Preparing Data for Import into the Energy Charting and Metrics Tool

Introduction

The Energy Charting and Metrics Tool (ECAM) requires the data to be arranged in a certain format for analysis. This document takes two examples or raw data files from building automation systems and walks through the process of preparing the data for ECAM building re-tuning analysis. The first example highlights the case where no pre-processing of data is required, only changing the arrangement of the data before running ECAM. The second example highlights a case where pre-processing of data is required, and goes through the steps necessary before pre-processing the data with the Universal Translator (UT2).

Preparation of Data for Import into ECAM

Figure 1 below is a screenshot of raw data ("*.csv" file type opened in Excel) that was generated by a building automation system (BAS). This particular file is for an air handler (AHU) in a commercial building. As shown in Figure 1, there are two columns for the date and time, and 8 columns of additional data.

1	Key	Name:Suffix			Trend Definitions Used					
2	Point_1:	SA1CCV		COV	30 minutes					
3	Point_2:	SA1HCV		COV	30 minutes					
4	Point_3:	SA1MAD		COV						
5	Point_4:	SA1MAT		30 minutes						
6	Point_5:	SA1SF		COV						
7	Point_6:	SA1RAT		30 minutes						
8	Point_7:	SA1SAT		COV	30 minutes					
9	Point_8:	SA1SP		COV						
10	Time Interv:	15 Minutes								
11	Date Range:	12/8/2010 00:00:00 - 12/25/2010 23:59:59								
12	Report Timi	All Hours								
13										
14	<>Date	Time	Point_1	Point_2	Point_3	Point_4	Point_5	Point_6	Point_7	Point_8
15	12/23/2010	6:45:00	19	No Data	6.7	67.011	ON	70.04	63.82	1.38
16	12/23/2010	7:00:00	19	No Data	6.7	63.6615	ON	70.36	60.63	1.38
17	12/23/2010	7:15:00	19	No Data	6.7	63.6615	ON	70.36	60.63	1.38
18	12/23/2010	7:30:00	19	No Data	6.7	65.3415	ON	70.04	62.23	1.38
19	12/23/2010	7:45:00	19	No Data	6.7	65.3415	ON	70.04	62.23	1.38
20	12/23/2010	8:00:00	19	No Data	6.7	65.5095	ON	70.51	62.39	1.38
21	12/23/2010	8:15:00	19	No Data	6.7	65.5095	ON	70.51	62.39	1.38
22	12/23/2010	8:30:00	19	No Data	6.7	65.6775	ON	70.2	62.55	1.38
23	12/23/2010	8:45:00	19	No Data	6.7	65.6775	ON	70.2	62.55	1.38
24	12/23/2010	9:00:00	19	No Data	6.7	65.8455	ON	70.36	62.71	1.38
25	12/23/2010	9:15:00	19	No Data	6.7	65.8455	ON	70.36	62.71	1.38
26	12/23/2010	9:30:00	19	No Data	6.7	65.8455	ON	70.51	62.71	1.38
27	12/23/2010	9:45:00	19	No Data	6.7	65.8455	ON	70.51	62.71	1.38
28	12/23/2010	10:00:00	19	No Data	6.7	65.8455	ON	70.67	62.71	1.38
29	12/23/2010	10:15:00	19	No Data	6.7	65.8455	ON	70.67	62.71	1.38
30	12/23/2010	10:30:00	19	No Data	6.7	66.171	ON	70.67	63.02	1.38

Figure 1: Raw data from a BAS for an air handler.

Step 1: Cut and paste the point names and put them above the corresponding column of data, as seen in Figure 2 (point names are listed in rows 2 through 9).

Step 2: Delete all of the rows prior to the row where the date/time and point names exist. The first column in the spreadsheet must be the date or date/time (Figure 3).

Step 3: Clear all cells that have "no data" or "non-numeric" entries. If there are entire columns or rows of "no data," delete those as well (Figure 4).

Step 4: Re-name and save this file as a "*.csv" file-type.

1	Key	Name:Suffix		Trend Definitions Used						
2	Point_1:	SA1CCV		COV	30 minutes					
3	Point_2:	SA1HCV		COV	30 minutes					
4	Point_3:	SA1MAD		COV						
5	Point_4:	SA1MAT		30 minutes						
6	Point_5:	SA1SF		COV						
7	Point_6:	SA1RAT		30 minutes						
8	Point_7:	SA1SAT		COV	30 minutes					
9	Point_8:	SA1SP		COV						
10	Time Interv	15 Minutes								
11	Date Range:	12/8/2010 0:00:00 - 12/25/2010 23:59:59								
12	Report Timi	All Hours								
13										
14	<>Date	Time	SA1CCV	SA1HCV	SA1MAD	SA1MAT	SA1SF	SA1RAT	SA1SAT	SA1SP
15	12/23/2010	6:45:00	19	No Data	6.7	67.011	ON	70.04	63.82	1.38
16	12/23/2010	7:00:00	19	No Data	6.7	63.6615	ON	70.36	60.63	1.38
17	12/23/2010	7:15:00	19	No Data	6.7	63.6615	ON	70.36	60.63	1.38
18	12/23/2010	7:30:00	19	No Data	6.7	65.3415	ON	70.04	62.23	1.38
19	12/23/2010	7:45:00	19	No Data	6.7	65.3415	ON	70.04	62.23	1.38
20	12/23/2010	8:00:00	19	No Data	6.7	65.5095	ON	70.51	62.39	1.38
21	12/23/2010	8:15:00	19	No Data	6.7	65.5095	ON	70.51	62.39	1.38
22	12/23/2010	8:30:00	19	No Data	6.7	65.6775	ON	70.2	62.55	1.38

Figure 2: Screenshot of the raw data with point names above the corresponding columns.

1	<>Date	Time	SA1CCV	SA1HCV	SA1MAD	SA1MAT	SA1SF	SA1RAT	SA1SAT	SA1SP
2	12/23/2010	6:45:00	19	No Data	6.7	67.011	ON	70.04	63.82	1.38
3	12/23/2010	7:00:00	19	No Data	6.7	63.6615	ON	70.36	60.63	1.38
4	12/23/2010	7:15:00	19	No Data	6.7	63.6615	ON	70.36	60.63	1.38
5	12/23/2010	7:30:00	19	No Data	6.7	65.3415	ON	70.04	62.23	1.38
6	12/23/2010	7:45:00	19	No Data	6.7	65.3415	ON	70.04	62.23	1.38
7	12/23/2010	8:00:00	19	No Data	6.7	65.5095	ON	70.51	62.39	1.38
8	12/23/2010	8:15:00	19	No Data	6.7	65.5095	ON	70.51	62.39	1.38
9	12/23/2010	8:30:00	19	No Data	6.7	65.6775	ON	70.2	62.55	1.38
10	12/23/2010	8:45:00	19	No Data	6.7	65.6775	ON	70.2	62.55	1.38
11	12/23/2010	9:00:00	19	No Data	6.7	65.8455	ON	70.36	62.71	1.38
12	12/23/2010	9:15:00	19	No Data	6.7	65.8455	ON	70.36	62.71	1.38
13	12/23/2010	9:30:00	19	No Data	6.7	65.8455	ON	70.51	62.71	1.38

Figure 3: Screenshot of raw data with all rows above the data removed.

1	<>Date	Time	SA1CCV	SA1MAD	SA1MAT	SA1SF	SA1RAT	SA1SAT	SA1SP
2	12/23/2010	6:45:00	19	6.7	67.011	ON	70.04	63.82	1.38
3	12/23/2010	7:00:00	19	6.7	63.6615	ON	70.36	60.63	1.38
4	12/23/2010	7:15:00	19	6.7	63.6615	ON	70.36	60.63	1.38
5	12/23/2010	7:30:00	19	6.7	65.3415	ON	70.04	62.23	1.38
6	12/23/2010	7:45:00	19	6.7	65.3415	ON	70.04	62.23	1.38
7	12/23/2010	8:00:00	19	6.7	65.5095	ON	70.51	62.39	1.38
8	12/23/2010	8:15:00	19	6.7	65.5095	ON	70.51	62.39	1.38
9	12/23/2010	8:30:00	19	6.7	65.6775	ON	70.2	62.55	1.38
10	12/23/2010	8:45:00	19	6.7	65.6775	ON	70.2	62.55	1.38
11	12/23/2010	9:00:00	19	6.7	65.8455	ON	70.36	62.71	1.38
12	12/23/2010	9:15:00	19	6.7	65.8455	ON	70.36	62.71	1.38

Figure 4: Screenshot of raw data set after all rows and/or columns with "no data" have been removed.

After these four steps, this individual file is ready to be processed in ECAM. For this case, you can see that the heating coil column (SA1HCV in Figure 3) was completely removed because it never had data appear in the data file. This file is now ready to be processed using the ECAM tool.

The next example deals with a similar data set, except for only one particular sensor. In this case it is the cooling coil valve versus time for 11 different air handlers in a commercial building. By looking at the point names in rows 2 through 12, you can see that each point name has a different number but they all have ".CCV" at the end. This is an indicator that each point is a different cooling coil valve (CCV). For situations such as these, there isn't enough data to generate meaningful ECAM plots. To deal with this case, edit each file (where each file contains a different sensor) with the four steps listed above, and merge them together using the Universal Translator (UT2) tool. This is a free tool, and the link to the user guide can be found here <insert the right link here>.

1	Key	Name:Suffix	Trend Definitions Used									
2	Point_1:	745.FL10.ACS101.CCV	15 minutes									
3	Point_2:	745.FL10.ACS102.CCV	15 minutes									
4	Point_3:	745.FL10.ACS103.CCV	15 minutes									
5	Point_4:	745.FL10.ACS104.CCV	15 minutes									
6	Point_5:	745.FL10.ACS107.CCV	15 minutes									
7	Point_6:	745.FL22.ACS221.CCV	15 minutes									
8	Point_7:	745.FL22.ACS222.CCV	15 minutes									
9	Point_8:	745.FL22.ACS223.CCV	15 minutes									
10	Point_9:	745.FL22.ACS224.CCV	15 minutes									
11	Point_10:	745.FL22.ACS225.CCV	15 minutes									
12	Point_11:	745.FL22.ACS226.CCV	15 minutes									
13	Time Interv	15 Minutes										
14	Date Range:	10/1/2011 00:00:00 - 10/14/2011 23:59:59										
15	Report Timi	All Hours										
16												
17	<>Date	Time	Point_1	Point_2	Point_3	Point_4	Point_5	Point_6	Point_7	Point_8	Point_9	Point_10	Point_11
18	10/1/2011	0:00:00	0	No Data	No Data	No Data	50.87	0	20.13	0	No Data	0	No Data
19	10/1/2011	0:15:00	0	No Data	No Data	No Data	55.29	0	0	17.26	No Data	15.54	No Data
20	10/1/2011	0:30:00	0	No Data	No Data	No Data	51.52	0	0	0	No Data	20.76	No Data
21	10/1/2011	0:45:00	0	No Data	No Data	No Data	52.68	0	0	0	No Data	24.98	No Data
22	10/1/2011	1:00:00	0	No Data	No Data	No Data	53.21	0	0	0	No Data	25.93	No Data
23	10/1/2011	1:15:00	0	No Data	No Data	No Data	50.61	0	0	0	No Data	20.86	No Data
24	10/1/2011	1:30:00	0	No Data	No Data	No Data	56.4	0	0	0	No Data	25.94	No Data
25	10/1/2011	1:45:00	0	No Data	No Data	No Data	50.92	0	0	0	No Data	12.54	No Data
26	10/1/2011	2:00:00	0	No Data	No Data	No Data	52.12	0	0	0	No Data	14.67	No Data
27	10/1/2011	2:15:00	0	No Data	No Data	No Data	55.24	0	0	0	No Data	21.75	No Data
28	10/1/2011	2:30:00	0	No Data	No Data	No Data	53.26	0	0	0	No Data	24.09	No Data
29	10/1/2011	2:45:00	0	No Data	No Data	No Data	52.92	0	0	0	No Data	23.75	No Data
30	10/1/2011	3:00:00	0	No Data	No Data	No Data	53.1	0	0	0	No Data	29.35	No Data

Figure 5: Raw data from a BAS for different cooling coil valves.

1	Key	Name:Suffix	Trend Definitions Used									
2	Point_1:	745.FL10.ACS101.CCV	15 minutes									
3	Point_2:	745.FL10.ACS102.CCV	15 minutes									
4	Point_3:	745.FL10.ACS103.CCV	15 minutes									
5	Point_4:	745.FL10.ACS104.CCV	15 minutes									
6	Point_5:	745.FL10.ACS107.CCV	minutes									
7	Point_6:	745.FL22.ACS221.CCV	minutes									
8	Point_7:	745.FL22.ACS222.CCV	minutes									
9	Point_8:	745.FL22.ACS223.CCV	minutes									
10	Point_9:	745.FL22.ACS224.CCV	minutes									
11	Point_10:	745.FL22.ACS225.CCV	minutes									
12	Point_11:	745.FL22.ACS226.CCV	minutes									
13	Time Interv	15 Minutes										
14	Date Range:	10/1/2011 00:00:00 - 10/ /2011 23:59:59										
15	Report Timi	All Hours										
16												
17	<>Date	Time	745.FL10.ACS	745.FL10.A	745.FL10.A	745.FL10.A	745.FL22.A	745.FL22.A	745.FL22.A	745.FL22.A	745.FL22.A	745.FL22.ACS226.CCV	
18	10/1/2011	0:00:00	0	No Data	No Data	No Data	50.87	0	20.13	0	No Data	0	No Data
19	10/1/2011	0:15:00	0	No Data	No Data	No Data	55.29	0	0	17.26	No Data	15.54	No Data
20	10/1/2011	0:30:00	0	No Data	No Data	No Data	51.52	0	0	0	No Data	20.76	No Data
21	10/1/2011	0:45:00	0	No Data	No Data	No Data	52.68	0	0	0	No Data	24.98	No Data
22	10/1/2011	1:00:00	0	No Data	No Data	No Data	53.21	0	0	0	No Data	25.93	No Data
23	10/1/2011	1:15:00	0	No Data	No Data	No Data	50.61	0	0	0	No Data	20.86	No Data
24	10/1/2011	1:30:00	0	No Data	No Data	No Data	56.4	0	0	0	No Data	25.94	No Data
25	10/1/2011	1:45:00	0	No Data	No Data	No Data	50.92	0	0	0	No Data	12.54	No Data
26	10/1/2011	2:00:00	0	No Data	No Data	No Data	52.12	0	0	0	No Data	14.67	No Data
27	10/1/2011	2:15:00	0	No Data	No Data	No Data	55.24	0	0	0	No Data	21.75	No Data
28	10/1/2011	2:30:00	0	No Data	No Data	No Data	53.26	0	0	0	No Data	24.09	No Data

Figure 6: Screenshot of the raw data with point names above the corresponding columns.

1	<>Date	Time	745.FL10.A(	745.FL10.A(	745.FL10.A(	745.FL10.A(	745.FL10.A(	745.FL22.A(	745.FL22.A(	745.FL22.A(	745.FL22.A(	745.FL22.A(	745.FL22.ACS226.CCV
2	10/1/2011	0:00:00	0	No Data	No Data	No Data	50.87	0	20.13	0	No Data	0	No Data
3	10/1/2011	0:15:00	0	No Data	No Data	No Data	55.29	0	0	17.26	No Data	15.54	No Data
4	10/1/2011	0:30:00	0	No Data	No Data	No Data	51.52	0	0	0	No Data	20.76	No Data
5	10/1/2011	0:45:00	0	No Data	No Data	No Data	52.68	0	0	0	No Data	24.98	No Data
6	10/1/2011	1:00:00	0	No Data	No Data	No Data	53.21	0	0	0	No Data	25.93	No Data
7	10/1/2011	1:15:00	0	No Data	No Data	No Data	50.61	0	0	0	No Data	20.86	No Data
8	10/1/2011	1:30:00	0	No Data	No Data	No Data	56.4	0	0	0	No Data	25.94	No Data
9	10/1/2011	1:45:00	0	No Data	No Data	No Data	50.92	0	0	0	No Data	12.54	No Data
10	10/1/2011	2:00:00	0	No Data	No Data	No Data	52.12	0	0	0	No Data	14.67	No Data
11	10/1/2011	2:15:00	0	No Data	No Data	No Data	55.24	0	0	0	No Data	21.75	No Data
12	10/1/2011	2:30:00	0	No Data	No Data	No Data	53.26	0	0	0	No Data	24.09	No Data
13	10/1/2011	2:45:00	0	No Data	No Data	No Data	52.92	0	0	0	No Data	23.75	No Data
14	10/1/2011	3:00:00	0	No Data	No Data	No Data	53.1	0	0	0	No Data	29.35	No Data
15	10/1/2011	3:15:00	0	No Data	No Data	No Data	54.46	0	0	0	No Data	17.53	No Data
16	10/1/2011	3:30:00	0	No Data	No Data	No Data	53.59	0	0	0	No Data	11.09	No Data
17	10/1/2011	3:45:00	0	No Data	No Data	No Data	55.07	0	0	0	No Data	12.42	No Data
18	10/1/2011	4:00:00	0	No Data	No Data	No Data	52.18	0	0	0	No Data	11.76	No Data
19	10/1/2011	4:15:00	0	No Data	No Data	No Data	50.84	0	0	0	No Data	12.27	No Data
20	10/1/2011	4:30:00	0	No Data	No Data	No Data	55.49	0	0	0	No Data	16.36	No Data
21	10/1/2011	4:45:00	0	No Data	No Data	No Data	52.61	0	0	0	No Data	15.61	No Data
22	10/1/2011	5:00:00	0	No Data	No Data	No Data	50.87	0	0	0	No Data	17.33	No Data

Figure 7: Screenshot after all rows above the data removed.

1	<>Date	Time	745.FL10.A(	745.FL10.A(	745.FL10.A(	745.FL10.A(	745.FL10.A(	745.FL22.A(	745.FL22.A(	745.FL22.A(	745.FL22.A(	745.FL22.A(	745.FL22.ACS226.CCV
2	10/5/2011	12:15:00	100	100	92.63	58.44	100	51	51.69	32.53	57.13	35	54.18
3	10/5/2011	12:30:00	100	100	91.57	58.52	100	52	52.23	37.74	57.84	38.14	55.89
4	10/5/2011	12:45:00	100	100	90.38	57.87	99.19	53	54.44	32.91	59.85	41.6	51.35
5	10/5/2011	13:00:00	100	98.55	88.5	57.74	98.27	54	54.7	37.13	60.3	40.46	52.16
6	10/5/2011	13:15:00	100	98.44	86.98	57.97	99.63	56	55.66	49.03	59.78	42.02	39.69
7	10/5/2011	13:30:00	100	98.63	85.52	58.53	100	55	56.24	39.01	62.74	44.86	51.09
8	10/5/2011	13:45:00	100	99.91	84.3	59.1	100	53	56.63	54.13	62.21	43.72	60.02
9	10/5/2011	14:00:00	100	100	83.22	58.23	100	58	56.6	52.99	56.32	41.05	58.86
10	10/5/2011	14:15:00	100	100	81.94	58.04	99.99	58	57.86	47.28	58.15	48.22	55.14
11	10/5/2011	14:30:00	100	99.55	80.48	58.7	98.62	43	58.03	42.82	48.2	48	51.28
12	10/5/2011	14:45:00	100	98.24	78.93	58.42	99.99	53	57.7	53.67	66.12	43.33	43.44
13	10/5/2011	15:00:00	100	98.56	77.59	57.9	99.97	39	58.06	38.12	60.76	44.38	69.92
14	10/5/2011	15:15:00	100	98.42	76.15	58.37	99.21	53	58.38	42.82	57.58	51.33	43.97
15	10/5/2011	15:30:00	100	97.42	74.63	58.09	98.31	60	58.71	56.42	42.5	49.42	39.78
16	10/5/2011	15:45:00	100	96.68	73.06	58.83	99.3	59	58.32	51.64	63.21	52.68	43.72
17	10/5/2011	16:00:00	100	97.34	71.71	58.61	99.17	61	58.55	43.18	59.34	46.4	71.84
18	10/5/2011	16:15:00	100	97.41	70.36	59.58	100	50	58.85	40.85	35.27	53.49	54.28
19	10/5/2011	16:30:00	100	98.91	69.07	59.16	96.27	45	58.45	52.51	50.31	52.13	35.52

Figure 8: Screenshot of raw data set after all rows and/or columns with "no data" have been removed.