

NOTES:

101. ALL DIMENSIONS ARE IN MILLIMETERS (mm) AND VALUES ARE IN SI UNITS. DIMENSIONS AND VALUES IN BRACKETS ARE U.S. CUSTOMARY UNITS (inch) CONVERTED FROM MILLIMETERS / SI UNITS.

107. INSPECTION / ACCEPTANCE TO BE MEASURED AND RECORDED IN SI UNITS.

109b. ESTIMATED WEIGHT IS 236.5 KG

901. FOR ADDITIONAL INFORMATION, SEE TODB-A MECHANICAL REQUIREMENTS DOCUMENT.

902. MAGNET SUB-COMPONENT ENVELOPES REPRESENT MAXIMUM ALLOWABLE SIZES OF RESPECTIVE SUB-COMPONENTS AT MMC THAT ALL COMPONENTS OF RESPECTIVE SUB-COMPONENTS MUST RESIDE IN. ENVELOPE SPACECLAIMS TAKE PRECEDENCE OVER REFERENCE DESIGN. FINAL DESIGN SHOULD BE UPDATED TO FIT WITHIN SPACECLAIMS AND SHARE COMMON FEATURE AND COMPONENTS WITH OTHER BTA QUADRUPOLES, WHERE APPLICABLE.

903. DESIGNATED COMPONENT SPACECLAIM LOCATIONS DEFINED WITH RESPECT TO OVERALL MAGNET ASSY. SPACECLAIM SPECIFICATIONS DEFINED BY VIEWS OF SPACECLAIM AND ALL COMPONENTS WITHIN SPACECLAIM.

904. SEE MECHANICAL REQUIREMENTS DOCUMENT FOR COIL SPECIFICATIONS.

905. SEE SHEET 2 FOR ELECTRICAL CIRCUIT DIAGRAMS AND THERMAL SWITCH TERMINAL BLOCK LABELLING.

906. SEE MECHANICAL REQUIREMENTS DOCUMENT FOR PREFERRED INSULATION STYLE.

907. MINIMUM BEND RADIUS OF COIL LEADS 2X OUTSIDE DIMENSION OF COIL CONDUCTOR.

908. THERMAL SWITCHES ON EXHAUST OF EACH HYDRAULIC CIRCUIT. THERMAL SWITCHES PLACED PROXIMAL TO COIL PACK. INCLUDE ELECTRICALLY INSULATING CAP ON EACH THERMAL SWITCH. SEE MECHANICAL REQUIREMENTS DOCUMENT FOR THERMAL SWITCH SPECIFICATION.

909. SEE MECHANICAL REQUIREMENTS DOCUMENT FOR BUSBAR MAX CROSS SECTION CURRENT DENSITY.

910. SEE MECHANICAL REQUIREMENTS DOCUMENT FOR BUS ENCLOSURE DESIGN REQUIREMENTS. BUS ENCLOSURE AS SHOWN IN REFERENCE DESIGN MUST BE MODIFIED TO FIT WITHIN SPACECLAIM AND MEET SAFETY/ISOLATION REQUIREMENTS STATED IN MECHANICAL REQUIREMENTS DOCUMENT.

911. BUSBAR TABS FOR POWER INPUT AND OUTPUT CONNECTIONS TO BE DESIGNED TO ACCOMMODATE LUGS SPECIFIED IN MECHANICAL REQUIREMENTS DOCUMENT.

912. MANIFOLD MUST HAVE ELECTRICAL PATH TO GROUND.

913. LABEL SUPPLY AND RETURN MANIFOLDS.

914. VENDOR MUST SUPPLY JIC/AN SSTL END CAP FITTINGS.

915. ALL HOSES MUST SATISFY MINIMUM BEND RADIUS AS SPECIFIED IN MECHANICAL REQUIREMENTS DOCUMENT.

916. SEE MECHANICAL REQUIREMENTS DOCUMENT FOR HOSE AND FITTING SPECIFICATIONS.

917. SEE MECHANICAL REQUIREMENTS DOCUMENT FOR HOSE BUNDLING SPECIFICATIONS.

918. SEE MECHANICAL REQUIREMENTS DOCUMENT FOR PREFERRED INSULATION STYLE.

919. SEE MECHANICAL REQUIREMENTS DOCUMENT FOR MINIMUM BEND RADIUS OF CORRECTOR COIL LEADS.

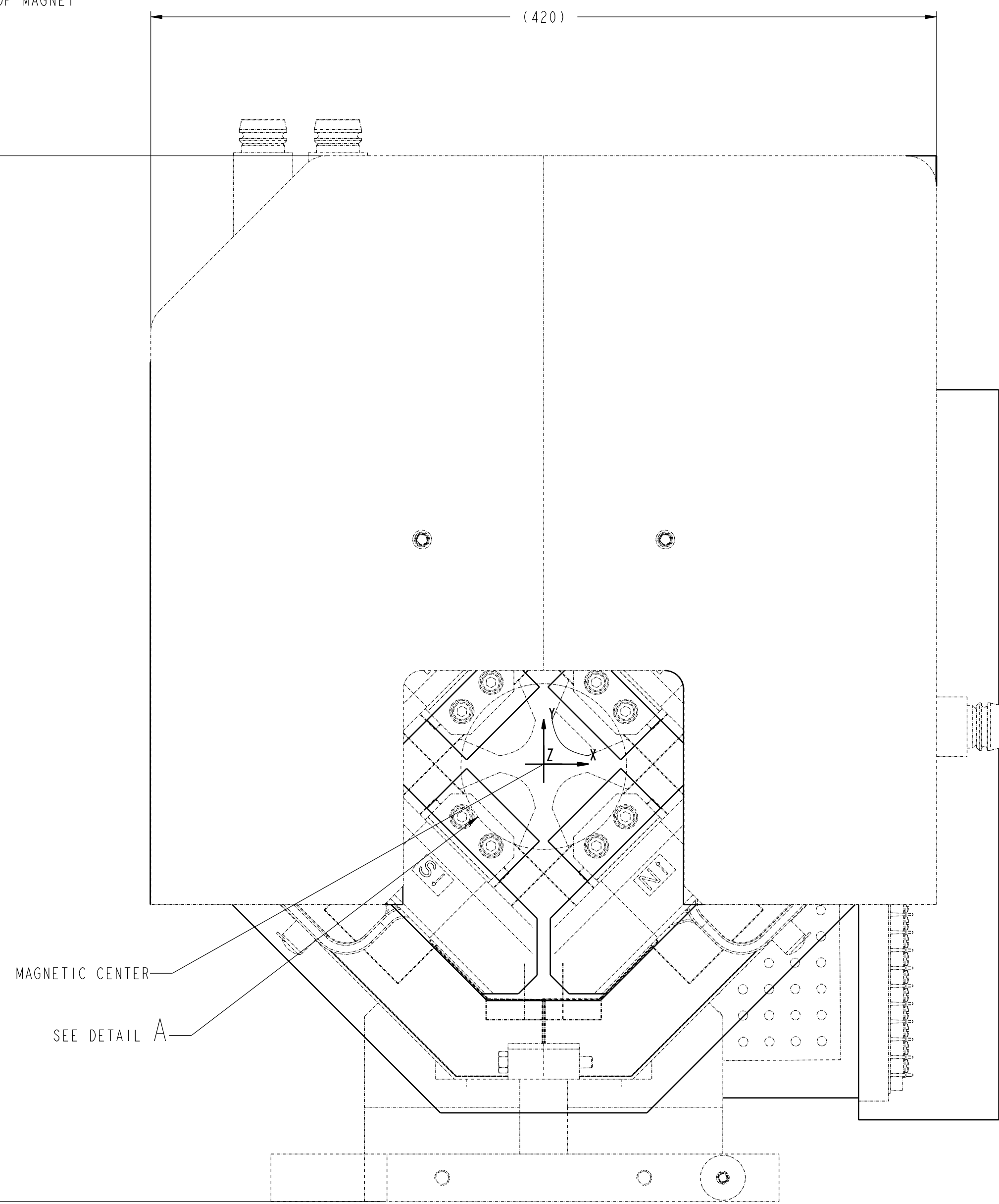
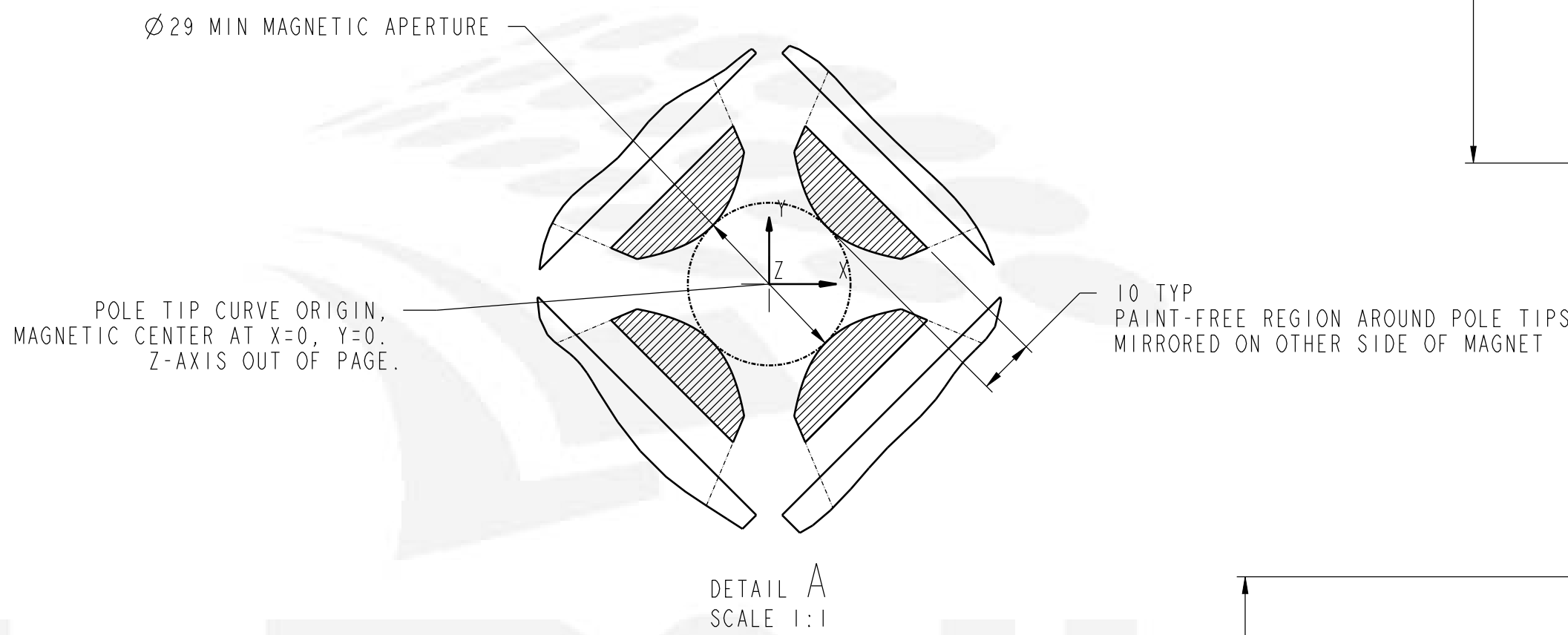
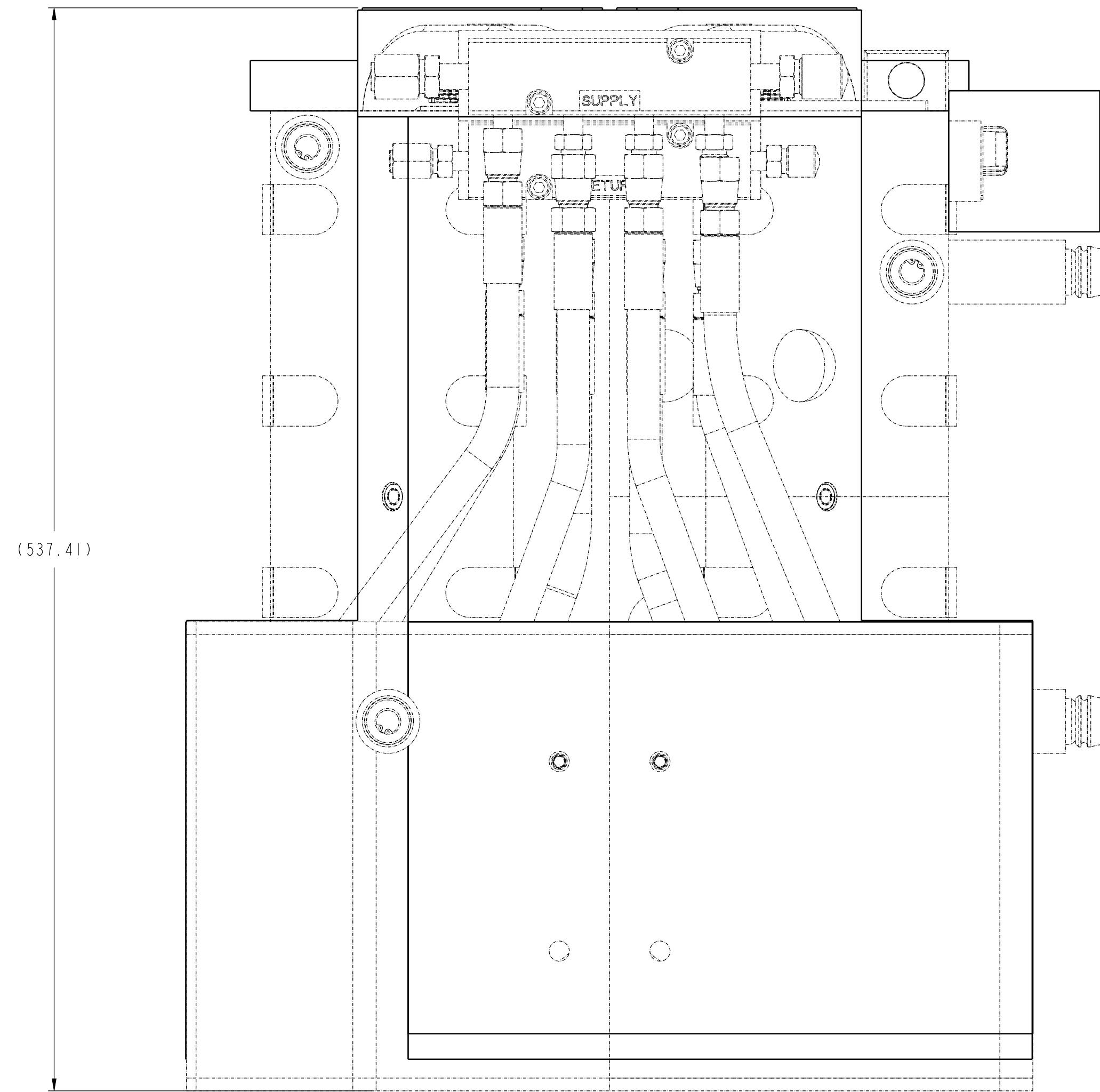
920. TERMINAL BLOCKS MUST ACCOMMODATE LUGS SPECIFIED IN MECHANICAL REQUIREMENTS DOCUMENT.

921. SEE DIAGRAMS ON SHEET 2 FOR CORRECTOR COIL ELECTRICAL CIRCUIT DIAGRAMS AND TERMINAL BLOCK LABELLING.

922. ORIENT TERMINAL BLOCKS AS SHOWN.

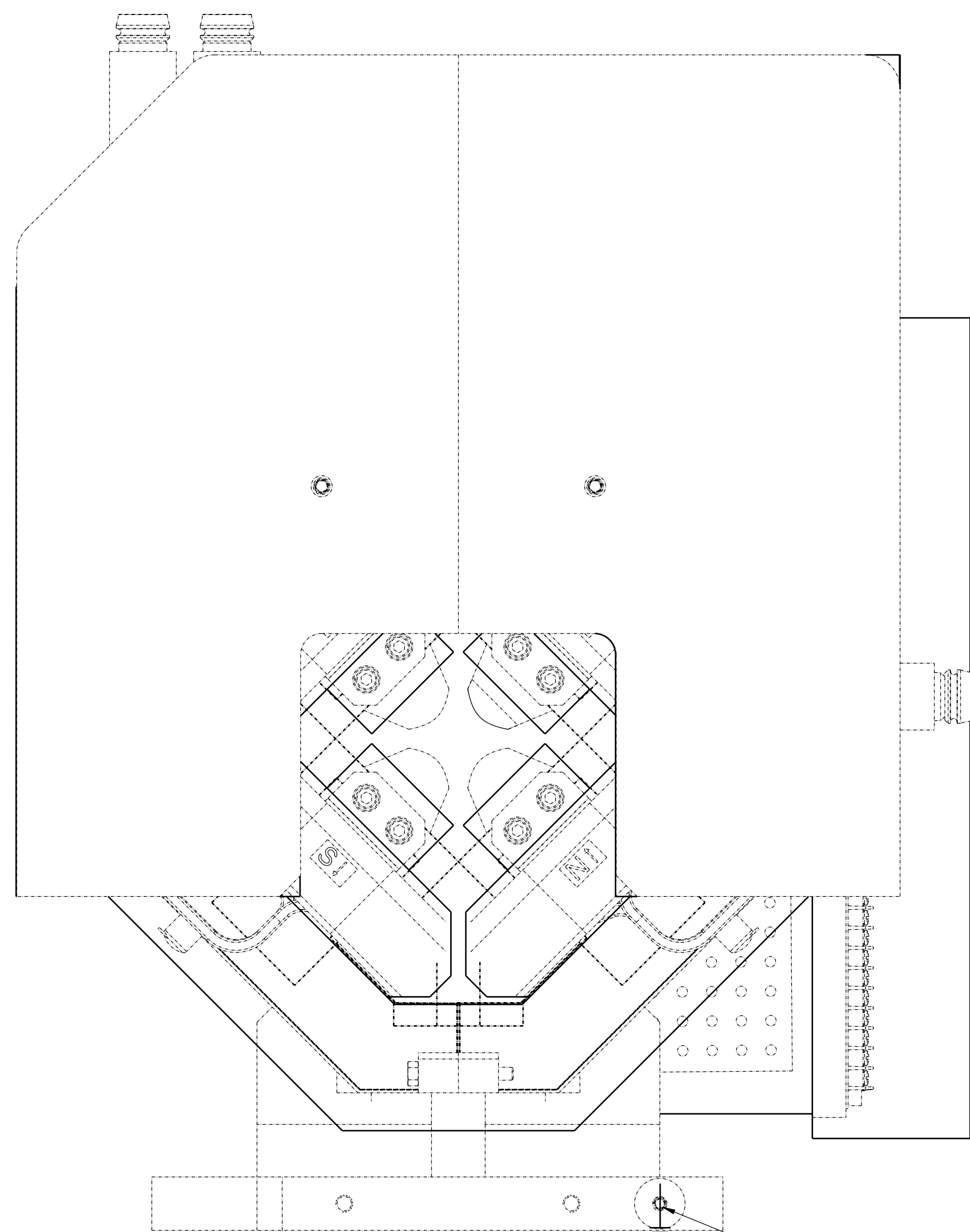
ABBREVIATIONS:
ALS-U = ADVANCE LIGHT SOURCE UPGRADE
ASSY = ASSEMBLY
BTA = BOOSTER-TO-ACCUMULATOR RING TRANSFER LINE
CKT = CIRCUIT
TB = TERMINAL BLOCK
LBNL = LAWRENCE BERKELEY NATIONAL LABORATORY
LCW = LOW-CONDUCTIVITY WATER
TODB-A = DE-FOCUSING QUADRUPOLE TYPE B, CONFIGURATION A

TQDB-A MASTER DRAWING

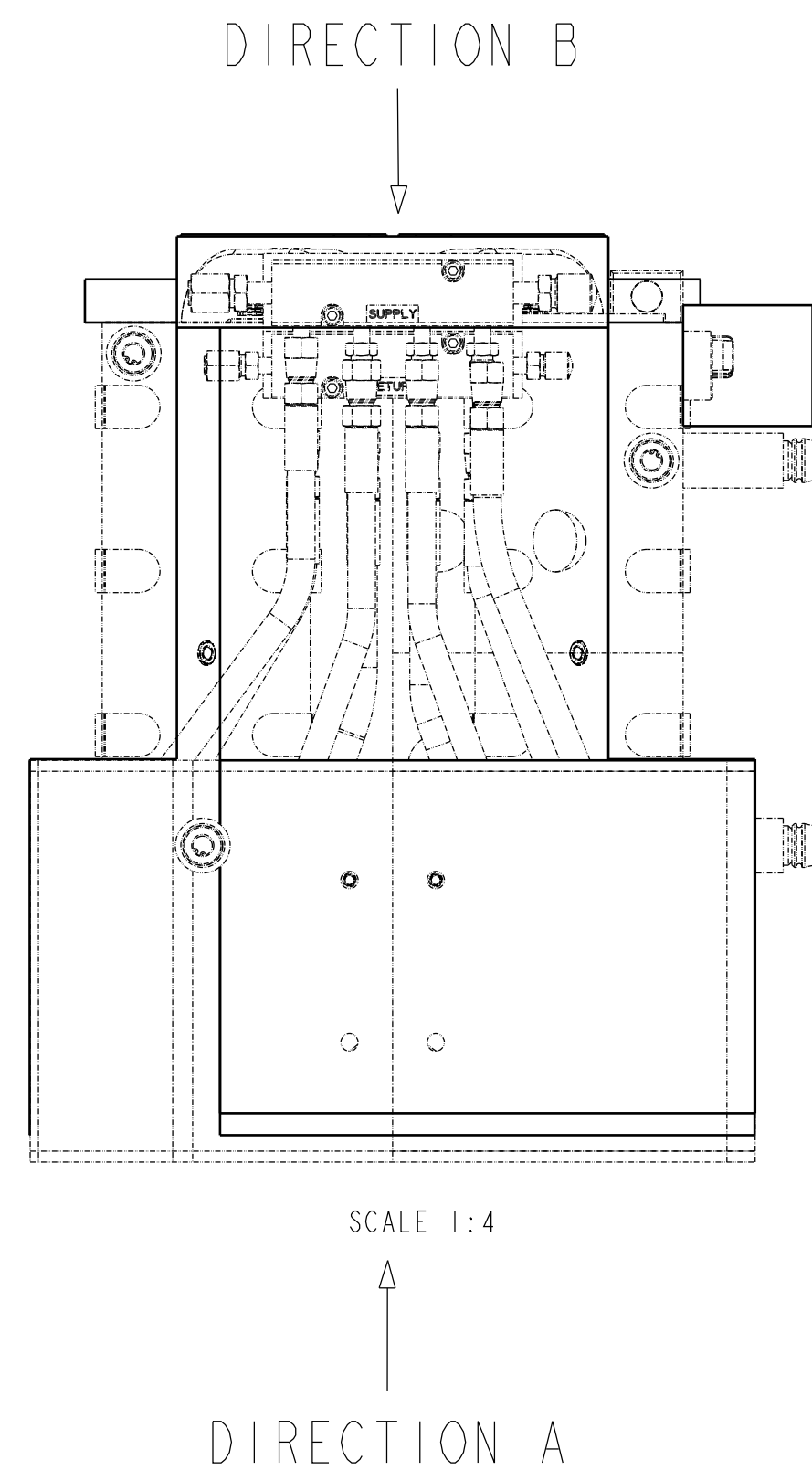
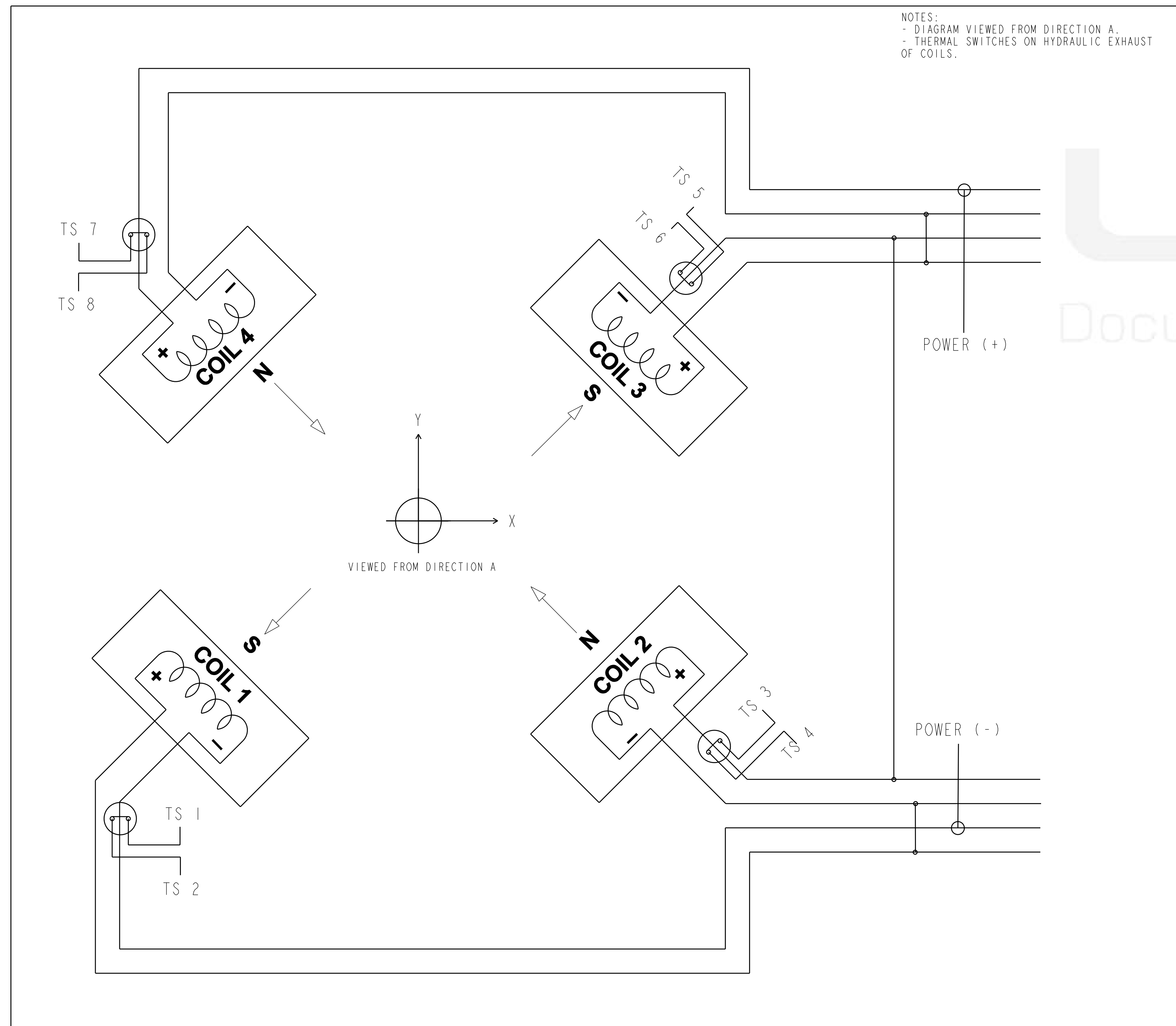


TQDB-A DRAWING TREE	
DRAWING DESCRIPTION	DRAWING NUMBER
YOKE PRE-ASSY, TODB-A	AL-1430-4960
BASEPLATE, TOFB, TODB-A, TODB-B	AL-1424-1529

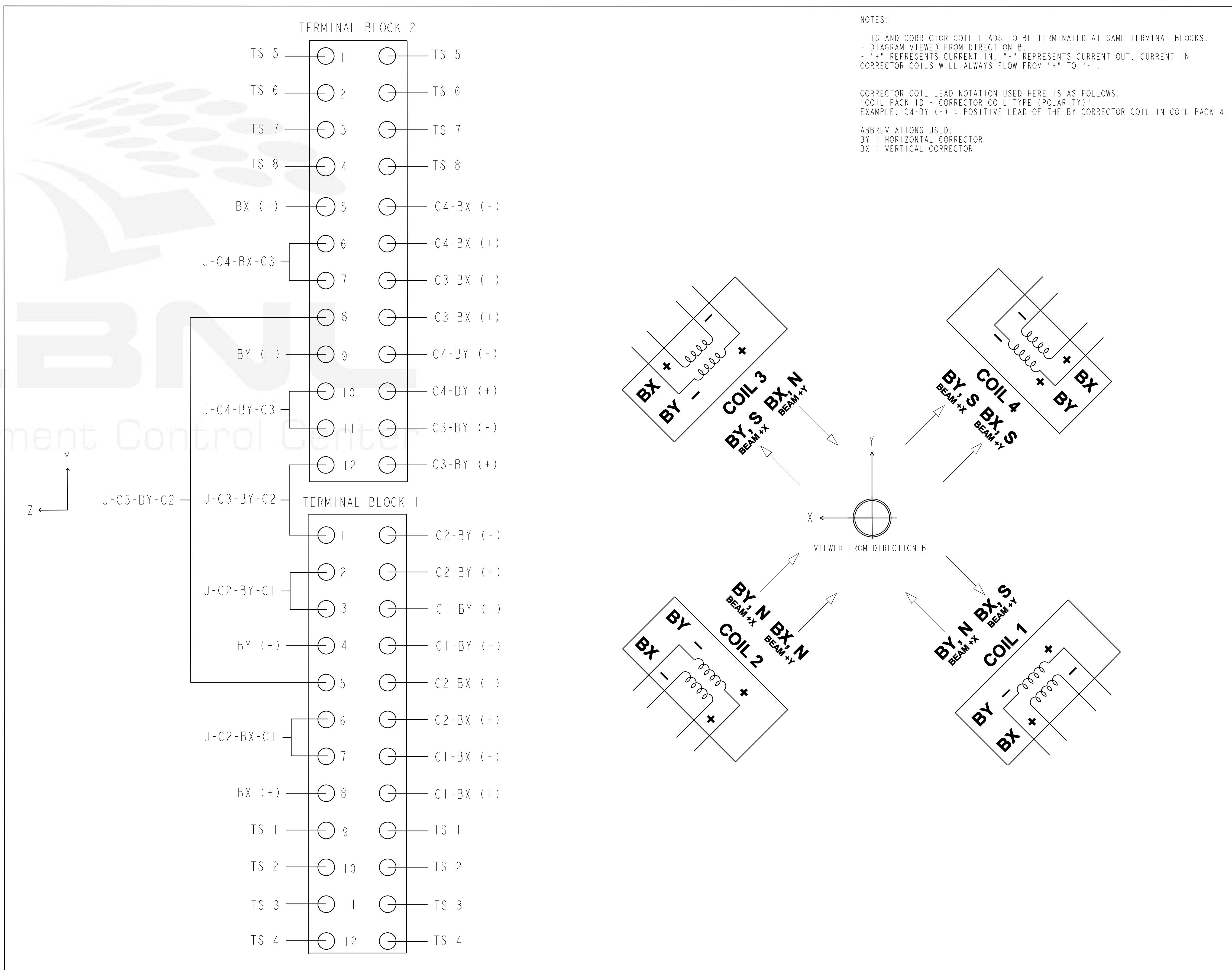
CHANGE DESCRIPTION (SEE LBNL PDM FOR REV HISTORY)		UNLESS OTHERWISE SPECIFIED		PROJECT NAME		ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY UNIVERSITY OF CALIFORNIA	
BASELINE RELEASE		ESTIMATED MASS 236,514 KG		ADVANCED LIGHT SOURCE		ALS-U - BOOSTER TO ACCUMULATOR TRANSFER LINE	
AUTHOR Saezari, Sultan		TOLERANCE FRACTIONS: ±, ±0.05		DRAW REF DOC EG-1000-0923		MAGNETS - GENERAL	
CHECKED BY mmorden		ANGLES: ±1°		SCALE 1:2		TODB-A MAGNET ASSY	
CHECKED AT Apr 16 2021 10:58:48 AM PDT		MACH. SURFS: 3.2um ✓ or better		THIRD ANGLE		CATEGORY CODE	
RELEASED BY CASwenson		REFERENCE THREADS ARE CLASS G or H		PRINT NOT TO SCALE		LIFECYCLE STATE	
RELEASED AT Apr 21 2021 9:51:20 AM PDT		MACHINED WORK -REMOVE BUBBLES, WELD SPLATTER & LOOSE SCALE		SHEET 1 OF 10		Item NUMBER	
THIS DRAWING IS THE PROPERTY OF ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY (LBNL) AND ANYTHING PRODUCED FROM THESE DRAWINGS IS SUBJECT TO LBNL'S INTELLECTUAL PROPERTY RIGHTS. THIS DRAWING IS LOANED ON A CONFIDENTIAL BASIS SUBJECT TO RETURN OR DESTRUCTION AND NOTHING HEREIN MAY BE REPRODUCED, USED OR DISCLOSED IN WHOLE OR PART WITHOUT PRIOR WRITTEN PERMISSION OF LBNL.						AL7210	
						Released	
						AL-1430-5205	
						A	



MAIN COIL ELECTRIC CIRCUIT CONNECTION DIAGRAM

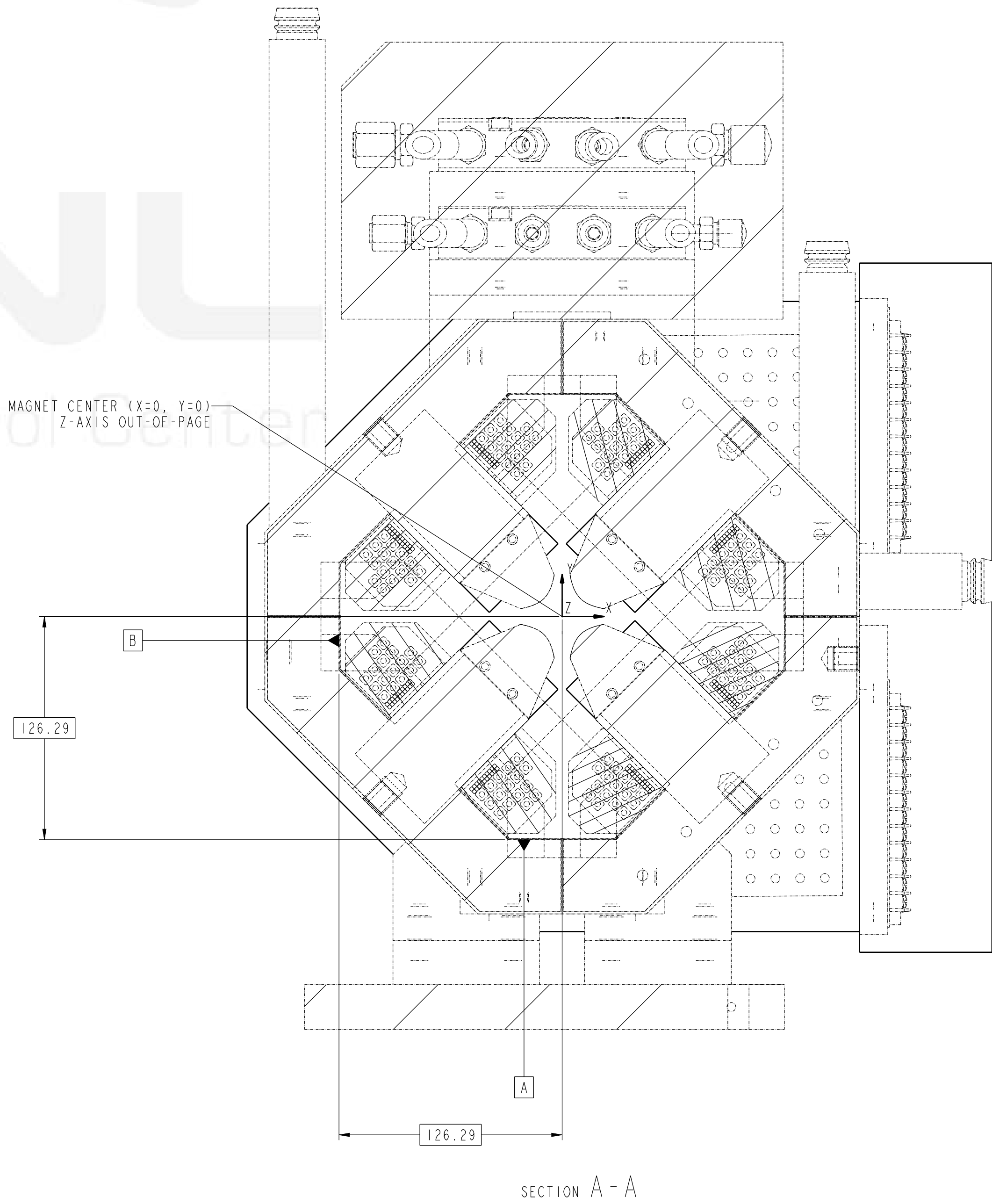
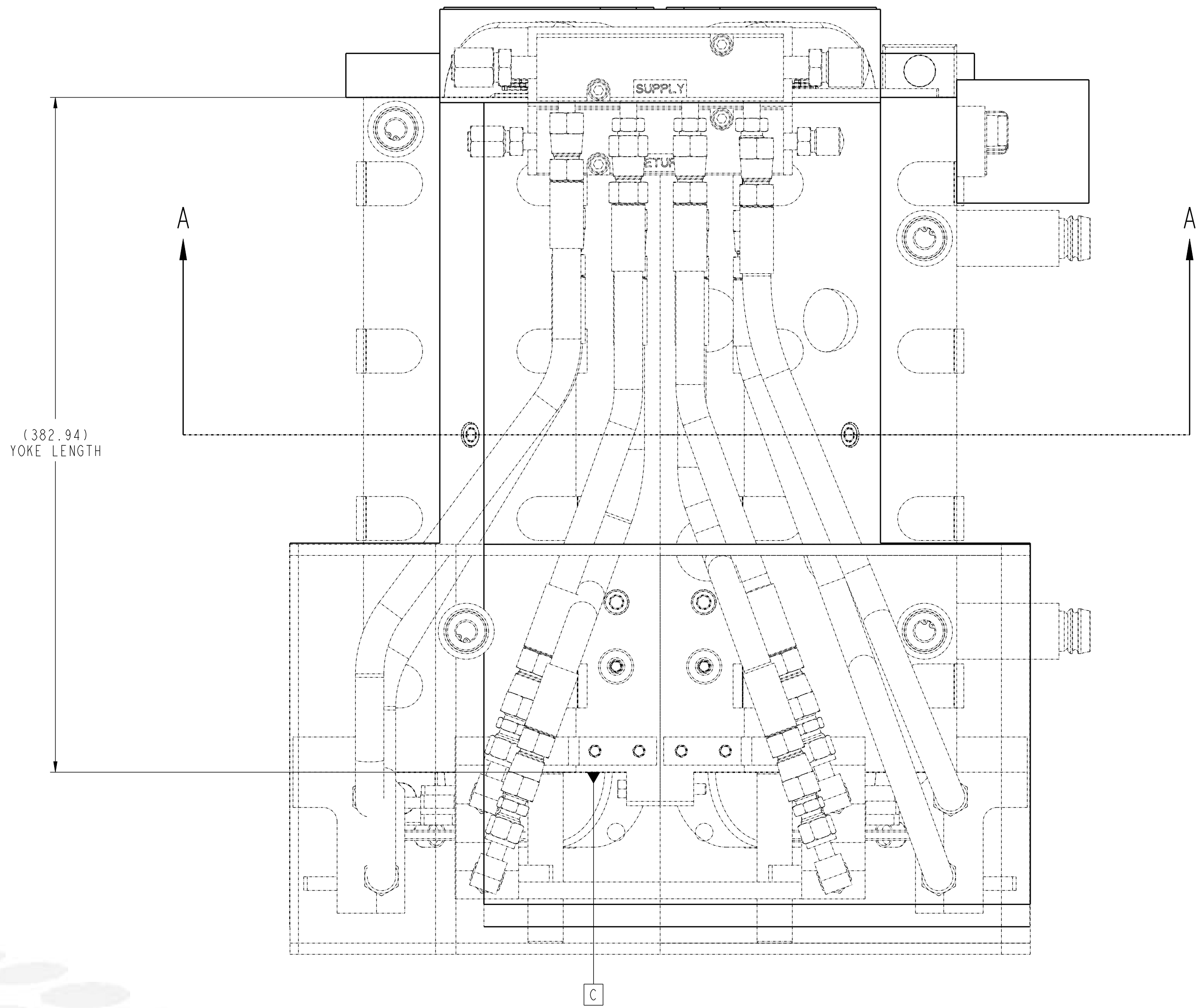
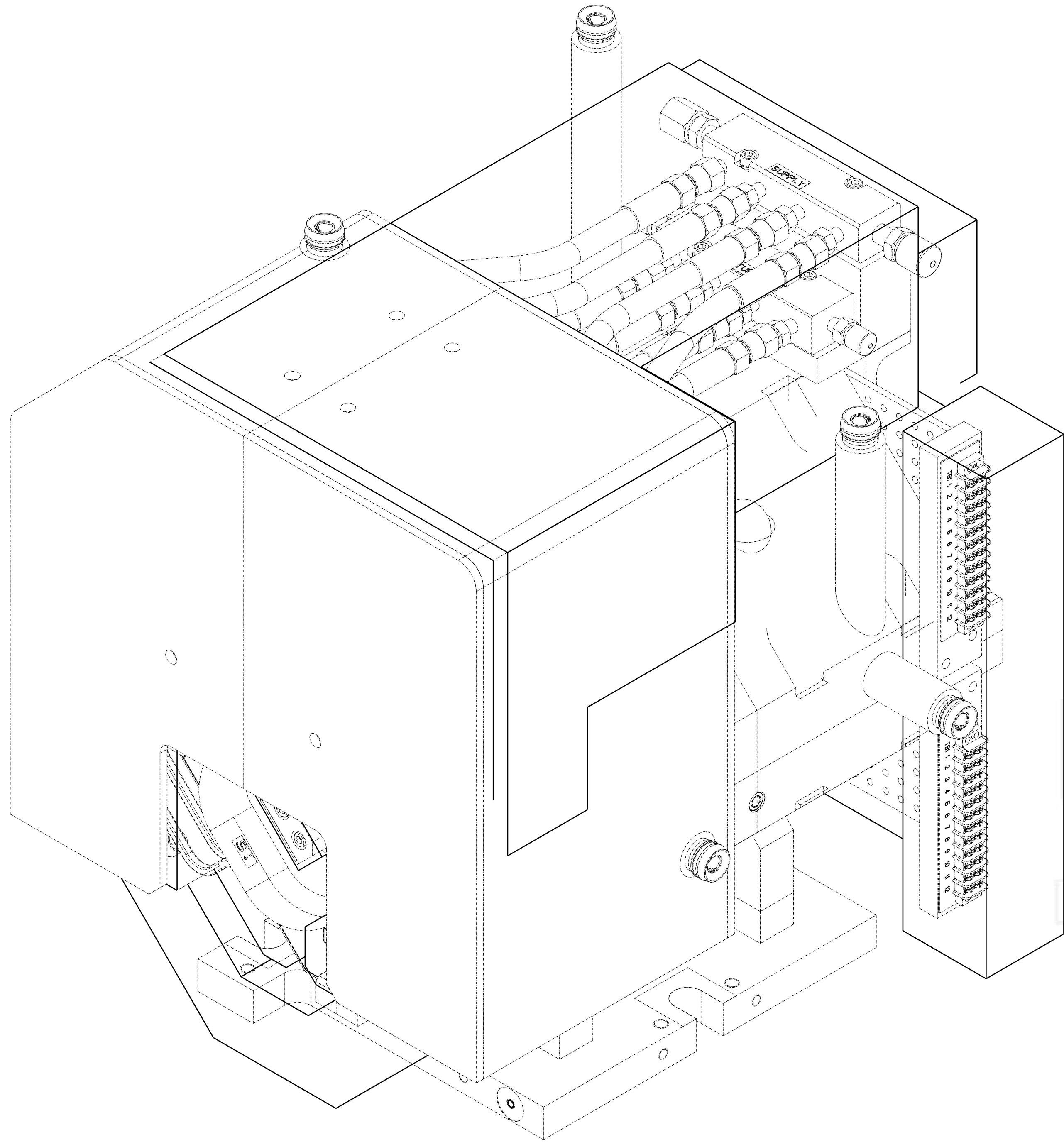


CORRECTOR COIL AND THERMAL SWITCH ELECTRICAL CIRCUIT CONNECTION DIAGRAM



NOTES:
[302] MAGNET SUB-COMPONENT SPACECLAIMS REPRESENT MAXIMUM ALLOWABLE SIZES OF RESPECTIVE SUB-COMPONENTS AT MMC THAT ALL COMPONENTS OF RESPECTIVE SUB-COMPONENTS MUST RESIDE IN.
[303] DESIGNATED COMPONENT SPACECLAIM LOCATIONS DEFINED WITH RESPECT TO OVERALL MAGNET ASSY. SPACECLAIM SPECIFICATIONS DEFINED BY VIEWS OF SPACECLAIM AND ALL COMPONENTS WITHIN SPACECLAIM.

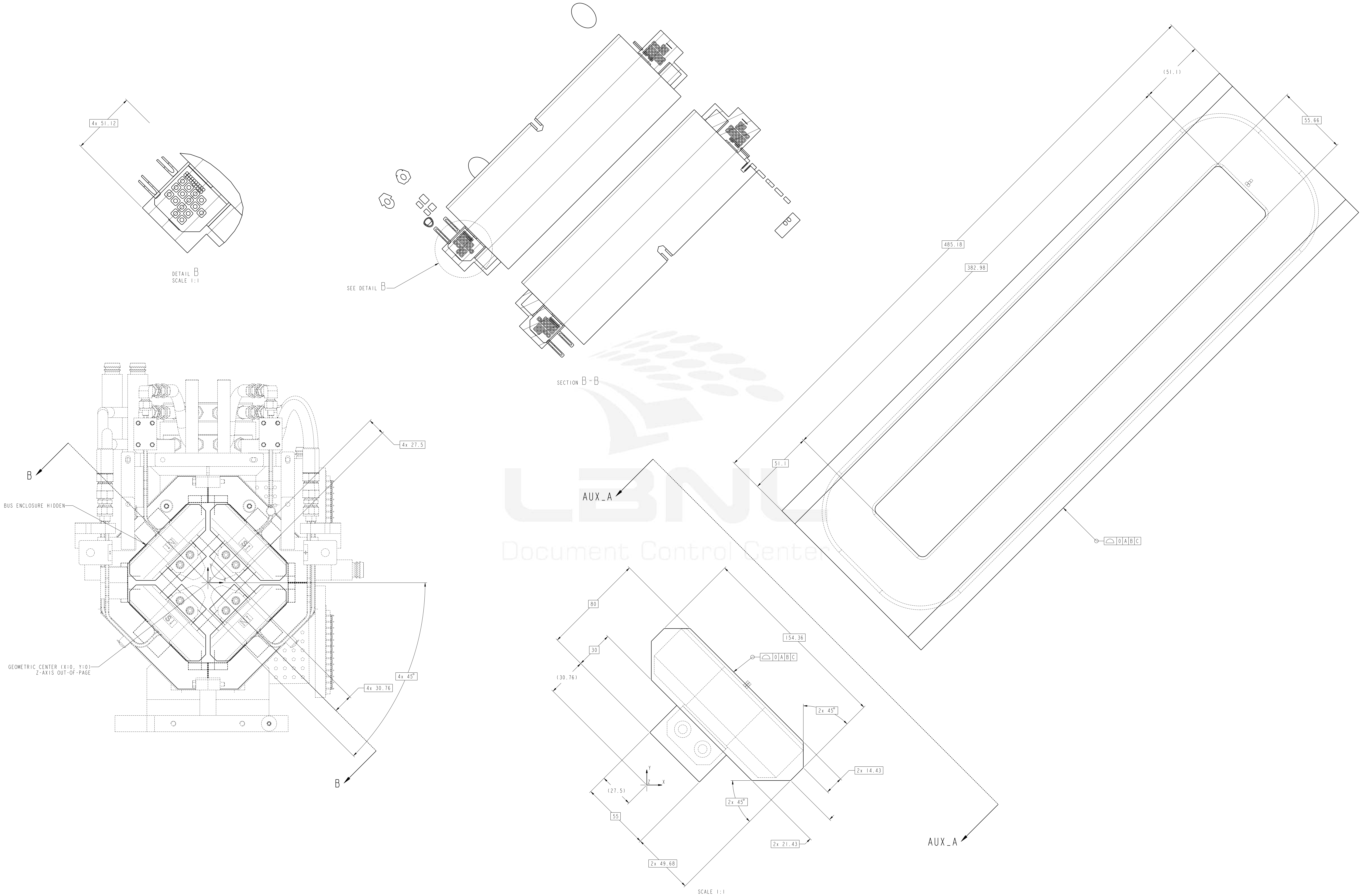
SPACECLAIM OVERVIEW



UNLESS OTHERWISE SPECIFIED		PROJECT NAME		ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY UNIVERSITY OF CALIFORNIA	
ESTIMATED MASS 236,514 KG		ADVANCED LIGHT SOURCE		ALS-U - BOOSTER TO ACCUMULATOR TRANSFER	
TOLERANCE F: ± 0.1 X: ± 0.1 Y: ± 0.05		SPR REF DOC	DRAWING UNITS	MAGNETS - GENERAL	
FRACTIONS: $\frac{1}{2}$ - $\frac{1}{4}$ - $\frac{1}{8}$		EG-1000-0923	mm-kg-s	TODD-A MAGNET ASSY	
ANGLES: $\pm 1^\circ$		SCALE	THIRD ANGLE	CATEGORY CODE	
MACH. SURFS: $\pm 3.2\mu m$ \checkmark or better		1:2		LIFE/CYCLE STATE	
REFERENCE - THREADS ARE CLASS G or H		PRINT NOT TO SCALE	SHEET	ITEM NUMBER	
- BREAK EDGES 0.5 MAX, ON		E	3 OF 10	Released	
- MACHINED WORK				AL-1430-5205	
- REMOVE BURRS, WELD SPLATTER				REV	
- & LOOSE SCALE				A	

NOTES:
902 SEE MECHANICAL REQUIREMENTS DOCUMENT FOR COIL SPECIFICATIONS.
905 SEE SHEET 2 FOR ELECTRICAL CIRCUIT DIAGRAMS AND THERMAL SWITCH TERMINAL BLOCK LABELLING.

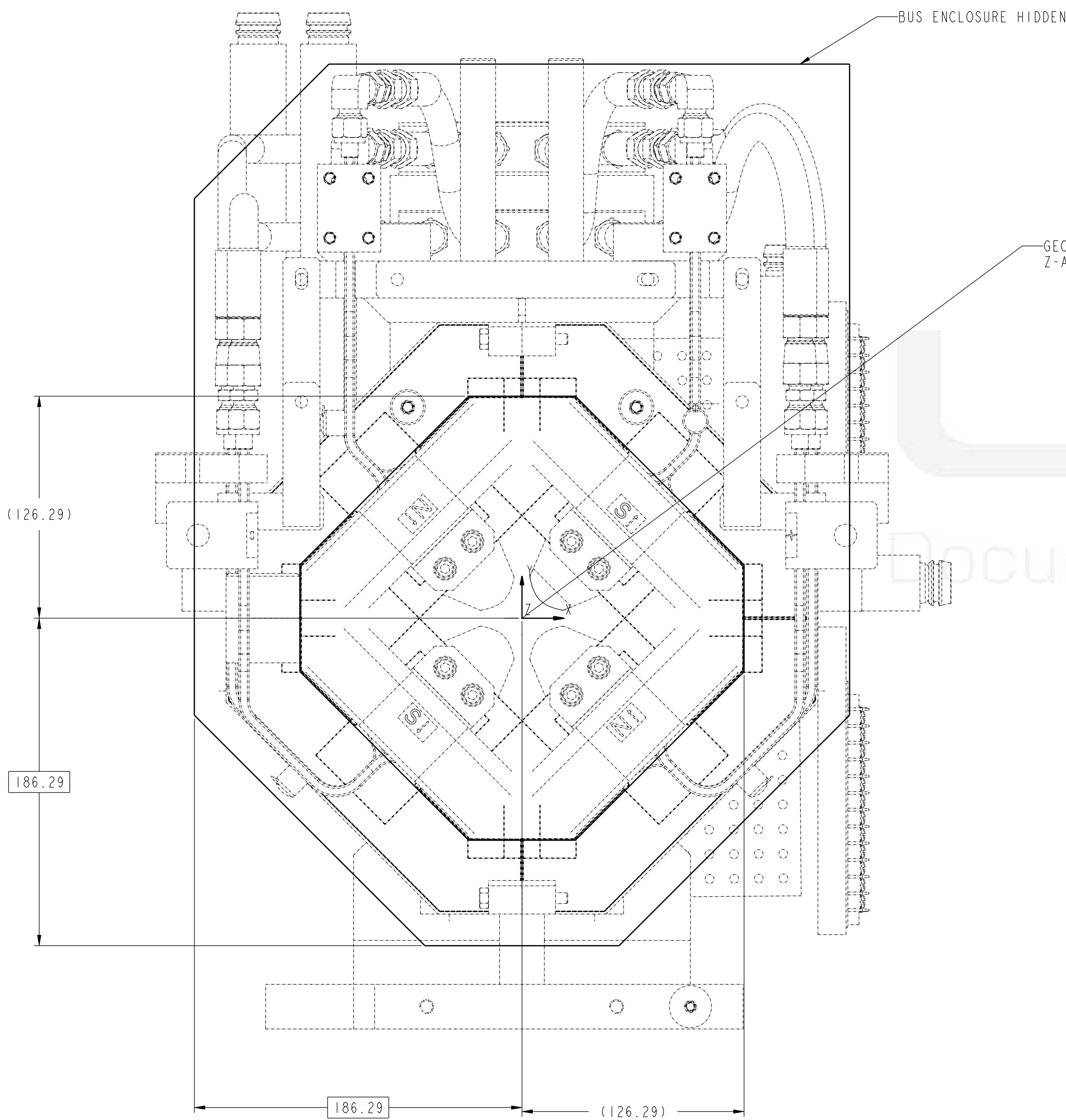
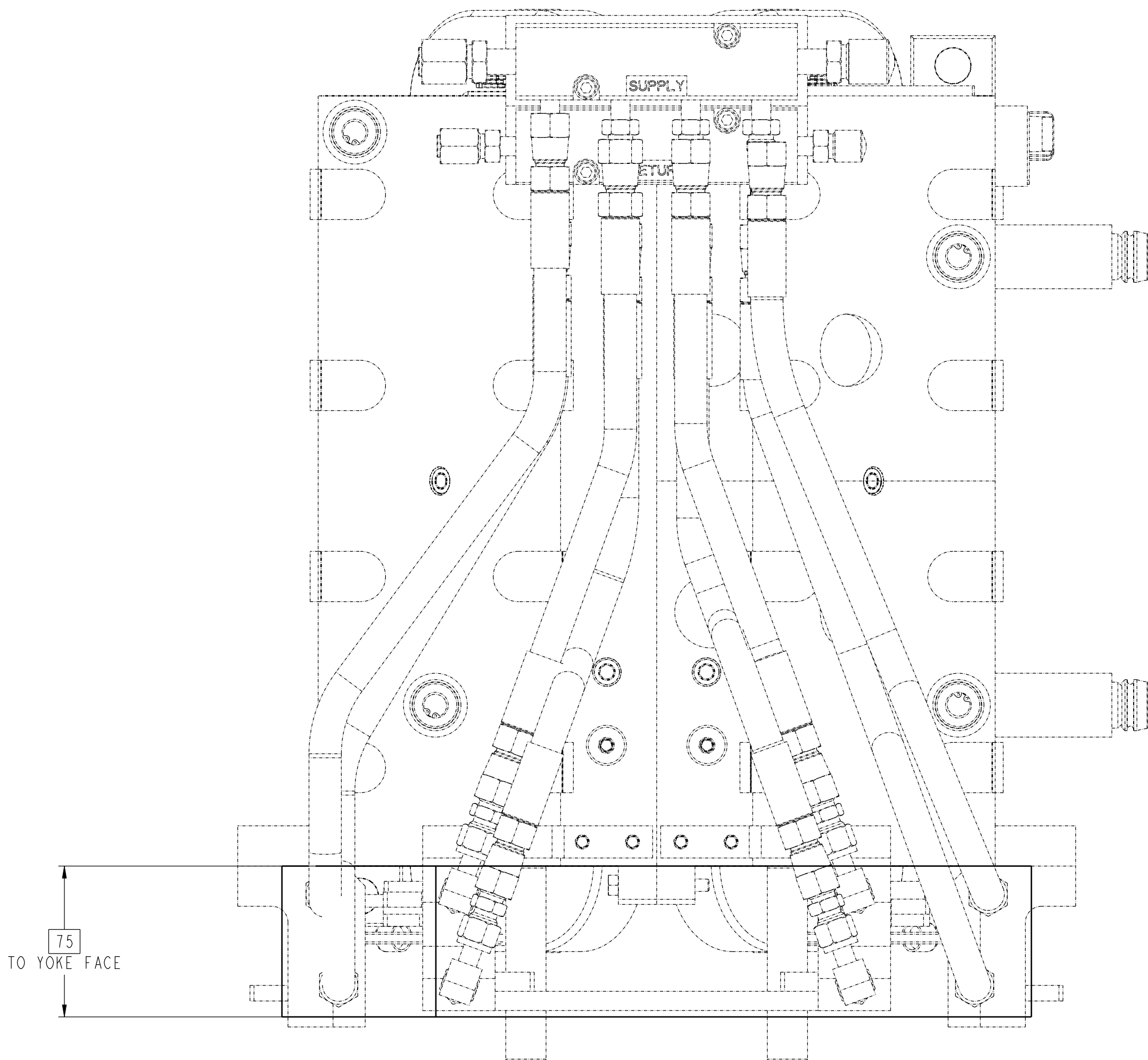
COIL CASTING SPACECLAIM INTERFACE



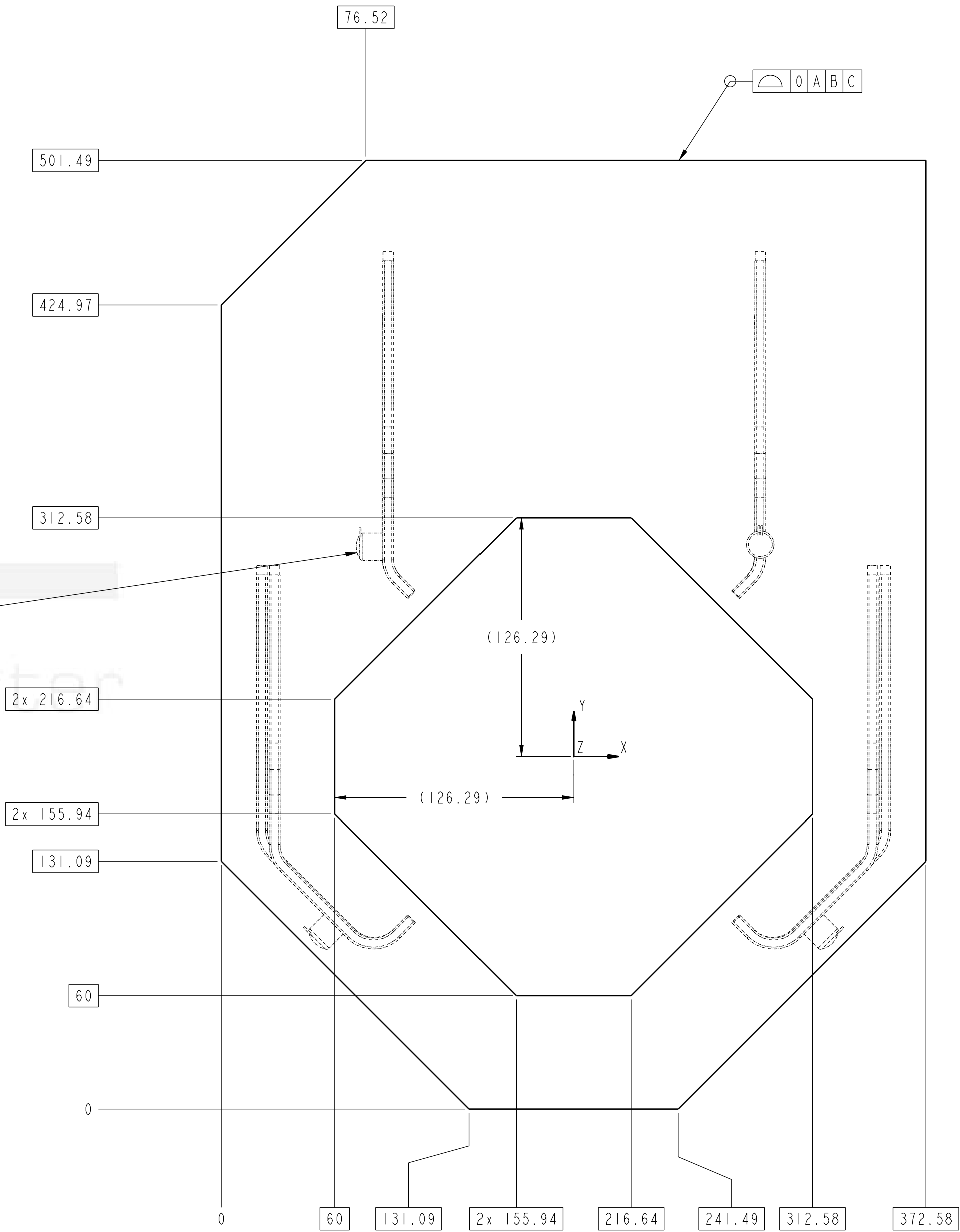
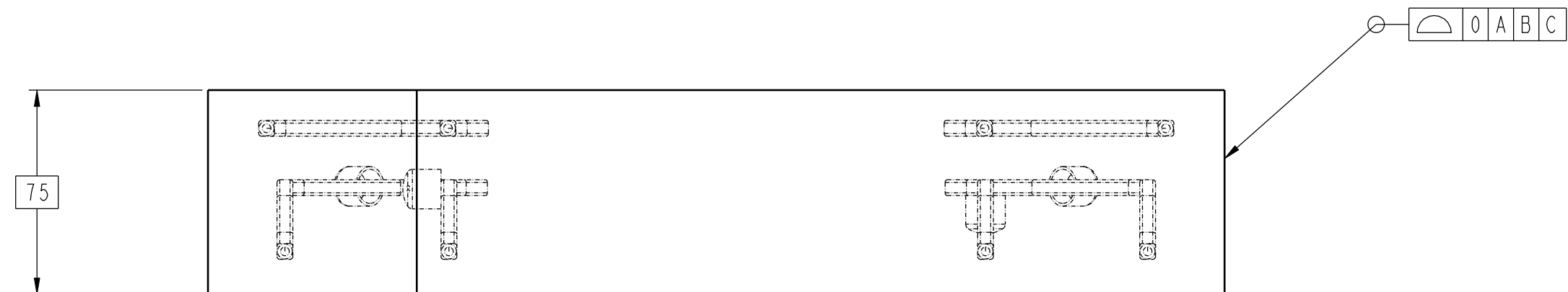
UNLESS OTHERWISE SPECIFIED		PROJECT NAME		ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY UNIVERSITY OF CALIFORNIA	
ESTIMATED MASS 236,514 KG		ADVANCED LIGHT SOURCE		ALS-U - BOOSTER TO ACCUMULATOR TRANSFER	
TOLERANCE X: ±0.05, Y: ±0.05, Z: ±0.05 FRACTIONS: ±0.05, ±0.05, ±0.05 ANGLES: ±0.5°		DWG REF DOC EG-1000-0923		DRAWING UNITS mm/kg/s	
MACH. SURFS: 3.2um ✓ or better		SCALE 1:2		THIRD ANGLE	
REFERENCE - THREADS ARE CLASS G or H - BREAK EDGES 0.5 MAX, ON - MACHINED WORK - REMOVE BURRS, WELD SPLATTER - & LOOSE SCALE		SHEET SIZE E		SHEET 4 OF 10	
		CATEGORY CODE AL7210		LIFECYCLE STATE Released	
		ITEM NUMBER AL-1430-5205		REV A	

NOTES:
906 SEE MECHANICAL REQUIREMENTS DOCUMENT FOR PREFERRED INSULATION STYLE.
907 MINIMUM BEND RADIUS OF COIL LEADS 2X OUTSIDE DIMENSION OF COIL CONDUCTOR.
908 THERMAL SWITCHES ON EXHAUST OF EACH HYDRAULIC CIRCUIT. THERMAL SWITCHES PLACED PROXIMAL TO COIL PACK. INCLUDE ELECTRICALLY INSULATING CAP ON EACH THERMAL SWITCH. SEE MECHANICAL REQUIREMENTS DOCUMENT FOR THERMAL SWITCH SPECIFICATION.

MAIN COIL LEADS SPACECLAIM INTERFACE

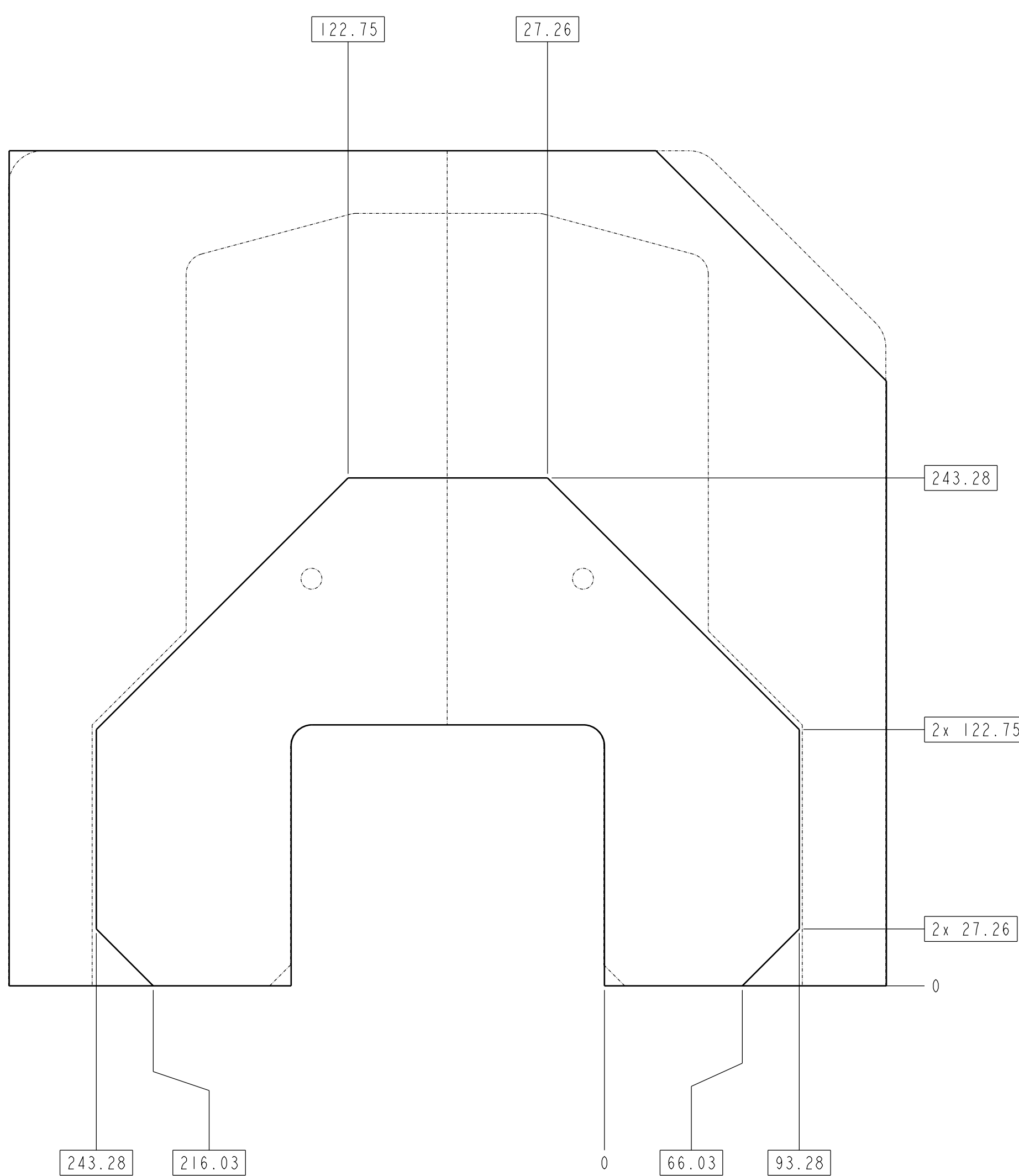
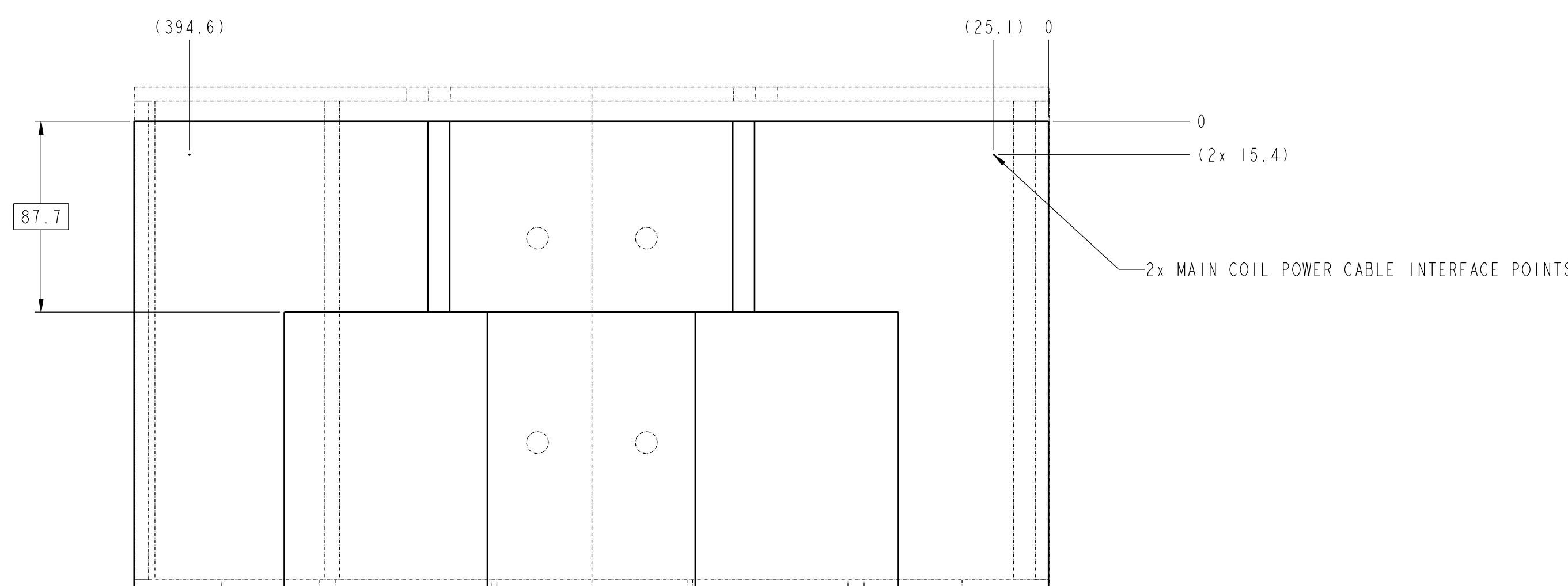
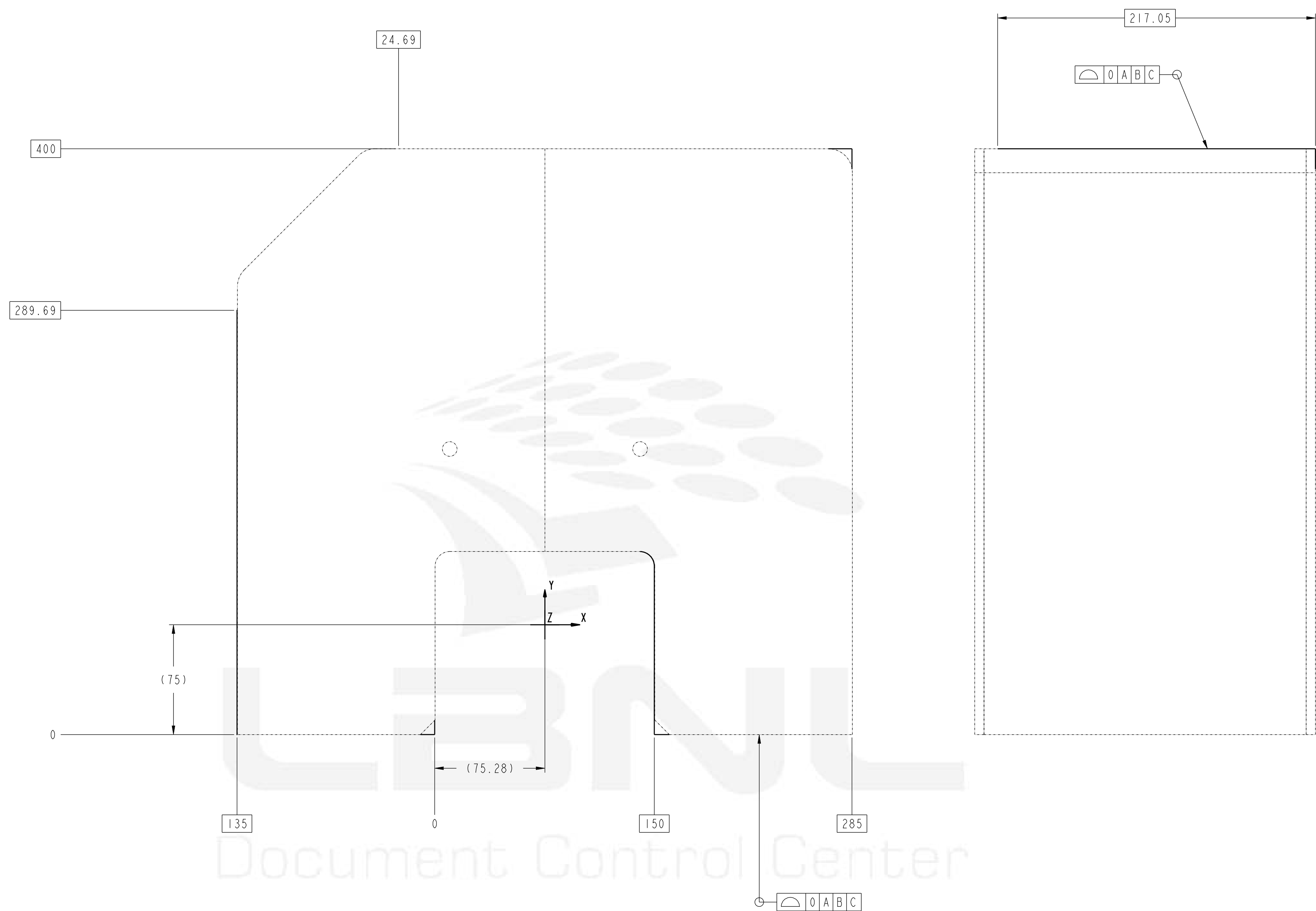
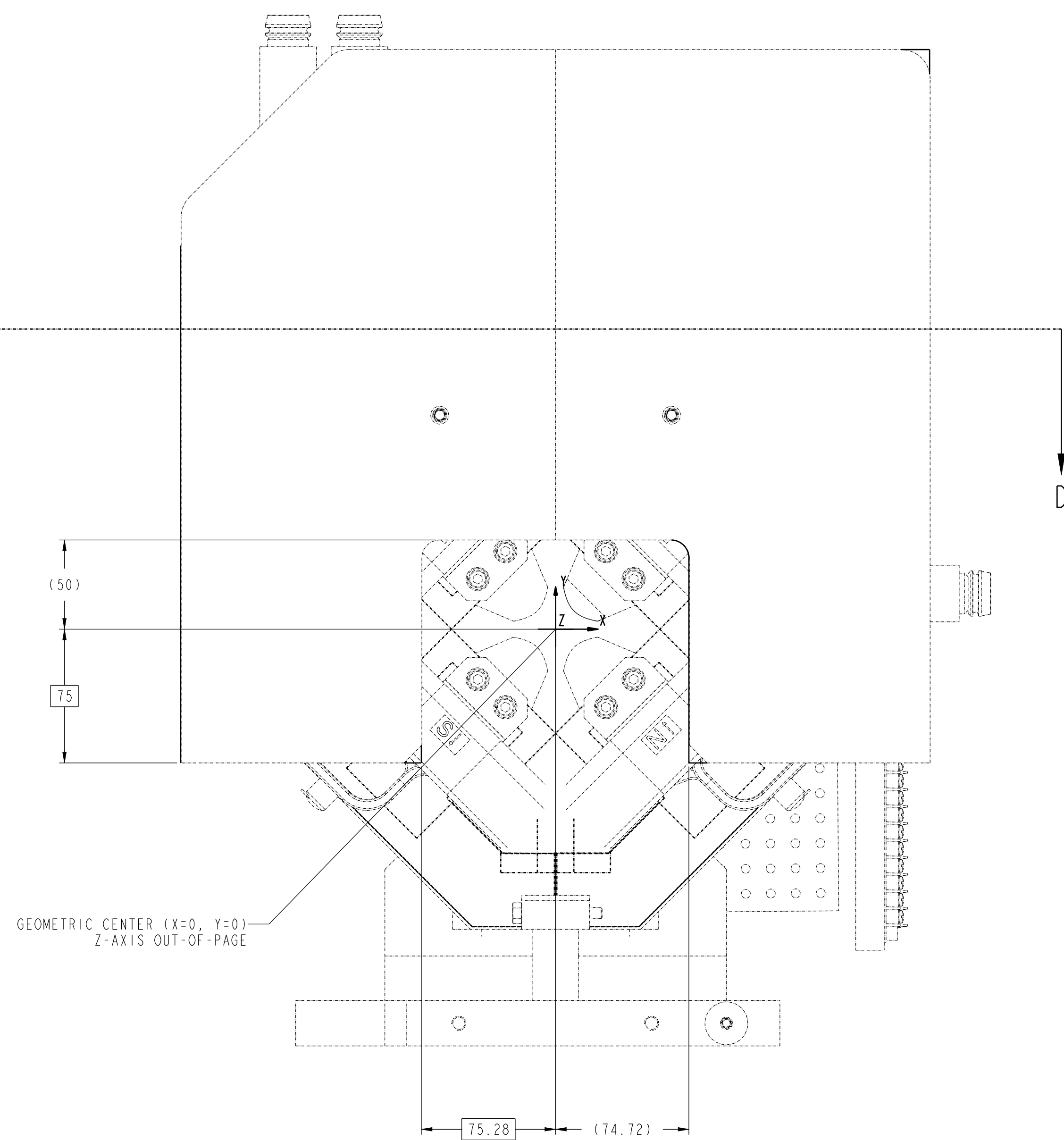





GEOMETRIC CENTER (X=0, Y=0)
Z-AXIS OUT-OF-PAGE



UNLESS OTHERWISE SPECIFIED		PROJECT NAME		ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY UNIVERSITY OF CALIFORNIA	
ESTIMATED MASS 236,514 KG		ADVANCED LIGHT SOURCE		ALS-U - BOOSTER TO ACCUMULATOR TRANSFER	
TOLERANCE X: ±0.1, Y: ±0.1, Z: ±0.1, XX: ±0.05, YY: ±0.05, ZZ: ±0.05		SHW REF DOC EG-1000-0923	DRAWING UNITS mm-Kg-s	MAGNETS - GENERAL	
FRACTIONS: 1/16, 1/8, 1/4, 1/2, 3/4, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100		SCALE 1:2	THIRD ANGLE	TODD-A MAGNET ASSY	
ANGLES: ±1°		PRINT NOT TO SCALE			
MACH. SURFS: 3.2um ✓ or better					
REFERENCE THREADS ARE CLASS G or H BREAK EDGES 0.5 MAX, ON MACHINED WORK REMOVE BUBBS, WELD SPLATTER & LOOSE SCALE					
SHEET SIZE E		SHEET 5 OF 10		CATEGORY CODE AL7210	LIFECYCLE STATE Released
				ITEM NUMBER AL-1430-5205	REV A

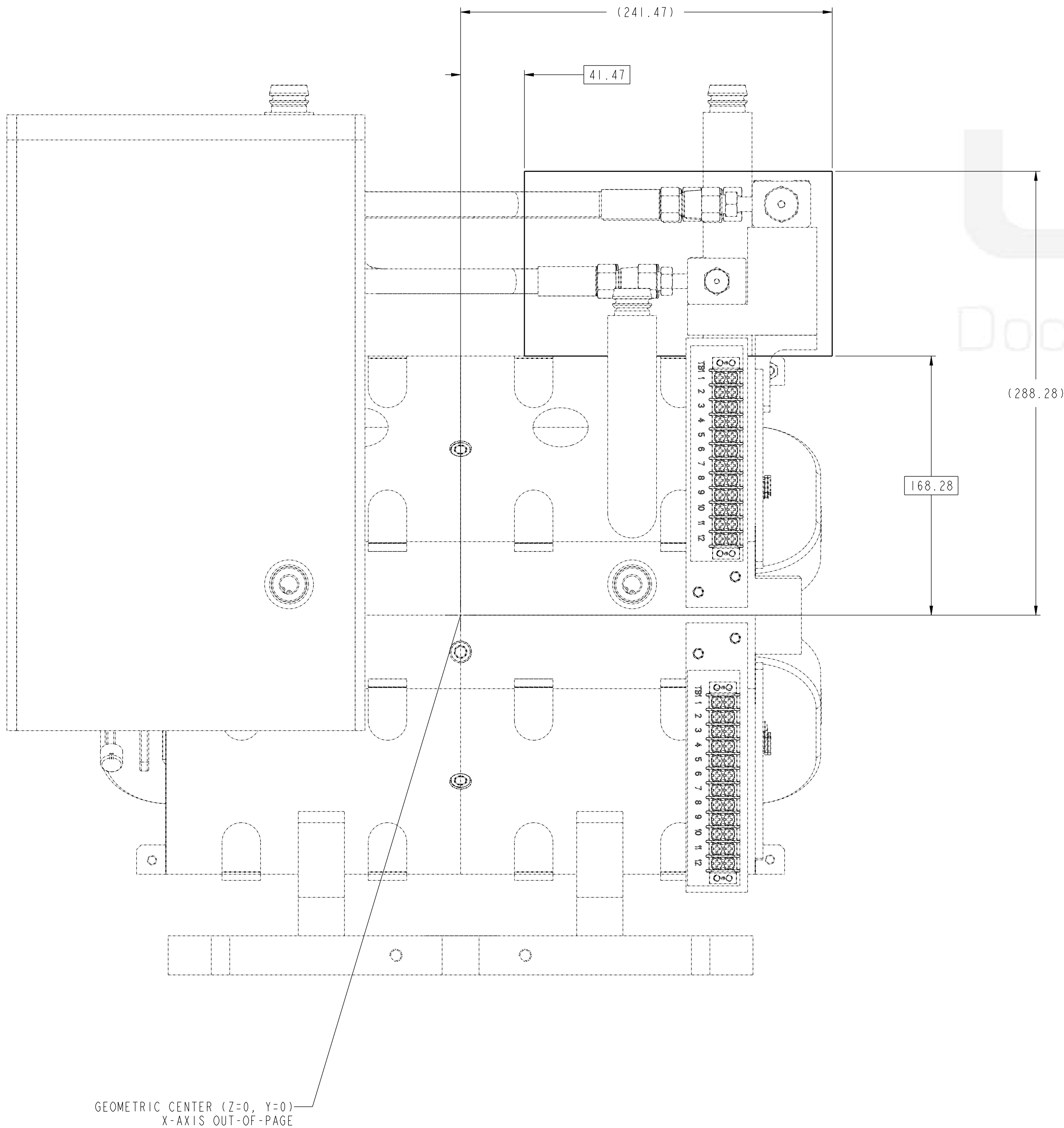
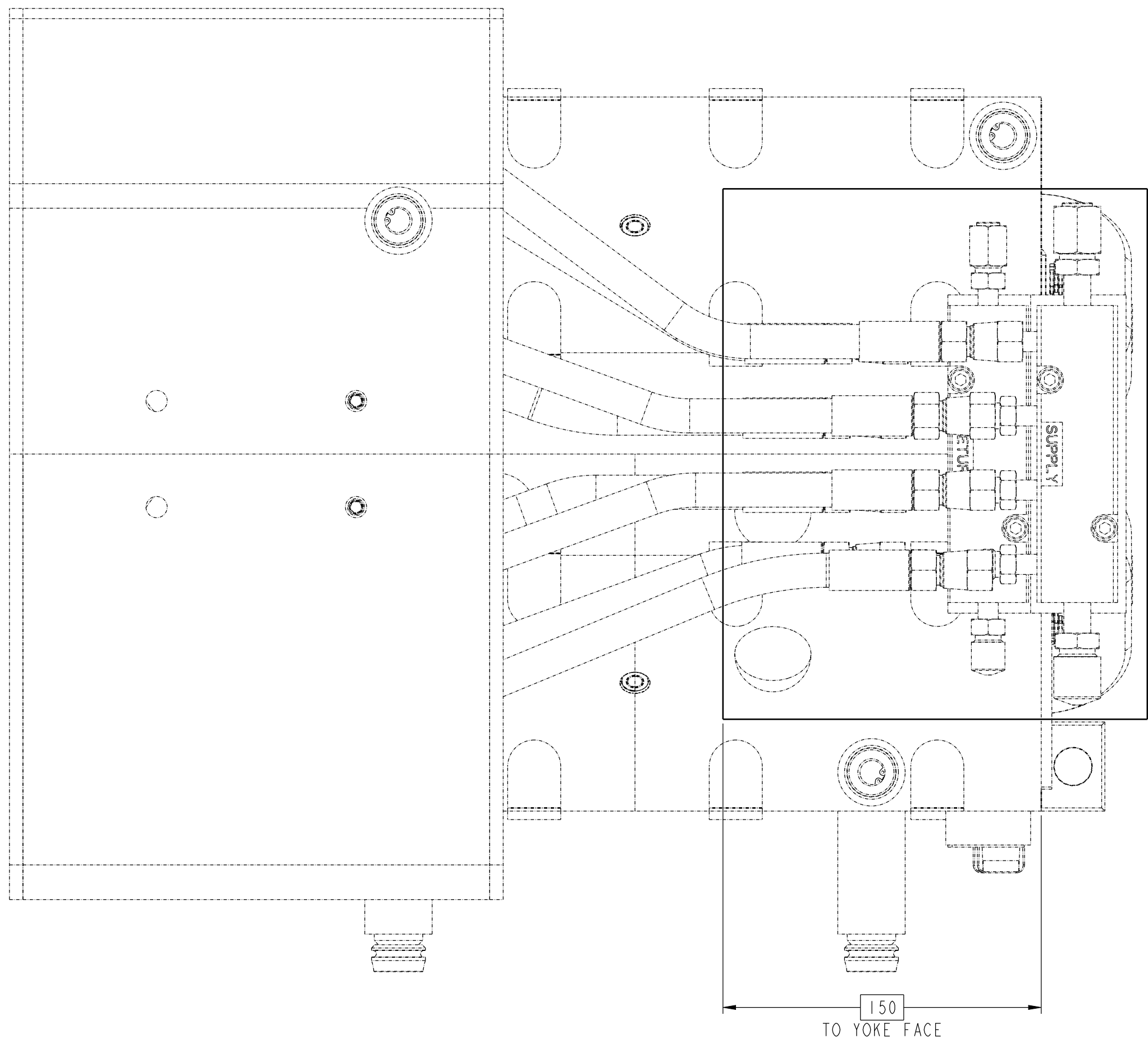
91) BUSBAR TABS FOR POWER INPUT AND OUTPUT CONNECTIONS TO BE DESIGNED TO ACCOMMODATE LUGS SPECIFIED IN MECHANICAL REQUIREMENTS DOCUMENT.



UNLESS OTHERWISE SPECIFIED		PROJECT NAME		ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY UNIVERSITY OF CALIFORNIA		 	
ESTIMATED COST \$26,334.30		ADVANCED LIGHT SOURCE					
TOLERANCE FRACTIONS: 1/8, 1/4, 1/2, 3/4, 0.05 X, Y, Z: +/- ANGLES: MACH. SURFACES: ± 0.2mm ✓ or better		DW: 100-100-0923		DRAWING UNITS mm-Kg-S			
SCALE THIRD ANGLE		1:2					
SURFACES ARE CLASS OF, OR H HIDDEN EDGES OF, OR MACHINED ON MACHINE WORK REMOVE BURRS, WELD SPLATTER & LOOSE SCALE		SHEET		CATEGORY CODE		LIFECYCLE STATE	
E 6 OF 10				AL7210		Released	
						AL-1430-5205	
						REX	

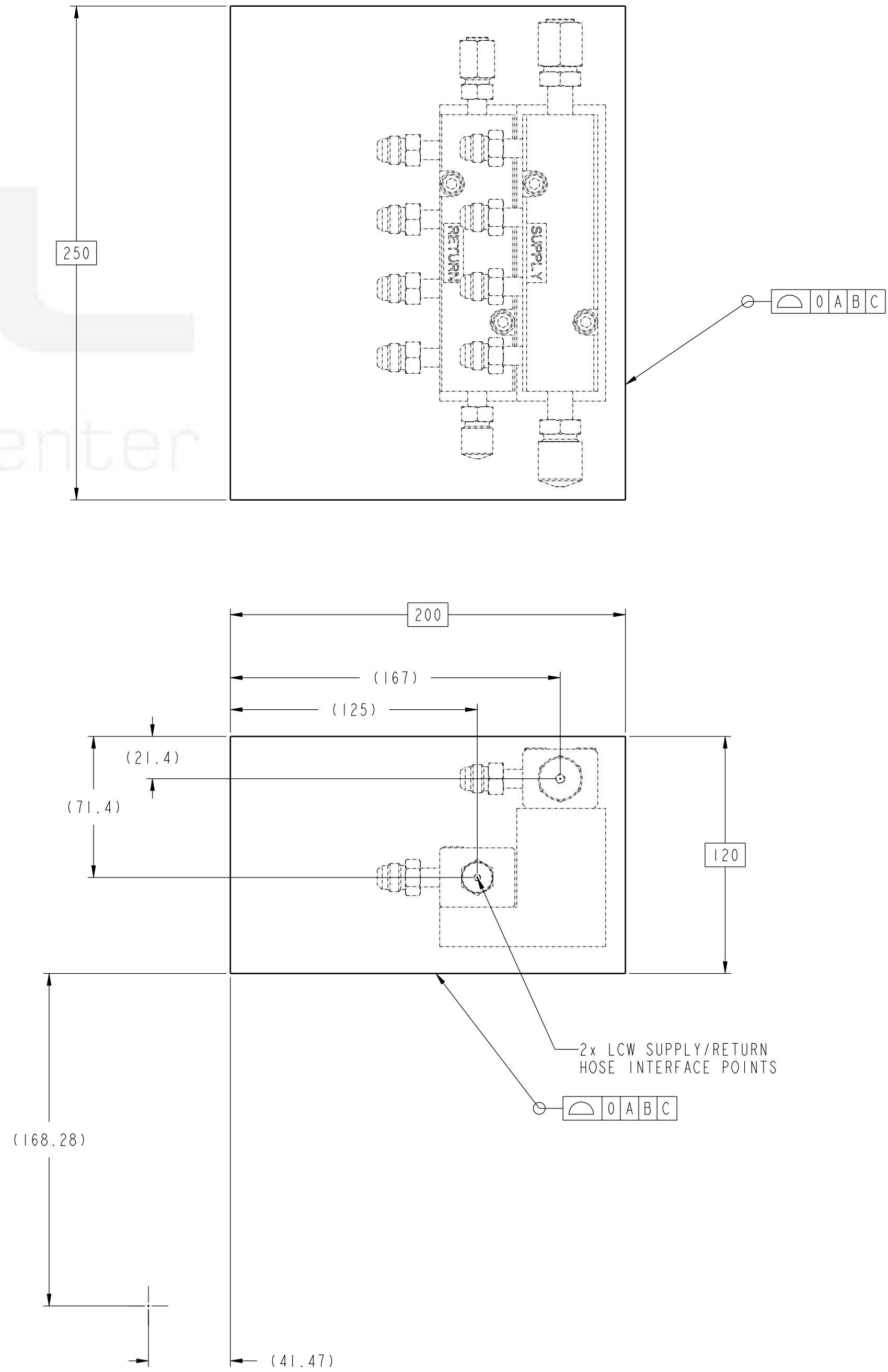
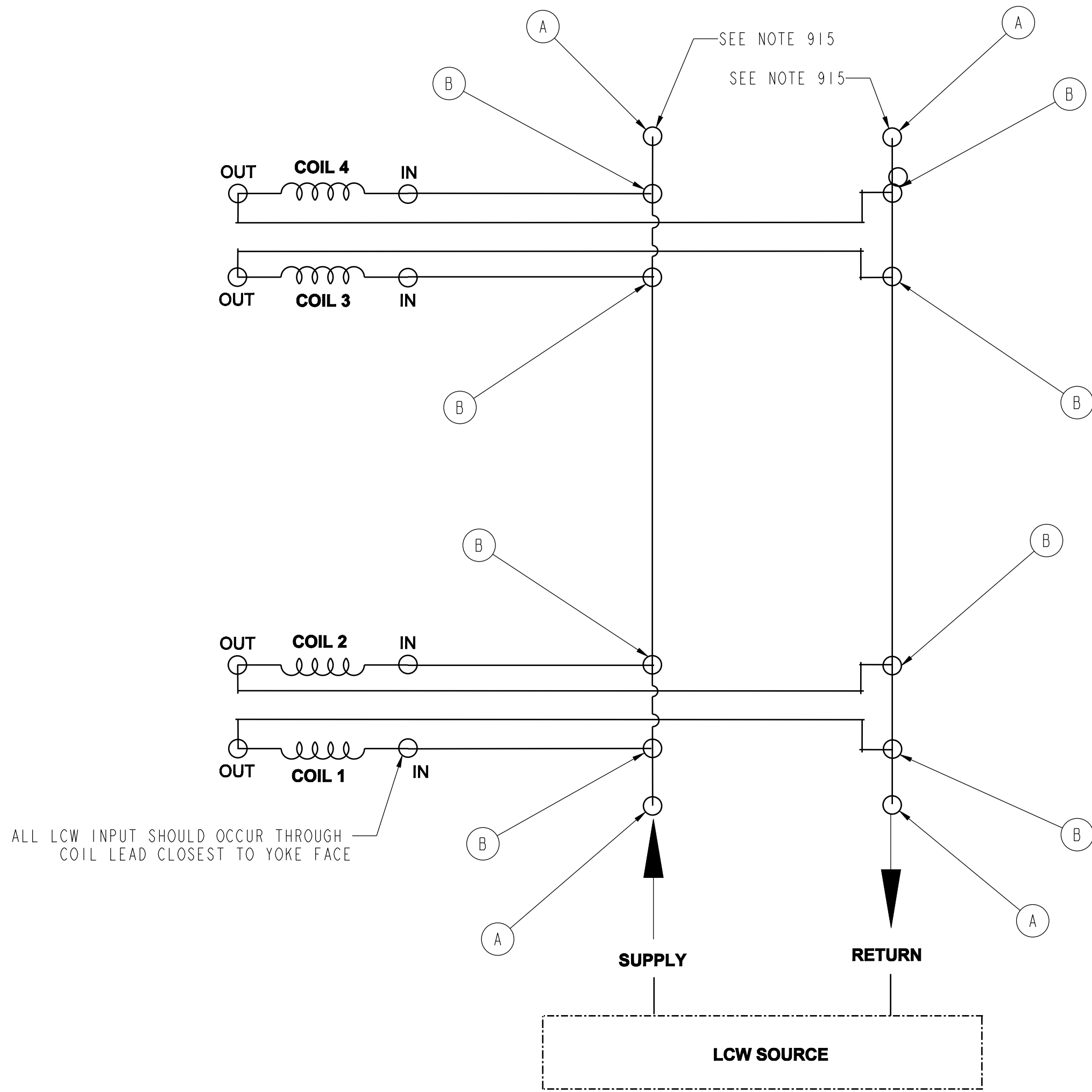
- NOTES:
- 912 MANIFOLD MUST HAVE ELECTRICAL PATH TO GROUND.
 - 913 LABEL SUPPLY AND RETURN MANIFOLDS.
 - 914 VENDOR MUST SUPPLY JIC/AN SSTL END CAP FITTINGS.

MANIFOLD SPACECLAIM INTERFACE



FITTING ID	MANUFACTURER	PART #	QTY
A	SWAGelok	SS-8-TA-1-8AN	4
B	SWAGelok	SS-6-TA-1-6AN	8

MAIN COIL LCW CONNECTIONS
WATER MANIFOLD HYDRAULIC CIRCUIT



UNLESS OTHERWISE SPECIFIED		PROJECT NAME		ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY UNIVERSITY OF CALIFORNIA	
ESTIMATED MASS 236.514 KG		ADVANCED LIGHT SOURCE		ALS-U - BOOSTER TO ACCUMULATOR TRANSFER	
TOLERANCE FRACTIONS: ±		DRAWING UNITS mm-kg-s		MAGNETS - GENERAL	
ANGLES: ±		SCALE 1:2		TODD-A MAGNET ASSY	
MACH. SURFS: 3.2um ✓ or better		THIRD ANGLE		CATEGORY CODE	
REFERENCE THREADS ARE CLASS G or H BREAK EDGES 0.5 MAX, ON MACHINED WORK REMOVE BUBBLES, WELD SPLATTER & LOOSE SCALE		SHEET SIZE E		LIFE/CYCLE STATE Released	
		SHEET 7 OF 10		ITEM NUMBER AL-1430-5205	
				REV A	

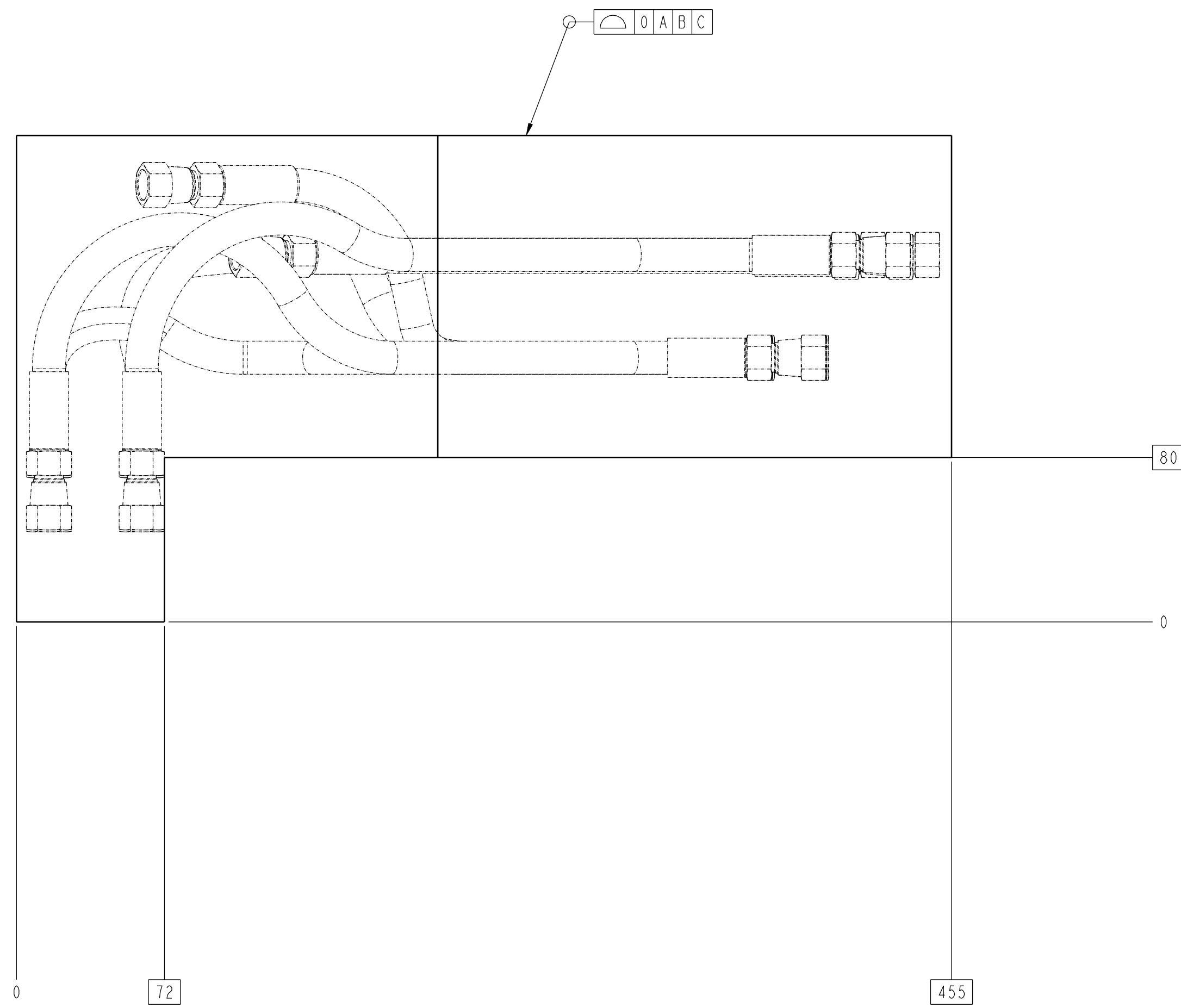
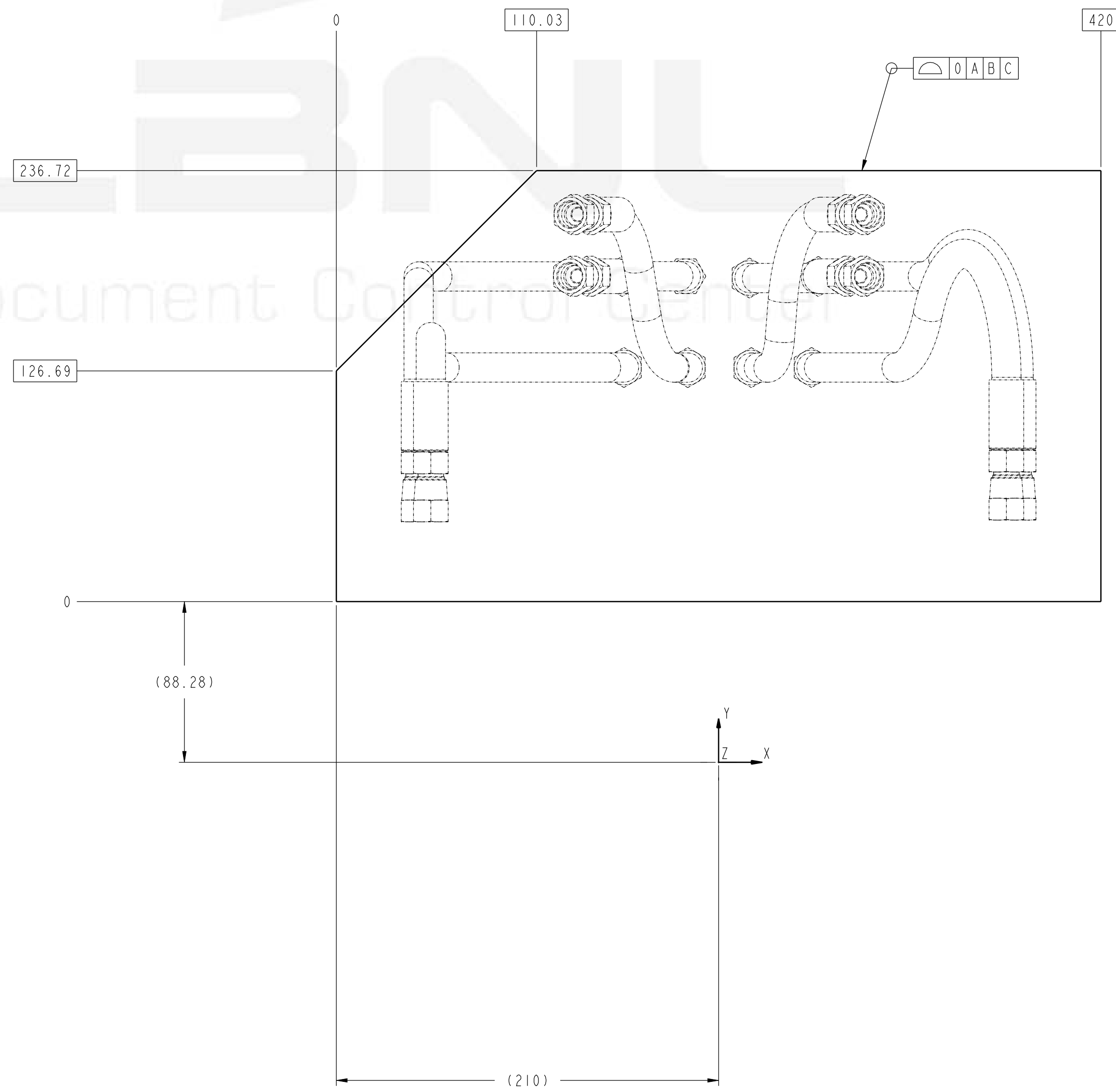
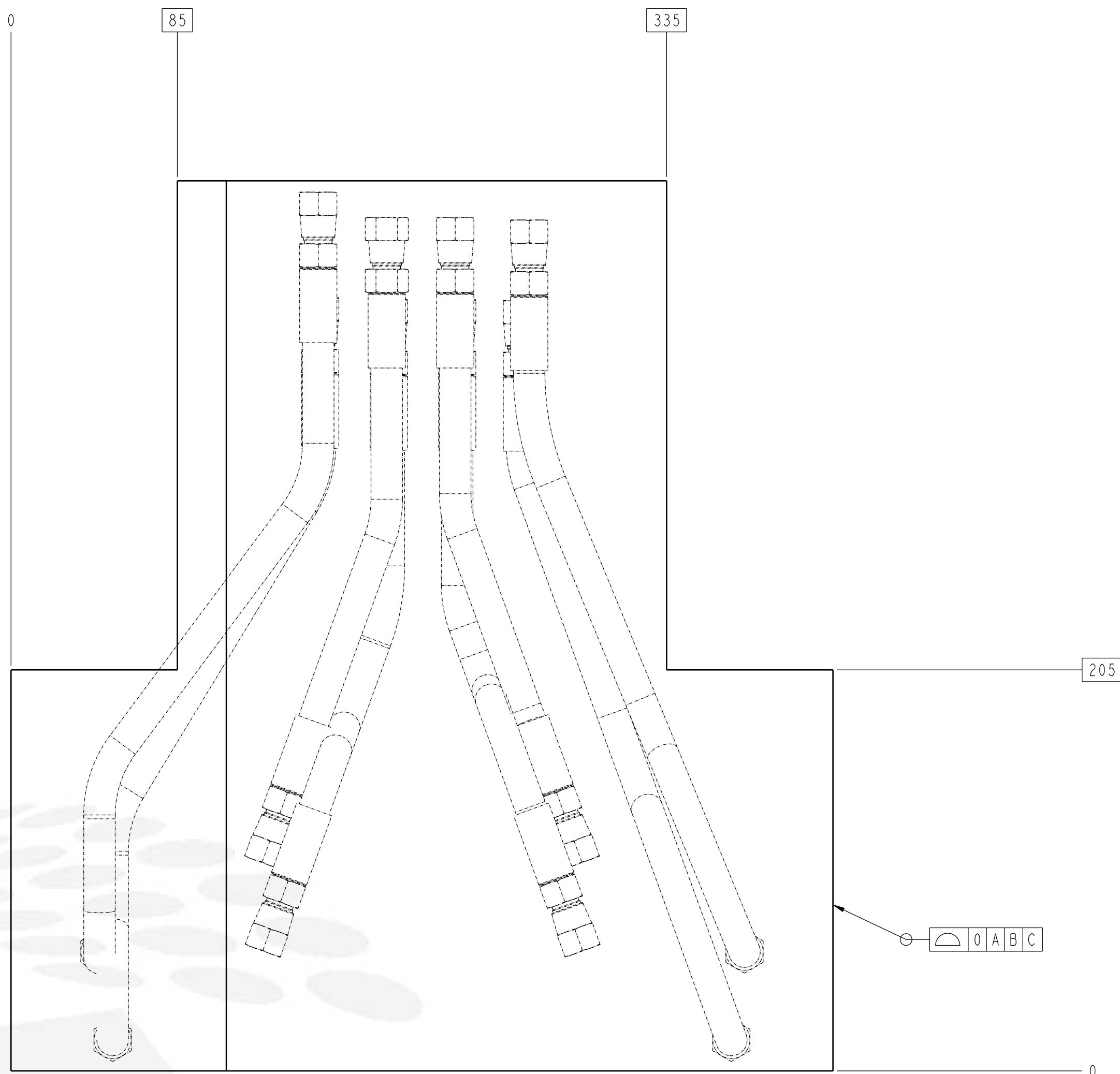
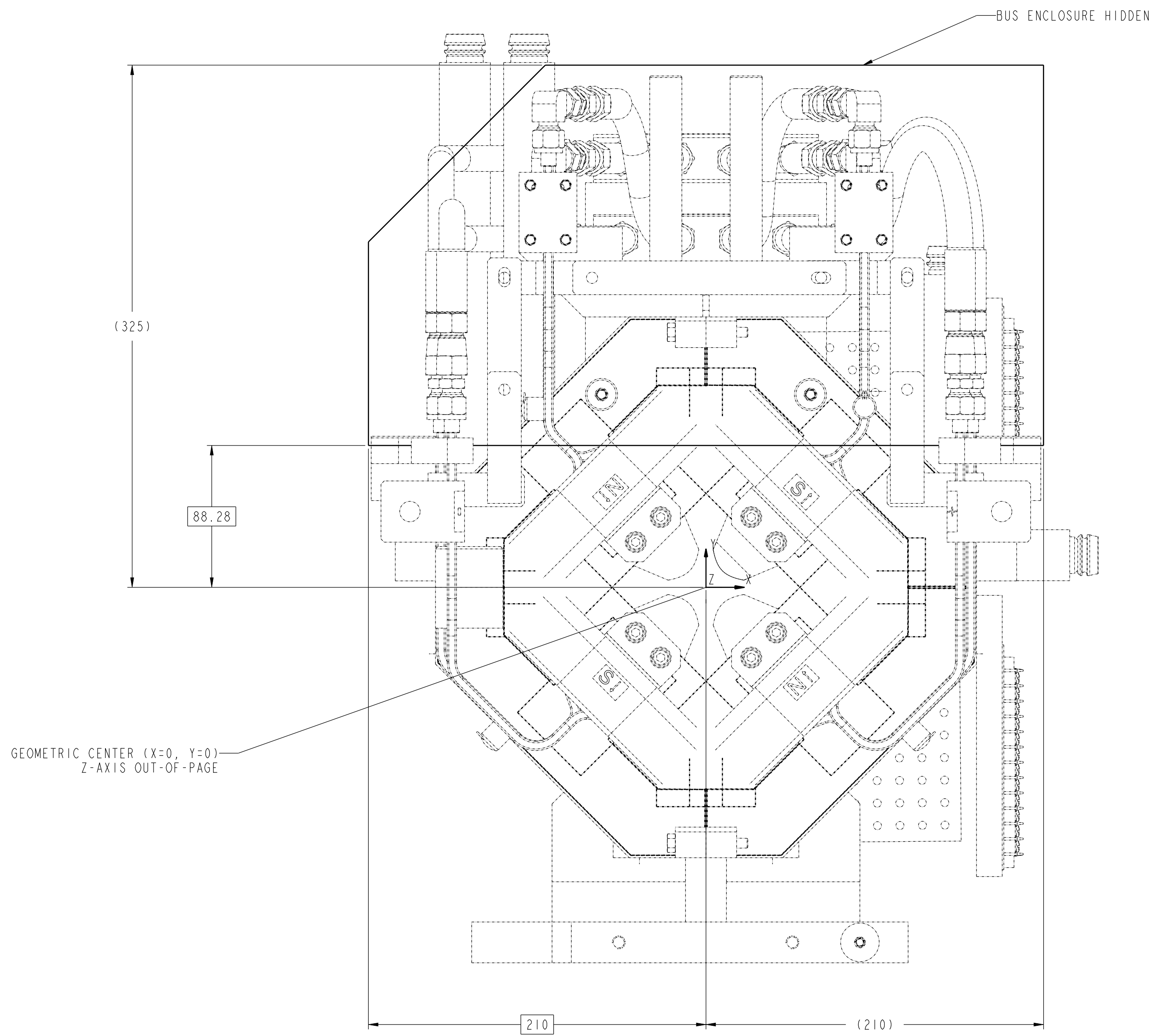
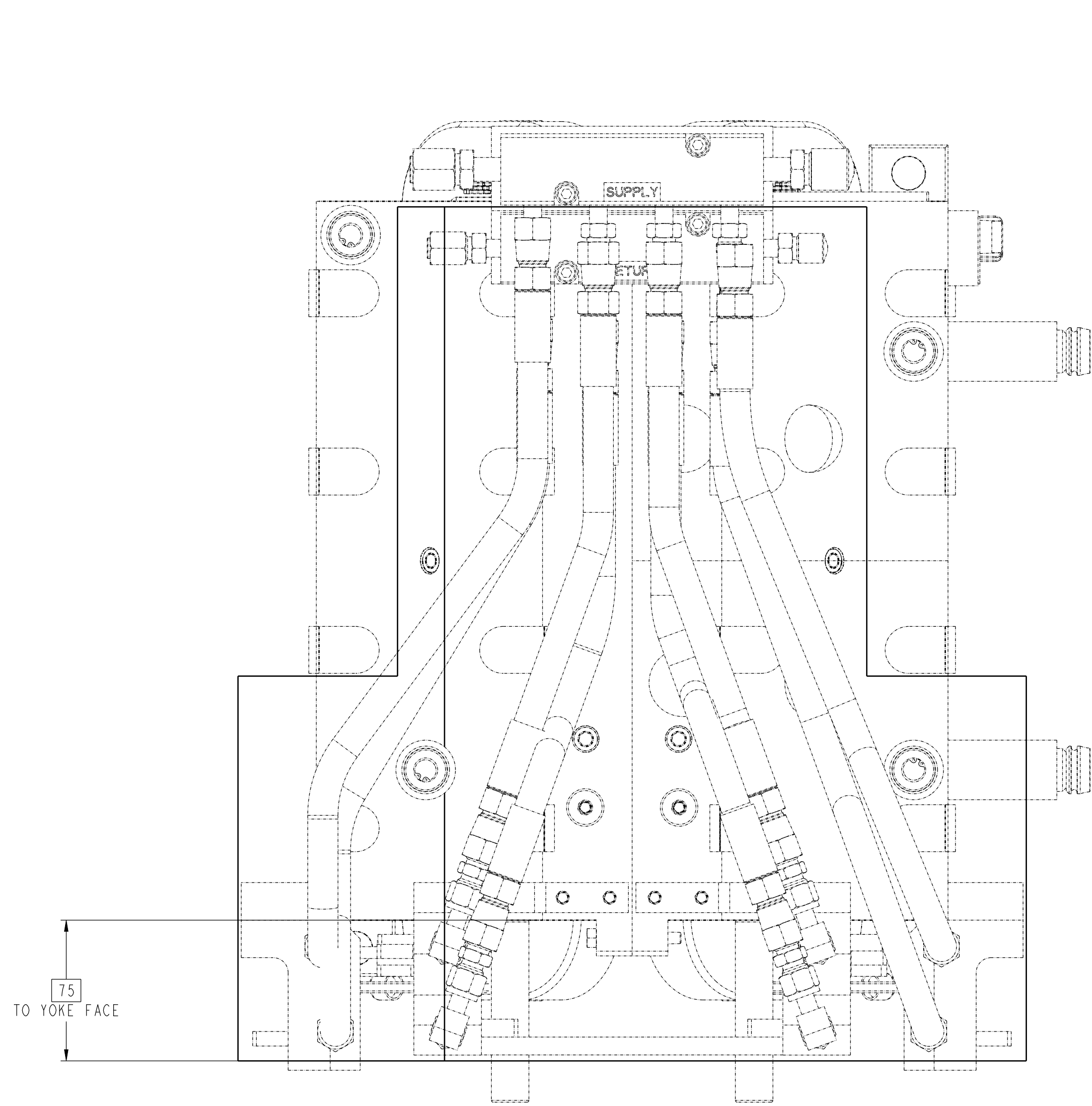
NOTES:

915> ALL HOSES MUST SATISFY MINIMUM BEND RADIUS AS SPECIFIED IN MECHANICAL REQUIREMENTS DOCUMENT.

916> SEE MECHANICAL REQUIREMENTS DOCUMENT FOR HOSE AND FITTING SPECIFICATIONS.

917> SEE MECHANICAL REQUIREMENTS DOCUMENT FOR HOSE BUNDLING SPECIFICATIONS.

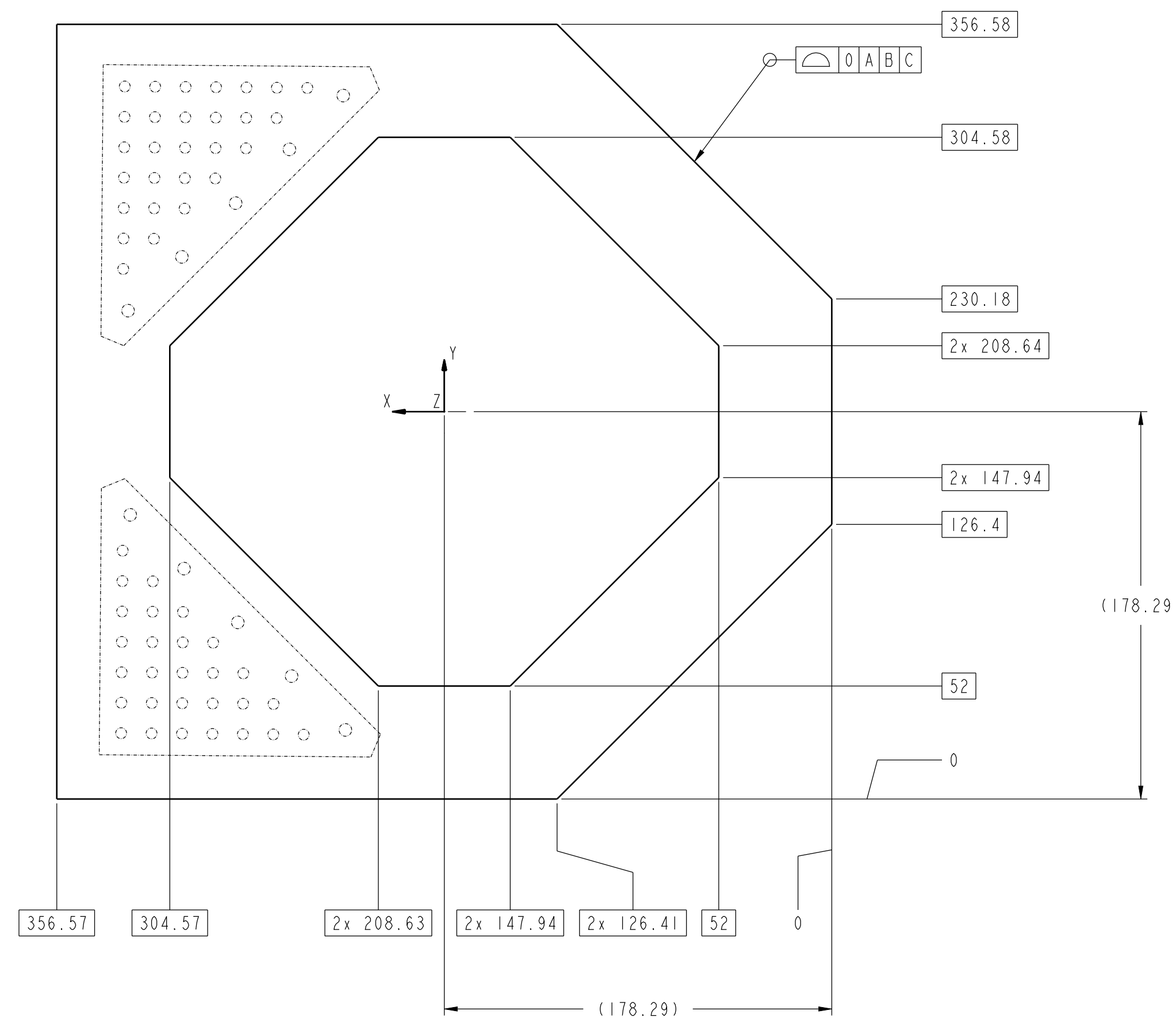
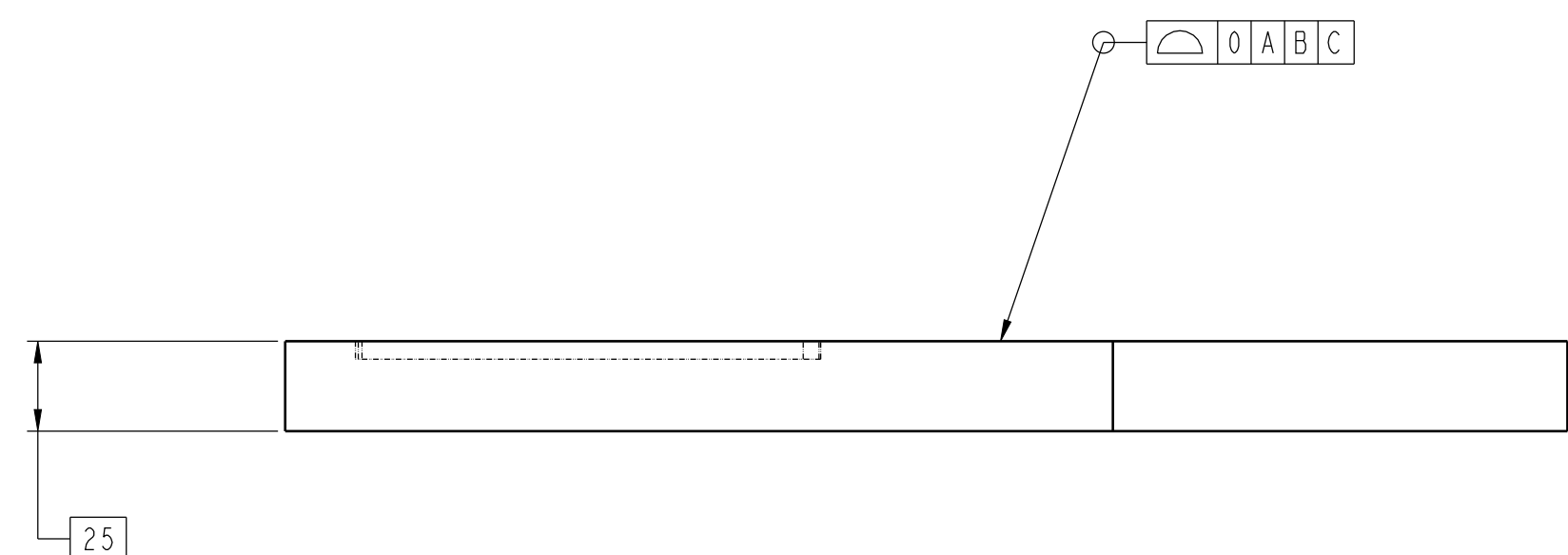
HOSES SPACECLAIM INTERFACE







UNLESS OTHERWISE SPECIFIED		PROJECT NAME		ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY UNIVERSITY OF CALIFORNIA	
ESTIMATED MASS 236,514 KG		ADVANCED LIGHT SOURCE		ALS-U - BOOSTER TO ACCUMULATOR TRANSFER	
TOLERANCE X: ±0.1, Y: ±0.1, Z: ±0.1		DRAWING UNITS mm-kg-s		MAGNETS - GENERAL	
FRACTIONS: 1/16, 1/32, 1/64		SCALE 1:2		TODD-A MAGNET ASSY	
ANGLES: ±1°		THIRD ANGLE		CATEGORY CODE	
MACH. SURFS: 3.2um ✓ or better		SHEET SIZE E		LIFECYCLE STATE	
REFERENCE - THREADS ARE CLASS G or H - BREAK EDGES 0.5 MAX, ON - MACHINED WORK - REMOVE BURRS, WELD SPLATTER - & LOOSE SCALE		8 OF 10		Released	
		ITEM NUMBER		AL-1430-5205	
		REV		A	

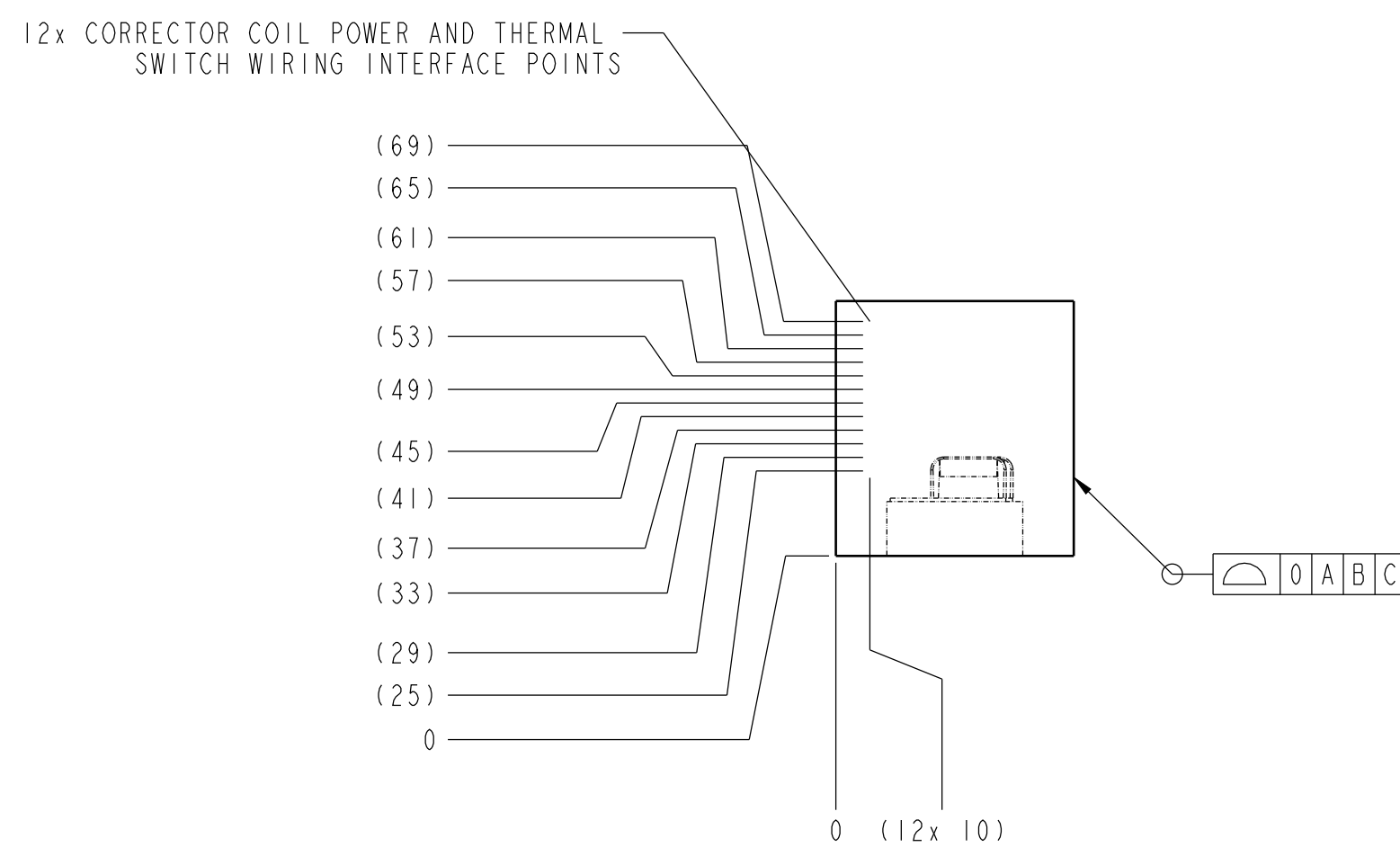
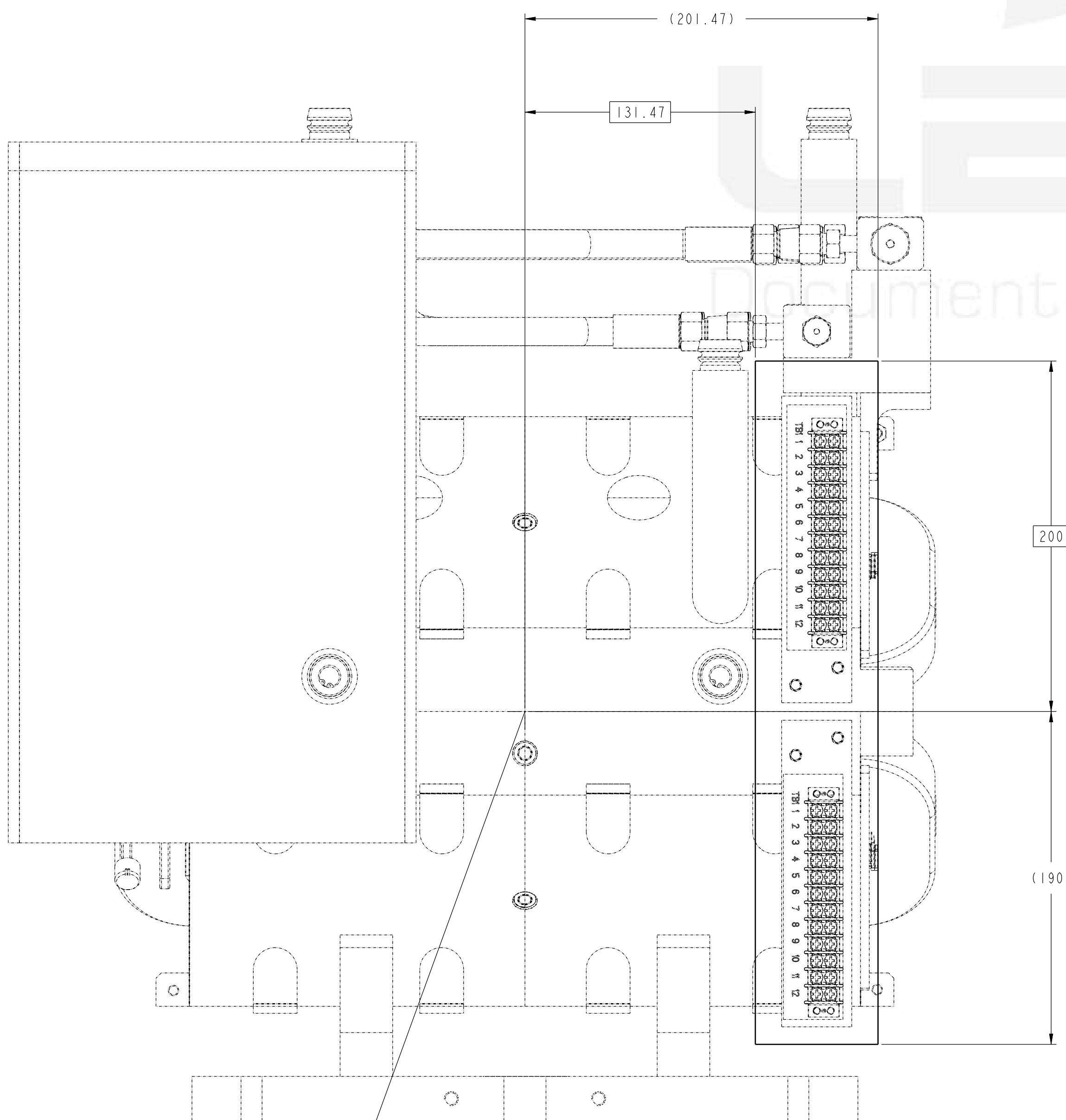
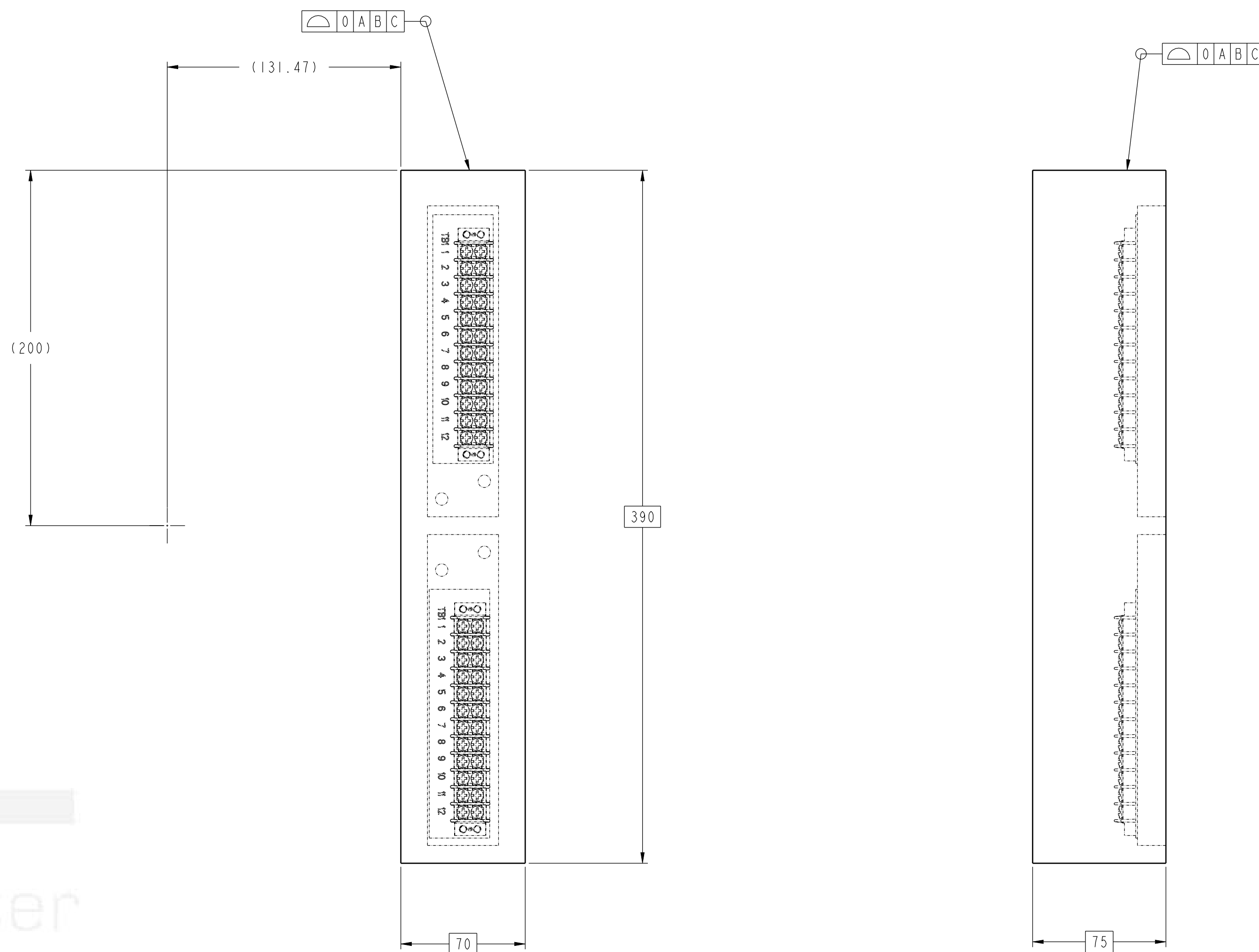
918 SEE MECHANICAL REQUIREMENTS DOCUMENT FOR PREFERRED INSULATION STYLE.

919 SEE MECHANICAL REQUIREMENTS DOCUMENT FOR MINIMUM BEND RADIUS OF CORRECTOR COIL LEADS.



UNLESS OTHERWISE SPECIFIED		PROJECT NAME		ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY		 	
DRAWING NO. 236.514 QG		ADVANCED LIGHT SOURCE		UNIVERSITY OF CALIFORNIA			
DIMENSIONS 0.001 ± 0.001 , $1 \times 10^{-4} \pm 0.5$ TOLERANCES ANGLES 0.001 MACH. SURFS. $3.2 \mu\text{m}$ $\sqrt{\text{ar}}$ better FINISHES THREADS ARE CLASS G or H DREAM DROPS 0.5 MACH ON MACHINED WORK DIMENSIONS: WELD SPALLER & LOOSE SCALE		DRAWING UNIT MM-KG-KS EG-1000-0923 SCALE $1:2$ 		DRAWING NOTES DIM-KG-KS EG-1000-0923 SCALE $1:2$ 		ALS-U - BOOSTER TO ACCUMULATOR TRANSFER LINE MAGNETS - GENERAL TODD-A MAGNET ASSY	
SHEET NO. 1		SHEET 1		CATEGORY CODE		LIFECYCLE STATE	
E 9 OF 10				AL7210		Released	
						ITEM NUMBER	
						AL-1430-5205	
						REV	

CORRECTOR COIL TERMINAL BLOCKS SPACECLAIM INTERFACE

[illegible]