





REV.	DATE	DESCRIPTION	DRN. BY	CHD. BY	APPD. BY
00	1-SEP-2017	1 ST ISSUE	D.K	F.O	N.N
01	6-OCT-2017	Revised as per comments.	F.O	N.N	N.N
02	17-Nov-2017	Revised as per comments.	K.K	T.F	N.N
03	17-Dec-2017	Revised as per comments.	F.O	N.N	N.N

2

Tag number:

Unit 1 - 01PGA03AP101, 01PGA03AP102

Unit 2 - 02PGA03AP101, 02PGA03AP102









CLIENT			
CLIENT'S ENGINEER			
EPC CONTRACTOR			
PROJECT	OLKARIA V GEOTHERMAL POWER DEVELOPMENT PROJECT (2 x 70MW)		
PACKAGE	AUXILIARY COOLING WATER PUMP		
VENDOR	 DMW SERIAL NO. 1111054		
DOCUMENT TITLE	PUMP DATASHEET		
DOC. NO. :	13-BB1T101-00005X		









a)Pre-designed Data by MHPS-IND

(Seller has to fill the required details & submit the same along with the bid document)

Symbol * = minimum information to be filled-in by customer,


Symbol *1 = to be offered by Seller

1. <u>Specification/Data sheet of Cooling water Pump.</u>			To be supplied	NO. OF PUMPS	2 x 100% Per units
				Total no of Pumps	4 Nos
			Not to be supplied	INSTALLATION	INDOOR/OUTDOOR
ITEM		MHPS-IND REQUIREMENTS	SPECIFICATION		REMARKS
Type *		■ Horizontal split casing centrifugal Pumps	Horizontal split casing centrifugal Pumps		
Drive *		■ Motor	Motor		
Model No		*1	NDF-SE-M		
Fluid *	Temperature (deg C)	23	23(23) 		
	Maximum temperature (deg C)	60	60(60) 		
	Density (kg/m3)	997.5	997.5(997.5) 		
	Water quality	Condensate water (Geothermal Steam)	Condensate water (Geothermal Steam)		
*Capacity	Discharge (m3/h)	910(884)	910(884) 		
Total Head (m)		30(30.5)	30 (30.5) 		
NPSH(Available) (m)		10.28	10.28		
NPSH (Required) (m)		*1	3.6 (3.4) 		Should be less than 5.4m
Total shut of head (m)		*1	41.7 (139% of rated head)		Less than 125% rated head
Pump Static efficiency		*1			
Pump overall efficiency		*1	84 %(84%) 		Shall be not less than 86%
Rotating speed (min-1)		*1	1488 (at rated load) 1485 (at full load) 		
Shaft seal		Mechanical seal(Cartridge type)	Mech. Seal(Cartridge type)		
Pump shaft power (BKW)		*1	89 kW(88kW)		
Critical Speed		*1	285% of rated speed		More than 125% of rated speed
Casing design pressure		*1	7 barg (Max. suction Pressure is 0.3 barg)		1.5 times of Shutoff pressure
Hydro test pressure		*1	10.5 barg		1.5 times of design pressure
No of impeller		Single	Single		
Rotating direction		*1	CW view from pump DE		
Starting Torque Nm & Moment of Inertia Kgm2(*A):		*1	Please refer Torque curve		
* Coupling		Spacer type coupling	Spacer type coupling		
Bearing					
Type of bearing		*1	Anti-friction		

	Direction / force (Maximum) KN	*1	Both direction / 0.6kN	
	Pump Material			
*	Casing	SUS316L or equivalent	ASTM A743 CF3M 	
*	Impeller	SUS316L or equivalent	ASTM A743 CF3M 	
*	Shaft	SUS316L or equivalent	ASTM A276 316L 	
*	Shaft Bearing	SUS316L or equivalent	N/A	
*	Base Plate	Steel	ASTM A36	
	Suction Nozzle (*B)	AISI 316 L Stainless steel or equivalent	ASTM A743 CF3M 	
	Discharge Nozzle (*B)	AISI 316 L Stainless steel or equivalent	ASTM A743 CF3M 	
	Motor			
	Type	TEFC	TEFC	
	Insulation Type	F	F	
	Limit of temperature raise	B	B	
	Capacity (kw)	110	110	
	Number of revolutions (rpm)	1500	1488 (at rated load)  1485 (at full load) 	Determined by vendor
	Voltage (v)	415	415	
	Motor efficiency	*1	95.4% 	Not less than 95%
	Utilities			
	Seal Cooling water requirement (l/min) & Temperature of water °C		N/A	
	Interface			
	Pump inlet (*B):			
	a) Flange standard	*1	ASME B16.5	
	b) Type of Flange	*1	#150 RF (Non-serration)	
	c) Size of Flange	*1	12 inch	
	Pump Outlet (*B):			
	a) Flange standard	*1	ASME B16.5	
	b) Type of Flange	*1	#150 RF (Non-serration)	
	c) Size of Flange	*1	10 inch	
	Seal water Inlet:			
	a) Flange standard	*1	N/A	
	b) Type of Flange	*1	N/A	
	c) Size of Flange	*1	N/A	
	Air Vent Pipe:		N/A	
	a) Flange standard	*1	ASME B16.5	
	b) Type of Flange	*1	#150 RF (Non-serration)	
	c) Size of Flange	*1	3/4 inch	
	Drain pipe			
	a) Flange standard	*1	N/A	Please drain water from discharge piping.
	b) Type of Flange	*1	N/A	
	c) Size of Flange	*1	N/A	

1	<input type="radio"/> CUSTOMER/SITE M/s KENGEN (KENYA)				REV.	DATE	PREP. BY	CHEC. BY	APP. BY
2	<input type="radio"/> PROJECT/UNIT OLKARIA V GEOTHERMAL POWER DEVELOPMENT PROJECT (2 x 70MW)				0	2017/9/1	D.K.	F.O.	N.N.
3	<input type="radio"/> PURCHASER M/s MHPS INDIA <input type="radio"/> WORK/JOB NO.				1	2017/10/6	F.O.	N.N.	N.N.
4	<input type="radio"/> TAG NO. 01PGA03AP101/102, 02PGA03AP101/102 <input type="radio"/> REQ./P.O.NO.				2	2017/11/17	K.K.	T.F.	N.N.
5	<input type="radio"/> SERVICE AUXILIARY COOLING WATER PUMP				3	2017/12/13	F.O.	N.N.	N.N.
6	<input type="radio"/> NO.REQUIRED (WORKING + STAND-BY) 4Nos (2x100%per Unit x 2)								
7	<input type="checkbox"/> MFR DMW COPORATION <input type="checkbox"/> MODEL NDF-SE-M <input type="checkbox"/> SERIAL NO. 1111054								
8	○ OPERATING CONDITIONS ()								
9									
10									
11	<input type="checkbox"/> AUTOMATIC START : ITEM NO.				<input type="checkbox"/> INTERMITTENT USE (START/DAY)		<input type="checkbox"/> PARALLEL RUNNING		
12	LIQUID Condensate water (Geothermal Steam) <input type="checkbox"/> HAZARDOUS				CAPACITY NOR. (m3/h)		RATED 910 (m3/h)		
13	CORR./ERO. BY H2S ENVIRONMENT <input type="checkbox"/> FLAMMABLE				OTHER				
14	PUMP.TEMP. NOR. 23 MIN. - MAX. 60 (Deg.C)				SUCT.PRESS.MIN/MAX./RA 0.3 /		barg		
15	SPEC.GRAV.@NOR.TEMP. 0.9975 MAX. -				DISCH.PRESS.		barg		
16	VAPOR PRESS. kg/cm2(a) @ (Deg.C)				DIFF.PRESS.		barg		
17	VISCOSITY (sct) @ (Deg.C)				DIFF.HEAD 30 (m)		NPSHA 10.28 (m)		
18	MELTING POINT (Deg.C)				LOCATION:AMB.TEMP 5 to 40 (Deg.C)		<input type="checkbox"/> INDOOR <input checked="" type="checkbox"/> OUTDOOR		
19					HAZARD.AREA CLASS				
20	CONSTRUCTION				MATERIALS				
21									
22	<input checked="" type="checkbox"/> PUMP TYPE <input type="checkbox"/> OTHER				<input type="checkbox"/> API CODE:				
23	<input type="checkbox"/> OH1 <input type="checkbox"/> OH2 <input type="checkbox"/> OH3 <input type="checkbox"/> OH4 <input type="checkbox"/> OH5 <input type="checkbox"/> OH6				<input checked="" type="checkbox"/> CASE A743 CF3M				
24	<input checked="" type="checkbox"/> BB1 <input type="checkbox"/> BB2 <input type="checkbox"/> BB3 <input type="checkbox"/> BB4 <input type="checkbox"/> BB5				<input checked="" type="checkbox"/> IMPELLER/INDUCER A743 CF3M				
25	<input type="checkbox"/> VS1 <input type="checkbox"/> VS2 <input type="checkbox"/> VS3 <input type="checkbox"/> VS4 <input type="checkbox"/> VS5 <input type="checkbox"/> VS6 <input type="checkbox"/> VS7				<input checked="" type="checkbox"/> WRG RING CASE/IMP. SS316L HARDENED / SS316L HARDENED				
26	<input type="checkbox"/> CASE TYPE <input checked="" type="checkbox"/> SINGLE-VOL. <input type="checkbox"/> DBL-VOL. <input type="checkbox"/> DIFFUSER				<input checked="" type="checkbox"/> SHAFT SS316L <input checked="" type="checkbox"/> SLEEVE SS316L				
27	<input checked="" type="checkbox"/> CASE JACKET <input type="checkbox"/> FULL <input type="checkbox"/> PARTIAL				<input checked="" type="checkbox"/> CASE GASKET NON-ASBESTOS <input checked="" type="checkbox"/> SHAFT TUBE -				
28	<input checked="" type="checkbox"/> NOZZLE SIZE TYPE/RATING FACE POSITION				<input checked="" type="checkbox"/> BRG HOUSING A216 WCB				
29	SUCTION 12" ASME / 150 RF SIDE				<input checked="" type="checkbox"/> CPLG GUARD ALUMINIUM				
30	DISCHARGE 10" ASME / 150 RF SIDE								
31									
32	<input checked="" type="checkbox"/> NO.OF STAGES ONE				<input type="checkbox"/> PERFORMANCE				
33	IMPELLER : <input checked="" type="checkbox"/> CLOSED <input type="checkbox"/> SEMI-OPEN <input type="checkbox"/> OPEN								
34	<input type="checkbox"/> SINGLE SUCT. <input checked="" type="checkbox"/> DBL SUCT. <input type="checkbox"/> W/INDUCER								
35	DIARATED (mm) MAX/MIN / (mm)				RPM Refer to Remarks 5 NPSH REQ'D 3.6 (m)				
36	<input checked="" type="checkbox"/> BRG RADIAL BALL NO. 6312				EFF. 84 (%) RATED POWER 89 (kW)				
37	THRUST BALL NO. 6312				MAX POWER @RATED IMP. 93 (kW)				
38	<input checked="" type="checkbox"/> LUBE <input type="checkbox"/> FLINGER <input type="checkbox"/> FLOOD <input type="checkbox"/> RING OIL <input type="checkbox"/> PRESS.				MIN.CONT.FLOW TH. 100 ST. 546 (m3/h)				
39	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> GREASE <input type="checkbox"/> PURE MIST <input type="checkbox"/> PURGE MIST				SUCT.SP.SPEED (min ⁻¹ .m3/min.m) 239				
40	POWER TRANSMISSION <input checked="" type="checkbox"/> DIRECT <input type="checkbox"/> GEAR <input type="checkbox"/>				SHUT-OFF HEAD @RATED IMP. 42 (m)				
41	<input checked="" type="checkbox"/> CPLG <input checked="" type="checkbox"/> FLEX.DISK <input type="checkbox"/> FLEX.FLG <input type="checkbox"/> GEAR <input type="checkbox"/> RIGID				MAX.DISCH.PRESS.@RATED IMP. 4.2 barg				
42	<input type="checkbox"/> (X) SPACER MFR/MODEL NO. REXNORD OR DIDO /				<input checked="" type="checkbox"/> MAX.ALLOW.WORK.PRESS. 7 barg 60 (Deg.C)				
43	<input type="checkbox"/> ROTATION VIEWED FROM CPLG END <input checked="" type="checkbox"/> CW <input type="checkbox"/> CCW				<input checked="" type="checkbox"/> HYDRO.TEST PRESS.CASE/JKT 10.5 barg				
44	<input type="checkbox"/> BASE PLATE <input checked="" type="checkbox"/> COMMON <input type="checkbox"/> SOLE <input type="checkbox"/> SEPARATE				<input checked="" type="checkbox"/> CASE PNEUM.TEST PRESS. - barg				
45	VERT.PUMP: <input type="checkbox"/> SUMP DEPTH - (m) <input checked="" type="checkbox"/> PUMP LENGTH - (m) <input checked="" type="checkbox"/> LINE SHAFT <input type="checkbox"/> OPEN <input type="checkbox"/> ENCLOSED								
46	<input checked="" type="checkbox"/> GUIDE BUSHING: MAT'L <input type="checkbox"/> LUBE <input type="checkbox"/> EXT.WATER <input type="checkbox"/> OIL <input type="checkbox"/> GREASE <input type="checkbox"/> PUMPAGE								
47	<input type="checkbox"/> PUMP THRUST RATED(UP/DOWN) - / - (N) <input type="checkbox"/> WITH SUCTION STRAINER								
48	<input checked="" type="checkbox"/> SHAFT SEAL <input type="checkbox"/> SEAL-LESS								
49	<input type="checkbox"/> PACKING :MFR MAT'L SIZE NO.OF RINGS								
50	<input checked="" type="checkbox"/> MECH.SEAL:MFR EBI API CODE - SIZE (SINGLE SEAL)								
51	MAT'L:FACES VS METAL ON-RING								
52	TYPE <input checked="" type="checkbox"/> SINGLE <input type="checkbox"/> DUAL UN-PRESS. <input type="checkbox"/> DUAL PRESS. <input type="checkbox"/> DOUBLE(BACK TO BACK)								
53	<input checked="" type="checkbox"/> CARTRIDGE <input type="checkbox"/> HOOK SLEEVE <input type="checkbox"/> INSIDE <input type="checkbox"/> OUTSIDE <input type="checkbox"/> ROTATING <input type="checkbox"/> STATIONARY								
54	<input type="checkbox"/> MULTIPLE SPRING <input type="checkbox"/> SINGLE SPRING <input type="checkbox"/> METAL BELLOWS <input type="checkbox"/> AUX.SEAL DEVICE								
55	<input checked="" type="checkbox"/> AUXILIARY PIPING <input type="checkbox"/> INLET CONDITION <input type="checkbox"/> FLOW <input checked="" type="checkbox"/> API <input checked="" type="checkbox"/> MAT'L <input checked="" type="checkbox"/> PURCHASER'S CONNECTIONS								
56	<input checked="" type="checkbox"/> SERVICE <input type="checkbox"/> FLUID (kPaG) (Deg.C) (m3/h) PLAN NO. (#0) SIZE TYPE/RATING FACE								
57	COOLING N/A								
58									
59	FLUSH (PRIM.) 31								
60	(AUX.)								
61	QUENCHING								
62									
63									
64	<input checked="" type="checkbox"/> PRESS.CASE CON'N <input checked="" type="checkbox"/> VENT WITH <input checked="" type="checkbox"/> VALVE <input type="checkbox"/> CAP <input type="checkbox"/> PLUG <input checked="" type="checkbox"/> FLANGE (SIZE 3/4 /RATING 150 /FACE RF)								
65	<input type="checkbox"/> (X) DRAIN WITH <input type="checkbox"/> VALVE <input type="checkbox"/> CAP <input checked="" type="checkbox"/> PLUG <input type="checkbox"/> FLANGE (SIZE /RATING /FACE)								
66	<input type="checkbox"/> MOTOR (ITEM NO.) <input checked="" type="checkbox"/> 4Nos (2x100%per Unit x 2)				<input type="checkbox"/> TURBINE (ITEM NO.) NO. (0 + 0)				
67	<input type="checkbox"/> PRVID.BY Vendor <input type="checkbox"/> MOUNT.BY DMW				<input type="checkbox"/> PROVID.BY <input type="checkbox"/> MOUNT.BY				
68	<input checked="" type="checkbox"/> MFR HHI <input checked="" type="checkbox"/> TYPE/ENCLOSURE TEFC/ IP55				<input checked="" type="checkbox"/> MFR <input type="checkbox"/> TYPE				
69	<input type="checkbox"/> RATED OUTPUT 110 (kW) POLES 4				<input type="checkbox"/> RATED OUTPUT (kW) <input type="checkbox"/> min ⁻¹				
70	<input type="checkbox"/> PHASE 3 <input type="checkbox"/> Hz 50 <input type="checkbox"/> VOLT 415				<input checked="" type="checkbox"/> VERT.THRUST CAP (UP / DOWN) - / - (N)				
71	<input checked="" type="checkbox"/> VERT.THRUST CAP. (UP / DOWN) - / - (N)				<input type="checkbox"/> CODES / STANDARD / ENG.SPEC				
72	REMARKS 1. Carbon steel material used in the pump are painted as per the MHPS painting specification for H2S environment.								
73	2. i. Vibration limit for the pump: As per ISO 10816-7 Category-1 Zone-A								
74	ii. Noise limit for the pump: 85dB(A) at site.								
75	3. Suction Specific speed: 1609 min⁻¹.m3/min.m								
76	4. Instruments provided for the Pump : RTD & Temperature Transmitter								
77	5. Rotating speed: 1488rpm at rated load / 1485rpm at full load								
78	<input type="checkbox"/> Casing Design Press. 7 barg								
79	<input type="checkbox"/> Casing Design Temp. 60 (Deg.C)								

NOTE: ☐ INDICATES INFORMATION COMPLETED BY PURCHASER ☐ BY MANUFACTURE ☒ BY MANUFACTURE OR PURCHASER
FLANGE RATING : Lb or K SIZE : inch (#0) MATERIAL : P(PIPING) T(TUBING) CS(C.STL) SS(S.STL) CU(COPPER) or ACTUAL MAT'L
(X) : INQUIRED or APPLIED (*) : VENDOR'S CHOICE (#) : REMARKED (R) : IF REQUIRED

NOZZLE LOADINGS				
		SUC.	DIS.	
FORCES (N)	F _X	± 6670	± 5340	
	F _Y	± 8000	± 6670	
	F _Z	± 5340	± 4450	
	F _R	± 11700	± 9630	
MOMENTS (N·m)	M _x	± 6100	± 5020	
	M _y	± 2980	± 2440	
	M _z	± 4610	± 3800	
	M _r	± 8210	± 6750	

REVISIONS					
NO.	DESCRIPTION	DATE	APPD. BY	CHD. BY	DRN. BY
1	Revised as per comments	29/09/2017	N. N	F. O	D. K
2	Revised Motor detail	25/10/2017	N. N	F. O	K. K
3	Revised as per comments	21/11/2017	N. N	Y. I	K. K

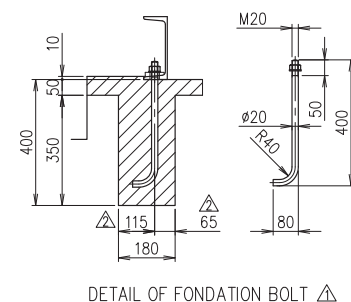
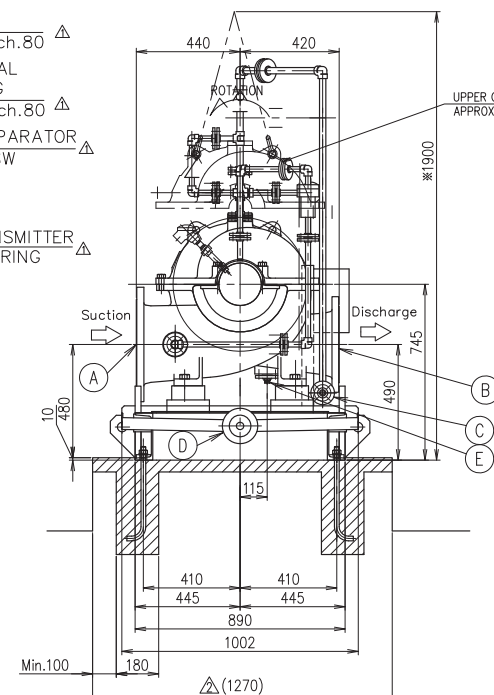
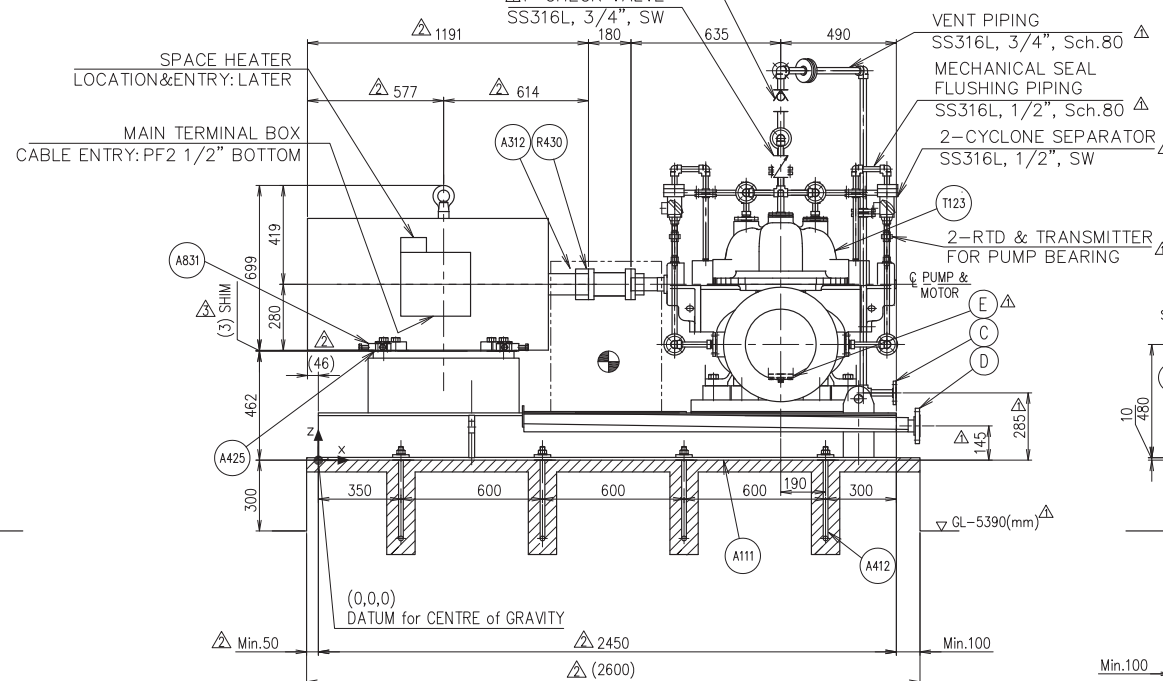
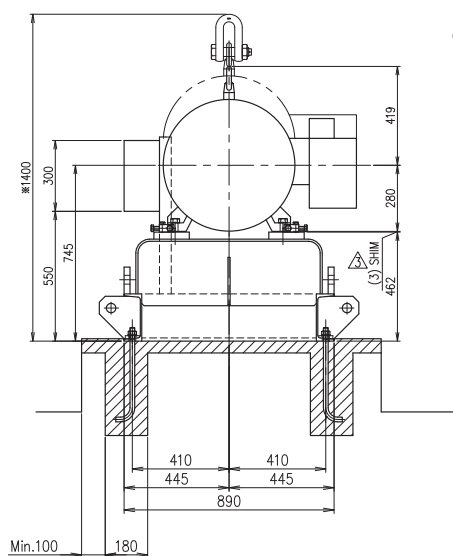
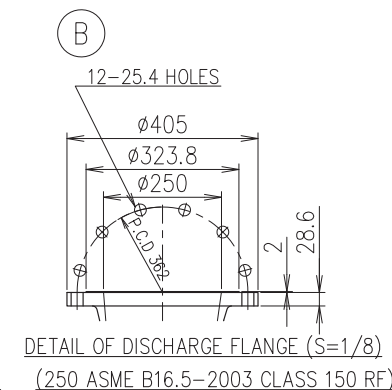
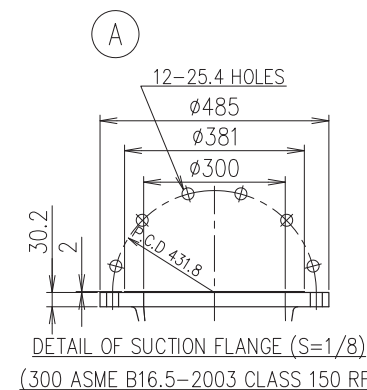
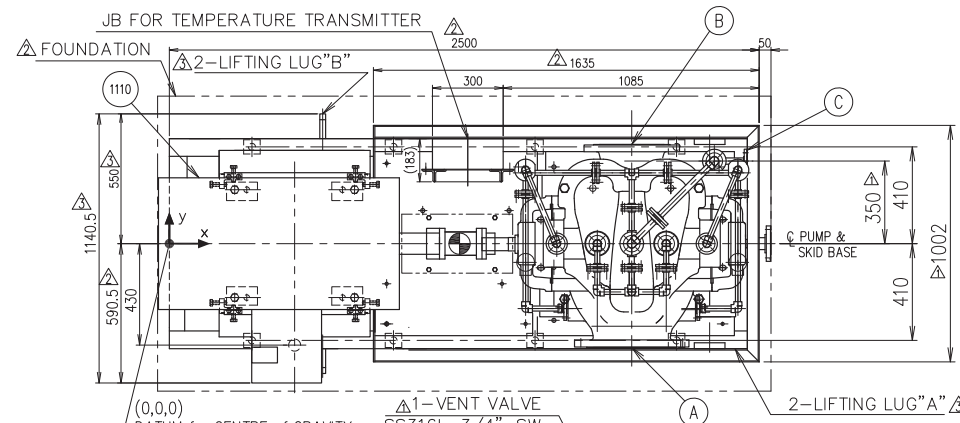
NO.	CONNECTION	MATERIAL	Quantity	SIZE & RATING
A	PUMP SUCTION	A743 CF3M or Equiv.	2x100% /Unit x 2 Units = Total 4 Nos	12" ASME #150 RF
B	PUMP DISCHARGE	A743 CF3M or Equiv.	2x100% /Unit x 2 Units = Total 4 Nos	10" ASME #150 RF
C	CASING VENT	A182 316L	2x100% /Unit x 2 Units = Total 4 Nos	3/4" ASME #150 RF
D	SKID BASE DRAIN	A105	2x100% /Unit x 2 Units = Total 4 Nos	2" ASME #150 RF
E	CASING DRAIN	A182 316L	2x100% /Unit x 2 Units = Total 4 Nos	PT3/4", PLUGED


RF: RAISED FACE
(Non-serration)

APPROX. MASSES (kg)		
	DRY	WET
PUMP	700	880
BASEPLATE	800	800
MOTOR	840	840
AUX. PARTS	100	150
TOTAL	2440	2670

LOADING DATA	
STATIC LOAD	2670 kg
DYNAMIC LOAD	534 kg
OPERATING LOAD	3204 kg

CENTRE of GRAVITY POINT		
	DRY	WET
x	1240	1290
y	0	0
z	485	490




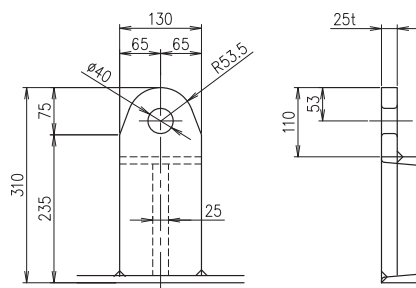
PUMP SPECIFICATION 		
	Duty Point	Design Point
TOTALHEAD (m)	30.5	30
FLOW (m ³ /H)	884	910

REMARKS

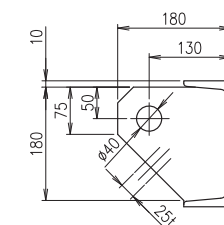
1. DIMENSION MARKED "※" SHOWS FOR MAINTENANCE.
(USE THE SUITABLE HANGER CHAINS FOR SAFETY.)
- △ 2. THE SKID BASE AND PUMP SHOULD BE INSTALLED WITHIN THE FOLLOWING TOLERANCE.
- THE RANGE VALUE: ±0.5mm
- THE STANDARD HORIZONTALITY: 5/100 mm per meter.
- △ 3. GL=EL+207000(mm)

符号 NO.	部品名称 PART NAME	材料 MATERIAL	△ 数量 QUANTITY	備考 REMARKS
T123	PUMP		2x100% /Unit x 2 Units = Total 4 Nos	300x250 NDF-SE
1110	MOTOR		2x100% /Unit x 2 Units = Total 4 Nos	△ 110KW x 415V x 4P
R430	COUPLING		2x100% /Unit x 2 Units = Total 4 Nos	△ SPACER TYPE COUPLING
A111	SKID BASE	A36	2x100% /Unit x 2 Units = Total 4 Nos	
A312	COUPLING GUARD	ALUMINIUM	2x100% /Unit x 2 Units = Total 4 Nos	
A412	△ FOUNDATION BOLTS	STAINLESSSTEEL	16x100% /Unit x 2 Units = Total 32 Nos	
A425	SHIMS	A240 304	2x100% /Unit x 2 Units = Total 4 sets	
AB31	ALIGNMENT PIECES	A36	8x100% /Unit x 2 Units = Total 16 sets	

 Tag No.:
 Unit 1 – 01PGA03AP101, 01PGA03AP102
 Unit 2 – 02PGA03AP101, 02PGA03AP102



3 DETAIL OF LIFTING LUG "A"



△ DETAIL OF LIFTING LUG "B"

DMW Serial No. 1111054

	ORDER
	ITEM
	SECTION
	DRAWN D. Kobayashi
CONFERRED	CHECKED F. Oba
	APPROVED N. Nakatani
	ISSUED 23, Aug. 2011
	Hydraulic Machinery Design Department





<p>EMPLOYER</p>  <p>KenGen Energy for the nation</p>	<p>ENGINEER</p>  <p>SGC SOUTH AFRICAN POWER</p>	
<p>CONTRACTOR</p>  <p>Mitsubishi Corporation</p>	 <p>MITSUBISHI HITACHI POWER SYSTEMS</p>	 <p>H YOUNG & CO. (EAST AFRICA) LTD</p>
<p>140MW Olkaria V GPPP Lot – II</p>		
<p>ACWP – EQUIPMENT GENERAL ARRANGEMENT DRAWING WITH FOUNDATION ARRANGEMENT DRAWING, TERMINAL POINTS & NOZZLE LOADING</p>		
<p>SCALE  1:16</p>	<p>DRAWING NO. 13-BB1122-00005X</p>	<p>REV. NO 3</p>
<p>VENDEDOR</p>	<p>株式会社 電業社機械製作所</p>	
	<p>PMW CORPORATION</p>	

REV.	DATE	DESCRIPTION	DRN. BY	CHD. BY	APPD. BY
00	12-OCT-17	1 ST ISSUE	F.O	N.N	N.N
01	24-NOV-17	REVISED AS PER COMMENTS	K.K	F.O	N.N

Tag number:

Unit 1 - 01PGA03AP101, 01PGA03AP102

Unit 2 - 02PGA03AP101, 02PGA03AP102

CLIENT			
CLIENT'S ENGINEER			
EPC CONTRACTOR			
PROJECT	OLKARIA V GEOTHERMAL POWER DEVELOPMENT PROJECT (2 x 70MW)		
PACKAGE	AUXILIARY COOLING WATER PUMP		
VENDOR	 DMW SERIAL NO. 1111054		
DOCUMENT TITLE	ACWP - Pump Cross Sectional Drawing with BOM		
DOC. NO. :	13-BB1T123-00004X		

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REVISIONS				
NO.	DESCRIPTION	DATE	APPD. BY	CHD. BY
1	Revised as per comments	24/11/2017	N.N	F.O
			K.K	

A

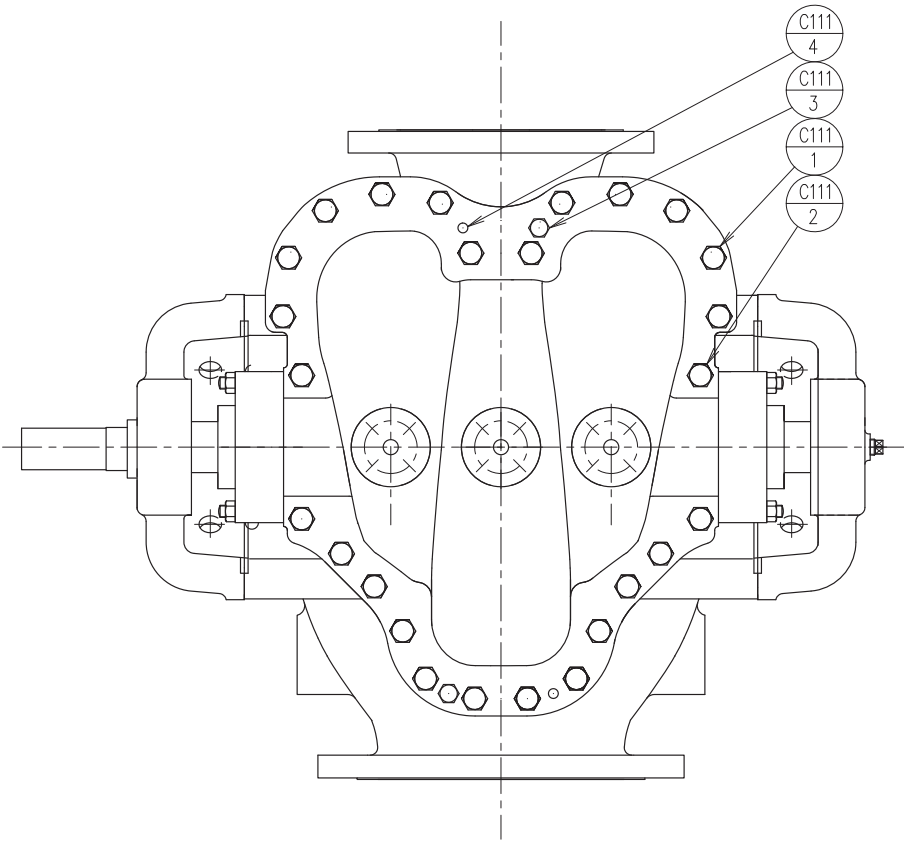
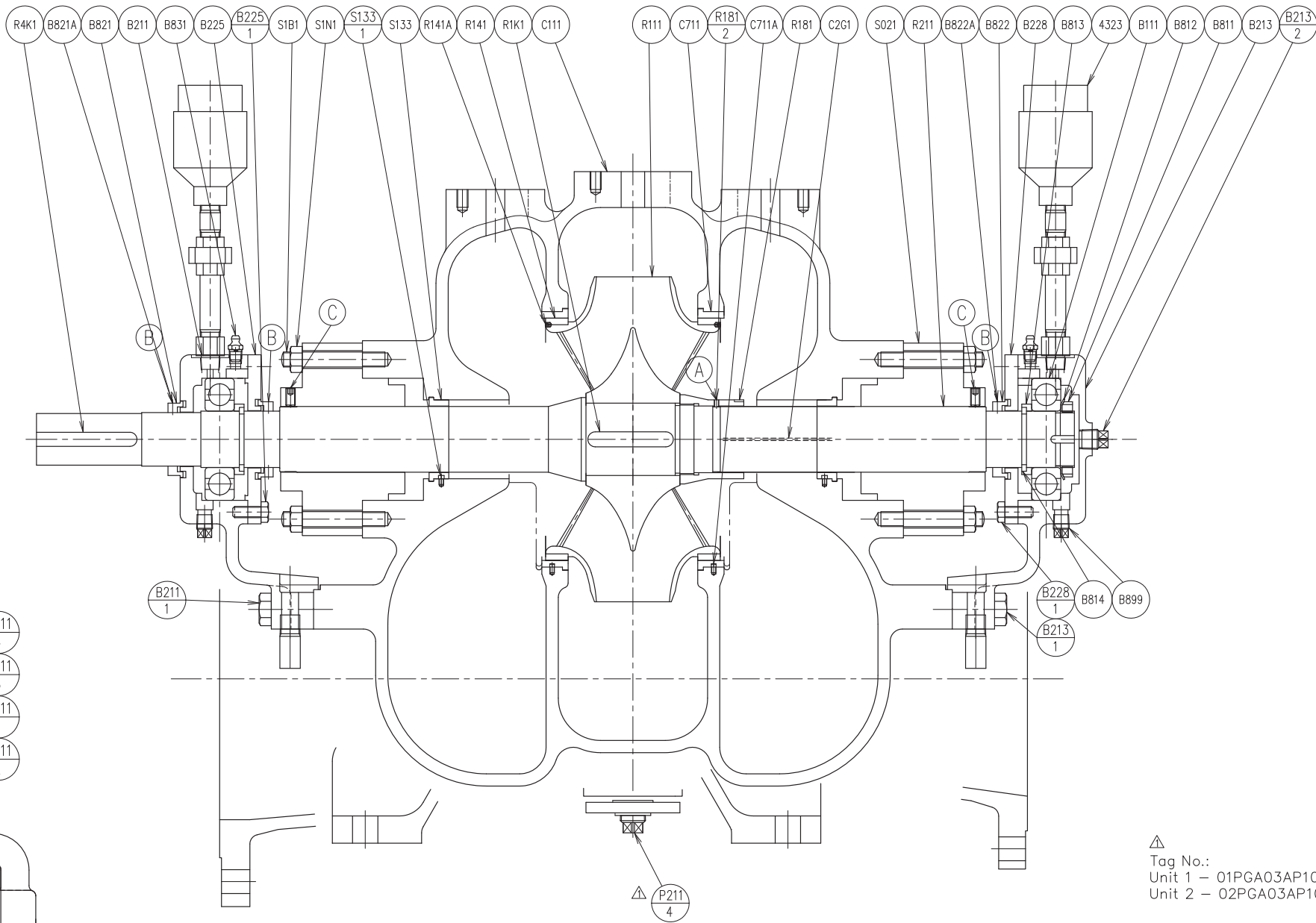
B

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D

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F



NOTE
1. Apply the agents to prevent screw from loosening, (A), (B) & (C). (Lock Tite#242)
(A) Impeller Nut Screw
(B) Deflector Screw
(C) Set Ring for Shaft Sleeve





DMW Serial No. 1111054

△
Tag No.:
Unit 1 - 01PGA03AP101, 01PGA03AP102
Unit 2 - 02PGA03AP101, 02PGA03AP102

ORDER	
ITEM	
SECTION	
DRAWN	F.Oba
CONFERRED	CHECKED N. Nakatani
	APPROVED N. Nakatani
	ISSUED 12. OCT. 2017
	Hydraulic Machinery Design Department

EMPLOYER	ENGINEER	
		
CONTRACTOR		
		
140MW Olkaria V GPPP Lot- II		
△ ACWP - Pump Cross Sectional Drawing WITH BOM		
SCALE 1:3	DRAWING NO. 13-BB17132-00004X	REV. NO 1 SHEET NO 1/1
		

BILL OF MATERIAL

PART No.	PART NAME	MATERIAL	QT'Y / UNIT	REMARKS
		ASTM		
R111	IMPELLER	A743 CF3M	1	
R141	IMPELLER WEAR RING	A276 316L	2	
R141A	HEXAGON SOCKET SET SCREW	S.S.316L	6	
R181	IMPELLER NUT	A276 316L	1	
R181-2	HEXAGON SOCKET SET SCREW	S.S.316L	2	
R211	SHAFT	A276 316L	1	
R1K1	IMPELLER KEY	A276 316L	1	16x10x75L 
R4K1	COUPLING KEY	A576 Gr1045	1	15x10x99.5L 
C111	CASING	A743 CF3M	1	Upper Side & Lower Side
C111-1	HEXAGON HEAD BOLT	S.S.304	22	
C111-2	HEXAGON HEAD BOLT	S.S.304	4	
C111-3	HEXAGON HEAD BOLT	S.S.304	2	For Jack Screw
C111-4	TAPER DOWEL PIN WITH NUT	S.S.304	2	
C2G1	CASING GASKET	NON-ASBESTOS	1	Aramid fiber with NBR binder
C711	CASING WEAR RING	A276 316L	2	
C711A	HEXAGON SOCKET SCREW	S.S.316L	2	
S021	MECHANICAL SEAL	MFR. STD.	1set	1set=DE+NDE
S1B1	MECHA. SEAL STUD	A193, B8M	1set	
S1N1	NUT FOR MECH. SEAL STUD	A194, B8M	1set	
S133	THROAT BUSHING	A276 316L	2	
S133-1	HEXAGON SOCKET SCREW	S.S.316L	2	
B111	BEARING	—	2	#6312
B211	RADIAL BEARING HOUSING	A216 WCB	1	
B211-1	HEXAGON HEAD BOLT	A283 Gr.C	4	
B213	THRUST BEARING HOUSING	A216 WCB	1	
B213-1	HEXAGON HEAD BOLT	A283 Gr.C	4	
B213-2	PLUG	S.S.304	1	
B225	BEARING COVER (RADIAL)	A36	1	
B225-1	HEXAGON HEAD BOLT	A283 Gr.C	4	
B228	BEARING COVER (THRUST)	A36	1	
B228-1	HEXAGON HEAD BOLT	A283 Gr.C	4	
B811	BEARING LOCK NUT	A283 Gr.C	1	AN12
B812	BEARING LOCK WASHER	A109	1	AW12
B813	BEARING COLLAR	A576 Gr1045	2	
B814	SPLIT RING FOR BEARING COLLER	A576 Gr1045	2	
B821	DEFLECTOR	A240 304	1	
B821A	HEXAGON SOCKET SET SCREW	S.S.304	2	
B822	DEFLECTOR	A240 304	2	
B821B	HEXAGON SOCKET SET SCREW	S.S.304	4	
B831	GREASE NIPPLE	S.S.304	2	
B899	PLUG	S.S.304	2	For Grease Drain
4323	RESISTANCE TEMPERATURE DETECTORS	MFR. STD.	2	
P211-4	PLUG	S.S.316L	1	

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PER PUMP ③

NO.	CONNECTION	MATERIAL	Q'TY	SIZE & RATING
A	PUMP SUCTION	A743 CF3M or Equiv.	1	12" ASME #150 RF
B	PUMP DISCHARGE	A743 CF3M or Equiv.	1	10" ASME #150 RF
C	CASING VENT	A182 316L	1	3/4" ASME #150 RF
D	SKID BASE DRAIN	A105	1	2" ASME #150 RF
E	CASING DRAIN ①	SS316L	1	PT3/4", PLUGED ①

RF: RAISED FACE
(Non-serration)

②
Tag No.:
Unit 1 - 01PGA03AP101, 01PGA03AP102
Unit 2 - 02PGA03AP101, 02PGA03AP102

① PUMP SPECIFICATION		
	DUTY POINT	DESIGN POINT
TOTAL HEAD (m)	30.5	30
FLOW (m ³ /H)	884	910
SPEED (min-1)	SS1500	SS1500
EFFICIENRY (%)	84	84

② Total No. of Pumps : 4

MHPS-I SCOPE DMW SCOPE

① DETAILS

PART	DETAILS
VENT PIPING	SS316L, 3/4", Sch.80
FLUSHING PIPING	SS316L, 1/2", Sch.80
FLANGES	SS316L, SW, ASME #150, RF
VENT VALVE	SS316L, 3/4", Class 150-800Lbs, SW
CHECK VALVE	SS316L, 1/2", Class 150-800Lbs, SW
CYCLONE SEPARATOR	SS316L, 1/2", SW

NO.	TAG NO.				REMARKS
	UNIT-1		UNIT-2		
	Pump-A	Pump-B	Pump-C	Pump-D	
TE1	01PGA03CT001	01PGA03CT003	02PGA03CT001	02PGA03CT003	RTD for Pump Radial BRG (DE)
TE2	③ 01PGA03CT002	③ 01PGA03CT004	③ 02PGA03CT002	③ 02PGA03CT004	RTD for Pump Thrust BRG (NDE)
TT1	③ 01PGA03CT131	③ 01PGA03CT133	③ 02PGA03CT131	③ 02PGA03CT133	TT for Pump Radial BRG (DE)
TT2	01PGA03CT132	01PGA03CT134	02PGA03CT132	02PGA03CT134	TT for Pump Thrust BRG (NDE)
JB1	01PGA03GH101	01PGA03GH102	02PGA03GH101	02PGA03GH102	Junction Box for Temp. Transmitter
	01PGA03AP101-M01	01PGA03AP102-M02	02PGA03AP101-M01	02PGA03AP102-M02	Motor
	01PGA03AT151	01PGA03AT152	02PGA03AP151	02PGA03AP152	Cyclone Separator(DE) ④
	④ 01PGA03AT153	④ 01PGA03AT154	④ 02PGA03AP153	④ 02PGA03AP154	Cyclone Separator(NDE) ④
	01PGA03AA991	01PGA03AA993	02PGA03AA991	02PGA03AA993	Check Valves
	01PGA03AA992	01PGA03AA994	02PGA03AA992	02PGA03AA994	Vent Valves

LEGEND

- Process Line
- Electrical Line
- Signal Line ②
- Check Valve
- Flange
- CYCLONE SEPARATOR
- RTD
- TEMPERATURE TRANSMITTER
- AUTOMATIC AIR VENT VALVE
- PLUG


NO.	DESCRIPTION	DATE	APPROVED	CHECKED	DRAWN
4	Revised as per customer's comment	5/Jan/2018	N. N	N. N	F. O
3	Revised as per customer's comment	30/Nov/2017	N. N	N. N	F. O
2	Revised as per customer's comment	16/Nov/2017	N. N	Y. I	K. K
1	Revised as per customer's comment	29/Sep/2017	N. N	N. N	F. O
0	FOR APPROVALS	04/Sep/2017	-	-	-

REVISIONS


DMW Serial No. 1111054

ORDER	
ITEM	
SECTION	
DRAWN	D. Kobayashi
CHECKED	F. Oba
APPROVED	N. Nakatani
ISSUED	4. Sep. 2017
Hydraulic Machinery Design Department	


EMPLOYER



KenGen
Energy for the nation


ENGINEER


SGC
GEOTHERMAL POWER

CONTRACTOR


Mitsubishi Corporation



MITSUBISHI HITACHI POWER SYSTEMS


H YOUNG & CO. (EAST AFRICA) LTD.

140MW Olkaria V GPPP Lot- II

PIPING AND INSTRUMENTATION DIAGRAM FOR AUXILIARY COOLING WATER PUMP


SCALE



DRAWING NO.
13-BB1T139-00002X

REV. NO
4

SHEET NO
1/1


DMW CORPORATION