BASE	POSITION	MODULE	XADR	YADR		
0	1	H4-ECOM			0	0
0	2	F08-RTD	X0-X37		0	0
0	3	D4-16NE3	X40-X57		40	0
0	4	F4-08TRS-2		Y0-Y7	0	0
0	5	F08-RTD	X60-X117		60	0
0	6	F08-RTD	X120-X157		120	0
0	7	F08-RTD	X160-X217		160	0
0	8	F4-16DA-2		Y20-Y57 (manual)	0	20M
1	1	F08-RTD	X220-X257		220	0
1	2	F08-RTD	X260-X317		260	0
1	3	F08-RTD	X320-X357		320	0
1	4	F4-16AD-1	X360-X400		360	0
1	5	F4-08TRS-2		Y10-17	0	10
1	6	D4-16NE3	X400-X417		400	0
1	7	(empty)				
1	8	(empty)				

	A	B	C	D	E	F	G	H	I
1				***Tritium Dehumidifier PLC***					
2				**NUMI-TRITIUM 131.225.137.89 Station 09**					
3				8 slot main base, 8 slot expansion base					
4									
5							Base-		
6	ACNET Tag	PLC Adr	Format	Description	Type	Device	Slot	CNL/ADR	Range
7									
8				**TRITIUM Analog Inputs:**					
9		VX20,VX0	Word	X37:0 8ch RTD					
10	E:DDHT01	V2150	Word	Munters Unit 1 vent temperature	RTD	F4-08RTD	0-1	1	
11	E:DDHT02	V2151	Word	Munters Unit 2 vent temperature	RTD	F4-08RTD	0-1	2	
12	E:DDHT03	V2152	Word	Munters Unit 3 vent temperature	RTD	F4-08RTD	0-1	3	
13	E:DDHT04	V2153	Word	Munters Unit 4 vent temperature	RTD	F4-08RTD	0-1	4	
14	E:DDHT05	V2154	Word	Munters Unit 5 vent temperature	RTD	F4-08RTD	0-1	5	
15	E:DDHT06	V2155	Word	Munters Unit 4 Tgt Hall Vent Temperature	RTD	F4-08RTD	0-1	6	
16	E:DDHT07	V2156	Word	Munters Unit 5 Tgt Hall Vent Temperature	RTD	F4-08RTD	0-1	7	
17		V2157	Word	Spare (6/1/06 was E:DKPT06 Decay Pipe Hole 6 temperature)	RTD	F4-08RTD	0-1	8	
18									
19		VX100,VX60	Word	X117:60 8ch RTD					
20	E:DKPT04	V2160	Word	Decay Pipe Hole 4 temperature	RTD	F4-08RTD	0-4	1	
21	E:DKPT05	V2161	Word	Decay Pipe Hole 5 temperature	RTD	F4-08RTD	0-4	2	
22	E:DKPT06	V2162	Word	Decay Pipe Hole 6 temperature(6/1/06 Need Charlie to move ACNET ent	RTD	F4-08RTD	0-4	3	
23		V2163	Word		RTD	F4-08RTD	0-4	4	
24	E:DKPT11	V2164	Word	Hole 1 RTD 1	RTD	F4-08RTD	0-4	5	
25	E:DKPT12	V2165	Word	Hole 1 RTD 2	RTD	F4-08RTD	0-4	6	
26	E:DKPT13	V2166	Word	Hole 1 RTD 3	RTD	F4-08RTD	0-4	7	
27	E:DKPT14	V2167	Word	Hole 1 RTD 4	RTD	F4-08RTD	0-4	8	
28									
29		VX140,VX120	Word	X157:120 8ch RTD					
30	E:DKPT21	V2170	Word	Hole 2 RTD 1	RTD	F4-08RTD	0-5	1	
31	E:DKPT22	V2171	Word	Hole 2 RTD 2	RTD	F4-08RTD	0-5	2	
32	E:DKPT23	V2172	Word	Hole 2 RTD 3	RTD	F4-08RTD	0-5	3	
33	E:DKPT24	V2173	Word	Hole 2 RTD 4	RTD	F4-08RTD	0-5	4	
34	E:DKPT31	V2174	Word	Hole 3 RTD 1	RTD	F4-08RTD	0-5	5	
35	E:DKPT32	V2175	Word	Hole 3 RTD 2	RTD	F4-08RTD	0-5	6	
36	E:DKPT33	V2176	Word	Hole 3 RTD 3	RTD	F4-08RTD	0-5	7	
37	E:DKPT34	V2177	Word	Hole 3 RTD 4	RTD	F4-08RTD	0-5	8	
38									
39		VX200,VX160	Word	X217:160 8ch RTD					
40	E:DKPT41	V2200	Word	Hole 4 RTD 1	RTD	F4-08RTD	0-6	1	
41	E:DKPT42	V2201	Word	Hole 4 RTD 2	RTD	F4-08RTD	0-6	2	
42	E:DKPT43	V2202	Word	Hole 4 RTD 3	RTD	F4-08RTD	0-6	3	
43	E:DKPT44	V2203	Word	Hole 4 RTD 4	RTD	F4-08RTD	0-6	4	
44	E:DKPT51	V2204	Word	Hole 5 RTD 1	RTD	F4-08RTD	0-6	5	

	A	B	C	D	E	F	G	H	I
45	E:DKPT52	V2205	Word	Hole 5 RTD 2	RTD	F4-08RTD	0-6	6	
46	E:DKPT53	V2206	Word	Hole 5 RTD 3	RTD	F4-08RTD	0-6	7	
47	E:DKPT54	V2207	Word	Hole 5 RTD 4	RTD	F4-08RTD	0-6	8	
48									
49		VX240,VX220	Word	X257:220 NX0001 UPFRTD TH WW DPRU 8ch RTD					
50	E:TDPU1T	V2220	Word	Decay pipe temp #1 (topmost pipe in tgt hall)	RTD	F4-08RTD	1-0	1	
51	E:TDPU2T	V2221	Word	Decay pipe temp #2	RTD	F4-08RTD	1-0	2	
52	E:TDPU3T	V2222	Word	Decay pipe temp #3	RTD	F4-08RTD	1-0	3	
53	E:TDPU4T	V2223	Word	Decay pipe temp #4	RTD	F4-08RTD	1-0	4	
54	E:TDPU5T	V2224	Word	Decay pipe temp #5	RTD	F4-08RTD	1-0	5	
55	E:TDPU6T	V2225	Word	Decay pipe temp #6	RTD	F4-08RTD	1-0	6	
56	E:TDPD1T	V2226	Word	Decay pipe temp #7	RTD	F4-08RTD	1-0	7	
57	E:TDPD2T	V2227	Word	Decay pipe temp #8	RTD	F4-08RTD	1-0	8	
58									
59		VX300,VX260	Word	X317:260 NX0002 DNFRTD TH WW DPRD 8ch RTD					
60	E:TDPD3T	V2230	Word	Decay pipe temp #9	RTD	F4-08RTD	1-1	1	
61	E:TDPD4T	V2231	Word	Decay pipe temp #10	RTD	F4-08RTD	1-1	2	
62	E:TDPD5T	V2232	Word	Decay pipe temp #11	RTD	F4-08RTD	1-1	3	
63	E:TDPD6T	V2233	Word	Decay pipe temp #12 (bottommost pipe in target hall)	RTD	F4-08RTD	1-1	4	
64	E:DKPT61	V2234	Word	Hole 6 RTD 1	RTD	F4-08RTD	1-1	5	
65	E:DKPT62	V2235	Word	Hole 6 RTD 2	RTD	F4-08RTD	1-1	6	
66	E:DKPT63	V2236	Word	Hole 6 RTD 3	RTD	F4-08RTD	1-1	7	
67	E:DKPT64	V2237	Word	Hole 6 RTD 4	RTD	F4-08RTD	1-1	8	
68									
69		VX340,VX320	Word	X357:X320 8ch RTD					
70	E:TPDAPI	V2600	Word	TgPile Dehu A Proc In T	RTD	F4-08RTD	1-2	1	OT0009
71	E:TPDAPO	V2601	Word	TgPile Dehu A Proc Out T	RTD	F4-08RTD	1-2	2	OT0009
72	E:TPDARI	V2602	Word	TgPile Dehu A Reac In T	RTD	F4-08RTD	1-2	3	OT0009
73	E:TPDARO	V2603	Word	TgPile Dehu A Reac Out T	RTD	F4-08RTD	1-2	4	OT0009
74	E:TPDBPI	V2604	Word	TgPile Dehu B Proc In T	RTD	F4-08RTD	1-2	5	OT0010
75	E:TPDBPO	V2605	Word	TgPile Dehu B Proc Out T	RTD	F4-08RTD	1-2	6	OT0010
76	E:TPDBRI	V2606	Word	TgPile Dehu B Reac In T	RTD	F4-08RTD	1-2	7	OT0010
77	E:TPDBRO	V2607	Word	TgPile Dehu B ReacOut T	RTD	F4-08RTD	1-2	8	OT0010
78									
79		VX400	Word	X417:400 16ch mA Input					
80		V10040	Word	Condensate Tank Analog Level (via FC33 converter)	4-20mA	F4-16AD-1	1-3	1	OA0296
81		V10041	Word	Condensate Pumps Discharge Pressure	4-20mA	F4-16AD-1	1-3	2	OA0412|0-400psig
82		V10042	Word	Condensate Pump A Motor Current	4-20mA	F4-16AD-1	1-3	3	OA0413
83		V10043	Word	Condensate Pump B Motor Current	4-20mA	F4-16AD-1	1-3	4	OA0414
84		V10044	Word	Barrel Filling Station Pump Motor Current	4-20mA	F4-16AD-1	1-3	5	OA0415
85		V10045	Word		4-20mA	F4-16AD-1	1-3	6	
86		V10046	Word		4-20mA	F4-16AD-1	1-3	7	
87		V10047	Word		4-20mA	F4-16AD-1	1-3	8	
88		V10050	Word		4-20mA	F4-16AD-1	1-3	9	
89		V10051	Word		4-20mA	F4-16AD-1	1-3	10	

	A	B	C	D	E	F	G	H	I
90		V10052	Word		4-20mA	F4-16AD-1	1-3	11	
91		V10053	Word		4-20mA	F4-16AD-1	1-3	12	
92		V10054	Word		4-20mA	F4-16AD-1	1-3	13	
93		V10055	Word		4-20mA	F4-16AD-1	1-3	14	
94		V10056	Word		4-20mA	F4-16AD-1	1-3	15	
95		V10057	Word		4-20mA	F4-16AD-1	1-3	16	
96									
97				**TRITIUM Analog Outputs:**					
98		VY20,VY40		Y57:20 16ch 10V Output					
99	E:DD1XTD	V10000	Word	Repeat of E:DDHT01 to MADC 87 Ch25	0-10vdc	F4-16DA-2	0-7	1	
100	E:DD2XTD	V10001	Word	Repeat of E:DDHT02 to MADC 87 Ch26	0-10vdc	F4-16DA-2	0-7	2	
101	E:DD3XTD	V10002	Word	Repeat of E:DDHT03 to MADC 87 Ch27	0-10vdc	F4-16DA-2	0-7	3	
102	E:DD4XTT	V10003	Word	Repeat of E:DDHT06 to MADC 87 Ch28	0-10vdc	F4-16DA-2	0-7	4	
103	E:DD5XTT	V10004	Word	Repeat of E:DDHT07 to MADC 87 Ch29	0-10vdc	F4-16DA-2	0-7	5	
104	E:DD4XTD	V10005	Word	Repeat of E:DDHT04 to MADC 87 Ch30	0-10vdc	F4-16DA-2	0-7	6	
105	E:DD5XTD	V10006	Word	Repeat of E:DDHT05 to MADC 87 Ch31	0-10vdc	F4-16DA-2	0-7	7	
106		V10007	Word		0-10vdc	F4-16DA-2	0-7	8	
107		V10010	Word		0-10vdc	F4-16DA-2	0-7	9	
108		V10011	Word	Munters Unit A 3-way Valve Control	0-10vdc	F4-16DA-2	0-7	10	OA0436
109		V10012	Word	Munters Unit B 3-way Valve Control	0-10vdc	F4-16DA-2	0-7	11	OA0437
110		V10013	Word		0-10vdc	F4-16DA-2	0-7	12	
111		V10014	Word		0-10vdc	F4-16DA-2	0-7	13	
112		V10015	Word		0-10vdc	F4-16DA-2	0-7	14	
113		V10016	Word		0-10vdc	F4-16DA-2	0-7	15	
114		V10017	Word	Barrel Filling Station Comfort Display (via FC33 converter)	0-10vdc	F4-16DA-2	0-7	16	OA0298
115									
116				**TRITIUM Digital Inputs:**					
117		VX40	Word	X57:40 16 point AC-DC Input					
118		X40	Bit	Munters Unit 1 Run Status WHT/BLK	24V AC/DC	D4-16NE3	0-2	A0	
119		X41	Bit	Munters Unit 2 Run Status YEL/BLK	24V AC/DC	D4-16NE3	0-2	A1	
120		X42	Bit	Munters Unit 3 Run Status WHT/RED	24V AC/DC	D4-16NE3	0-2	A2	
121		X43	Bit	Munters Unit 4 Run Status YEL/RED	24V AC/DC	D4-16NE3	0-2	A3	
122		X44	Bit	Munters Unit 5 Run Status WHT/GRN	24V AC/DC	D4-16NE3	0-2	A4	
123		X45	Bit	Munters Unit 1 Fault Status GRN/BLK	24V AC/DC	D4-16NE3	0-2	A5	
124		X46	Bit	Munters Unit 2 Fault Status BRN/BLK	24V AC/DC	D4-16NE3	0-2	A6	
125		X47	Bit	Munters Unit 3 Fault Status GRN/RED	24V AC/DC	D4-16NE3	0-2	A7	
126		X50	Bit	Munters Unit 4 Fault Status BRN/RED	24V AC/DC	D4-16NE3	0-2	B0	
127		X51	Bit	Munters Unit 5 Fault Status BLU/GRN	24V AC/DC	D4-16NE3	0-2	B1	
128		X52	Bit	AHU4 ON Status	24V AC/DC	D4-16NE3	0-2	B2	
129		X53	Bit	Munters Unit A Run Status	24V AC/DC	D4-16NE3	0-2	B3	OA0434
130		X54	Bit	Munters Unit B Run Status	24V AC/DC	D4-16NE3	0-2	B4	OA0435
131		X55	Bit	Munters Unit A Fault Status	24V AC/DC	D4-16NE3	0-2	B5	OA0434
132		X56	Bit	Munters Unit B Fault Status	24V AC/DC	D4-16NE3	0-2	B6	OA0435
133		X57	Bit	Condensate Tank HH Alarm from interposing relay	24V AC/DC	D4-16NE3	0-2	B7	
134									

	A	B	C	D	E	F	G	H	I
135		VX400	Word	X417:400 16 point AC-DC Input					
136		X400	Bit	DDHA & DDHB Permit (Glycol flow switch from mezz. Chiller)	24V AC/DC	D4-16NE3	1-5	A0	OA0418
137		X401	Bit	Glycol Supply Klixon	24V AC/DC	D4-16NE3	1-5	A1	OA0438
138		X402	Bit	Secondary Containment Leak Detect (from leak module)	24V AC/DC	D4-16NE3	1-5	A2	
139		X403	Bit		24V AC/DC	D4-16NE3	1-5	A3	
140		X404	Bit		24V AC/DC	D4-16NE3	1-5	A4	
141		X405	Bit		24V AC/DC	D4-16NE3	1-5	A5	
142		X406	Bit		24V AC/DC	D4-16NE3	1-5	A6	
143		X407	Bit		24V AC/DC	D4-16NE3	1-5	A7	
144		X410	Bit		24V AC/DC	D4-16NE3	1-5	B0	
145		X411	Bit		24V AC/DC	D4-16NE3	1-5	B1	
146		X412	Bit		24V AC/DC	D4-16NE3	1-5	B2	
147		X413	Bit		24V AC/DC	D4-16NE3	1-5	B3	
148		X414	Bit		24V AC/DC	D4-16NE3	1-5	B4	
149		X415	Bit		24V AC/DC	D4-16NE3	1-5	B5	
150		X416	Bit		24V AC/DC	D4-16NE3	1-5	B6	
151		X417	Bit		24V AC/DC	D4-16NE3	1-5	B7	
152									
153		VY0	Word	Y7:0 8 point Relay Output					
154		Y0	Bit	Munters Unit A RUN/~STOP	NO Relay	F4-08TRS-2	0-3	0(Form C)	OA0410
155		Y1	Bit	Munters Unit B RUN/~STOP	NO Relay	F4-08TRS-2	0-3	1(Form C)	OA0411
156		Y2	Bit	Watchdog Kick	NC Relay	F4-08TRS-2	0-3	2(Form C)	
157		Y3	Bit	Munters Unit 1 RUN/~STOP RED/BLK	NO Relay	F4-08TRS-2	0-3	3(Form C)	
158		Y4	Bit	Munters Unit 2 RUN/~STOP BLU/BLK	NO Relay	F4-08TRS-2	0-3	4(Form A)	
159		Y5	Bit	Munters Unit 3 RUN/~STOP ORG/BLK	NO Relay	F4-08TRS-2	0-3	5(Form A)	
160		Y6	Bit	Munters Unit 4 RUN/~STOP BLU/RED	NO Relay	F4-08TRS-2	0-3	6(Form A)	
161		Y7	Bit	Munters Unit 5 RUN/~STOP ORG/RED	NO Relay	F4-08TRS-2	0-3	7(Form A)	
162									
163		VY0	Word	Y17:10 8 point Relay Output					
164		Y10	Bit	[Condensate HH | Leak Detect] to Evaporator	NO Relay	F4-08TRS-2	1-4	0(Form C)	OT0012/Red-Blk
165		Y11	Bit	[Condensate HH | Leak Detect] to Chiller	NO Relay	F4-08TRS-2	1-4	1(Form C)	OA0417
166		Y12	Bit	Condensate System Beam Permit	NC Relay	F4-08TRS-2	1-4	2(Form C)	CB1704
167		Y13	Bit		NO Relay	F4-08TRS-2	1-4	3(Form C)	
168		Y14	Bit		NO Relay	F4-08TRS-2	1-4	4(Form A)	
169		Y15	Bit		NO Relay	F4-08TRS-2	1-4	5(Form A)	
170		Y16	Bit		NO Relay	F4-08TRS-2	1-4	6(Form A)	
171		Y17	Bit		NO Relay	F4-08TRS-2	1-4	7(Form A)	
172									
173				**TRITIUM Inputs from ACNET:**					
174		V2241	Word	ACNET Command Bits 1					
175	E:DDHS01	B2241.0	Bit	Munters Unit 1 RUN/~STOP	Bit-Out				
176	E:DDHS02	B2241.1	Bit	Munters Unit 2 RUN/~STOP	Bit-Out				
177	E:DDHS03	B2241.2	Bit	Munters Unit 3 RUN/~STOP	Bit-Out				
178	E:DDHS04	B2241.3	Bit	Munters Unit 4 RUN/~STOP	Bit-Out				
179	E:DDHS05	B2241.4	Bit	Munters Unit 5 RUN/~STOP	Bit-Out				

	A	B	C	D	E	F	G	H	I
180	E:TPDS0A	B2241.5	Bit	Munters Unit A RUN/~STOP	Bit-Out				
181	E:TPDS0B	B2241.6	Bit	Munters Unit B RUN/~STOP	Bit-Out				
182		B2241.7	Bit		Bit-Out				
183		B2241.8	Bit		Bit-Out				
184		B2241.9	Bit		Bit-Out				
185		B2241.10	Bit		Bit-Out				
186		B2241.11	Bit		Bit-Out				
187		B2241.12	Bit		Bit-Out				
188		B2241.13	Bit		Bit-Out				
189		B2241.14	Bit		Bit-Out				
190		B2241.15	Bit		Bit-Out				
191									
192		V2242	Word	ACNET Command Bits 2					
193	E:DDHA01-C	B2242.0	Bit	Reset Munters#1 Fault Flag	Bit-Out				
194	E:DDHA02-C	B2242.1	Bit	Reset Munters#2 Fault Flag	Bit-Out				
195	E:DDHA03-C	B2242.2	Bit	Reset Munters#3 Fault Flag	Bit-Out				
196	E:DDHA04-C	B2242.3	Bit	Reset Munters#4 Fault Flag	Bit-Out				
197	E:DDHA05-C	B2242.4	Bit	Reset Munters#5 Fault Flag	Bit-Out				
198	E:TPDA0A-C	B2242.5	Bit	Reset Munters#A Fault Flag	Bit-Out				
199	E:TPDA0B-C	B2242.6	Bit	Reset Munters#B Fault Flag	Bit-Out				
200	E:TPDAHH-C	B2242.7	Bit	Reset Condensate Tank HH Trip	Bit-Out				
201	E:TPDALK-C	B2242.8	Bit	Reset Secondary Containment Leak Trip	Bit-Out				
202	E:TPDAGT-C	B2242.9	Bit	Reset Chiller Glycol Temp High Trip	Bit-Out				
203	E:TPDAGF-C	B2242.10	Bit	Reset Chiller Glycol Flow Trip	Bit-Out				
204		B2242.11	Bit		Bit-Out				
205		B2242.12	Bit		Bit-Out				
206		B2242.13	Bit		Bit-Out				
207		B2242.14	Bit		Bit-Out				
208		B2242.15	Bit		Bit-Out				
209									
210				**TRITIUM Outputs to ACNET:**					
211		V2001	Word	TRITIUM Loop-Thru Status					
212	E:DDHS01-S	B2001.0	Bit	Munters Unit 1 Run Status	Bit-In				
213	E:DDHS02-S	B2001.1	Bit	Munters Unit 2 Run Status	Bit-In				
214	E:DDHS03-S	B2001.2	Bit	Munters Unit 3 Run Status	Bit-In				
215	E:DDHS04-S	B2001.3	Bit	Munters Unit 4 Run Status	Bit-In				
216	E:DDHS05-S	B2001.4	Bit	Munters Unit 5 Run Status	Bit-In				
217	E:TPDS0A-S	B2001.5	Bit	Munters Unit A Run Status	Bit-In				
218	E:TPDS0B-S	B2001.6	Bit	Munters Unit B Run Status	Bit-In				
219	E:TPDLHH-S	B2001.7	Bit	Condensate Tank HH Status	Bit-In				
220	E:TPDLLK-S	B2001.8	Bit	Secondary Containment Leak Status	Bit-In				
221	E:TPDTCG-S	B2001.9	Bit	Chiller Glycol Temp Status	Bit-In				
222	E:TPDFCG-S	B2001.10	Bit	Chiller Glycol Flow Status	Bit-In				
223		B2001.11	Bit		Bit-In				
224		B2001.12	Bit		Bit-In				

	A	B	C	D	E	F	G	H	I
225		B2001.13	Bit		Bit-In				
226		B2001.14	Bit		Bit-In				
227		B2001.15	Bit		Bit-In				
228									
229		V2002	Word	TRITIUM General Status					
230	E:DDHS06	B2002.0	Bit	Air Handling Unit 4 (AHU4) On Status	Bit-In				
231		B2002.1	Bit		Bit-In				
232		B2002.2	Bit		Bit-In				
233		B2002.3	Bit		Bit-In				
234		B2002.4	Bit		Bit-In				
235		B2002.5	Bit		Bit-In				
236		B2002.6	Bit		Bit-In				
237		B2002.7	Bit		Bit-In				
238		B2002.8	Bit		Bit-In				
239		B2002.9	Bit		Bit-In				
240		B2002.10	Bit		Bit-In				
241		B2002.11	Bit		Bit-In				
242		B2002.12	Bit		Bit-In				
243		B2002.13	Bit		Bit-In				
244		B2002.14	Bit		Bit-In				
245		B2002.15	Bit		Bit-In				
246									
247		V2003	Word	TRITIUM Alarms					
248	E:DDHA01	B2003.0	Bit	Munters Unit 1 Fault Status	Bit-In				
249	E:DDHA02	B2003.1	Bit	Munters Unit 2 Fault Status	Bit-In				
250	E:DDHA03	B2003.2	Bit	Munters Unit 3 Fault Status	Bit-In				
251	E:DDHA04	B2003.3	Bit	Munters Unit 4 Fault Status	Bit-In				
252	E:DDHA05	B2003.4	Bit	Munters Unit 5 Fault Status	Bit-In				
253	E:TPDA0A	B2003.5	Bit	Munters Unit A Fault Status	Bit-In				
254	E:TPDA0B	B2003.6	Bit	Munters Unit B Fault Status	Bit-In				
255	E:TPDAHH	B2003.7	Bit	TRIP Condensate Tank HH	Bit-In				
256	E:TPDALK	B2003.8	Bit	TRIP Secondary Containment Leak	Bit-In				
257	E:TPDAGT	B2003.9	Bit	TRIP Chiller Glycol Supply Temp Hi	Bit-In				
258	E:TPDAGF	B2003.10	Bit	TRIP Loss of Chiller Glycol Flow	Bit-In				
259		B2003.11	Bit		Bit-In				
260		B2003.12	Bit		Bit-In				
261	E:DDHPLC	B2003.13	Bit	PLC Error	Bit-In				
262	E:DDHPLC	B2003.14	Bit	PLC Warning	Bit-In				
263	E:DDHPLC	B2003.15	Bit	PLC Fatal Error	Bit-In				
264									
265	E:DDHOK	V2210	Word	Heartbeat					
266	E:TPDLCT	V2211	Word	Condensate Tank Level					0-36in
267		V2212	Word						
268		V2213	Word						
269		V2214	Word						

	A	B	C	D	E	F	G	H	I
270		V2215	Word						
271		V2216	Word						
272		V2217	Word						
273									
274	E:TPDP01	V2611:10	IEEE	Condensate Pumps Discharge Pressure					0-400 psig
275	E:TPDI01	V2613:12	IEEE	Condensate Pump 1 Motor Current					0-5A
276	E:TPDI02	V2615:14	IEEE	Condensate Pump 2 Motor Current					0-5A
277	E:TPDIBF	V2617:16	IEEE	Barrel Fill Pump Motor Current					0-5A
278									
279	E:TPDW0A	V2621:20	IEEE	Munters Unit A 3-way Valve Position (from PID loop)					0-100%
280	E:TPDW0B	V2623:22	IEEE	Munters Unit B 3-way Valve Position (from PID loop)					0-100%
281		V2625:24	IEEE						
282		V2627:26	IEEE						
283									
284				**CMEM Usage**					
285		C0	Bit	Condensate System Fault					
286									
287				**VMEM Usage**					
288		V10000-10017	Word	Vout Source Data					
289		V10020	Word	Vout module channel index					
290		V10021	Word	Vout Ch1-8 Source Data Pointer					
291		V10022	Word	Vout Ch9-16 Source Data Pointer					
292		V10025:4	IEEE	Averager time constant					
293		V10027:6	IEEE	Averager Xn (current input value)					
294		V10030	IEEE	Averager Yn-1 (current output value)					
295		V10031							
296		V10032							
297		V10033							
298		V10034							
299		V10035							
300		V10036							
301		V10037							
302		V10040-10057	Word	mA in Source Data					
303									
304									
305				**Timer Usage**					
306		T0		Watchdog State 0 Delay					
307		T1		Watchdog State 1 Delay					
308		T2		Averager execution timer					
309									
310				**State Usage**					
311		S0	Initial	Watchdog Off					
312		S1		Watchdog Kick					

Path: c:\pak\numi\new-tritium\tritium.prj
Save Date: 11/16/07 12:29:53
Creation Date: 11/08/07 18:15:19
PLC Type: 450
Class ID: DirectLogic 405 Series
Link Name: TRITIUM
Description: NuMI TRITIUM Dehumidifier PLC
Version: Issue O
Company: Fermi National Accelerator Laboratory, Batavia, IL
Department: Accelerator Controls / Systems Hardware Group
Programmer: Paul Kasley x8658

****
INITIALIZATION
****

1 _FirstScan SP0
- LD K0
- OUT VY0
- OUT Munters RUN/STOP bits V2241
- OUT Munters Fault Flags V2242

2 _FirstScan SP0
- LDR R0.125
- OUTD Averager Time Constant TC V10024

3 _FirstScan SP0
- LD K0

Initialize outputs to MADC87 to 0.

4 _FirstScan SP0
- OUT VOUT Ch1 V10000
- OUT VOUT Ch2 V10001
- OUT VOUT Ch3 V10002
- OUT VOUT Ch4 V10003
- OUT VOUT Ch5 V10004
- OUT VOUT Ch6 V10005
- OUT VOUT Ch7 V10006

****
SCAN BASE0 RTDs
****
RTD 0-1: Dehumidifiers

On each scan, read one channel from RTD module 0-1.
Store fahrenheit temperature values as 2's complement
binary data starting at V2150. One decimal pt is implied
(a reading of 336 is interpreted as 33.6 deg).

A complete scan of all 8 channels will take 8 ladder scans.
This should be plenty fast for anyone.

5 _On SP1

LD RTD #1 Data VX0
LD VX20
ANDD K7
OUTX RTD#1 Base Adrs E:DDHT01 V2150

Base 0 Module 4
Decay pipe holes 4,5,6 and DKP hole 1 RTDs

6 _On SP1

LD Base 0 Module 4 RTDdata VX60
LD VX100
ANDD K7
OUTX Base 0 Module 4 base address V2160

Base 0 Module 5
DKP Holes 2 and 3

7 _On SP1

LD Base 0 Module 5 RTD Data VX120
LD VX140
ANDD K7
OUTX Base 0 Module 5 base address V2170

Base 0 Module 6
DKP Holes 4 and 5

8 _On SP1

LD Base 0 Module 6 RTD Data VX160
LD VX200
ANDD K7
OUTX Base 0 Module 6 base address V2200

****
REPEAT MUNTERS TEMPS TO MADC INPUTS
****

Scale RTD values between 0F and 204.8F to 0V to 10VDC. All channels are updated each scan.

Copy and scale RTD values to output registers

The timer updates the MADC averagers and the direct readbacks once per second.

9 Sample Timer
T2

TMR
Sample Timer
T2
K10

Average and repeat E:DDHT01 to E:M1OT. This an exponential averager according to y(n) = A[x(n) - y(n-1)] + y(n-1). This is essentially a single pole RC filter.

10 Sample Timer
T2

LD
RTD#1 Base Adrs
E:DDHT01
V2150

SHFL
K1

BTOR

OUTD
Current value, IEEE
Xn
V10026

LD
VOUT Ch1
V10000

BTOR

OUTD
Current Output, IEEE
Yn-1
V10030

LDR
Current value, IEEE
Xn
V10026

SUBR
Current Output, IEEE
Yn-1
V10030

MULR
Averager Time Constant
TC
V10024

ADDR
Current Output, IEEE
Yn-1
V10030

RTOB

OUT
VOUT Ch1
V10000

Average and repeat E:DDHT02 to E:M2OT

Sample Timer

11 — T2 —

LD
Munters#2 Vent Temp
E:DDHT02
V2151

SHFL
K1

BTOR

OUTD
Current value, IEEE
Xn
V10026

LD
VOUT Ch2
V10001

BTOR

OUTD
Current Output, IEEE
Yn-1
V10030

LDR
Current value, IEEE
Xn
V10026

SUBR
Current Output, IEEE
Yn-1
V10030

MULR
Averager Time Constant
TC
V10024

ADDR
Current Output, IEEE
Yn-1
V10030

RTOB

OUT
VOUT Ch2
V10001

Average and repeat E:DDHT03 to E:M3OT

Sample Timer

12 — T2 —

LD
Munters#3 Vent Temp
E:DDHT03
V2152

SHFL
K1

BTOR

OUTD
Current value, IEEE
Xn
V10026

LD
VOUT Ch3
V10002

BTOR

OUTD
Current Output, IEEE
Yn-1
V10030

LDR
Current value, IEEE
Xn
V10026

SUBR
Current Output, IEEE
Yn-1
V10030

MULR
Averager Time Constant
TC
V10024

ADDR
Current Output, IEEE
Yn-1
V10030

RTOB

OUT
VOUT Ch3
V10002

Average and repeat E:DDHT06 to E:M4OT

Sample Timer

13 T2

LD
Munters #4 Vent to Tgt
Hall Temp
E:DDHT06
V2155

SHFL
K1

BTOR

OUTD
Current value, IEEE
Xn
V10026

LD
VOUT Ch4
V10003

BTOR

OUTD
Current Output, IEEE
Yn-1
V10030

LDR
Current value, IEEE
Xn
V10026

SUBR
Current Output, IEEE
Yn-1
V10030

MULR
Averager Time Constant
TC
V10024

ADDR
Current Output, IEEE
Yn-1
V10030

RTOB

OUT
VOUT Ch4
V10003

Average and repeat E:DDHT07 to E:M5OT

Sample Timer

14 T2

LD
Munters #5 Vent to Tgt
Hall Temp
E:DDHT07
V2156

SHFL
K1

BTOR

OUTD
Current value, IEEE
Xn
V10026

LD
VOUT Ch5
V10004

BTOR

OUTD
Current Output, IEEE
Yn-1
V10030

LDR
Current value, IEEE
Xn
V10026

SUBR
Current Output, IEEE
Yn-1
V10030

MULR
Averager Time Constant
TC
V10024

ADDR
Current Output, IEEE
Yn-1
V10030

RTOB

OUT
VOUT Ch5
V10004

Average and repeat E:DDHT04 to E:M4OTDK

Sample Timer

15 — T2 —

LD
Munters#4 Vent Temp
E:DDHT04
V2153

SHFL
K1

BTOR

OUTD
Current value, IEEE
Xn
V10026

LD
VOUT Ch6
V10005

BTOR

OUTD
Current Output, IEEE
Yn-1
V10030

LDR
Current value, IEEE
Xn
V10026

SUBR
Current Output, IEEE
Yn-1
V10030

MULR
Averager Time Constant
TC
V10024

ADDR
Current Output, IEEE
Yn-1
V10030

RTOB

OUT
VOUT Ch6
V10005

Average and repeat E:DDHT05 to E:M5OTDK

Sample Timer

16 — T2

- LD Munters#5 Vent Temp E:DDHT05 V2154
- SHFL K1
- BTOR
- OUTD Current value, IEEE Xn V10026
- LD VOUT Ch7 V10006
- BTOR
- OUTD Current Output, IEEE Yn-1 V10030
- LDR Current value, IEEE Xn V10026
- SUBR Current Output, IEEE Yn-1 V10030
- MULR Averager Time Constant TC V10024
- ADDR Current Output, IEEE Yn-1 V10030
- RTOB
- OUT VOUT Ch7 V10006

Write to the 0-10V analog output module

Set up the pointers

17 — _On SP1

- LD K8000
- OUT VOUT channel pointer V10020
- LDA O10000
- OUT Ch1-8 source pointer V10021
- LDA O10010
- OUT Ch9-16 source pointer V10022

18 — _On SP1 — (K8 FOR)

Load indirect via V10021,mask,combine,and write to module low word.

19 _On SP1

LD P10021
ANDD Kfff
OR VOUT channel pointer V10020
OUTIF Y20 K16

Load indirect via V10022,mask,combine, and write to module high word.

20 _On SP1

LD P10022
ANDD Kfff
OR VOUT channel pointer V10020
OUTIF Y40 K16

Bump the two source pointers and the channel pointer.

21 _On SP1

INCB Ch1-8 source pointer V10021
INCB Ch9-16 source pointer V10022
LD VOUT channel pointer V10020
ADDB K1000
OUT VOUT channel pointer V10020

Loop

22 NEXT

****
SCAN RTDS ON EXPANSION BASE
****
On each scan, read one channel from RTD modules on
the expansion base.

Store fahrenheit temperature values as 2's complement
binary data starting at V2150. One decimal pt is implied
(a reading of 336 is interpreted as 33.6 deg).

A complete scan of all 16 channels will take 16 ladder scans.
This should be plenty fast for anyone.

Base 1 Module 0
DKP water manifold temps 1 thru 8

23 _On SP1

LD
Base 1, Module 0 RTD data
VX220

LD
VX240

ANDD
K7

OUTX
1-0 base address
V2220

Base 1, Module 1
DKP water manifold temps 9 thru 12, DKP Hole 6 RTDs

24 _On SP1

LD
Base 1, Module 1 RTD data
VX260

LD
VX300

ANDD
K7

OUTX
1-1 base address
V2230

Base 1, Module 2
Munters A and B RTDs

25 _On SP1

LD
Base 1, Module 2 RTD data
VX320

LD
VX340

ANDD
K7

OUTX
1-2 base address
TPDAPI
V2600

Read all 16 mA inputs at Base 1 Module 4 into VMEM

26 _On SP1 — K16 FOR

LDIF F4-16AD-1 4-20mA Data 1-4_MADC X360 K12

LDIF X374 K4

OUTX 1-4 MADC raw data base address MADC1-4_Base V10040

27 NEXT

****
STATUS UPDATE
****
Copy status bits from the digital input module to ACNET.

Munters #1 RUN Status

28 X40 — Munters#1 Run Status E:DDHS01-S B2001.0 OUT

Munters #2 RUN Status

29 X41 — Munters#2 Run Status E:DDHS02-S B2001.1 OUT

Munters #3 RUN Status

30 X42 — Munters#3 Run Status E:DDHS03-S B2001.2 OUT

Munters #4 RUN Status

31 X43 — Munters#4 Run Status E:DDHS04-S B2001.3 OUT

Munters #5 RUN Status

32 X44 — Munters#5 Run Status E:DDHS05-S B2001.4 OUT

AHU4 ON Status

33 X52 — AHU4 ON Status E:DDHS06 B2002.0 OUT

Munters #A RUN Status

34 X53 — Munters#A Run Status B2001.5 OUT

35 Munter #B RUN Status X54 — Munters#B Run Status B2001.6 OUT

****
FAULT LATCHES
****

36 Munters #1 FAULT X45 — Munters#1 Fault E:DDHA01 B2003.0 SET

37 Munters #2 FAULT X46 — Munters#2 Fault E:DDHA02 B2003.1 SET

38 Munters #3 FAULT X47 — Munters#3 Fault E:DDHA03 B2003.2 SET

39 Munters #4 FAULT X50 — Munters#4 Fault E:DDHA04 B2003.3 SET

40 Munters #5 FAULT X51 — Munters#5 Fault E:DDHA05 B2003.4 SET

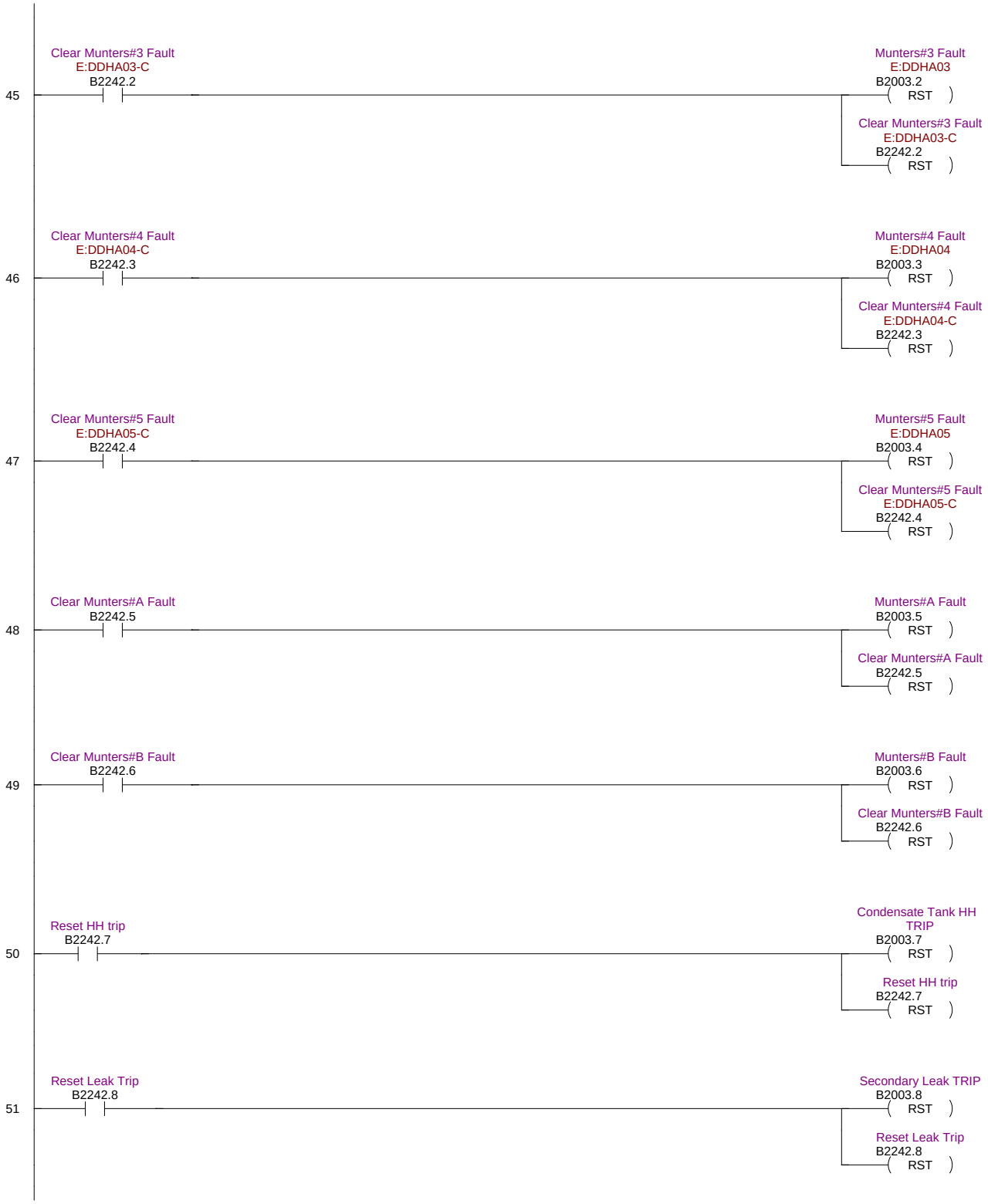
41 Munters #A FAULT X55 — Munters#A Fault B2003.5 SET

42 Munters #B FAULT X56 — Munters#B Fault B2003.6 SET

****
FAULT RESETS
****

43 Clear Munters#1 Fault E:DDHA01-C B2242.0 — Munters#1 Fault E:DDHA01 B2003.0 RST; Clear Munters#1 Fault E:DDHA01-C B2242.0 RST

44 Clear Munters#2 Fault E:DDHA02-C B2242.1 — Munters#2 Fault E:DDHA02 B2003.1 RST; Clear Munters#2 Fault E:DDHA02-C B2242.1 RST


45
Clear Munters#3 Fault
E:DDHA03-C
B2242.2
Munters#3 Fault
E:DDHA03
B2003.2
RST
Clear Munters#3 Fault
E:DDHA03-C
B2242.2
RST
46
Clear Munters#4 Fault
E:DDHA04-C
B2242.3
Munters#4 Fault
E:DDHA04
B2003.3
RST
Clear Munters#4 Fault
E:DDHA04-C
B2242.3
RST
47
Clear Munters#5 Fault
E:DDHA05-C
B2242.4
Munters#5 Fault
E:DDHA05
B2003.4
RST
Clear Munters#5 Fault
E:DDHA05-C
B2242.4
RST
48
Clear Munters#A Fault
B2242.5
Munters#A Fault
B2003.5
RST
Clear Munters#A Fault
B2242.5
RST
49
Clear Munters#B Fault
B2242.6
Munters#B Fault
B2003.6
RST
Clear Munters#B Fault
B2242.6
RST
50
Reset HH trip
B2242.7
Condensate Tank HH
TRIP
B2003.7
RST
Reset HH trip
B2242.7
RST
51
Reset Leak Trip
B2242.8
Secondary Leak TRIP
B2003.8
RST
Reset Leak Trip
B2242.8
RST

52 Reset Glycol Temp Trip B2242.9 → Glycol Supply Temp Hi TRIP B2003.9 RST; Reset Glycol Temp Trip B2242.9 RST

53 Reset Glycol flow trip B2242.10 → Glycol Flow TRIP B2003.10 RST; Reset Glycol flow trip B2242.10 RST

****
MUNTERS ON/OFF CONTROL
****

54 Munters#1 RUN/stop E:DDHS01 B2241.0 → Munters#1 RUN contact Y3 OUT

55 Munters#2 RUN/stop E:DDHS02 B2241.1 → Munters#2 RUN contact Y4 OUT

56 Munters#3 RUN/stop E:DDHS03 B2241.2 → Munters#3 RUN contact Y5 OUT

57 Munters#4 RUN/stop E:DDHS04 B2241.3 → Munters#4 RUN contact Y6 OUT

58 Munters#5 RUN/stop E:DDHS05 B2241.4 → Munters#5 RUN contact Y7 OUT

Keep TPDA and TPDB off if there is a problem.

59 Munters#A RUN/stop B2241.5 ∧ Condensate System Trip C0 → Munters#A RUN contact Y0 OUT

60 Munters#B RUN/stop B2241.6 ∧ Condensate System Trip C0 → Munters#B RUN contact Y1 OUT

****
ALARMS AND TRIPS
****

Latch each trip and send ACNET a corresponding real-time status

The Glycol Klixon is closed when the supply temp is less than 55F.
The Secondary Leak closes when water is detected.
The Glycol Flow Switch is closed when the chiller is running.
The HH switch closes when the tank float is up.

61 — Glycol Supply Klixon X401 (NC) → Glycol Supply Temp Hi TRIP B2003.9 (SET); Glycol Temp Status B2001.9 (OUT)

62 — Secondary Leak X402 (NO) → Secondary Leak TRIP B2003.8 (SET); Secondary Leak Status B2001.8 (OUT)

63 — Glycol Flow Switch X400 (NC) → Glycol Flow TRIP B2003.10 (SET); Glycol Flow Status B2001.10 (OUT)

64 — Condensate Tank HH X57 (NO) → Condensate Tank HH TRIP B2003.7 (SET); Tank HH Status B2001.7 (OUT)

If a problem exists, stop TPDA and TPDB and require operations to restart them.

65 — Condensate Tank HH TRIP B2003.7 (NO) OR Secondary Leak TRIP B2003.8 (NO) OR Glycol Supply Temp Hi TRIP B2003.9 (NO) OR Glycol Flow TRIP B2003.10 (NO) → Condensate System Trip C0 (OUT); Munters#A RUN/stop B2241.5 (RST); Munters#B RUN/stop B2241.6 (RST)

Send the chiller and the Evap PLC a permit if the tank is not HH and there is no leak.

66 — Condensate Tank HH TRIP B2003.7 (NC) AND Secondary Leak TRIP B2003.8 (NC) → Chiller Permit Y11 (OUT); Evap PLC permit Y10 (OUT)

Remove Beam Permit if anything is wrong with the water collection

67 — Condensate System Trip C0 (NC) — Condensate System Beam Permit Y12 OUT

****
PROCESS ANALOG I/O
****

Keep both 3-way valves full open until I can implement PID loops on each one

68 — _On SP1
- LD K333
- OUT VOUT Ch10 Munters A V10011
- OUT VOUT Ch11 Munters B V10012

69 — _On SP1
- LD 1-4 MADC raw data base address MADC1-4_Base V10040
- OUT Condensate Tank Level to ACNET E:TPDLCT V2211

70 — _On SP1
- LD 1-4 MADC raw data base address MADC1-4_Base V10040
- OUT VOUT Ch16 Barrel Fill Stn Dispaly V10017

Read, convert and scale the pump discharge pressure at the condensate tank.
Range is 0 to 400 psig. SF=400/4096=.09765625

71 — _On SP1
- LD MCP1 and MCP2 discharge pressure V10041
- BTOR
- MULR R0.09765625
- OUTD MCP Discharge Pressure to ACNET V2610

Read, convert, and scale pump motor 1 current.
Range is 0-5A. SF=5/4096=.001220703125

72 _On SP1 — LD MCP1 Motor Current V10042 — BTOR — MULR R0.001220703 — OUTD MCP1 Current to ACNET V2612

Read, convert, and scale pump motor 2 current.
Range is 0-5A. SF=5/4096=.001220703125

73 _On SP1 — LD MCP2 Motor Current V10043 — BTOR — MULR R0.001220703 — OUTD MCP2 Current to ACNET V2614

Read, convert, and scale fill station motor current.
Range is 0-5A. SF=5/4096=.001220703125

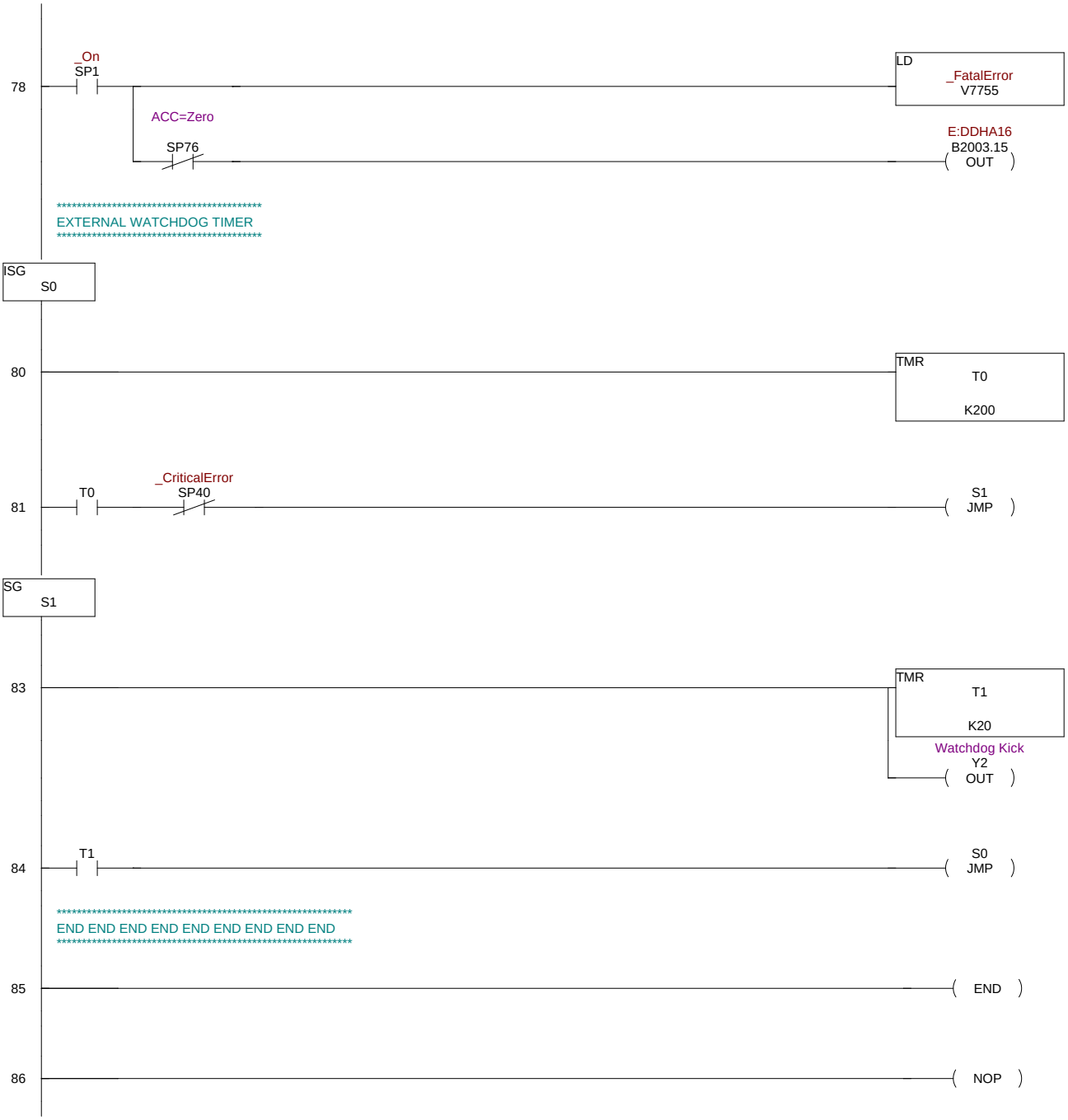
74 _On SP1 — LD Fill Station Motor Current V10044 — BTOR — MULR R0.001220703 — OUTD FIll Stn Current to ACNET V2616

****
HEARTBEAT AND PLC ERRORS
****

75 _On SP1 — INCB Heartbeat Counter E:DDHA17 V2210

76 _On SP1 — LD _Error V7756
ACC=Zero SP76 — E:DDHA14 B2003.13 OUT

77 _On SP1 — LD _Warning V7757
ACC=Zero SP76 — E:DDHA15 B2003.14 OUT


78
_On
SP1
LD
_FatalError
V7755
ACC=Zero
SP76
E:DDHA16
B2003.15
OUT
****
EXTERNAL WATCHDOG TIMER
****
ISG
S0
80
TMR
T0
K200
81
T0
_CriticalError
SP40
S1
JMP
SG
S1
83
TMR
T1
K20
Watchdog Kick
Y2
OUT
84
T1
S0
JMP
****
END END END END END END END END END
****
85
END
86
NOP