

8 7 6 5 4 3 2 1

D

C

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A

D

C

B

A



DRAWING NOTES:

10 Feb 09 1p Revised to reflect mast design, vent and PRV locations. to
 08Jan 09 0p Added Page 2 in
 18 Dec 08 0p Added V115, V116, V117, V133, V123, HX101, HX102, HX103, HX104, MV103, CK101. Flex hose Removed V106, V105 Changed V111, V112, V141, V142 To FV LH
 29 Oct 08 0p Preliminary Release

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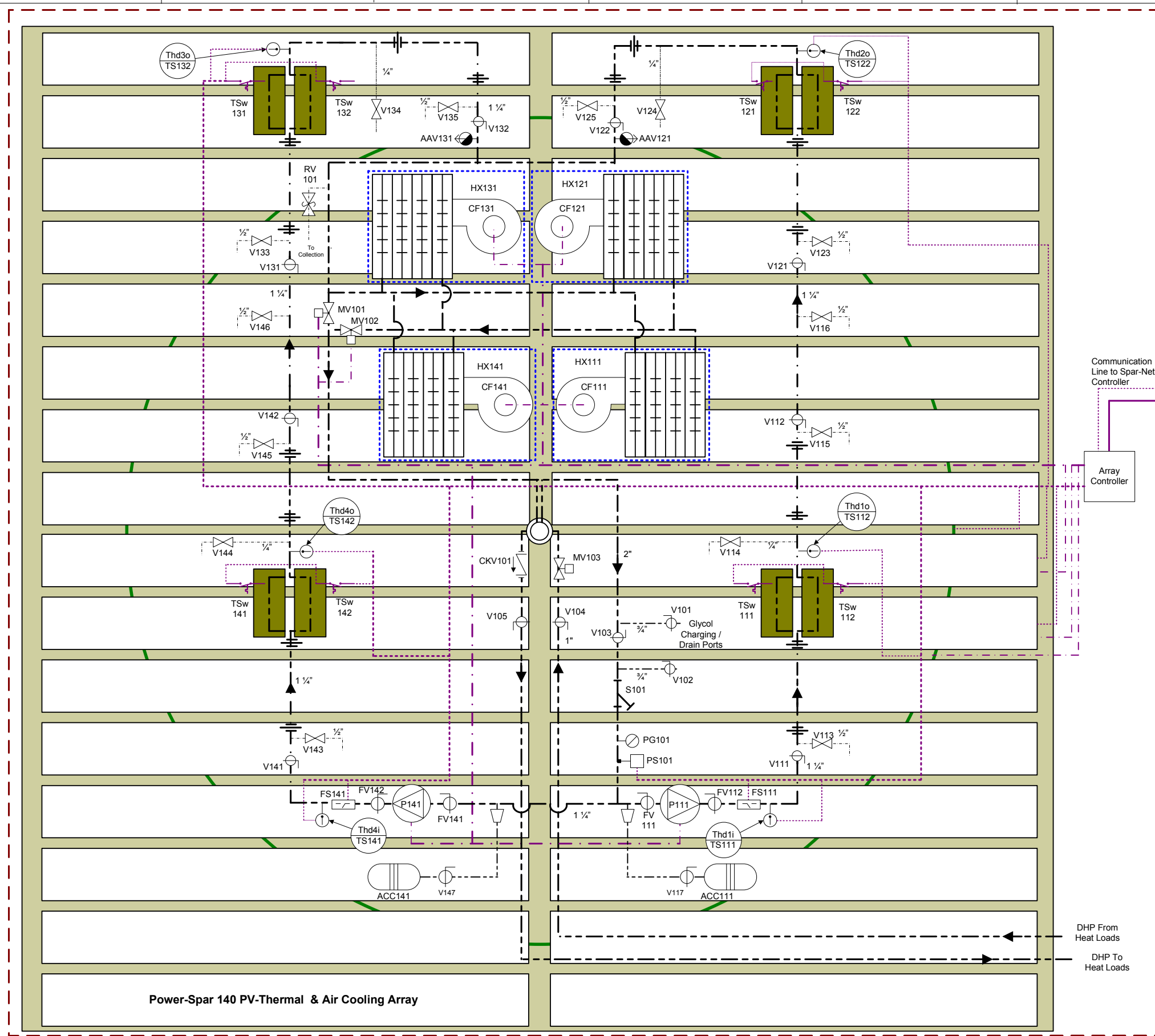
Legend

- 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.



Power-Spar 140 PV-Thermal & Air Cooling Array

DHP From Heat Loads
DHP To Heat Loads

Menova energy inc.
111 Walgreen Road,
Ottawa, Ontario, K0A 1L0
Tel. (613) 599-6232
Fax. (613) 599-2749
www.power-spar.com

SIZE	D	RFP-80124	REV	
SCALE	NTS	SHEET 1	OF	2

8 7 6 5 4 3 2 1

DRAWING NOTES:



Glycol Loop Part Designations

AAV121	Quadrant 2 Automatic Air Vent	TSW121	Absorber 2a Temperature Switch
AAV131	Quadrant 3 Automatic Air Vent	TSW122	Absorber 2b Temperature Switch
ACC111	Quadrant 1 & 2 Accumulator	TSW131	Absorber 3a Temperature Switch
ACC141	Quadrant 3 & 4 Accumulator	TSW132	Absorber 3b Temperature Switch
CF111	In-Line Forced Air Fan	TSW141	Absorber 4a Temperature Switch
CF121	In-Line Forced Air Fan	TSW142	Absorber 4b Temperature Switch
CF131	In-Line Forced Air Fan	V101	Plumbing Board DHP Return Isolating Valve
CF141	In-Line Forced Air Fan	V102	Plumbing Board DHP Inlet Isolating Valve
CKV101	DHP Return Line Check Valve	V103	Glycol Fill Flow-Splitting Valve
FS111	Glycol Loop Flow Switch	V104	Glycol Fill / Drain Inlet Valve
FS141	Glycol Loop Flow Switch	V105	Glycol Fill / Drain Outlet Valve
FV111	P111 Inlet Flange Valve	V111	Mast Inlet Isolating Valve
FV112	P111 Outlet Flange Valve	V112	Mast Outlet Isolating Valve
FV141	P141 Inlet Flange Valve	V113	Mast Inlet Line Drain Valve
FV142	P141 Outlet Flange Valve	V114	Absorber Vent Valve
HX111	Heat Exchanger	V115	Mast Outlet Line Drain Valve
HX121	Heat Exchanger	V116	Sub-Array Connection Line Drain Valve
HX131	Heat Exchanger	V117	Quadrant 1 & 2 ACC Isolating Valve
HX141	Heat Exchanger	V121	Mast Inlet Isolating Valve
MV101	DHP Loop Motorized Valve	V122	Mast Outlet Isolating Valve
P111	Quadrant 1 & 2 Glycol Circulating Pump	V123	Mast Inlet Line Drain Valve
P141	Quadrant 3 & 4 Glycol Circulating Pump	V124	Absorber Vent Valve
PG101	Pressure Gauge	V125	Mast Outlet Line Drain Valve
PS101	Low-Pressure Switch	V131	Mast Inlet Isolating Valve
RV101	Pressure Relief Valve	V132	Mast Outlet Isolating Valve
S101	Glycol Loop Strainer	V133	Mast Inlet Line Drain Valve
TS111	Spar Array InletTemperature	V134	Absorber Vent Valve
TS141	Spar Array InletTemperature	V135	Mast Outlet Line Drain Valve
TS112	Absorber Head 1 OutletTemperature	V141	Mast Inlet Isolating Valve
TS122	Absorber Head 2 OutletTemperature	V142	Mast Outlet Isolating Valve
TS132	Absorber Head 3 OutletTemperature	V143	Mast Inlet Line Drain Valve
TS142	Absorber Head 4 OutletTemperature	V144	Absorber Vent Valve
TSW111	Absorber 1a Temperature Switch	V145	Mast Outlet Line Drain Valve
TSW112	Absorber 1b Temperature Switch	V146	Sub-Array Connection Line Drain Valve
		V147	Quadrant 3 & 4 ACC Isolating Valve

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

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08Jan09 1 PRELIMINARY RELEASE

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08Jan09	1	PRELIMINARY RELEASE

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

MATERIAL	3RD ANGLE PROJ.

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES.

DECIMAL	TOLERANCE	ANGLES	SURFACE
.XX	±.005	XXX	XXX
+/-	+/-	+/-	+/-

OWNER: MENOVA ENERGY

PROJECT: PS-140 PV-T-AC

TITLE: PV-Thermal Air Cooled Array Cooling System

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SIZE	REV	
D	RFP- 80124	
SCALE	SHEET	OF
NTS	2	2