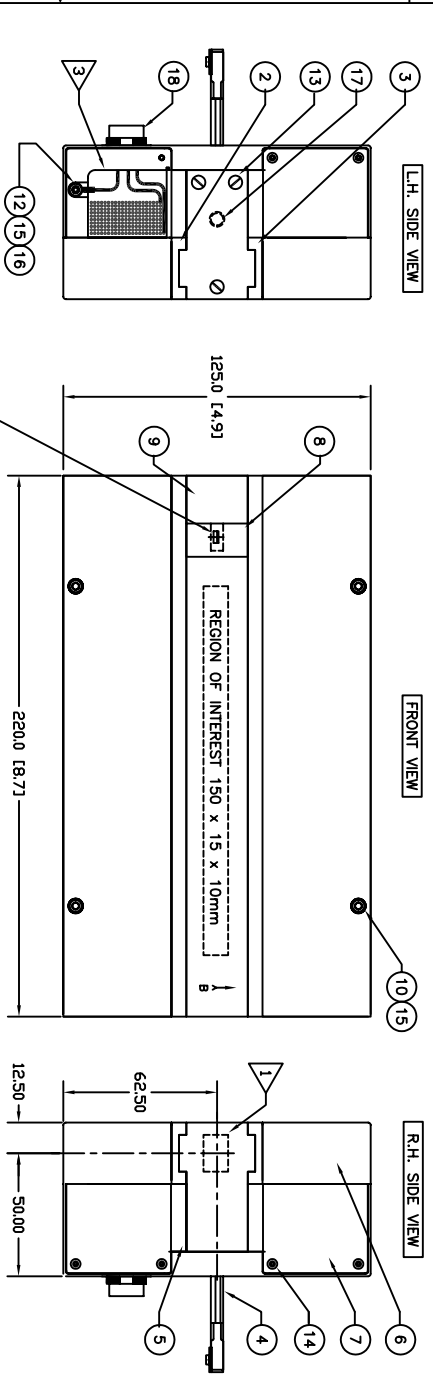
**DRAWINGS**

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REV	RELEASE	DESCRIPTION	DATE	APPROVED
A				



MAGNET SPECIFICATIONS	
POLE GAP:	25.0mm
POLE LENGTH:	220mm
FIELD:	50 mT (500 gauss)
UNIFORMITY:	± 2.5% or 0.5mT OVER ROI
ACCURACY:	± 3.0% or 0.6mT OVER ROI
RESPONSE:	100G STEP TO 1% IN <1.0 sec
COIL RESISTANCE (20° C)	2.50 ohm
RESISTANCE (Hot)	2.90 ohm
MAX POWER:	2.94/72W/ (20W)
CONNECTION	CONNECTION
WEIGHT:	est 12KG (28 lbs)



- NOTE:
- 1 REGION OF INTEREST 150 x 15 x 10mm LOCATED 12.5mm DOWN FROM TOP POLE SURFACE
  - 2 TOP VIEW OF MAGNET WITH COVER ITEM 6 REMOVED
  - 3 R.H. SIDE VIEW OF MAGNET WITH COVER ITEM 7 REMOVED
  - 4 M3 MOUNTING HARDWARE [4 x ITEM 11, 4 x ITEM 15, 4 x ITEM 16] NOT SHOWN ON DRAWING

DRAWING IS NOT RELEASED

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
20	1	109000640	LABEL, INPUT/HALL PROBE	
19	1	109000630	LABEL, SPECIFICATION/CAUTION	
18	1	31W0004-100-2	CONNECTOR, 4 PIN AMPHENOL C091 SERIES	
17	1	1SBL6	BALL PLUNGER	
16	5	DIN 433	WASHER, FLAT M3 x 6 x 0.5	
15	15	BN 792	WASHER, RIBBED LOCK SPRING/STEEL	
14	16	DIN 7991	SFHS, M3 x 6 S/S	
13	3	R-MAN-3-25	SFHS, M3 x 25 NYLON	
12	5	DIN 912	SFHS, M3 x 12 S/S	
11	8	DIN 912	SFHS, M3 x 16 S/S	
10	4	DIN 912	SFHS, M3 x 20 S/S	
9	1	17904720	PROBE GUIDE, OUTER	
8	1	17904710	PROBE GUIDE, INNER	
7	4	17904690	COVER, YOKE	
6	2	17904670	COVER, COIL	
5	2	17904680	COVER, GAP	
4	1	11901810	HALL PROBE ASSEMBLY	
3	1	11901800	POLE/COIL ASSEMBLY, TOP	
2	1	11901790	POLE/COIL ASSEMBLY, BOTTOM	
1	1	17904650	YOKE	

DO NOT SCALE FROM DRAWING (unless otherwise specified)  
 DATE: 07/12/13  
 DRAWN: GJM/09/01  
 CHECKED: GJM/09/01  
 ENGINEERING: GJM/09/01  
 MFG ASST: SYSTEMS  
 SOFTWARE: AUTOCAD 13  
 SCALE: 1:1  
 SHEET 1 OF 1

GMW  
 955 Industrial Rd, San Carlos, CA 94070  
 TEL: (650)802-8292, Fax: (650)802-8298  
 GENERAL MAGNET ASSEMBLY  
 A111901780

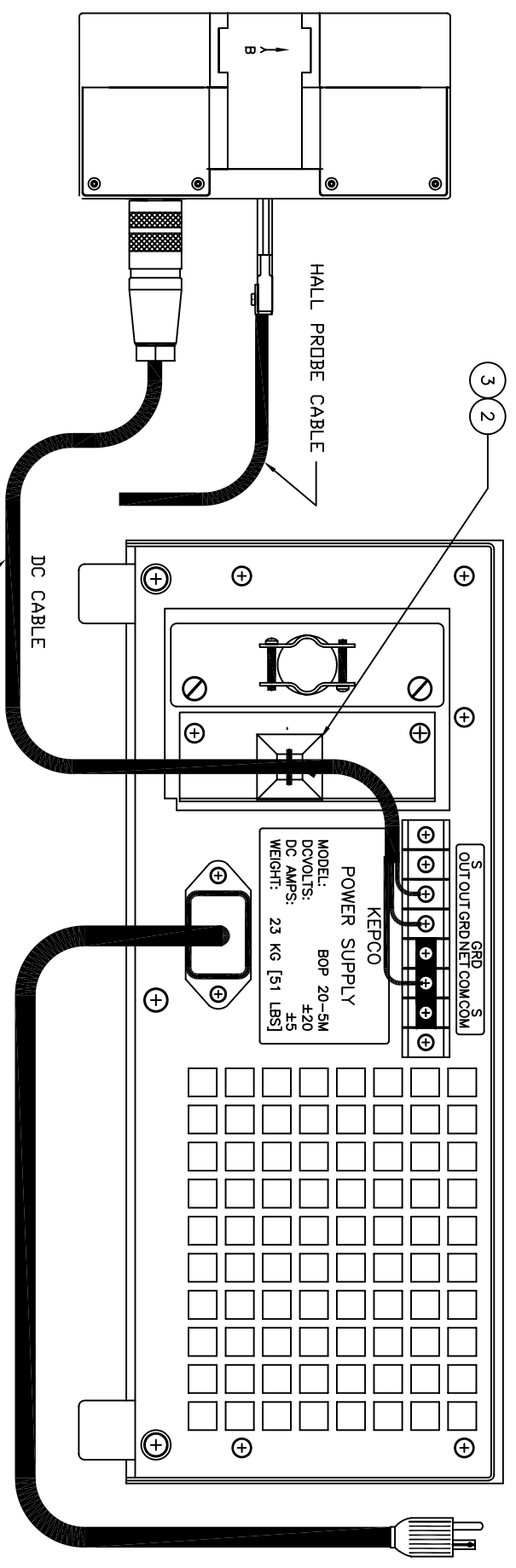
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REV	DESCRIPTION	DWFT	DATE	APPROVED
A	RELEASE		11/05/01	G.DOUGLAS

REVISIONS

HEAD MAGNET

KEPCO MODEL: BOP 20-5M BIPOLAR POWER SUPPLY



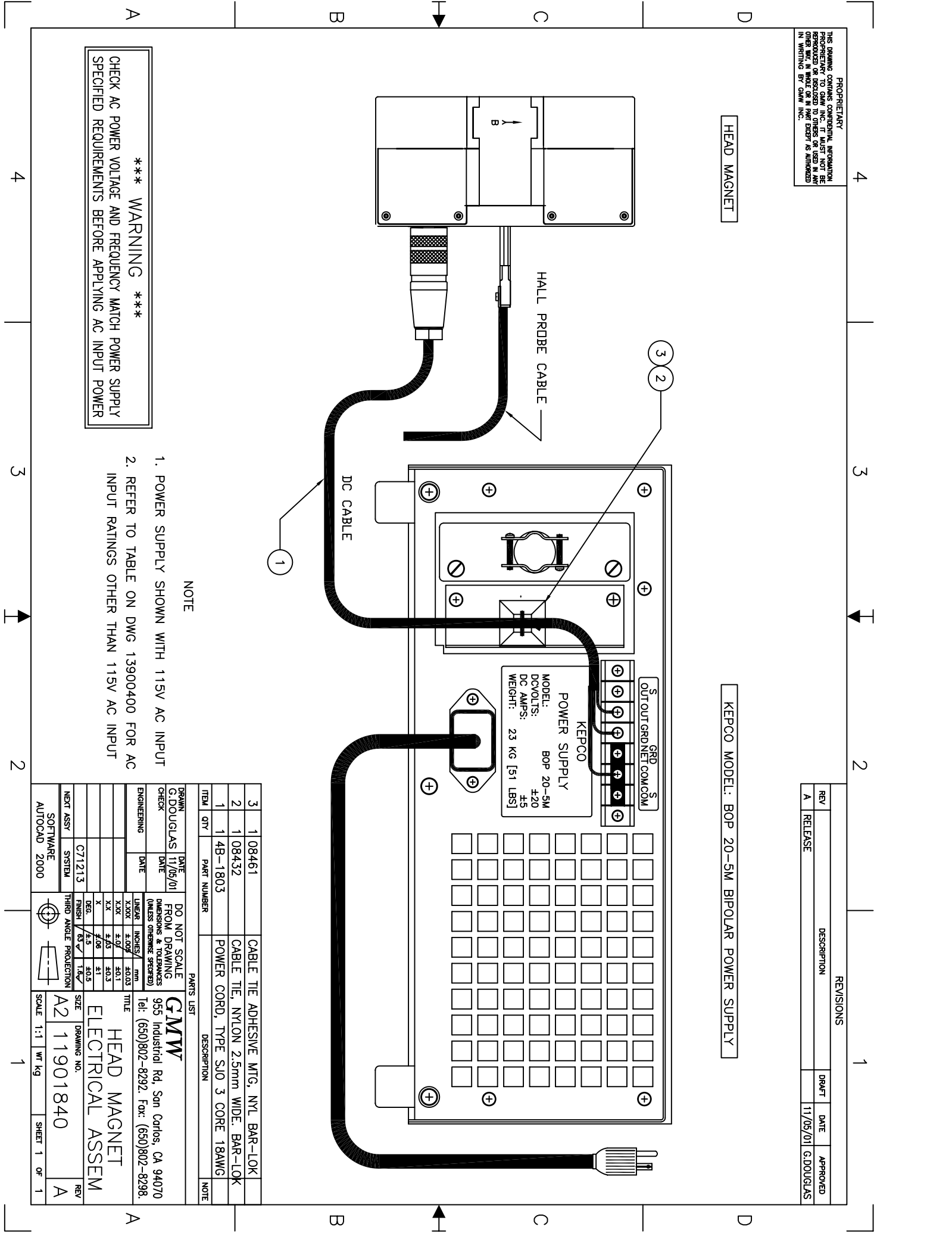
\*\*\* WARNING \*\*\*  
CHECK AC POWER VOLTAGE AND FREQUENCY MATCH POWER SUPPLY  
SPECIFIED REQUIREMENTS BEFORE APPLYING AC INPUT POWER

- NOTE
1. POWER SUPPLY SHOWN WITH 115V AC INPUT
  2. REFER TO TABLE ON DWG 13900400 FOR AC INPUT RATINGS OTHER THAN 115V AC INPUT

ITEM	QTY	PART NUMBER	DESCRIPTION
3	1	08461	CABLE TIE ADHESIVE MTG, NYL BAR-LOK
2	1	08432	CABLE TIE, NYLON 2.5mm WIDE, BAR-LOK
1	1	4B-1803	POWER CORD, TYPE SJO 3 CORE 18AWG

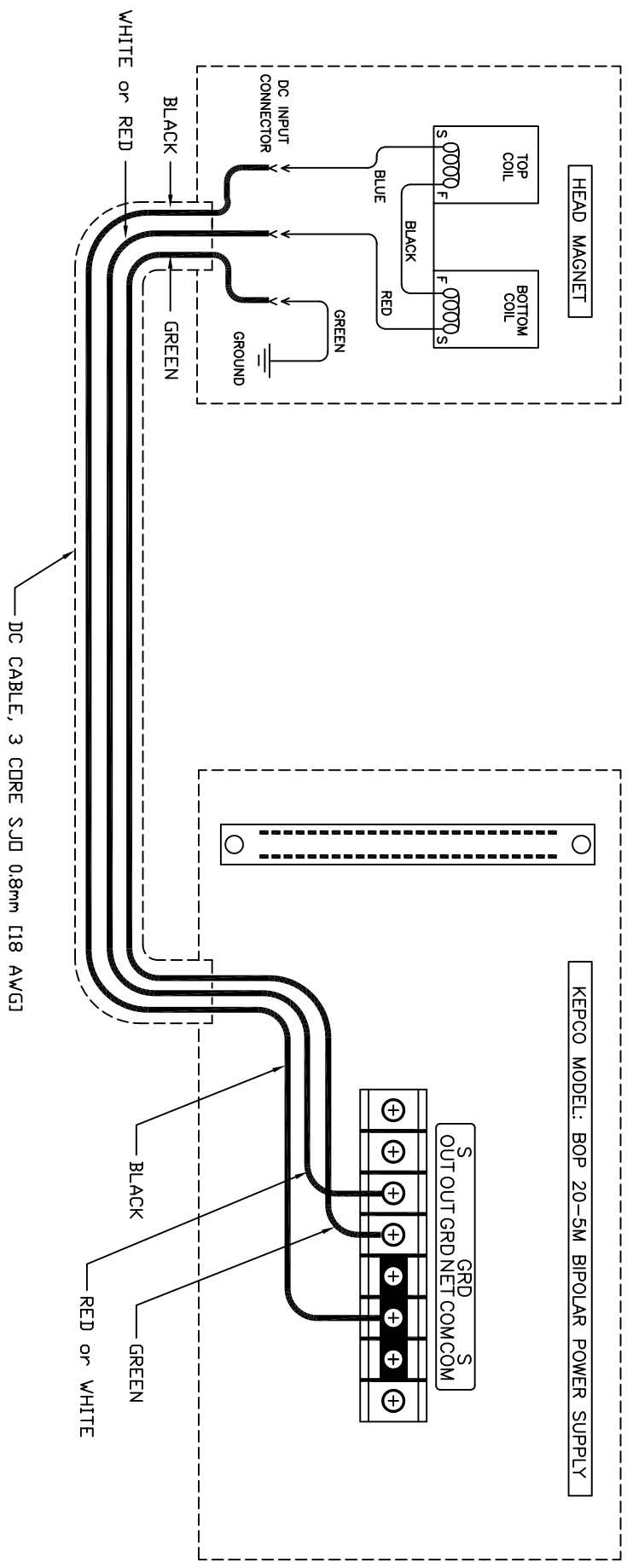
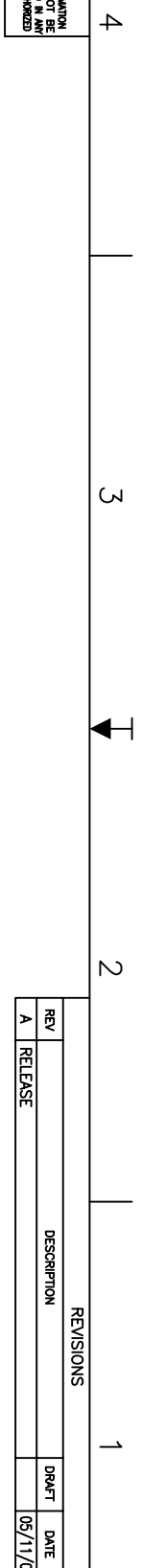
DATE	DATE	DO NOT SCALE FROM DRAWING DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)	TITLE
11/05/01	11/05/01		HEAD MAGNET ELECTRICAL ASSEM
G.DOUGLAS	G.DOUGLAS		
ENGINEERING	DATE	LINEAR DIMENSIONS INCHES/mm	
		X.XXX ±.001	±0.03
		X.X ±.01	±0.1
		X.X ±.05	±0.5
		X ±.08	±1
		DEG. / 1.5	±0.5
		FINISH / 63	1.5
		THIRD ANGLE PROJECTION	
SOFTWARE	SYSTEM	SIZE	DRAWING NO.
AUTOCAD 2000		A2	11901840
		SCALE 1:1	WT kg
			SHEET 1 OF 1

GMW  
955 Industrial Rd, San Carlos, CA 94070  
Tel: (650)802-8292, Fax: (650)802-8298.



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A	RELEASE		05/11/01	G.DOUGLAS



AC INPUT POWER 2 PHASE, 47 to 63HZ	208V	230V	-
AC INPUT FULL LOAD CURRENT	1.4	1.3	-
RECOMMENDED MAIN AC BREAKER	-	-	-
RECOMMENDED AC POWER OUTLET	-	-	-
RECOMMENDED AC CABLE SIZE	-	-	-

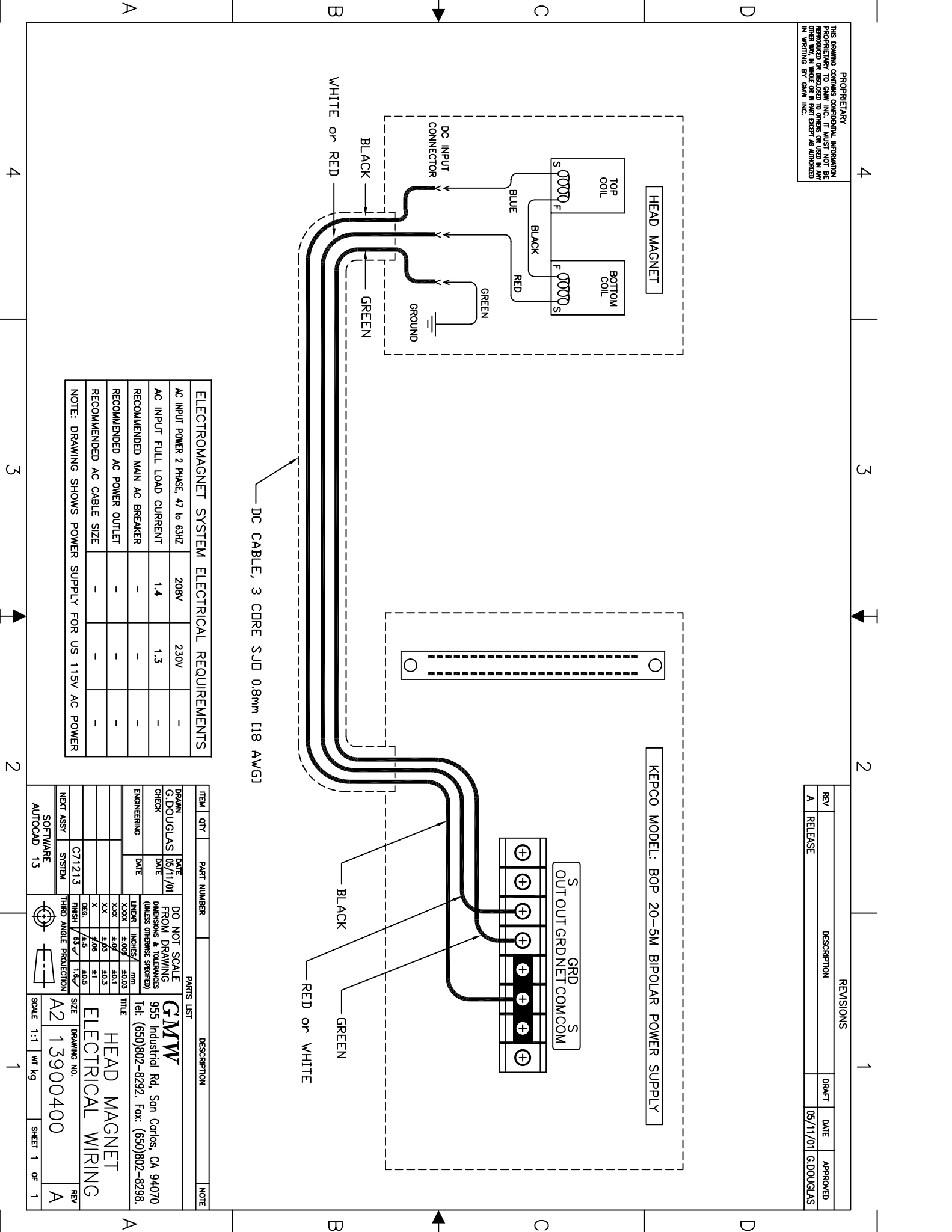
NOTE: DRAWING SHOWS POWER SUPPLY FOR US 115V AC POWER

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
DRWMN				
G.DOUGLAS		05/11/01	DATE	
CHEK			DATE	
ENGINEERING			DATE	
SOFTWARE				
AUTOCAD	13			

DO NOT SCALE FROM DRAWING DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)	LINEAR	ANGLES	TITLE
X.XXX	±.009	±0.03	HEAD MAGNET ELECTRICAL WIRING
X.X	±.01	±0.1	
X.X	±.03	±0.3	
X	±.06	±1	
DEG. / 4.5	±0.5		
FINISH	1.6		
THIRD ANGLE PROJECTION			
SIZE	A2		
DRAWING NO.	139000400		
REV	A		

955 Industrial Rd, San Carlos, CA 94070  
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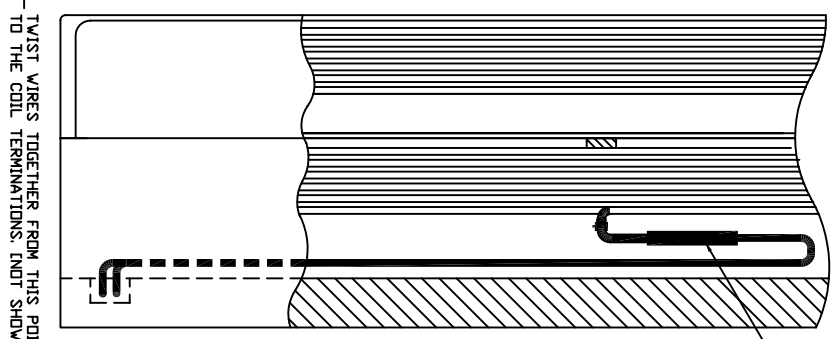
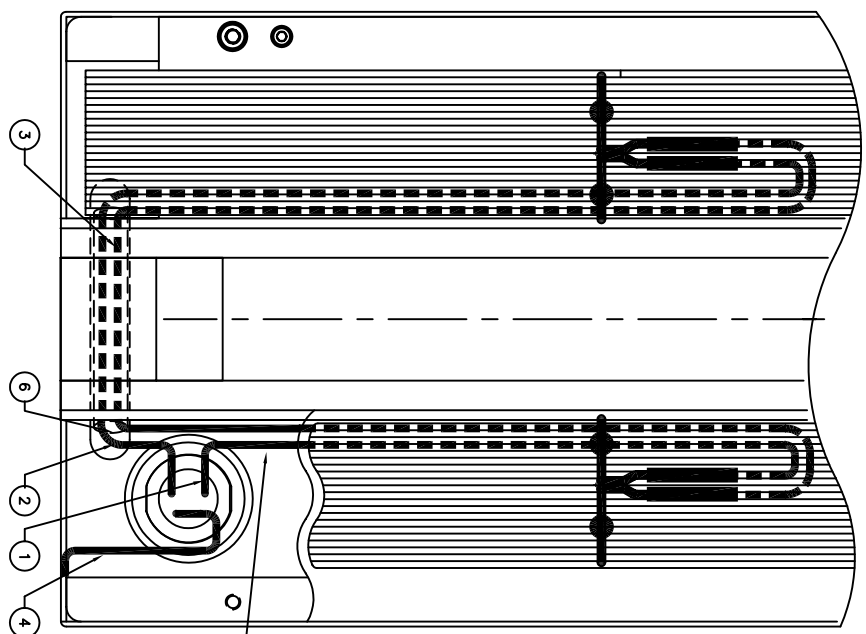
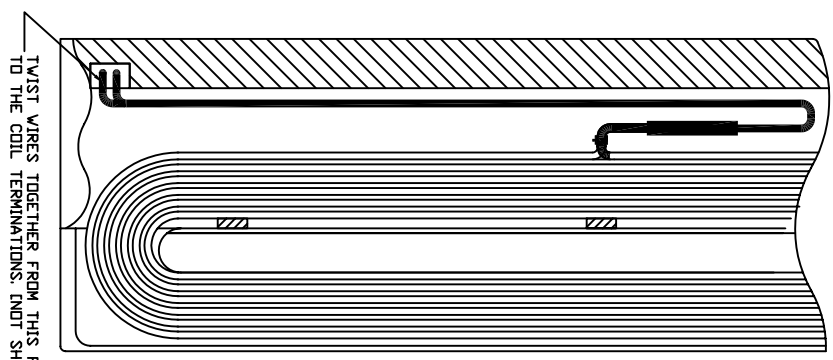


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TOP VIEW

FRONT VIEW

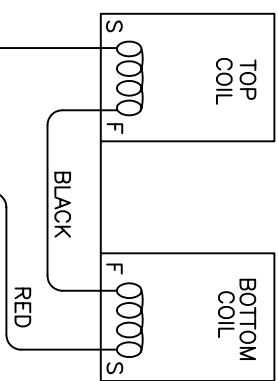
BOTTOM VIEW



1 TWIST WIRES TOGETHER FROM THIS POINT  
TO THE COIL TERMINATIONS. (NOT SHOWN)

1 TWIST WIRES TOGETHER FROM THIS POINT  
TO THE COIL TERMINATIONS. (NOT SHOWN)

1 TWIST WIRES TOGETHER. SOLDER  
THEN COVER WITH HEATSHRINK  
SLEEVING (ITEM 5) [4 PLS]

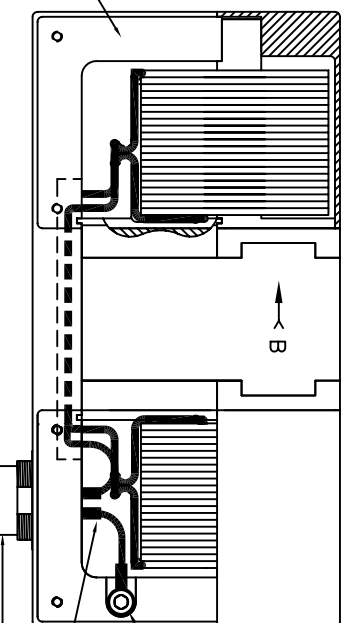


DC INPUT CONNECTOR

REAR VIEW

END VIEW

- NOTE:
- 1 VIEW SHOWS COIL COVER REMOVED
  - 2 VIEW SHOWS YOKE COVER REMOVED



12 15 16 SEE DVG NO 11901780

MAGNET GEBÄUDE

SOLDER JOINT, THEN COVER WITH  
HEATSHRINK SLEEVING ITEM 5] [3 PLS]

DC POWER INPUT CONNECTOR  
AMPHENDL PART NO 31W0004-100-2

REV		DESCRIPTION	DATE	APPROVED
A	RELEASE		10/28/01	GD00USAS

PARTS LIST		
PART NUMBER	DESCRIPTION	NOTE
7 A/R	GRUMP LUG, M3 HOLE	
6 A/R	HEATSHRINK SLEEVING, 5mm BLACK	
5 A/R	HEATSHRINK SLEEVING, 3mm BLACK	
4 A/R	WIRE, PCV GREEN [20 AWG]	
3 A/R	WIRE, PCV BLACK [20 AWG]	
2 A/R	WIRE, PCV BLUE [20 AWG]	
1 A/R	WIRE, PCV RED [20 AWG]	
TOTAL QTY		

DATE	DESCRIPTION
10/28/01	FROM DRAWING
10/28/01	FOR TESTING
10/28/01	FOR RELEASE

DATE	REVISION	BY	DESCRIPTION

REV	DATE	APPROVED
A	11/19/01	1820

GMW  
955 Industrial Rd, San Carlos, CA 94070  
Tel: (650)802-8292, Fax: (650)802-8298

HEAD MAGNET  
MAGNET WIRING  
SCALE 1:1 WT kg

11901780 (2/12/13)  
DC POWER INPUT CONNECTOR  
AMPHENDL PART NO 31W0004-100-2

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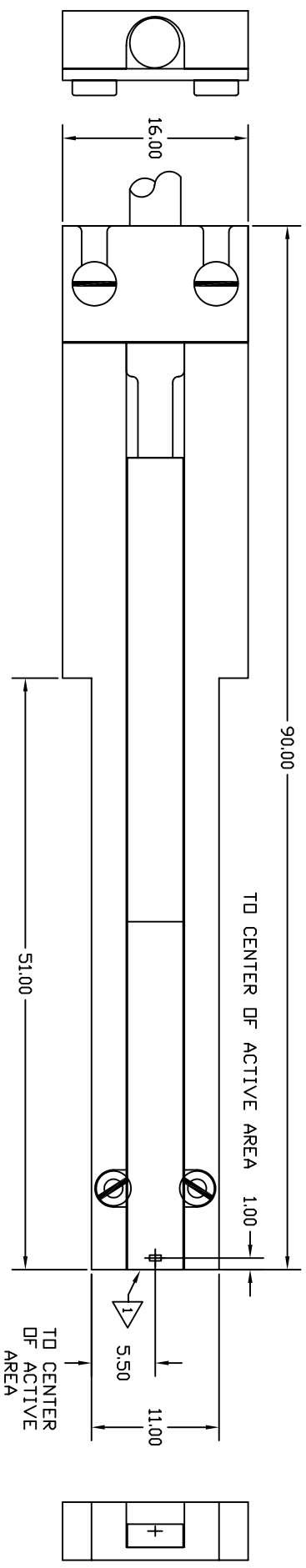
REV	DESCRIPTION	DWFT	DATE	APPROVED
A	RELEASE		10/08/01	G.Douglis

REVISIONS

END VIEW

TOP VIEW

END VIEW



SIDE VIEW

MAX THICKNESS 5.00

TD CENTER OF ACTIVE AREA

TD CENTER OF ACTIVE AREA

TD CENTER OF ACTIVE AREA

NOTE:

- 1- PROBE HEAD MOUNTS FLUSH WITH END OF PROBE HOLDER
- 2- SENTRON YR 100F HALL PROBE SHOWN. SEPARATE ORDER ITEM.

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
4	2	TBA-18	SCREW, M1.6 X 2 CHEESE HD NYLON	
3	2	MMN-2-4	SCREW, M2 X 4 CHEESE HD NYLON	
2	1	17901860	CABLE CLAMP	
1	1	17904700	PROBEHOLDER STEM	

DRAWN	DATE	DO NOT SCALE	TITLE
G.DOUGLAS	10/02/01	FROM DRAWING DIMENSIONS & TOLERANCES (UNLESS OTHERWISE SPECIFIED)	HEAD MAGNET PROBE ASSEMBLY
CHECK	DATE		
ENGINEERING	DATE		
LINEAR	INCHES/ mm		
X.XXX	±.009	±0.03	
X.X	±.07	±0.1	
X.X	±.05	±0.3	
X	±.08	±1	
DEG.	±.5	±0.5	
FINISH	1.6		
THIRD ANGLE PROJECTION			
11901780	C71213		
NEXT ASSY	SYSTEM		
SOFTWARE	AUTOCAD 13		
SCALE	4:1	WT kg	
SHEET	1	OF	1

4 3 2 1

## **Section 8**

### **MAGNETIC FIELD TRANSDUCERS**