

Ground Source Heat Pump Monitoring (GSHP), Trewellard, Cornwall

Remote energy monitoring was installed on an EON Heatplant 3.5kWth GSHP in May 2008. The unit is housed within an outdoor enclosure, supplying heating and hot water to a ground floor flat owned by Penwith Housing Association. Improvements to the insulation of the property were part of the project.

The following table was taken from a web portal snapshot at 14:30 on Tuesday 14th September 2010.

			Low Setpoint	High Setpoint
Analogue Inputs				
[IN01]	Cond (LWT)	30.65 °C	-	-
[IN02]	Cond (EWT)	29.66 °C	-	-
[IN03]	Evap (EWT)	11.20 °C	-	-
[IN04]	Evap (LWT)	10.95 °C	-	-
[IN07]	HWS Cylinder Temp	48.45 °C	-	-
[IN08]	Room Temp	22.97 °C	-	-
[IN09]	Outdoor Temp	17.26 °C	-	-
Analogue Outputs				
[EXT001]	Frequency (Live)	50.0Hz	-	-
[EXT002]	Power Factor	1.00PF	-	-
[EXT003]	CT Ratio (KTA)	8	-	-
[EXT004]	Phase 1 Current	0.0A	-	-
[EXT007]	1-Phase kW Power	0.00kW	-	-
[EXT008]	1-Phase kVA Power	0.00kVA	-	-
[EXT009]	1-Phase kVA Power	0.00kVA	-	-
[EXT010]	Phase 1 Voltage	239.9V	-	-
[EXT013]	Electricity Meter kWh	5005.7kWh	-	-
[EXT014]	Reactive Energy	947.5kVArh	-	-
Digital Inputs				
[IN11]	Hot Water Demand	Off	-	-
[IN12]	Heating Demand	Off	-	-
Variables				
[VAR01]	Evap Water Meter Total Flow	5788610l	-	-
[VAR02]	Evap Water Meter HH Flow	230ltr/HH	-	-
[VAR04]	Cond Water Meter Total Flow	3575400l	-	-
[VAR05]	Cond Water Meter HH Flow	140ltr/HH	-	-
[VAR07]	HWS Water Meter Total Usage	50230l	-	-
[VAR08]	HWS Water Meter HH Usage	0ltr/HH	-	-
[VAR10]	Log Interval (Seconds)	0	-	-
[VAR11]	Special logging total time	0	-	-

The table illustrates that there are 7 temperatures being recorded and multiple electricity parameters to determine electrical usage and efficiency. Additionally, the controls are monitored to identify when the GSHP is delivering energy to the heating system or the hot water system. Evaporator and condenser loop temperatures and water flows are monitored allowing the heat pump consultant to perform detailed analysis to identify system efficiency. Temperature monitoring terms used are as follows.

1. EWT: Entering water temperature.
2. LWT: Leaving water temperature.

Access to the data is simple, using an email address and password supplied by t-mac Technologies, the developers and manufacturers and the information provided in the snapshot may be selected individually or collectively to produce chart or text reports; text can be exported to Excel for more detailed analysis.

The system has proved to be very efficient and the occupants have been extremely satisfied. They are able to set room and hot water temperatures to meet their individual needs/comfort levels and the running costs have matched expectations.

Energy analysis dashboards are available to undertake usage and cost analysis of all meters connected to the t-mac unit. These allow the following reports to be generated.

- kW Profile report
- kWh Profile report
- Cost report
- Night/day usage report
- Degree Days report
- Activity Groups report
- Grouped Data report
- Export Data report

An outdoor temperature sensor, if installed may be set up within the energy analysis dashboard to provide the local conditions for the degree day report. The table below is a sample of degree day data from this site. However, it must be stated that the sensor is not in the most exposed situation and therefore indicates less degree days than others in Cornwall which are available on the internet.

Date	Mean Temp	Degree Days
Jun-08	16	-9
Jul-08	17	-40
Aug-08	17	-33
Sep-08	15	29
Oct-08	12	104
Nov-08	10	157
Dec-08	8	231
Jan-09	7	257
Feb-09	8	221
Mar-09	9	202
Apr-09	11	143
May-09	13	73
Jun-09	17	-59
Jul-09	17	-50
Aug-09	17	-53
Sep-09	15	19
Oct-09	14	56
Nov-09	11	141
Dec-09	8	237
Jan-10	6	293
Feb-10	7	242
Mar-10	8	232
Apr-10	10	162
May-10	13	81
Jun-10	17	-47
Jul-10	18	-74