



- Legend**
- Propylene-Glycol Loop
 - Control Input Signals
 - Multi-Input Signals
 - Control Output Signals
 - Multi-Output Signals
 - AC Power Line
 - Spar Array Equipment
 - Air Cooling System

- AAV Automatic Air Vent
- ACC Accumulator
- CF In-Line Forced Air Fan
- FS Flow Switch
- FV Flange Valve
- MX Mixing Valve
- P Pump
- PG Pressure Gauge
- PS Pressure Switch
- RV Relief Valve
- S Strainer
- TS Temperature Sensor
- TSw Temperature Switch

- Accumulator
- Pressure Switch
- Relief Valve
- Pressure Gauge
- Temperature Switch
- Temperature Sensor
- Centrifugal Fan
- Ball Valve
- Drain Valve
- Automatic Air Vent
- Pump
- Strainer
- Flow Switch
- Union
- Temperature Inputs
- Rotary Fluid Joint
- Motorized Valve
- Check Valve

Sub-Array Designations
Sunward End

3	2
4	1

Sample only. Subject to change.

DRAWING NOTES:

10 Feb 09 1p Revised to reflect mast design, vent and PRV locations. to
 16 Dec 08 0p Added: V116, V117, MV101, CHKV101, Flexible Link.
 Changed: V111, V112, V141, V142 To FV.
 Removed: V106, V107
 29 Oct 08 0p Preliminary Release

DESIGNER: T. Graham DATE: 2008-10-30
 DRAFT APPR. ENC. APPR. CUST. APPR.

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES.

DECIMAL TOLERANCE	ANGLES	SURFACE
+/- .005	+/- .005	57

OWNER: MENOVA ENERGY
 PROJECT: PS-140 PV-T Array

Menova energy inc.
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SIZE: D	RFP-80122	REV:
SCALE: NTS	SHEET 1	of 2



DRAWING NOTES:

Glycol Loop Part Designations

AAV121	Quadrant 2 Automatic Air Vent	V101	Plumbing Board DHP Return Isolating Valve
AAV131	Quadrant 3 Automatic Air Vent	V102	Plumbing Board DHP Inlet Isolating Valve
ACC111	Quadrant 1 & 2 Accumulator	V103	Glycol Fill Flow-Splitting Valve
ACC141	Quadrant 3 & 4 Accumulator	V104	Glycol Fill / Drain Inlet Valve
CKV101	DHP Return Line Check Valve	V105	Glycol Fill / Drain Outlet Valve
FS111	Glycol Loop Flow Switch	V111	Mast Inlet Isolating Valve
FS141	Glycol Loop Flow Switch	V112	Mast Outlet Isolating Valve
FV111	P111 Inlet Flange Valve	V113	Mast Inlet Line Drain Valve
FV112	P111 Outlet Flange Valve	V114	Absorber Vent Valve
FV141	P141 Inlet Flange Valve	V115	Mast Outlet Line Drain Valve
FV142	P141 Outlet Flange Valve	V116	Sub-Array Connection Line Drain Valve
MV101	DHP Loop Motorized Valve	V117	Quadrant 1 & 2 ACC Isolating Valve
P111	Quadrant 1 & 2 Glycol Circulating Pump	V121	Mast Inlet Isolating Valve
P141	Quadrant 3 & 4 Glycol Circulating Pump	V122	Mast Outlet Isolating Valve
PG101	Pressure Gauge	V123	Mast Inlet Line Drain Valve
PS101	Low-Pressure Switch	V124	Absorber Vent Valve
RV101	Pressure Relief Valve	V125	Mast Outlet Line Drain Valve
S101	Glycol Loop Strainer	V131	Mast Inlet Isolating Valve
TS111	Spar Array InletTemperature	V132	Mast Outlet Isolating Valve
TS141	Spar Array InletTemperature	V133	Mast Inlet Line Drain Valve
TS112	Absorber Head 1 OutletTemperature	V134	Absorber Vent Valve
TS122	Absorber Head 2 OutletTemperature	V135	Mast Outlet Line Drain Valve
TS132	Absorber Head 3 OutletTemperature	V141	Mast Inlet Isolating Valve
TS142	Absorber Head 4 OutletTemperature	V142	Mast Outlet Isolating Valve
TSW111	Absorber 1a Temperature Switch	V143	Mast Inlet Line Drain Valve
TSW112	Absorber 1b Temperature Switch	V144	Absorber Vent Valve
TSW121	Absorber 2a Temperature Switch	V145	Mast Outlet Line Drain Valve
TSW122	Absorber 2b Temperature Switch	V146	Sub-Array Connection Line Drain Valve
TSW131	Absorber 3a Temperature Switch	V147	Quadrant 3 & 4 ACC Isolating Valve
TSW132	Absorber 3b Temperature Switch		
TSW141	Absorber 4a Temperature Switch		
TSW142	Absorber 4b Temperature Switch		

Piping and Hose Schedule

All Glycol piping Type L copper with expansion joints every 80ft.
 Pipe insulation for lines 1" and under to be 1" closed cell foam >100C rated. Insulation covered with 6 mil white PVC cladding.
 Pipe Supports are XXX type every 8 ft minimum.
 All flexible hose reinforced EPDM rubber rated at 200psi 85C minimum.
 Hose insulation for lines 1" and under to be 1" closed cell foam >100C rated. Insulation cover: Urethane coated 1050 ballistic nylon, resealable.

Glycol Schedule

All Glycol heat transfer fluid to be 50/50 solution of Propylene Glycol: Freezing Point -34C, Burst Point -70C, Maximum Operating Temperature 135C. Recochem RecoFreeze PG50 or equivalent.

Power-Spar Cooling Unit

Entering Glycol Temperature: 10C min, 80C max
 Leaving Glycol Temperature: 10C min 80C max, Normal 25C winter, 35C Summer
 Array-Cooling Mode
 Entering Air Temperature: -35C min, 45C max
 Leaving Air Temperature: 10C min 55C max
 Max Air Flow: 3000 cfm

10 Feb 09	1p	Revised to reflect mast design, vent and PRV locations. tg
28 Oct 08	0p	Preliminary Release - tg
DATE	REV	DESCRIPTION

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DESIGNER	T. Graham	DATE	2008-10-30
DRAFT APPR.		ENG. APPR.	
		CUST. APPR.	

MATERIAL		3RD ANGLE PROJ.	
FINISH			

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES			
DECIMAL TOLERANCE	ANGLES	SURFACE	
+/- .015	+/- .005	6.3	

OWNER: MENOVA ENERGY

PROJECT: PS140 PV-T Array

TITLE: PV-Thermal Array Cooling System

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SCALE	NTS	SHEET	2	OF	2
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