System Analysis and Report

NMRN – Holland I Submarine

Airconditioning, Dehumidification and Ventilation Systems

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Background

Stream Marine have been asked to provide a report into the status of the HVAC systems at NMRN, Holland I submarine exhibit building

Stream Marine carried out a site survey on Friday 12th and Monday 22nd May with a view to ascertaining what systems are functioning, what can be salvaged and put to good use in the future, and what requires replacement.

We have furthermore undertaken to calculate what cooling requirement would be expected to be needed in order to ascertain whether the current system is sufficient.

Brief

The brief sets out the requirements for artificial environment within the submarine gallery itself. The current environment is reliant on a bespoke air-handling system to the gallery. It includes an intelligent Building Management System that is not functioning, dehumidification and heating within the controlled room. The system suffers from there being no alarm to alert staff to a trip, breakdown or other malfunction.

Further to the installation of the air handling system, NMRN wish to address the issue of solar gain within the gallery. A large glass wall makes up one side of the gallery. Solar gain during sunny periods attributes to its high temperatures and low humidity, creating an unsuitable environment for both visitors and Holland 1.

Existing System

The existing HVAC system consists of two desiccant dehumidifiers which process the air in order to produce an appropriate environment for the submarine. The air handling plant circulates air round the space, and two separate heat pumps provide cooling and heating for the area. One heat pump is devoted to the underfloor heating system, and the other can provide cooling or heating to the AHU coil.

More details of the system can be found in Appendix 1, the system general description from the O & M documentation.

The Trend control system consists of two parts, a main controller and an auxiliary for more inputs and outputs. Appendices 2 and 3 give further details as to these, which are downloads from the Trend software.

Investigations

Findings – Control System

The control system was generally found to be performing normally. The front panel showed a few error lights, and we suspect that some bulbs are blown and therefore not showing accurately, but broadly speaking the control panel reflected the system functionality well.

There is some confusion as to the operation of the heat pumps under different settings, and a label was found indicating two separate settings for “Summer” and “Winter”. This is a misnomer, the actual functionality of the switch labelled is to join the two heat pumps together in the event of the UFH system not being functioning, and heating via the AHU being required.

The Trend Network Display Panel is not working, and is not wired, reason unclear. This screen could offer the staff valuable insight and should be brought back into service.

The temperature sensor readings do not appear to be very accurate, so calibration would be advantageous.

Findings – Ductwork and Airside

The ductwork design is not well understood as the drawings given do not include this, and a lack of ductwork hatches renders it very difficult to view the interior of the ductwork and in particular the operation of dampers.

However the system ductwork design appears to be quite muddled, with the supply and return sides of the system connected together unnecessarily, albeit with available dampers to limit the backflow. This may have been intentional but if so the purpose is unclear.

The majority of the damper motors that operate the dampers are removed from the spindles, and large number of the dampers themselves are not operational, either due to the spindles breaking or being stuck.

There is only one fan within the AHU, although the control panel indicates that there are two. This fan is working acceptably.

Toilet extract systems appear to be performing OK.

Ductwork insulation is tatty in places and requires refurbishment.

Findings – Heat Pumps

One of the heat pumps appear to be working acceptably, although there is a fault on the other that indicates a pump failure.

Findings – Heat Gain Calculations

It has not been possible to establish with 100% accuracy the U value of the building envelope, but based on reasonable worst case scenario, and assuming that the plant can still provide most of the

rated specification, then the existing cooling capacity is certainly adequate for the requirement. Calculations provided in the appendix.

Findings – Pipework

The majority of the damper motors that operate the valves are removed from the spindles, but most of the valves appear to function.

The pipework suffers from a lack of labelling, there are some labels with flow direction but they are not consistent.

The Grundfos pumps all appear to work but require cleaning and maintenance.

Findings – Dehumidifiers

One of the dehumidifiers is working, and the wheel is turning, but the other does not show any signs of life.

Remedial Works

It is proposed to split the remedial works into phases, with the second phase consisting of items that require the investigations from the first phase to be complete before they are confirmed to be necessary. The third phase will then consist of works that would add value to the system but do not inhibit current operation.

First Phase – Minimum necessary works

Ductwork

Label all ductwork correctly with airflow direction

Add all necessary access panels to observe damper positions

Check all damper positions and ensure correct placement

Replace Joventa damper motors as required

Repair insulation throughout

Add manual damper for plant room extract

Heat Pumps

Replace Wilo pump in Airedale chiller

Chiller servicing and recommissioning

Dehumidifiers

Dehumidifier servicing and recommissioning

Control System

Replace non-functional sensors

Recalibrate correct ones

Get panel key for access

Repair or replace Trend NDP as required

Replace all bulbs in front panel

Pipework

Repair leak on UFH header

Label all pipework correctly with flow direction

Replace flow meters including depressurising system

Check Warmafloor UFH valves

Check all valve positions

Clean out Grundfos pumps and replace as required

Replace Joventa valve motors if necessary

Solar issue

Add film to windows in main glazed area, with calculations of expected heat reduction, and indication of visual reductions from outside, and any darkening to the interior

Second Phase – Recommended

Ductwork

Reposition supply air grilles to ensure best airflow

Recommission airflows throughout

Replace dampers as necessary

Mark all damper positions clearly on the outside

Recommission system and take temperature and airflow readings for future

Tidy up plantroom and leave in good condition

Third Phase – Suggested

Provide remote alarm box to allow easy monitoring of system for staff

Install PC to give remote access during non-work hours

Clean ductwork

Ensure lights are working in plantroom

Provide additional fan motor for future breakdown, as this is single point of failure

Appendix 1 – Existing System O & M Manual General Description

2. GENERAL INFORMATION

Holland 1 Museum requires a controlled environment to help preserve the Submarine.

The dehumidification of Holland 1 Gallery is by means of a desiccant dehumidifier. This is the only type of system capable of removing the moisture brought in by visitors and maintaining the required storage conditions for the boat. Heat pumps have been installed to provide both cooling and heating to the Gallery. The heat pumps provide cooling in the Summer and heating during the Winter.

2.1.1 LPHW Heating

Heating to the Gallery and ancillary areas is by underfloor heating coils complete with control manifold interconnected to local room thermostats as indicated on the drawings.

The complete underfloor heating system has been installed and commissioned by the Specialist Contractor, Warmafloor (GB) Ltd, 42 Botley Road, Park Gate, Southampton SO31 1AJ.

Low pressure hot water is provided by an Airedale Model KKHS7 external heat pump.

The heat pump is complete with its own integral controls and is controlled via the new BMS system which is fully described within Section 4 of this manual.

A fully automatic pressurisation unit, model pressfill AX-TW2 complete with expansion vessel and high and low level pressure switches has been installed in the upper plant room to provide automatic cold feed and expansion to the system.

A twin headed Grundfos model UPSD32-50 circulating pump has been installed in the position, as indicated on the drawings.

All new LPHW pipework has been installed using copper tube with capillary soldered joints.

Isolating and balancing valves have been installed in the positions as indicated on the drawings to provide correct balancing and isolation facilities to the system.

Air vents have been installed at all high points with draincocks at all low points to facilitate correct maintenance for the system.

All pipework has been thermally insulated to the requirements of the Specification.

On completion the system has been tested, commissioned and treated with chemical inhibitor.

2.1.2 Ventilation & Air Conditioning

Ventilation & Air Conditioning is provided to the Gallery area by a packaged air handling unit connected by a galvanised ductwork system to 4 in number supply jet diffusers and 2 in number extract grilles installed in the Gallery, as indicated on the drawings.

The air handling unit is complete with panel filter section, two 26kw heating/cooling coils (one duty, one standby) and a fan section complete with duty/standby motors.

The cooling/heating coils are connected by a copper pipework system to a Airedale model KKHS7 external heat pump.

Automatic change-over valves to the cooling/heating coils have been installed as indicated on the drawing.

The pipework system is complete with its own Grundfos model UPSD 40-80F twin circulating pump and is connected to the pressurisation unit.

The pipework system has been designed and installed to change-over from heat pump no.2 (air handling circuit) to heat pump no.1 (underfloor heating circuit) in case heat pump no.2 fails.

Isolating and balancing valves have been installed in the positions as indicated on the drawings to provide correct balancing and isolation facilities for the system.

Two in number electric re-activated desiccant dehumidifiers , model R 062 as manufactured by Humidity Control Systems Ltd have been supplied and installed to provide humidity control for the system. The units are installed and interconnected to provide duty and standby facility to the system.

All ductwork has been manufactured and installed to ductwork standard Specification DW142.

Upon completion both the water system and ductwork systems have been commissioned to CIBSE Requirements & Recommendations.

2.1.3 Toilet & Presentation Area Extract Systems

The toilet areas and presentation areas have been provided with their own individual extract systems.

Each extract system is complete with its own extract fan, galvanised ductwork system and extract grilles, all as indicated on the drawings.

Both systems are fully automatic and controlled by the BMS system. Both systems have been fully commissioned by the Specialist Commissioning Engineers to the requirements and recommendations of the CIBSE.

2.1.4 Domestic Hot & Cold Water

Hot water to the wc wash hand basins and cleaners sink is provided by a Heatrae Sadia Megaflow 125 litre hot water heater installed in the plant room.

A new cold water main enters the building in the plant room and is complete with main isolating stopcock and double check valve.

Mains cold water is supplied to the heating/cooling pressursiation unit, hot water megaflow and to all wc's, wash hand basins and cleaners sink.

All hot and cold water pipework has been installed using copper tube with capillary soldered joints.

Isolating valves have been installed to all items of equipment with draincocks at all low points to facilitate correct isolation and maintenance for the system.

All hot and cold water pipework in voids, ducts and in the plant room has been thermally insulated to the requirements of the Specification.

The complete hot and cold water pipework system has been chlorinated and sterilised to the requirements of the Local Water Authority.

2.1.5 Sanitaryware, Soils & Waste System

The following sanitaryware has been supplied and installed as indicated on the drawings.

i	WC Pans & Cisterns	-	Armitage Shanks Marnia wc pans and cisterns with orion seats
ii	Wash Hand Basins	-	Armitage Shanks 500mm Portman, Nuastyle pillar taps and 32mm waste
iii	Cleaners Sink	-	Armitage Shanks 'Alder' cleaners sink complete with 15mm CP taps, 75mm trap, brackets, legs and bucket cratings

Appendix 2 – Trend Main Controller

Telephone:

Fax:

Email:

Address Module	
Supervisor Port	22
NDP Address	0
Alarm Address	1
Remote Lan	0
Text Switch	ON
Identifier	Holland 1 OS20
Attribute F	
Attribute G	
Attribute H	
Attribute I	
Attribute J	
Attribute K	
Firmware Version	IQ241 Iss3.00 Mar 20 2001
Loader Issue	Loader Iss 2.21 Mar 01 2001
Serial Number	81040187

Issue	Revision	Project Change Note / Comments	Pages Affected	Date Approved	Approved By
0	1				

Notes

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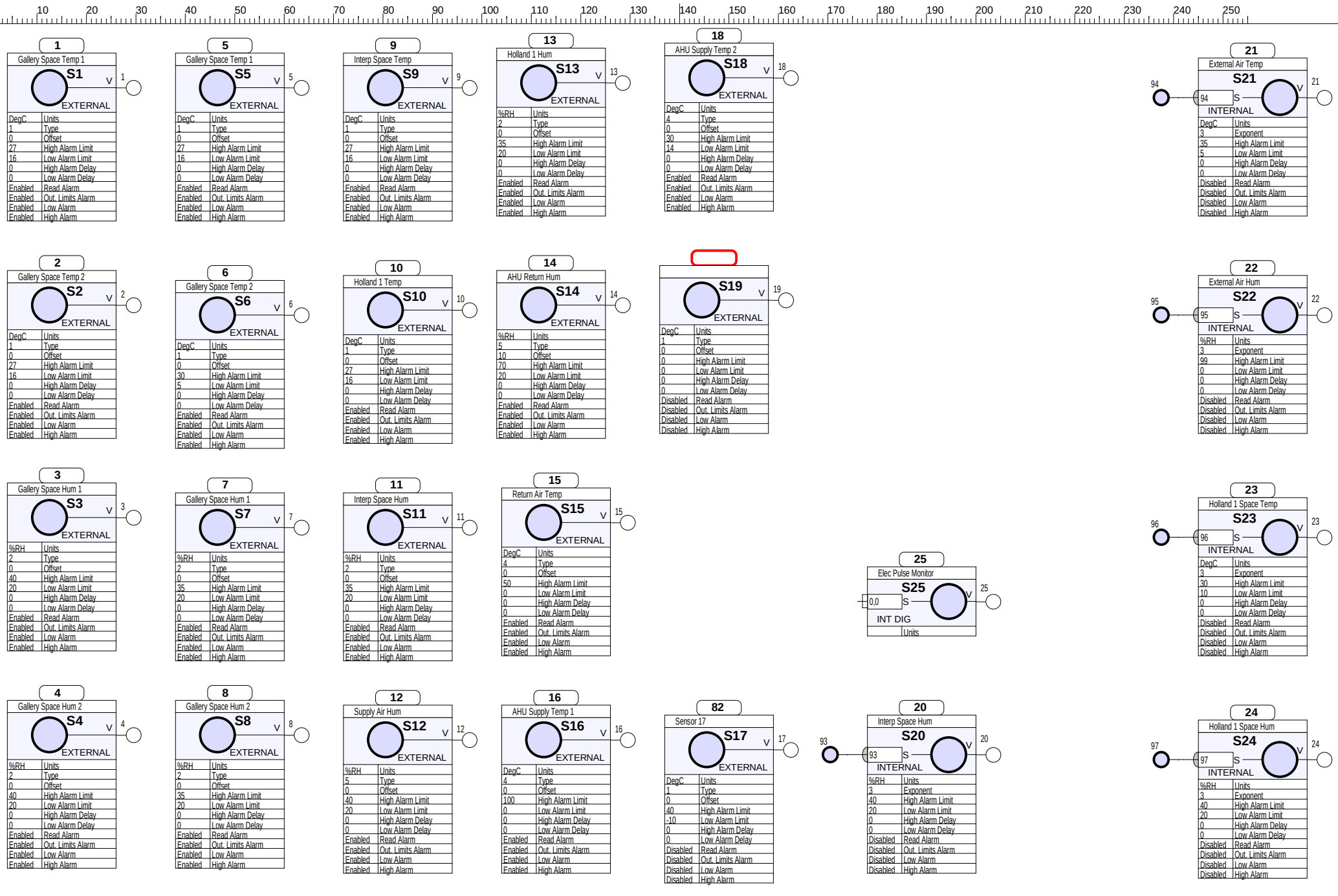
Client:			
Details:			
Drawn By:	Engineer		
Engineer:			
Controller Type:	IQ 241		
Project Number:	Stream	**Date:**	12/05/2017
Outstation: 020	**Lan:** 000	**Page:**	01 of 10

Holland 1 OS20

Strategy pages



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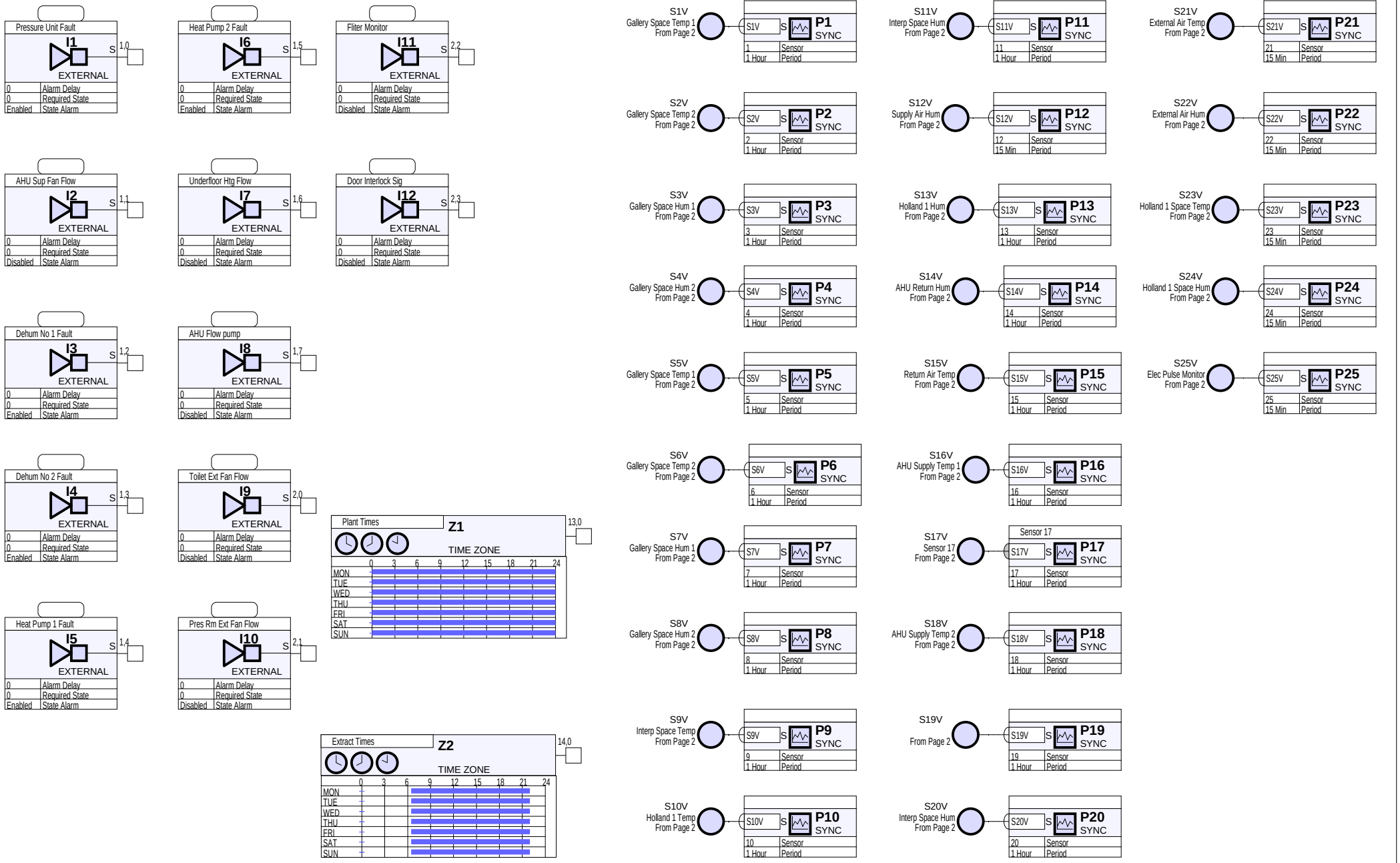

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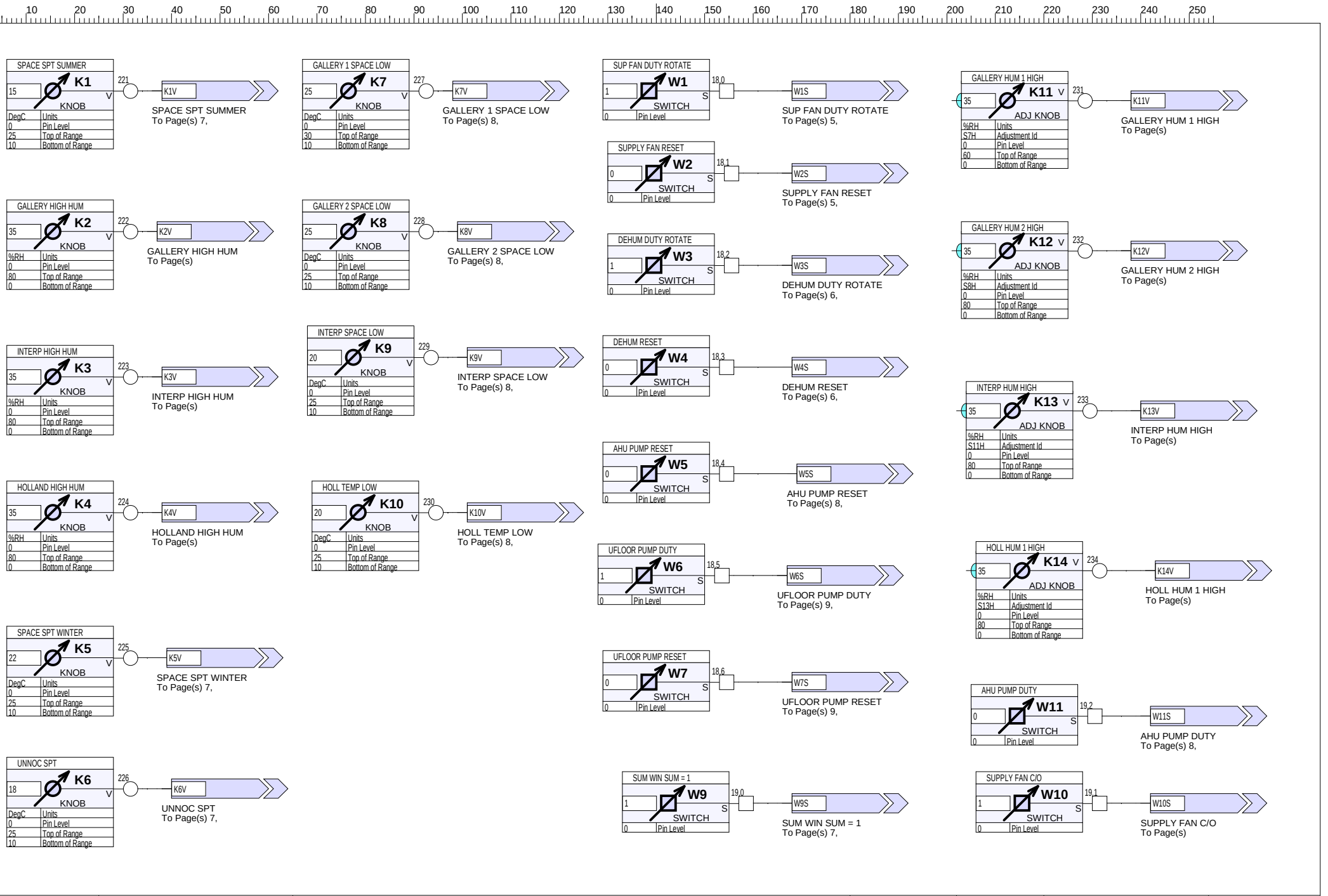

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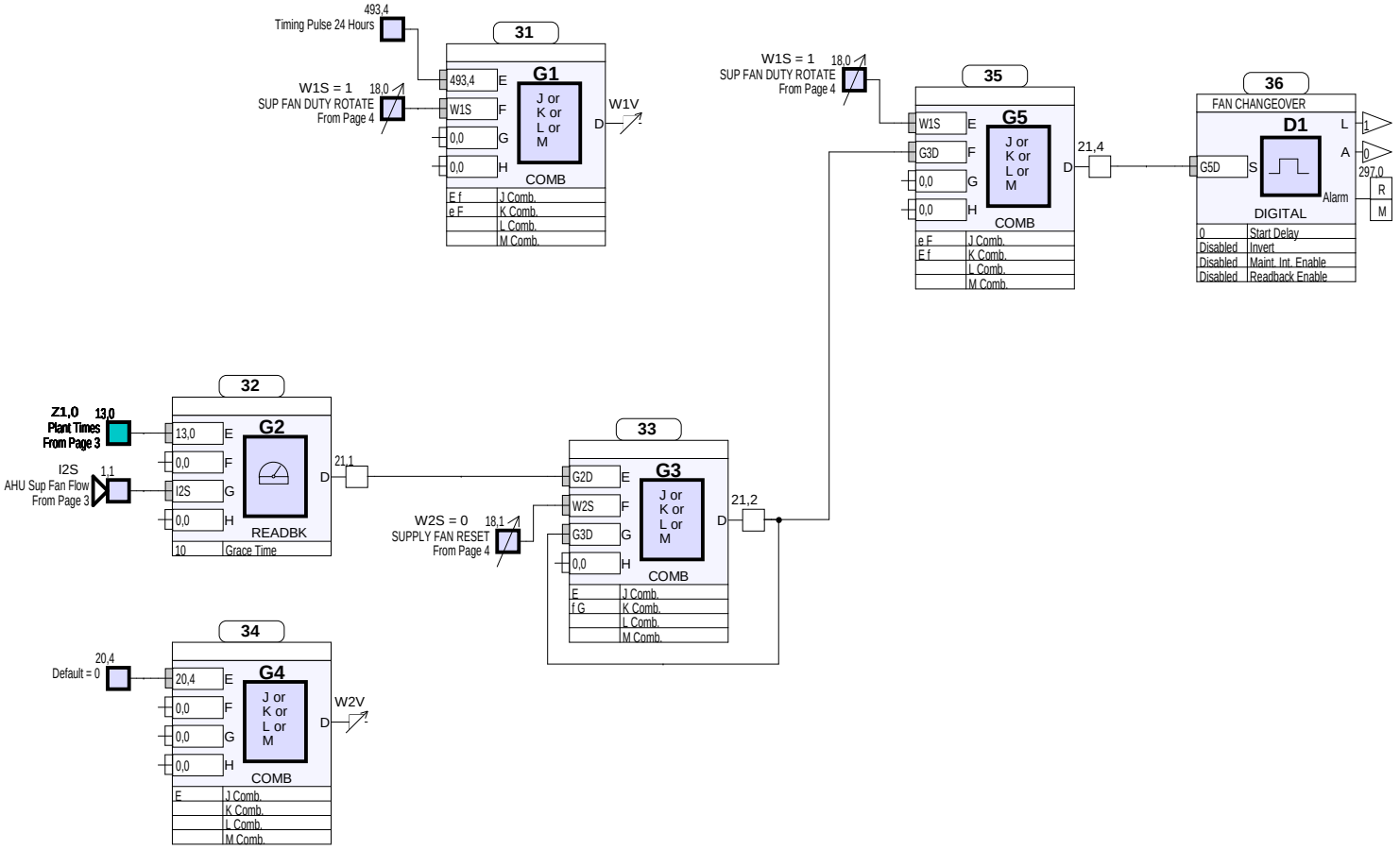

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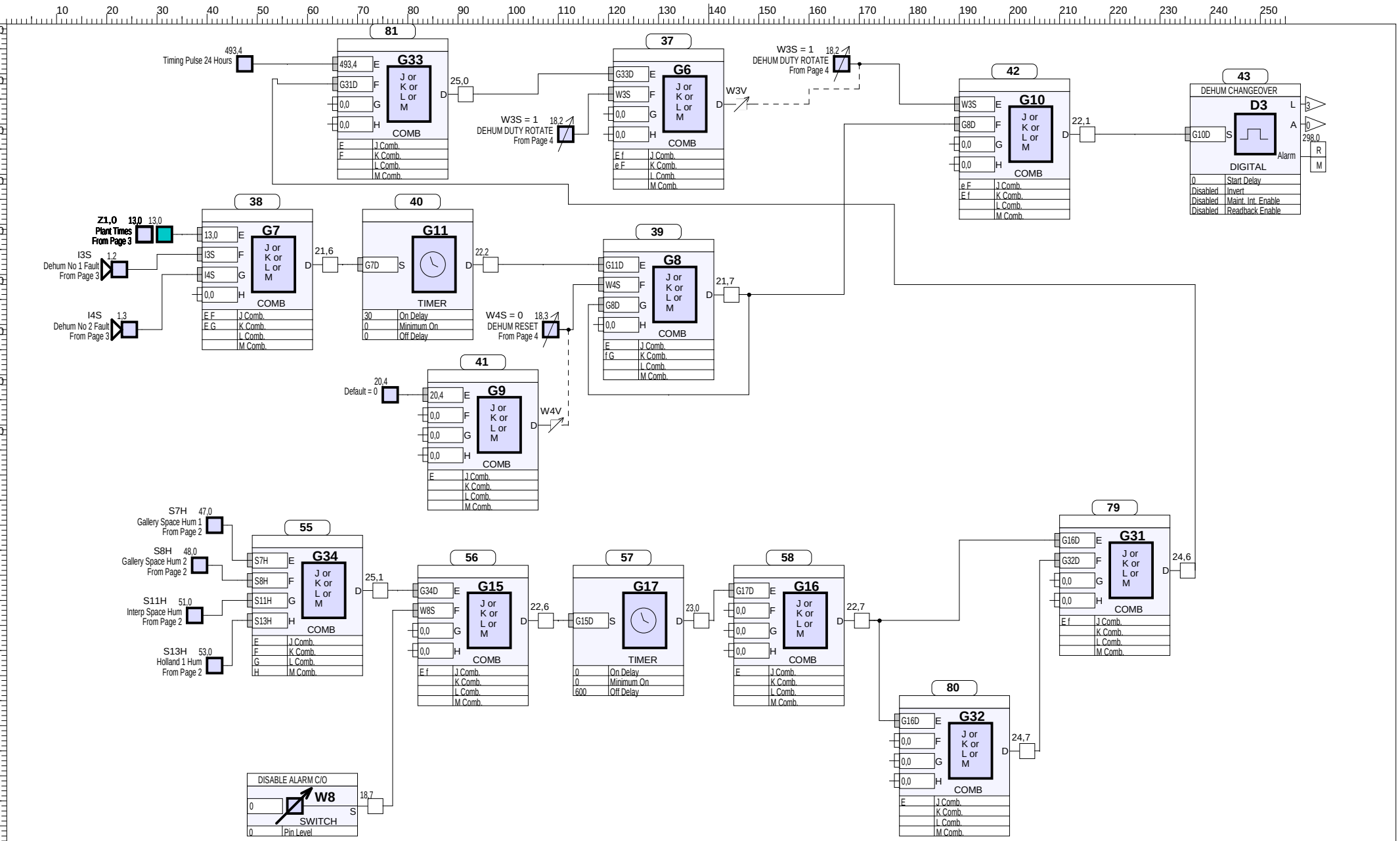

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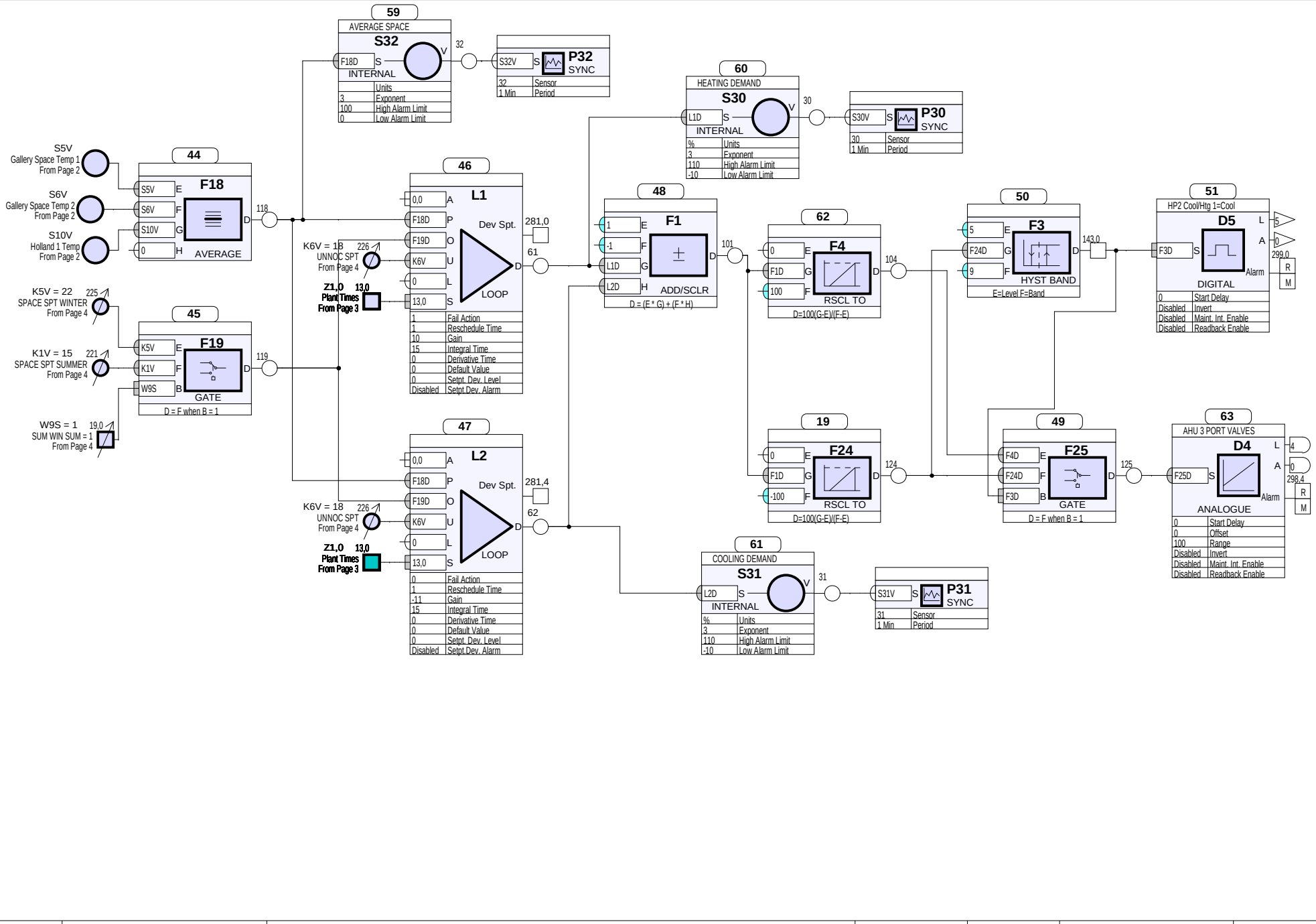

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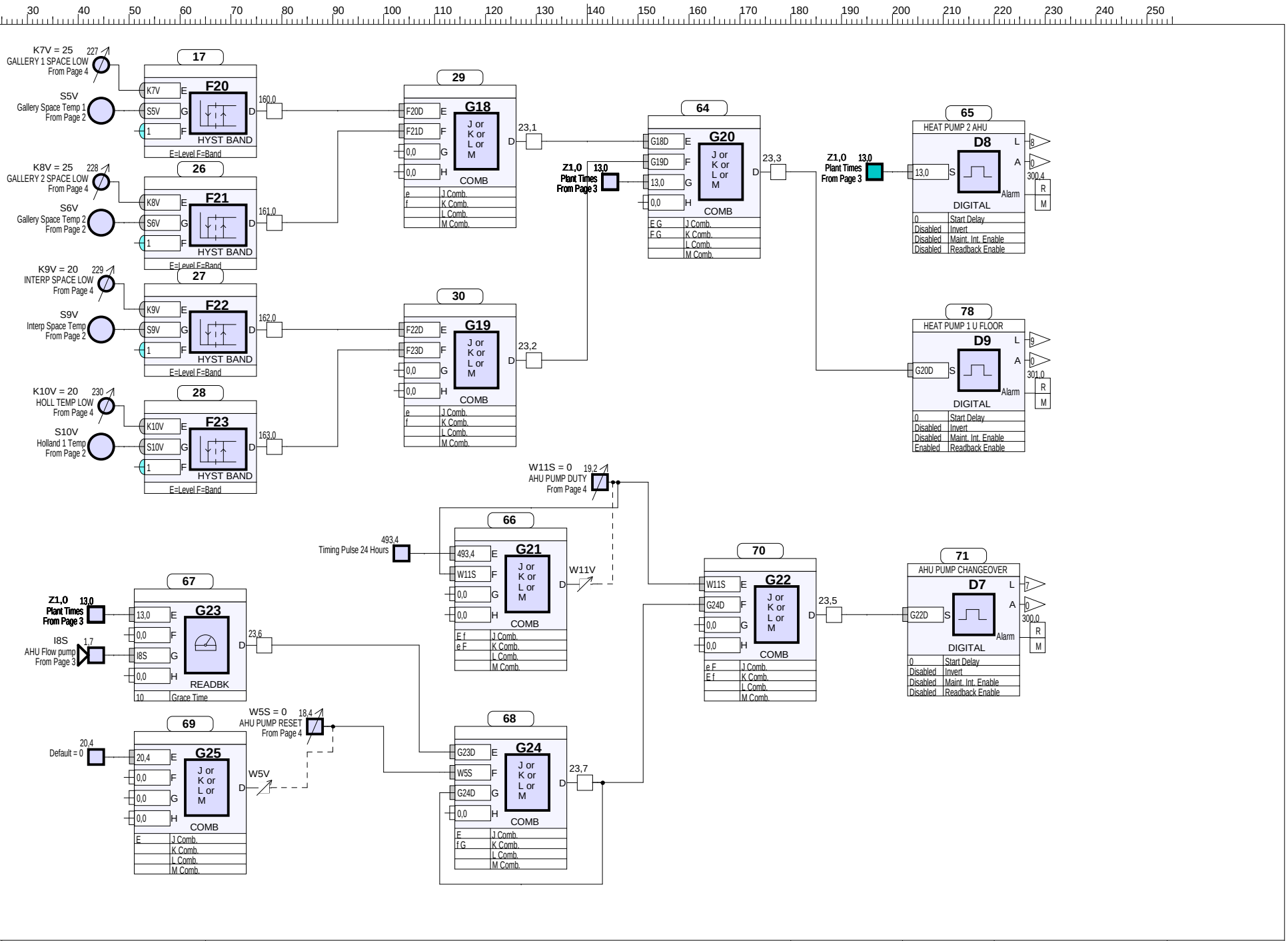

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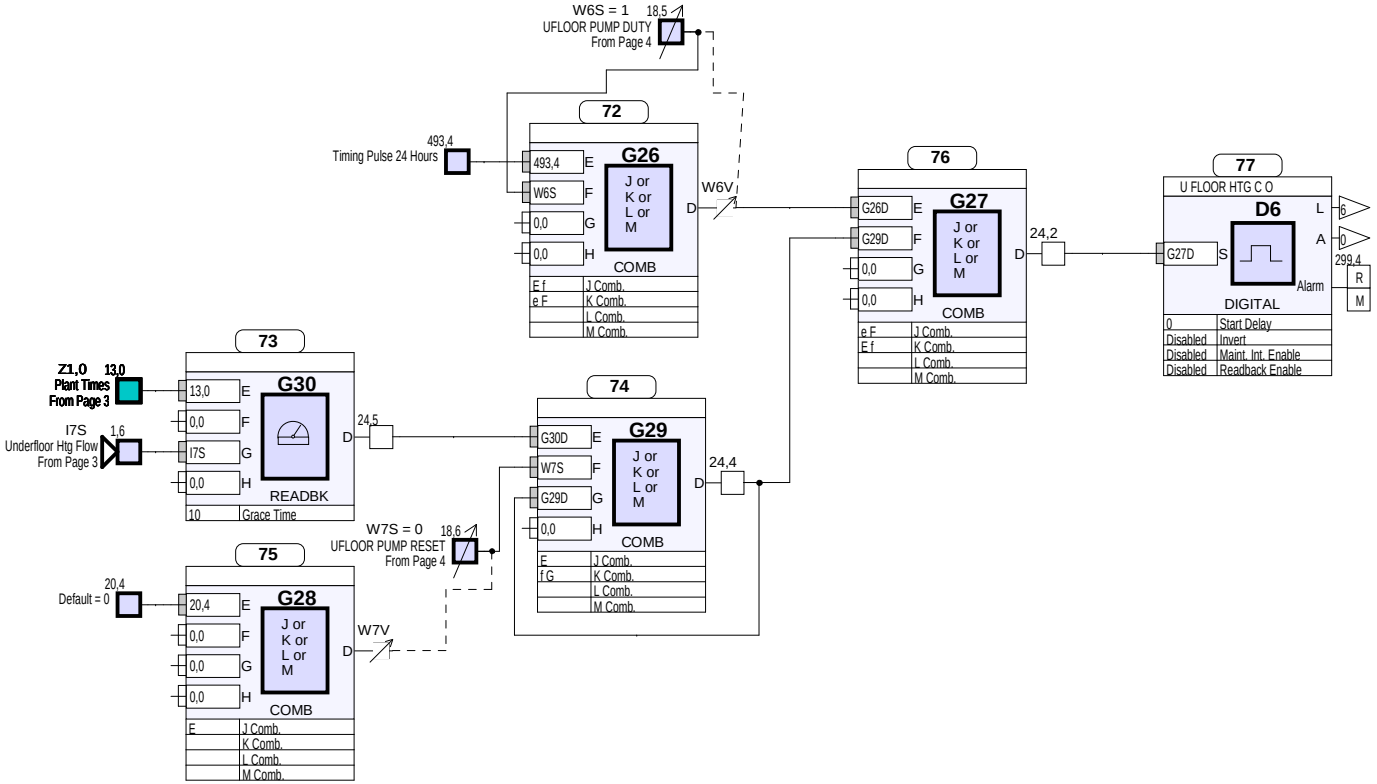

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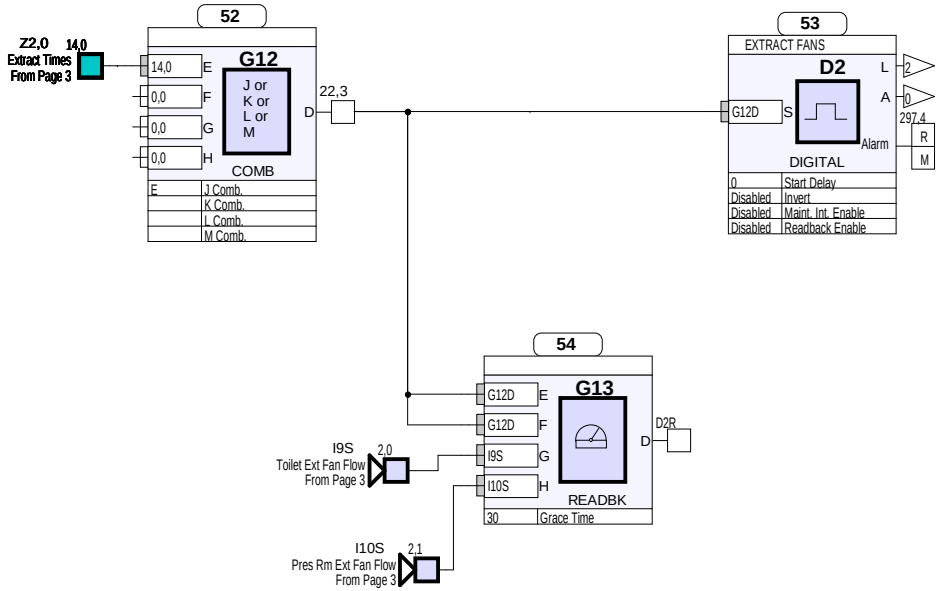

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						Outstation: 020	**Page:** 10 of 10

Address Module	
Identifier	Holland 1 OS20
Attribute F (2)	
Attribute G (3)	
Attribute H (4)	
Attribute I (5)	
Attribute J (6)	
Attribute K (7)	
Local Lan / Address	0 / 20
General Alarm Group	0
Language Default	
Installed Languages	
Supervisor Port	22
Version	IQ241 Iss3.00 Mar 20 2001

Sensor Number	Type	Label	Units	S.E.T. Part Number	High Alarm Limit	High Alarm Delay	Low Alarm Limit	Low Alarm Delay	Offset	Source	Exp.	Alarm Enable Byte	Alarm Enable ROLH	Alarm Byte	Ackn. Byte
1	1	Gallery Space Temp 1	DegC	1 - H/ST/T Thermistor	27	0	16	0	0			407	1 1 1 1	41	315
2	1	Gallery Space Temp 2	DegC	1 - H/ST/T Thermistor	27	0	16	0	0			408	1 1 1 1	42	316
3	1	Gallery Space Hum 1	%RH	2 - H/DT/H	40	0	20	0	0			409	1 1 1 1	43	317
4	1	Gallery Space Hum 2	%RH	2 - H/DT/H	40	0	20	0	0			410	1 1 1 1	44	318
5	1	Gallery Space Temp 1	DegC	1 - H/ST/T Thermistor	27	0	16	0	0			411	1 1 1 1	45	319
6	1	Gallery Space Temp 2	DegC	1 - H/ST/T Thermistor	30	0	5	0	0			412	1 1 1 1	46	320
7	1	Gallery Space Hum 1	%RH	2 - H/DT/H	35	0	20	0	0			413	1 1 1 1	47	321
8	1	Gallery Space Hum 2	%RH	2 - H/DT/H	35	0	20	0	0			414	1 1 1 1	48	322
9	1	Interp Space Temp	DegC	1 - H/ST/T Thermistor	27	0	16	0	0			415	1 1 1 1	49	323
10	1	Holland 1 Temp	DegC	1 - H/ST/T Thermistor	27	0	16	0	0			416	1 1 1 1	50	324
11	1	Interp Space Hum	%RH	2 - H/DT/H	35	0	20	0	0			417	1 1 1 1	51	325
12	1	Supply Air Hum	%RH	5 - H/DT/H	40	0	20	0	0			418	1 1 1 1	52	326
13	1	Holland 1 Hum	%RH	2 - H/DT/H	35	0	20	0	0			419	1 1 1 1	53	327
14	1	AHU Return Hum	%RH	5 - H/DT/H	70	0	20	0	10			420	1 1 1 1	54	328
15	1	Return Air Temp	DegC	4 - H/DT/T Thermistor	50	0	0	0	0			421	1 1 1 1	55	329
16	1	AHU Supply Temp 1	DegC	4 - H/DT/T Thermistor	100	0	0	0	0			422	1 1 1 1	56	330
17	1	Sensor 17	DegC	1 - H/ST/T Thermistor	40	0	-10	0	0			423	0 0 0 0	57	331
18	1	AHU Supply Temp 2	DegC	4 - H/DT/T Thermistor	30	0	14	0	0			424	1 1 1 1	58	332
19	1		DegC	1 - H/ST/T Thermistor	0	0	0	0	0			425	0 0 0 0	59	333
20	2	Interp Space Hum	%RH		40	0	20	0		93	3	426	0 0 0 0	60	334
21	2	External Air Temp	DegC		35	0	5	0		94	3	427	0 0 0 0	61	335
22	2	External Air Hum	%RH		99	0	0	0		95	3	428	0 0 0 0	62	336
23	2	Holland 1 Space Temp	DegC		30	0	10	0		96	3	429	0 0 0 0	63	337
24	2	Holland 1 Space Hum	%RH		40	0	20	0		97	3	430	0 0 0 0	64	338
25	4	Elec Pulse Monitor								0,0		431	0 0 0 0	65	339
26	0											432	0 0 0 0	66	340
27	0											433	0 0 0 0	67	341
28	0											434	0 0 0 0	68	342
29	0											435	0 0 0 0	69	343
30	2	HEATING DEMAND	%		110	0	-10	0		L1D	3	436	0 0 0 0	70	344
31	2	COOLING DEMAND	%		110	0	-10	0		L2D	3	437	0 0 0 0	71	345
32	2	AVERAGE SPACE			100	0	0	0		F18D	3	438	0 0 0 0	72	346
33	0											439	0 0 0 0	73	347
34	0											440	0 0 0 0	74	348
35	0											441	0 0 0 0	75	349
36	0											442	0 0 0 0	76	350
37	0											443	0 0 0 0	77	351
38	0											444	0 0 0 0	78	352
39	0											445	0 0 0 0	79	353
40	0											446	0 0 0 0	80	354
41	0											447	0 0 0 0	81	355
42	0											448	0 0 0 0	82	356
43	0											449	0 0 0 0	83	357
44	0											450	0 0 0 0	84	358
45	0											451	0 0 0 0	85	359
46	0											452	0 0 0 0	86	360
47	0											453	0 0 0 0	87	361
48	0											454	0 0 0 0	88	362

Dig In Number	Label	Alarm Enable	Delay	Required State	Address Bit	Enable Bit	Required Bit	Ackn. Bit
1	Pressure Unit Fault	1	0	0	1,0	487,0	401,0	395,0
2	AHU Sup Fan Flow	0	0	0	1,1	487,1	401,1	395,1
3	Dehum No 1 Fault	1	0	0	1,2	487,2	401,2	395,2
4	Dehum No 2 Fault	1	0	0	1,3	487,3	401,3	395,3
5	Heat Pump 1 Fault	1	0	0	1,4	487,4	401,4	395,4
6	Heat Pump 2 Fault	1	0	0	1,5	487,5	401,5	395,5
7	Underfloor Htg Flow	0	0	0	1,6	487,6	401,6	395,6
8	AHU Flow pump	0	0	0	1,7	487,7	401,7	395,7
9	Toilet Ext Fan Flow	0	0	0	2,0	488,0	402,0	396,0
10	Pres Rm Ext Fan Flow	0	0	0	2,1	488,1	402,1	396,1
11	Fliter Monitor	0	0	0	2,2	488,2	402,2	396,2
12	Door Interlock Sig	0	0	0	2,3	488,3	402,3	396,3
13					2,4	488,4	402,4	396,4
14					2,5	488,5	402,5	396,5
15					2,6	488,6	402,6	396,6
16					2,7	488,7	402,7	396,7
17					3,0	489,0	403,0	397,0
18					3,1	489,1	403,1	397,1
19					3,2	489,2	403,2	397,2
20					3,3	489,3	403,3	397,3
21					3,4	489,4	403,4	397,4
22					3,5	489,5	403,5	397,5
23					3,6	489,6	403,6	397,6
24					3,7	489,7	403,7	397,7
25					4,0	490,0	404,0	398,0
26					4,1	490,1	404,1	398,1
27					4,2	490,2	404,2	398,2
28					4,3	490,3	404,3	398,3
29					4,4	490,4	404,4	398,4
30					4,5	490,5	404,5	398,5
31					4,6	490,6	404,6	398,6
32					4,7	490,7	404,7	398,7
33					5,0	491,0	405,0	399,0
34					5,1	491,1	405,1	399,1
35					5,2	491,2	405,2	399,2
36					5,3	491,3	405,3	399,3
37					5,4	491,4	405,4	399,4
38					5,5	491,5	405,5	399,5
39					5,6	491,6	405,6	399,6
40					5,7	491,7	405,7	399,7
41					6,0	492,0	406,0	400,0
42					6,1	492,1	406,1	400,1
43					6,2	492,2	406,2	400,2
44					6,3	492,3	406,3	400,3
45					6,4	492,4	406,4	400,4
46					6,5	492,5	406,5	400,5
47					6,6	492,6	406,6	400,6
48					6,7	492,7	406,7	400,7

Knob Number	Label	Units	Value	ID	Max. Level	Min. Level	Pin Level	Node
1	SPACE SPT SUMMER	DegC	15		25	10	0	221
2	GALLERY HIGH HUM	%RH	35		80	0	0	222
3	INTERP HIGH HUM	%RH	35		80	0	0	223
4	HOLLAND HIGH HUM	%RH	35		80	0	0	224
5	SPACE SPT WINTER	DegC	22		25	10	0	225
6	UNNOC SPT	DegC	18		25	10	0	226
7	GALLERY 1 SPACE LOW	DegC	25		30	10	0	227
8	GALLERY 2 SPACE LOW	DegC	25		25	10	0	228
9	INTERP SPACE LOW	DegC	20		25	10	0	229
10	HOLL TEMP LOW	DegC	20		25	10	0	230
11	GALLERY HUM 1 HIGH	%RH	35	S7H	60	0	0	231
12	GALLERY HUM 2 HIGH	%RH	35	S8H	80	0	0	232
13	INTERP HUM HIGH	%RH	35	S11H	80	0	0	233
14	HOLL HUM 1 HIGH	%RH	35	S13H	80	0	0	234
15								235
16								236
17								237
18								238
19								239
20								240
21								241
22								242
23								243
24								244
25								245
26								246
27								247
28								248
29								249
30								250

Switch Number	Label	Status	Pin Level State	Node Bit
1	SUP FAN DUTY ROTATE	1	0	18,0
2	SUPPLY FAN RESET	0	0	18,1
3	DEHUM DUTY ROTATE	1	0	18,2
4	DEHUM RESET	0	0	18,3
5	AHU PUMP RESET	0	0	18,4
6	UFLOOR PUMP DUTY	1	0	18,5
7	UFLOOR PUMP RESET	0	0	18,6
8	DISABLE ALARM C/O	0	0	18,7
9	SUM WIN SUM = 1	1	0	19,0
10	SUPPLY FAN C/O	1	0	19,1
11	AHU PUMP DUTY	0	0	19,2
12				19,3
13				19,4
14				19,5
15				19,6
16				19,7
17				20,0
18				20,1
19				20,2
20				20,3

Driver Number	Label	Type	Source	Delay	Inv?	Analogue Offset	Analogue Range	TP+Override Period	TP+Override Override	Raise/Lower Drive	Raise/Lower Feedbk	Hysteresis On	Hysteresis Off	Channel Phase	Channel Anti Phase
1	FAN CHANGEOVER	1	G5D	0	0									1	0
2	EXTRACT FANS	1	G12D	0	0									2	0
3	DEHUM CHANGEOVER	1	G10D	0	0									3	0
4	AHU 3 PORT VALVES	2	F25D	0	0	0	100							4	0
5	HP2 Cool/Htg 1=Cool	1	F3D	0	0									5	0
6	U FLOOR HTG C O	1	G27D	0	0									6	0
7	AHU PUMP CHANGEOVER	1	G22D	0	0									7	0
8	HEAT PUMP 2 AHU	1	13,0	0	0									8	0
9	HEAT PUMP 1 U FLOOR	1	G20D	0	0									9	0
10		0												0	0
11		0												0	0
12		0												0	0
13		0												0	0
14		0												0	0
15		0												0	0
16		0												0	0
17		0												0	0
18		0												0	0
19		0												0	0
20		0												0	0
21		0												0	0
22		0												0	0
23		0												0	0
24		0												0	0
25		0												0	0
26		0												0	0
27		0												0	0
28		0												0	0
29		0												0	0
30		0												0	0
31		0												0	0
32		0												0	0

Zone 1	Plant Times					
Day	Start 1	Stop 1	Start 2	Stop 2	Start 3	Stop 3
Monday	0:00	24:00	0:00	0:00	0:00	0:00
Tuesday	0:00	24:00	0:00	0:00	0:00	0:00
Wednesday	0:00	24:00	0:00	0:00	0:00	0:00
Thursday	0:00	24:00	0:00	0:00	0:00	0:00
Friday	0:00	24:00	0:00	0:00	0:00	0:00
Saturday	0:00	24:00	0:00	0:00	0:00	0:00
Sunday	0:00	24:00	0:00	0:00	0:00	0:00
Zone 2	Extract Times					
Day	Start 1	Stop 1	Start 2	Stop 2	Start 3	Stop 3
Monday	6:30	22:00	0:00	0:00	0:00	0:00
Tuesday	6:30	22:00	0:00	0:00	0:00	0:00
Wednesday	6:30	22:00	0:00	0:00	0:00	0:00
Thursday	6:30	22:00	0:00	0:00	0:00	0:00
Friday	6:30	22:00	0:00	0:00	0:00	0:00
Saturday	6:30	22:00	0:00	0:00	0:00	0:00
Sunday	6:30	22:00	0:00	0:00	0:00	0:00
Zone 3						
Day	Start 1	Stop 1	Start 2	Stop 2	Start 3	Stop 3
Monday	0:00	0:00	0:00	0:00	0:00	0:00
Tuesday	0:00	0:00	0:00	0:00	0:00	0:00
Wednesday	0:00	0:00	0:00	0:00	0:00	0:00
Thursday	0:00	0:00	0:00	0:00	0:00	0:00
Friday	0:00	0:00	0:00	0:00	0:00	0:00
Saturday	0:00	0:00	0:00	0:00	0:00	0:00
Sunday	0:00	0:00	0:00	0:00	0:00	0:00
Zone 4						
Day	Start 1	Stop 1	Start 2	Stop 2	Start 3	Stop 3
Monday	0:00	0:00	0:00	0:00	0:00	0:00
Tuesday	0:00	0:00	0:00	0:00	0:00	0:00
Wednesday	0:00	0:00	0:00	0:00	0:00	0:00
Thursday	0:00	0:00	0:00	0:00	0:00	0:00
Friday	0:00	0:00	0:00	0:00	0:00	0:00
Saturday	0:00	0:00	0:00	0:00	0:00	0:00
Sunday	0:00	0:00	0:00	0:00	0:00	0:00
Zone 5						
Day	Start 1	Stop 1	Start 2	Stop 2	Start 3	Stop 3
Monday	0:00	0:00	0:00	0:00	0:00	0:00
Tuesday	0:00	0:00	0:00	0:00	0:00	0:00
Wednesday	0:00	0:00	0:00	0:00	0:00	0:00
Thursday	0:00	0:00	0:00	0:00	0:00	0:00
Friday	0:00	0:00	0:00	0:00	0:00	0:00
Saturday	0:00	0:00	0:00	0:00	0:00	0:00
Sunday	0:00	0:00	0:00	0:00	0:00	0:00

1	S1	2	S2	3	S3	4	S4	5	S5	6	S6	7	S7	8	S8
9	S9	10	S10	11	S11	12	S12	13	S13	14	S14	15	S15	16	S16
17	F20	18	S18	19	F24	20	S20	21	S21	22	S22	23	S23	24	S24
25	S25	26	F21	27	F22	28	F23	29	G18	30	G19	31	G1	32	G2
33	G3	34	G4	35	G5	36	D1	37	G6	38	G7	39	G8	40	G11
41	G9	42	G10	43	D3	44	F18	45	F19	46	L1	47	L2	48	F1
49	F25	50	F3	51	D5	52	G12	53	D2	54	G13	55	G34	56	G15
57	G17	58	G16	59	S32	60	S30	61	S31	62	F4	63	D4	64	G20
65	D8	66	G21	67	G23	68	G24	69	G25	70	G22	71	D7	72	G26
73	G30	74	G29	75	G28	76	G27	77	D6	78	D9	79	G31	80	G32
81	G33	82	S17	83		84		85		86		87		88	
89		90		91		92		93		94		95		96	
97		98		99		100		101		102		103		104	
105		106		107		108		109		110		111		112	
113		114		115		116		117		118		119		120	
121		122		123		124		125		126		127		128	
129		130		131		132		133		134		135		136	
137		138		139		140		141		142		143		144	
145		146		147		148		149		150		151		152	
153		154		155		156		157		158		159		160	
161		162		163		164		165		166		167		168	
169		170		171		172		173		174		175		176	
177		178		179		180		181		182		183		184	
185		186		187		188		189		190		191		192	
193		194		195		196		197		198		199		200	
201		202		203		204		205		206		207		208	
209		210		211		212		213		214		215		216	
217		218		219		220		221		222		223		224	
225		226		227		228		229		230		231		232	
233		234		235		236		237		238		239		240	
241		242		243		244		245		246		247		248	
249		250		251		252		253		254		255		256	
257		258		259		260		261		262		263		264	
265		266		267		268		269		270		271		272	
273		274		275		276		277		278		279		280	
281		282		283		284		285		286		287		288	
289		290		291		292		293		294		295		296	
297		298		299		300		301		302		303		304	
305		306		307		308		309		310		311		312	
313		314		315		316		317		318		319		320	
321		322		323		324		325		326		327		328	
329		330		331		332		333		334		335		336	
337		338		339		340		341		342		343		344	
345		346		347		348		349		350		351		352	
353		354		355		356		357		358		359		360	
361		362		363		364		365		366		367		368	
369		370		371		372		373		374		375		376	
377		378		379		380		381		382		383		384	
385		386		387		388		389		390		391		392	
393		394		395		396		397		398		399		400	

Plot	Sensor	Period	Plot	Sensor	Period	Plot	Sensor	Period	Plot	Sensor	Period	Plot	Sensor	Period
1	1	1 Hour												
2	2	1 Hour												
3	3	1 Hour												
4	4	1 Hour												
5	5	1 Hour												
6	6	1 Hour												
7	7	1 Hour												
8	8	1 Hour												
9	9	1 Hour												
10	10	1 Hour												
11	11	1 Hour												
12	12	15 Min												
13	13	1 Hour												
14	14	1 Hour												
15	15	1 Hour												
16	16	1 Hour												
17	17	1 Hour												
18	18	1 Hour												
19	19	1 Hour												
20	20	1 Hour												
21	21	15 Min												
22	22	15 Min												
23	23	15 Min												
24	24	15 Min												
25	25	15 Min												
26														
27														
28														
29														
30	30	1 Min												
31	31	1 Min												
32	32	1 Min												

Project:	Stream2	**Plots List**	**Project Number:**	Stream	**Date:** 12/05/2017
			Outstation:	020	**Page:** T09 of T20

ICC	Direction	Remote Outstation	Remote Attribute	Destination Lan	Interval	Variable	Remote Node	Local Node	Significant Change
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									

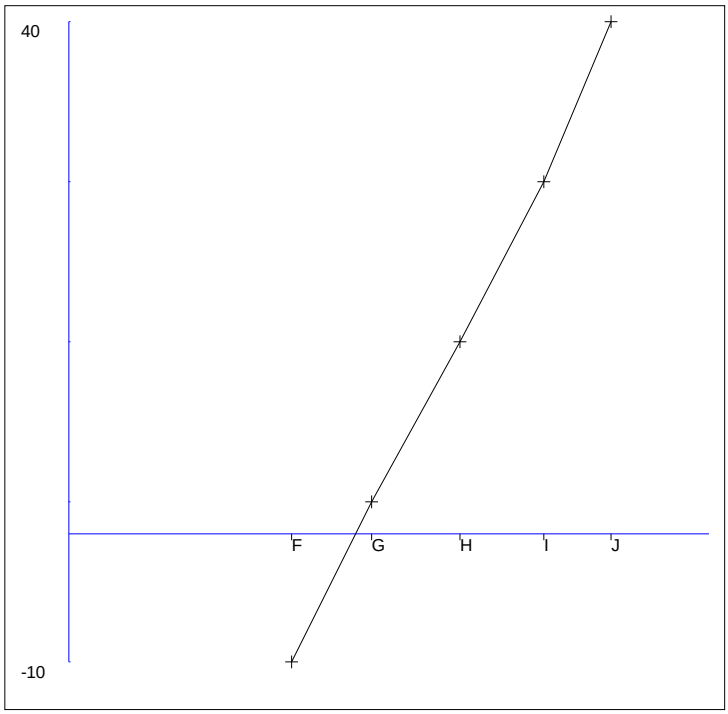
49	0	99		149		199							
50	50	100	100	150		200							
51	1	101	F1D	151		201							
52	-1	102		152		202							
53		103		153		203							
54		104	F4D	154		204							
55		105		155		205							
56		106		156		206							
57		107		157		207							
58		108		158		208							
59		109		159		209							
60		110		160		210							
61	L1D	111		161		211							
62	L2D	112		162		212							
63		113		163		213							
64		114		164		214							
65		115		165		215							
66		116		166		216							
67		117		167		217							
68		118	F18D	168		218							
69		119	F19D	169		219							
70		120		170		220							
71		121		171									
72		122		172									
73		123		173									
74		124	F24D	174									
75		125	F25D	175									
76		126		176									
77		127		177									
78		128		178									
79		129		179									
80		130		180									
81		131		181									
82		132		182									
83		133		183									
84		134		184									
85		135		185									
86		136		186									
87		137		187									
88		138		188									
89		139		189									
90		140		190									
91		141		191									
92		142		192									
93		143		193									
94		144		194									
95		145		195									
96		146		196									
97		147		197									
98		148		198									

21,0		28,3		35,6		458,7									
21,1	G2D	28,4		35,7		459,7									
21,2	G3D	28,5		36,0		460,7									
21,3		28,6		36,1		461,7									
21,4	G5D	28,7		36,2		462,7									
21,5		29,0		36,3		463,7									
21,6	G7D	29,1		36,4		464,7									
21,7	G8D	29,2		36,5		465,7									
22,0		29,3		36,6		466,7									
22,1	G10D	29,4		36,7		467,7									
22,2	G11D	29,5		409,7		468,7									
22,3	G12D	29,6		410,7		469,7									
22,4		29,7		411,7		470,7									
22,5		30,0		412,7		471,7									
22,6	G15D	30,1		413,7		472,7									
22,7	G16D	30,2		414,7		473,7									
23,0	G17D	30,3		415,7		474,7									
23,1	G18D	30,4		416,7		475,7									
23,2	G19D	30,5		417,7		476,7									
23,3	G20D	30,6		418,7		477,7									
23,4		30,7		419,7		478,7									
23,5	G22D	31,0		420,7		479,7									
23,6	G23D	31,1		421,7		480,7									
23,7	G24D	31,2		422,7											
24,0		31,3		423,7											
24,1		31,4		424,7											
24,2	G27D	31,5		425,7											
24,3		31,6		426,7											
24,4	G29D	31,7		427,7											
24,5	G30D	32,0		428,7											
24,6	G31D	32,1		429,7											
24,7	G32D	32,2		430,7											
25,0	G33D	32,3		431,7											
25,1	G34D	32,4		432,7											
25,2		32,5		433,7											
25,3		32,6		434,7											
25,4		32,7		435,7											
25,5		33,0		436,7											
25,6		33,1		437,7											
25,7		33,2		438,7											
26,0		33,3		439,7											
26,1		33,4		440,7											
26,2		33,5		441,7											
26,3		33,6		442,7											
26,4		33,7		443,7											
26,5		34,0		444,7											
26,6		34,1		445,7											
26,7		34,2		446,7											
27,0		34,3		447,7											
27,1		34,4		448,7											
27,2		34,5		449,7											
27,3		34,6		450,7											
27,4		34,7		451,7											
27,5		35,0		452,7											
27,6		35,1		453,7											
27,7		35,2		454,7											
28,0		35,3		455,7											
28,1		35,4		456,7											
28,2		35,5		457,7											

D1 - P05	I4 - P03	S18 - P02											
D2 - P10	I5 - P03	S19 - P02											
D3 - P06	I6 - P03	S2 - P02											
D4 - P07	I7 - P03	S20 - P02											
D5 - P07	I8 - P03	S21 - P02											
D6 - P09	I9 - P03	S22 - P02											
D7 - P08	K1 - P04	S23 - P02											
D8 - P08	K10 - P04	S24 - P02											
D9 - P08	K11 - P04	S25 - P02											
F1 - P07	K12 - P04	S3 - P02											
F18 - P07	K13 - P04	S30 - P07											
F19 - P07	K14 - P04	S31 - P07											
F20 - P08	K2 - P04	S32 - P07											
F21 - P08	K3 - P04	S4 - P02											
F22 - P08	K4 - P04	S5 - P02											
F23 - P08	K5 - P04	S6 - P02											
F24 - P07	K6 - P04	S7 - P02											
F25 - P07	K7 - P04	S8 - P02											
F3 - P07	K8 - P04	S9 - P02											
F4 - P07	K9 - P04	W1 - P04											
G1 - P05	L1 - P07	W10 - P04											
G10 - P06	L2 - P07	W11 - P04											
G11 - P06	P1 - P03	W2 - P04											
G12 - P10	P10 - P03	W3 - P04											
G13 - P10	P11 - P03	W4 - P04											
G15 - P06	P12 - P03	W5 - P04											
G16 - P06	P13 - P03	W6 - P04											
G17 - P06	P14 - P03	W7 - P04											
G18 - P08	P15 - P03	W8 - P06											
G19 - P08	P16 - P03	W9 - P04											
G2 - P05	P17 - P03	Z1 - P03											
G20 - P08	P18 - P03	Z2 - P03											
G21 - P08	P19 - P03												
G22 - P08	P2 - P03												
G23 - P08	P20 - P03												
G24 - P08	P21 - P03												
G25 - P08	P22 - P03												
G26 - P09	P23 - P03												
G27 - P09	P24 - P03												
G28 - P09	P25 - P03												
G29 - P09	P3 - P03												
G3 - P05	P30 - P07												
G30 - P09	P31 - P07												
G31 - P06	P32 - P07												
G32 - P06	P4 - P03												
G33 - P06	P5 - P03												
G34 - P06	P6 - P03												
G4 - P05	P7 - P03												
G5 - P05	P8 - P03												
G6 - P06	P9 - P03												
G7 - P06	S1 - P02												
G8 - P06	S10 - P02												
G9 - P06	S11 - P02												
I1 - P03	S12 - P02												
I10 - P03	S13 - P02												
I11 - P03	S14 - P02												
I12 - P03	S15 - P02												
I2 - P03	S16 - P02												
I3 - P03	S17 - P02												

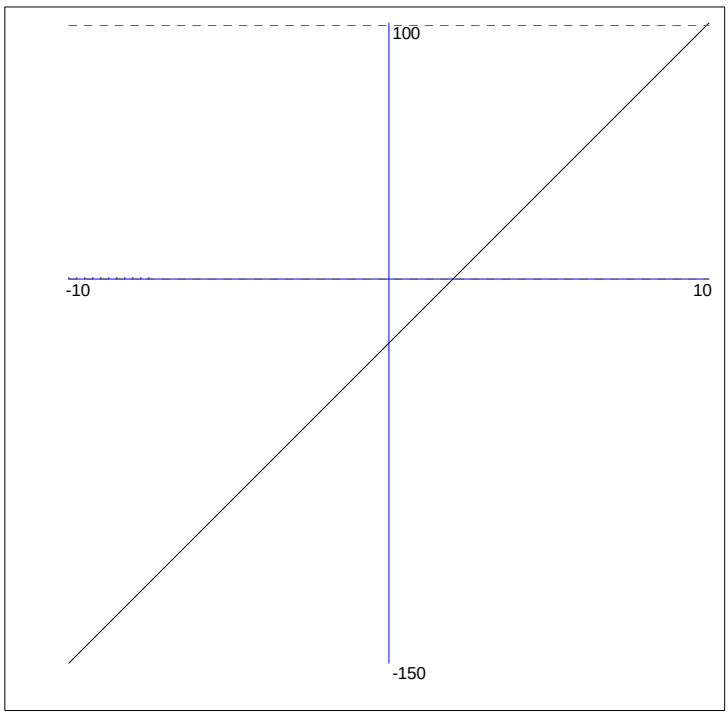
Sensor Type	Unique Reference	Scaling Range
1	H/ST/T Thermistor	-10 to +40C

Parameter	Input / Value	Output
Scaling Type	2	
Top of Range	40	
Bottom of Range	-10	
Linearise F	8.47	
Linearise G	7.42	
Linearise H	6.11	
Linearise I	4.73	
Linearise J	3.48	



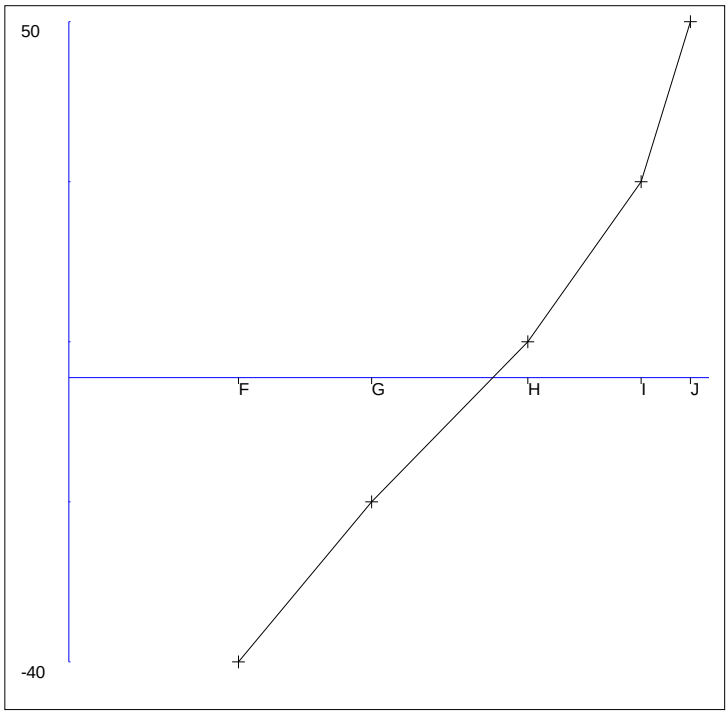
Sensor Type	Unique Reference	Scaling Range
2	H/DT/H	0 to +95%RH

Parameter	Input / Value	Output
Scaling Type	0	
Exponent	3	
Top of Range	100	
Bottom of Range	-150	
Upper Limit	99	
Lower Limit	0	



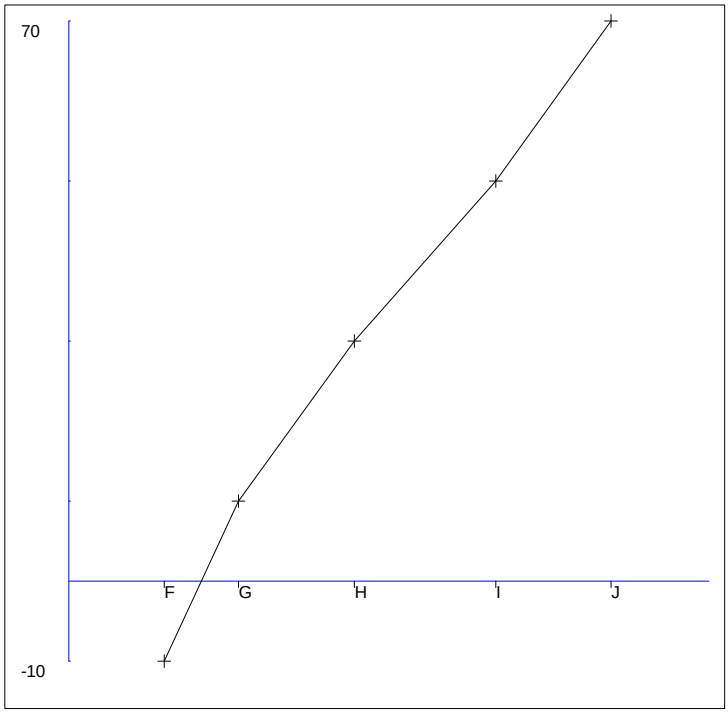
Sensor Type	Unique Reference	Scaling Range
3	H/OT/T Thermistor	-40 to +50C

Parameter	Input / Value	Output
Scaling Type	2	
Top of Range	50	
Bottom of Range	-40	
Linearise F	9.71	
Linearise G	8.94	
Linearise H	7.17	
Linearise I	4.73	
Linearise J	2.65	



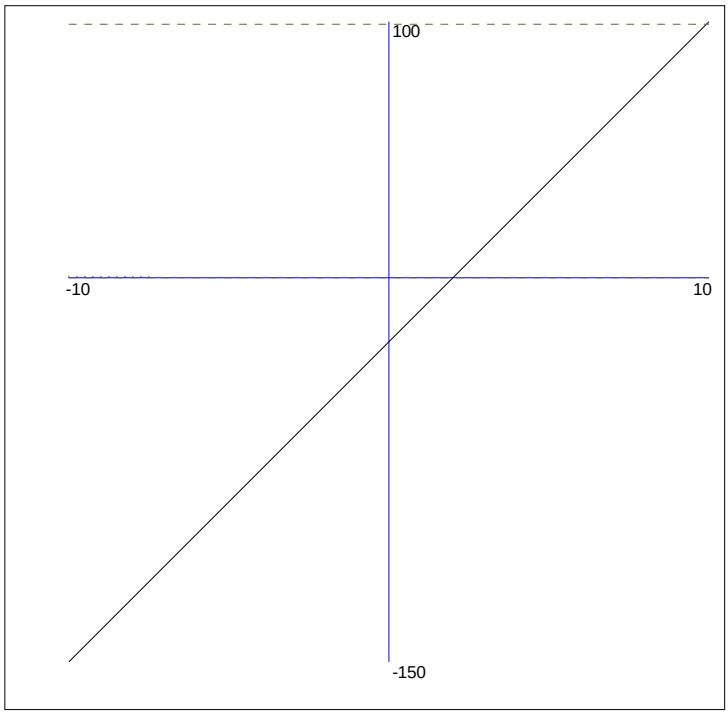
Sensor Type	Unique Reference	Scaling Range
4	H/DT/T Thermistor	-10 to +70C

Parameter	Input / Value	Output
Scaling Type	2	
Top of Range	70	
Bottom of Range	-10	
Linearise F	8.47	
Linearise G	6.67	
Linearise H	4.46	
Linearise I	2.65	
Linearise J	1.49	



Sensor Type	Unique Reference	Scaling Range
5	H/DT/H	0 to +95%RH

Parameter	Input / Value	Output
Scaling Type	0	
Exponent	3	
Top of Range	100	
Bottom of Range	-150	
Upper Limit	99	
Lower Limit	0	



Item	Label	Parent	Pin Level	Item	Label	Parent	Pin Level	Item	Label	Parent	Pin Level
1	Root	0	0								
2		0	0								
3		0	0								
4		0	0								
5		0	0								
6		0	0								
7		0	0								
8		0	0								
9		0	0								
10		0	0								
11		0	0								
12		0	0								
13		0	0								
14		0	0								
15		0	0								
16		0	0								
17		0	0								
18		0	0								
19		0	0								
20		0	0								
21		0	0								
22		0	0								
23		0	0								
24		0	0								
25		0	0								
26		0	0								
27		0	0								
28		0	0								
29		0	0								
30		0	0								
31		0	0								
32		0	0								
33		0	0								
34		0	0								
35		0	0								
36		0	0								
37		0	0								
38		0	0								
39		0	0								
40		0	0								

Item	Module	Direct.	Pin Level	Item	Module	Direct.	Pin Level	Item	Module	Direct.	Pin Level	Item	Module	Direct.	Pin Level
1		0	0	61		0	0	121		0	0	181		0	0
2		0	0	62		0	0	122		0	0	182		0	0
3		0	0	63		0	0	123		0	0	183		0	0
4		0	0	64		0	0	124		0	0	184		0	0
5		0	0	65		0	0	125		0	0	185		0	0
6		0	0	66		0	0	126		0	0	186		0	0
7		0	0	67		0	0	127		0	0	187		0	0
8		0	0	68		0	0	128		0	0	188		0	0
9		0	0	69		0	0	129		0	0	189		0	0
10		0	0	70		0	0	130		0	0	190		0	0
11		0	0	71		0	0	131		0	0	191		0	0
12		0	0	72		0	0	132		0	0	192		0	0
13		0	0	73		0	0	133		0	0	193		0	0
14		0	0	74		0	0	134		0	0	194		0	0
15		0	0	75		0	0	135		0	0	195		0	0
16		0	0	76		0	0	136		0	0	196		0	0
17		0	0	77		0	0	137		0	0	197		0	0
18		0	0	78		0	0	138		0	0	198		0	0
19		0	0	79		0	0	139		0	0	199		0	0
20		0	0	80		0	0	140		0	0	200		0	0
21		0	0	81		0	0	141		0	0				
22		0	0	82		0	0	142		0	0				
23		0	0	83		0	0	143		0	0				
24		0	0	84		0	0	144		0	0				
25		0	0	85		0	0	145		0	0				
26		0	0	86		0	0	146		0	0				
27		0	0	87		0	0	147		0	0				
28		0	0	88		0	0	148		0	0				
29		0	0	89		0	0	149		0	0				
30		0	0	90		0	0	150		0	0				
31		0	0	91		0	0	151		0	0				
32		0	0	92		0	0	152		0	0				
33		0	0	93		0	0	153		0	0				
34		0	0	94		0	0	154		0	0				
35		0	0	95		0	0	155		0	0				
36		0	0	96		0	0	156		0	0				
37		0	0	97		0	0	157		0	0				
38		0	0	98		0	0	158		0	0				
39		0	0	99		0	0	159		0	0				
40		0	0	100		0	0	160		0	0				
41		0	0	101		0	0	161		0	0				
42		0	0	102		0	0	162		0	0				
43		0	0	103		0	0	163		0	0				
44		0	0	104		0	0	164		0	0				
45		0	0	105		0	0	165		0	0				
46		0	0	106		0	0	166		0	0				
47		0	0	107		0	0	167		0	0				
48		0	0	108		0	0	168		0	0				
49		0	0	109		0	0	169		0	0				
50		0	0	110		0	0	170		0	0				
51		0	0	111		0	0	171		0	0				
52		0	0	112		0	0	172		0	0				
53		0	0	113		0	0	173		0	0				
54		0	0	114		0	0	174		0	0				
55		0	0	115		0	0	175		0	0				
56		0	0	116		0	0	176		0	0				
57		0	0	117		0	0	177		0	0				
58		0	0	118		0	0	178		0	0				
59		0	0	119		0	0	179		0	0				
60		0	0	120		0	0	180		0	0				

Group	Module	Label	Alarm Type	Group	Module	Label	Alarm Type	Group	Module	Label	Alarm Type

Strategy Index

Appendix 3 – Trend Auxiliary Controller

Telephone:

Fax:

Email:

Address Module	
Supervisor Port	23
NDP Address	0
Alarm Address	1
Remote Lan	0
Text Switch	ON
Identifier	Holland 1 OS21
Attribute F	
Attribute G	
Attribute H	
Attribute I	
Attribute J	
Attribute K	
Firmware Version	IQ220 Iss3.00 Mar 20 2001
Loader Issue	Loader Iss 2.20 Oct 28 1999
Serial Number	81041356

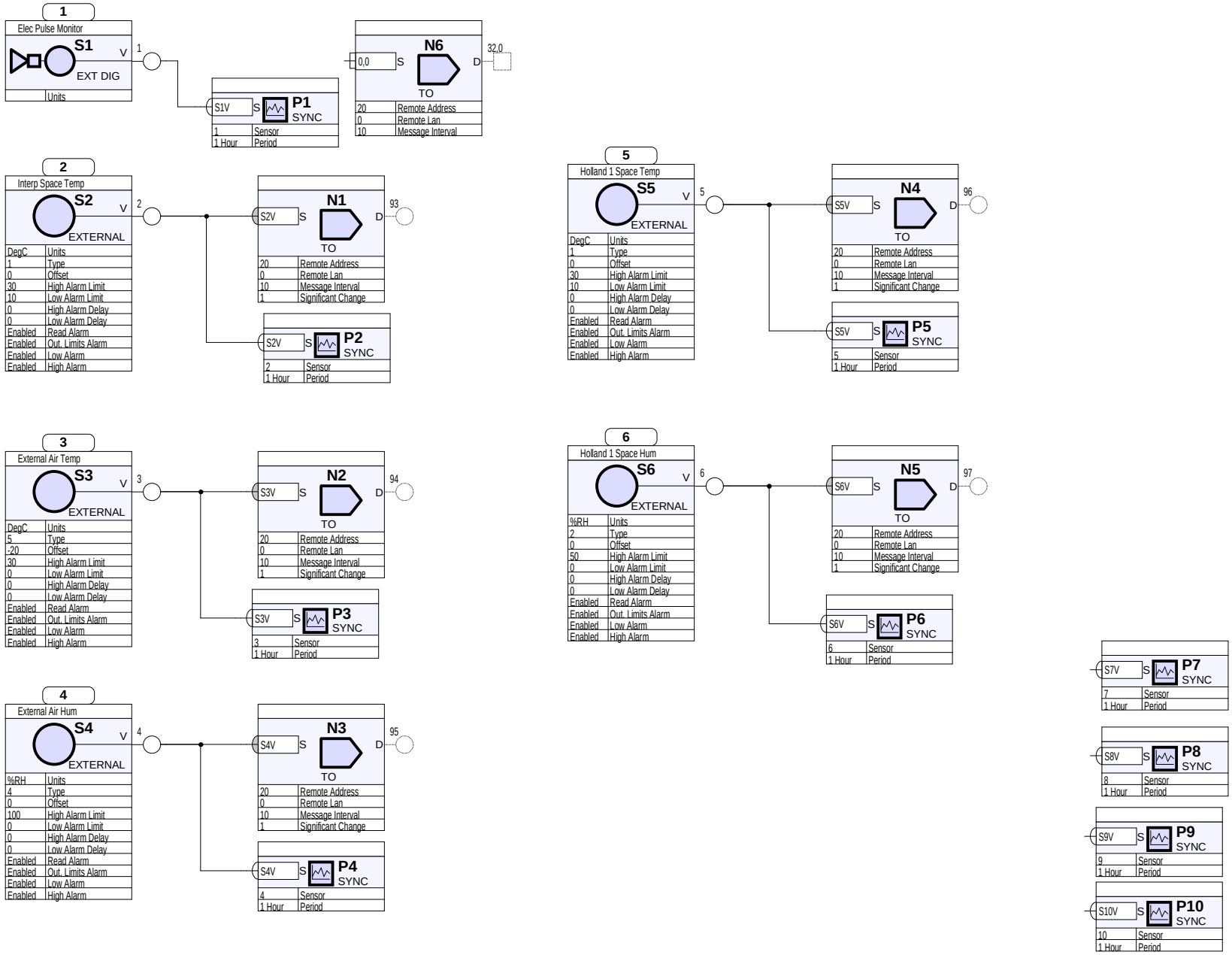
Issue	Revision	Project Change Note / Comments	Pages Affected	Date Approved	Approved By
0	1				

Notes

Site GUID:	Stream {0277F757-3377-43C0-A88A-E12051BA5E4E}		
Project:	Stream2		
Client:			
Details:			
Drawn By:	Engineer		
Engineer:			
Controller Type:	IQ 221		
Project Number:	Stream	**Date:**	12/05/2017
Outstation: 021	**Lan:** 000	**Page:**	01 of 02

Holland 1 OS21

Strategy pages



Drawing Reference	Page Details	SET Strategy	Issue	Revision	Checked By	Project Number:	Stream	Date:	12/05/2017
SET-000-021-02	Page: 2	Designed By:	0	01		Outstation:	021	Page:	02 of 02

Address Module	
Identifier	Holland 1 OS21
Attribute F (2)	
Attribute G (3)	
Attribute H (4)	
Attribute I (5)	
Attribute J (6)	
Attribute K (7)	
Local Lan / Address	0 / 21
General Alarm Group	0
Language Default	
Installed Languages	
Supervisor Port	23
Version	IQ220 Iss3.00 Mar 20 2001

Sensor Number	Type	Label	Units	S.E.T. Part Number	High Alarm Limit	High Alarm Delay	Low Alarm Limit	Low Alarm Delay	Offset	Source	Exp.	Alarm Enable Byte	Alarm Enable ROLH	Alarm Byte	Ackn. Byte
1	3	Elec Pulse Monitor										407	0 0 0 0	41	315
2	1	Interp Space Temp	DegC	1 - H/ST/T Thermistor	30	0	10	0	0			408	1 1 1 1	42	316
3	1	External Air Temp	DegC	5 - H/OT/T PRT	30	0	0	0	-20			409	1 1 1 1	43	317
4	1	External Air Hum	%RH	4 - AQ/D	100	0	0	0	0			410	1 1 1 1	44	318
5	1	Holland 1 Space Temp	DegC	1 - H/ST/T Thermistor	30	0	10	0	0			411	1 1 1 1	45	319
6	1	Holland 1 Space Hum	%RH	2 - H/DT/H	50	0	0	0	0			412	1 1 1 1	46	320
7	0											413	0 0 0 0	47	321
8	0											414	0 0 0 0	48	322
9	0											415	0 0 0 0	49	323
10	0											416	0 0 0 0	50	324
11	0											417	0 0 0 0	51	325
12	0											418	0 0 0 0	52	326
13	0											419	0 0 0 0	53	327
14	0											420	0 0 0 0	54	328
15	0											421	0 0 0 0	55	329
16	0											422	0 0 0 0	56	330
17	0											423	0 0 0 0	57	331
18	0											424	0 0 0 0	58	332
19	0											425	0 0 0 0	59	333
20	0											426	0 0 0 0	60	334
21	0											427	0 0 0 0	61	335
22	0											428	0 0 0 0	62	336
23	0											429	0 0 0 0	63	337
24	0											430	0 0 0 0	64	338
25	0											431	0 0 0 0	65	339
26	0											432	0 0 0 0	66	340
27	0											433	0 0 0 0	67	341
28	0											434	0 0 0 0	68	342
29	0											435	0 0 0 0	69	343
30	0											436	0 0 0 0	70	344
31	0											437	0 0 0 0	71	345
32	0											438	0 0 0 0	72	346

Dig In Number	Label	Alarm Enable	Delay	Required State	Address Bit	Enable Bit	Required Bit	Ackn. Bit
1					1,0	487,0	401,0	395,0
2					1,1	487,1	401,1	395,1
3					1,2	487,2	401,2	395,2
4					1,3	487,3	401,3	395,3
5					1,4	487,4	401,4	395,4
6					1,5	487,5	401,5	395,5
7					1,6	487,6	401,6	395,6
8					1,7	487,7	401,7	395,7
9					2,0	488,0	402,0	396,0
10					2,1	488,1	402,1	396,1
11					2,2	488,2	402,2	396,2
12					2,3	488,3	402,3	396,3
13					2,4	488,4	402,4	396,4
14					2,5	488,5	402,5	396,5
15					2,6	488,6	402,6	396,6
16					2,7	488,7	402,7	396,7
17					3,0	489,0	403,0	397,0
18					3,1	489,1	403,1	397,1
19					3,2	489,2	403,2	397,2
20					3,3	489,3	403,3	397,3
21					3,4	489,4	403,4	397,4
22					3,5	489,5	403,5	397,5
23					3,6	489,6	403,6	397,6
24					3,7	489,7	403,7	397,7
25					4,0	490,0	404,0	398,0
26					4,1	490,1	404,1	398,1
27					4,2	490,2	404,2	398,2
28					4,3	490,3	404,3	398,3
29					4,4	490,4	404,4	398,4
30					4,5	490,5	404,5	398,5
31					4,6	490,6	404,6	398,6
32					4,7	490,7	404,7	398,7

Knob Number	Label	Units	Value	ID	Max. Level	Min. Level	Pin Level	Node
1								221
2								222
3								223
4								224
5								225
6								226
7								227
8								228
9								229
10								230
11								231
12								232
13								233
14								234
15								235
16								236
17								237
18								238
19								239
20								240
21								241
22								242
23								243
24								244
25								245
26								246
27								247
28								248
29								249
30								250

Switch Number	Label	Status	Pin Level State	Node Bit
1				18,0
2				18,1
3				18,2
4				18,3
5				18,4
6				18,5
7				18,6
8				18,7
9				19,0
10				19,1
11				19,2
12				19,3
13				19,4
14				19,5
15				19,6
16				19,7
17				20,0
18				20,1
19				20,2
20				20,3

Driver Number	Label	Type	Source	Delay	Inv?	Analogue Offset	Analogue Range	TP+Override Period	TP+Override Override	Raise/Lower Drive	Raise/Lower Feedbk	Hysteresis On	Hysteresis Off	Channel Phase	Channel Anti Phase
1		0												0	0
2		0												0	0
3		0												0	0
4		0												0	0
5		0												0	0
6		0												0	0
7		0												0	0
8		0												0	0
9		0												0	0
10		0												0	0
11		0												0	0
12		0												0	0

Zone 1						
Day	Start 1	Stop 1	Start 2	Stop 2	Start 3	Stop 3
Monday	0:00	0:00	0:00	0:00	0:00	0:00
Tuesday	0:00	0:00	0:00	0:00	0:00	0:00
Wednesday	0:00	0:00	0:00	0:00	0:00	0:00
Thursday	0:00	0:00	0:00	0:00	0:00	0:00
Friday	0:00	0:00	0:00	0:00	0:00	0:00
Saturday	0:00	0:00	0:00	0:00	0:00	0:00
Sunday	0:00	0:00	0:00	0:00	0:00	0:00
Zone 2						
Day	Start 1	Stop 1	Start 2	Stop 2	Start 3	Stop 3
Monday	0:00	0:00	0:00	0:00	0:00	0:00
Tuesday	0:00	0:00	0:00	0:00	0:00	0:00
Wednesday	0:00	0:00	0:00	0:00	0:00	0:00
Thursday	0:00	0:00	0:00	0:00	0:00	0:00
Friday	0:00	0:00	0:00	0:00	0:00	0:00
Saturday	0:00	0:00	0:00	0:00	0:00	0:00
Sunday	0:00	0:00	0:00	0:00	0:00	0:00
Zone 3						
Day	Start 1	Stop 1	Start 2	Stop 2	Start 3	Stop 3
Monday	0:00	0:00	0:00	0:00	0:00	0:00
Tuesday	0:00	0:00	0:00	0:00	0:00	0:00
Wednesday	0:00	0:00	0:00	0:00	0:00	0:00
Thursday	0:00	0:00	0:00	0:00	0:00	0:00
Friday	0:00	0:00	0:00	0:00	0:00	0:00
Saturday	0:00	0:00	0:00	0:00	0:00	0:00
Sunday	0:00	0:00	0:00	0:00	0:00	0:00
Zone 4						
Day	Start 1	Stop 1	Start 2	Stop 2	Start 3	Stop 3
Monday	0:00	0:00	0:00	0:00	0:00	0:00
Tuesday	0:00	0:00	0:00	0:00	0:00	0:00
Wednesday	0:00	0:00	0:00	0:00	0:00	0:00
Thursday	0:00	0:00	0:00	0:00	0:00	0:00
Friday	0:00	0:00	0:00	0:00	0:00	0:00
Saturday	0:00	0:00	0:00	0:00	0:00	0:00
Sunday	0:00	0:00	0:00	0:00	0:00	0:00
Zone 5						
Day	Start 1	Stop 1	Start 2	Stop 2	Start 3	Stop 3
Monday	0:00	0:00	0:00	0:00	0:00	0:00
Tuesday	0:00	0:00	0:00	0:00	0:00	0:00
Wednesday	0:00	0:00	0:00	0:00	0:00	0:00
Thursday	0:00	0:00	0:00	0:00	0:00	0:00
Friday	0:00	0:00	0:00	0:00	0:00	0:00
Saturday	0:00	0:00	0:00	0:00	0:00	0:00
Sunday	0:00	0:00	0:00	0:00	0:00	0:00

1	S1	2	S2	3	S3	4	S4	5	S5	6	S6	7		8	
9		10		11		12		13		14		15		16	
17		18		19		20		21		22		23		24	
25		26		27		28		29		30		31		32	
33		34		35		36		37		38		39		40	
41		42		43		44		45		46		47		48	
49		50		51		52		53		54		55		56	
57		58		59		60		61		62		63		64	
65		66		67		68		69		70		71		72	
73		74		75		76		77		78		79		80	
81		82		83		84		85		86		87		88	
89		90		91		92		93		94		95		96	
97		98		99		100		101		102		103		104	
105		106		107		108		109		110		111		112	
113		114		115		116		117		118		119		120	
121		122		123		124		125		126		127		128	
129		130		131		132		133		134		135		136	
137		138		139		140		141		142		143		144	
145		146		147		148		149		150		151		152	
153		154		155		156		157		158		159		160	
161		162		163		164		165		166		167		168	
169		170		171		172		173		174		175		176	
177		178		179		180		181		182		183		184	
185		186		187		188		189		190		191		192	
193		194		195		196		197		198		199		200	
201		202		203		204		205		206		207		208	
209		210		211		212		213		214		215		216	
217		218		219		220		221		222		223		224	
225		226		227		228		229		230		231		232	
233		234		235		236		237		238		239		240	

Plot	Sensor	Period	Plot	Sensor	Period	Plot	Sensor	Period	Plot	Sensor	Period	Plot	Sensor	Period
1	1	1 Hour												
2	2	1 Hour												
3	3	1 Hour												
4	4	1 Hour												
5	5	1 Hour												
6	6	1 Hour												
7	7	1 Hour												
8	8	1 Hour												
9	9	1 Hour												
10	10	1 Hour												
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														

Project:	Stream2	Plots List	Project Number:	Stream	Date:	12/05/2017
			Outstation:	021	Page:	T09 of T20

ICC	Direction	Remote Outstation	Remote Attribute	Destination Lan	Interval	Variable	Remote Node	Local Node	Significant Change
1	1	20		0	10	0	93	S2V	1
2	1	20		0	10	0	94	S3V	1
3	1	20		0	10	0	95	S4V	1
4	1	20		0	10	0	96	S5V	1
5	1	20		0	10	0	97	S6V	1
6	1	20		0	10	2	32,0	0,0	
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									

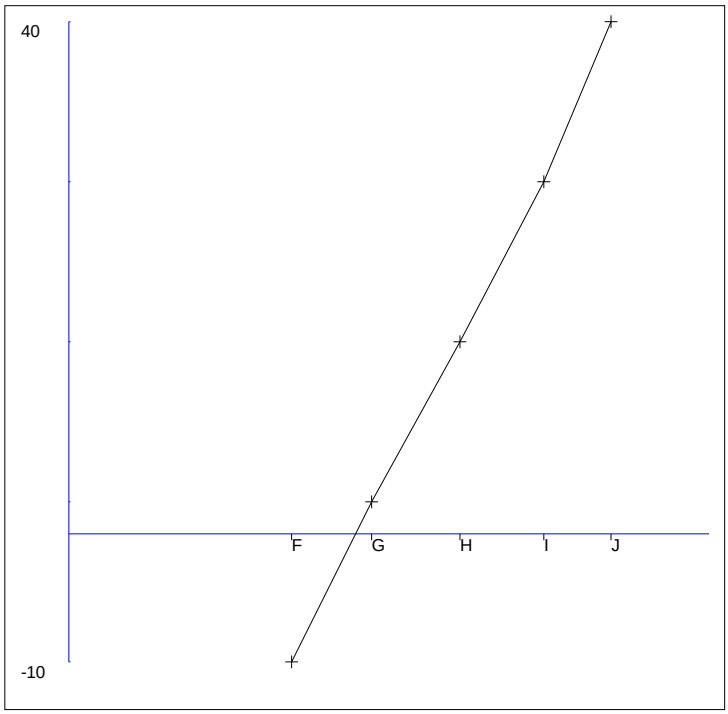
49	0	99		149		199							
50	50	100	100	150		200							
51	1	101		151		201							
52	-1	102		152		202							
53		103		153		203							
54		104		154		204							
55		105		155		205							
56		106		156		206							
57		107		157		207							
58		108		158		208							
59		109		159		209							
60		110		160		210							
61		111		161		211							
62		112		162		212							
63		113		163		213							
64		114		164		214							
65		115		165		215							
66		116		166		216							
67		117		167		217							
68		118		168		218							
69		119		169		219							
70		120		170		220							
71		121		171									
72		122		172									
73		123		173									
74		124		174									
75		125		175									
76		126		176									
77		127		177									
78		128		178									
79		129		179									
80		130		180									
81		131		181									
82		132		182									
83		133		183									
84		134		184									
85		135		185									
86		136		186									
87		137		187									
88		138		188									
89		139		189									
90		140		190									
91		141		191									
92		142		192									
93		143		193									
94		144		194									
95		145		195									
96		146		196									
97		147		197									
98		148		198									

21,0		28,3		35,6		458,7									
21,1		28,4		35,7		459,7									
21,2		28,5		36,0		460,7									
21,3		28,6		36,1		461,7									
21,4		28,7		36,2		462,7									
21,5		29,0		36,3		463,7									
21,6		29,1		36,4		464,7									
21,7		29,2		36,5		465,7									
22,0		29,3		36,6		466,7									
22,1		29,4		36,7		467,7									
22,2		29,5		409,7		468,7									
22,3		29,6		410,7		469,7									
22,4		29,7		411,7		470,7									
22,5		30,0		412,7		471,7									
22,6		30,1		413,7		472,7									
22,7		30,2		414,7		473,7									
23,0		30,3		415,7		474,7									
23,1		30,4		416,7		475,7									
23,2		30,5		417,7		476,7									
23,3		30,6		418,7		477,7									
23,4		30,7		419,7		478,7									
23,5		31,0		420,7		479,7									
23,6		31,1		421,7		480,7									
23,7		31,2		422,7											
24,0		31,3		423,7											
24,1		31,4		424,7											
24,2		31,5		425,7											
24,3		31,6		426,7											
24,4		31,7		427,7											
24,5		32,0		428,7											
24,6		32,1		429,7											
24,7		32,2		430,7											
25,0		32,3		431,7											
25,1		32,4		432,7											
25,2		32,5		433,7											
25,3		32,6		434,7											
25,4		32,7		435,7											
25,5		33,0		436,7											
25,6		33,1		437,7											
25,7		33,2		438,7											
26,0		33,3		439,7											
26,1		33,4		440,7											
26,2		33,5		441,7											
26,3		33,6		442,7											
26,4		33,7		443,7											
26,5		34,0		444,7											
26,6		34,1		445,7											
26,7		34,2		446,7											
27,0		34,3		447,7											
27,1		34,4		448,7											
27,2		34,5		449,7											
27,3		34,6		450,7											
27,4		34,7		451,7											
27,5		35,0		452,7											
27,6		35,1		453,7											
27,7		35,2		454,7											
28,0		35,3		455,7											
28,1		35,4		456,7											
28,2		35,5		457,7											

N1 - P02													
N2 - P02													
N3 - P02													
N4 - P02													
N5 - P02													
N6 - P02													
P1 - P02													
P10 - P02													
P2 - P02													
P3 - P02													
P4 - P02													
P5 - P02													
P6 - P02													
P7 - P02													
P8 - P02													
P9 - P02													
S1 - P02													
S2 - P02													
S3 - P02													
S4 - P02													
S5 - P02													
S6 - P02													

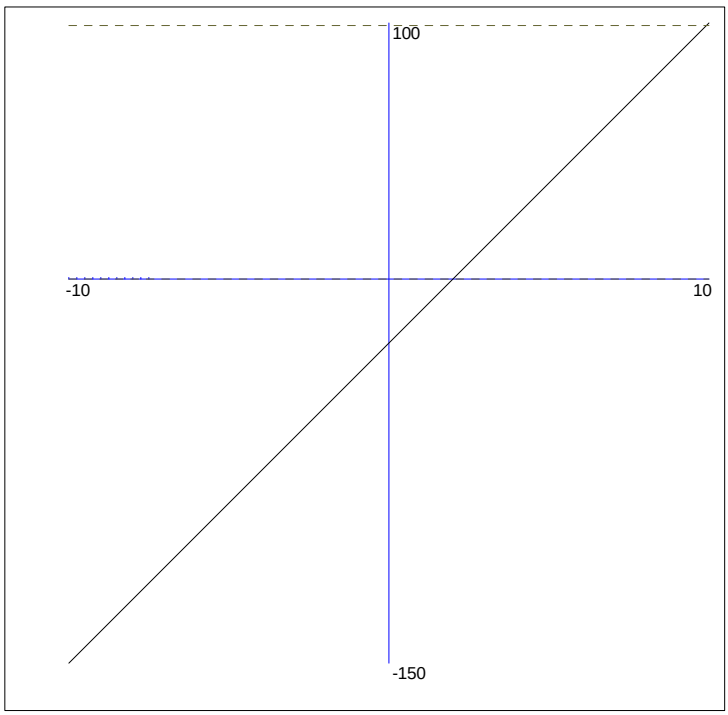
Sensor Type	Unique Reference	Scaling Range
1	H/ST/T Thermistor	-10 to +40C

Parameter	Input / Value	Output
Scaling Type	2	
Top of Range	40	
Bottom of Range	-10	
Linearise F	8.47	
Linearise G	7.42	
Linearise H	6.11	
Linearise I	4.73	
Linearise J	3.48	



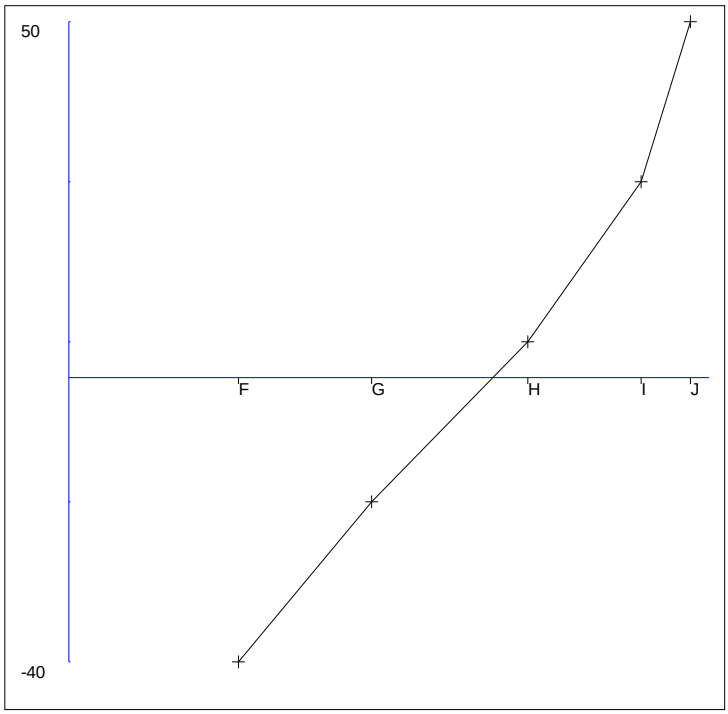
Sensor Type	Unique Reference	Scaling Range
2	H/DT/H	0 to +95%RH

Parameter	Input / Value	Output
Scaling Type	0	
Exponent	3	
Top of Range	100	
Bottom of Range	-150	
Upper Limit	99	
Lower Limit	0	



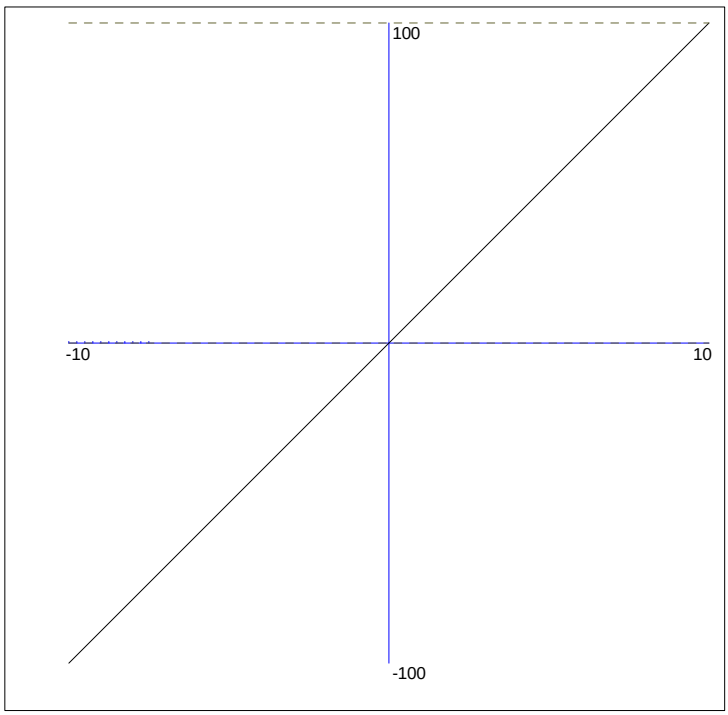
Sensor Type	Unique Reference	Scaling Range
3	H/OT/T Thermistor	-40 to +50C

Parameter	Input / Value	Output
Scaling Type	2	
Top of Range	50	
Bottom of Range	-40	
Linearise F	9.71	
Linearise G	8.94	
Linearise H	7.17	
Linearise I	4.73	
Linearise J	2.65	



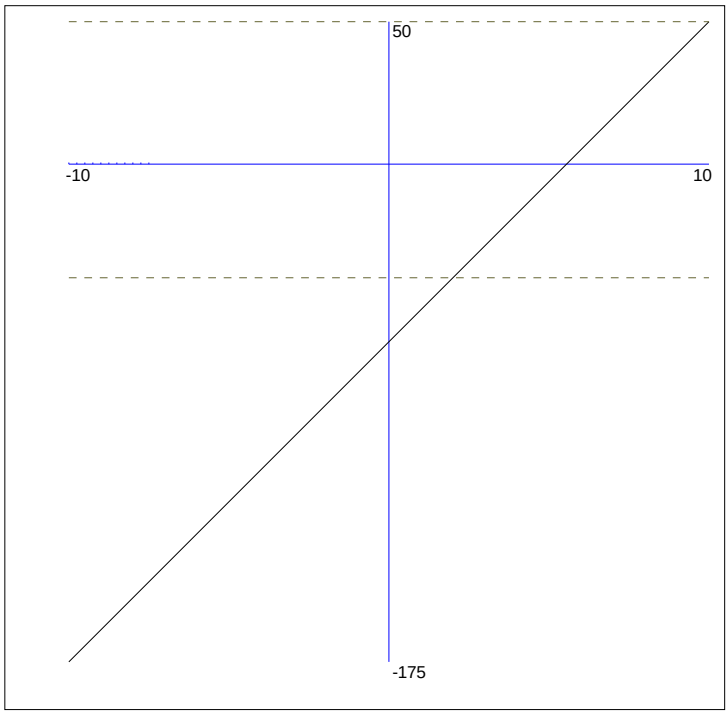
Sensor Type	Unique Reference	Scaling Range
4	AQ/D	0 to +100

Parameter	Input / Value	Output
Scaling Type	0	
Exponent	3	
Top of Range	100	
Bottom of Range	-100	
Upper Limit	100	
Lower Limit	0	



Sensor Type	Unique Reference	Scaling Range
5	H/OT/T PRT	-40 to +50C

Parameter	Input / Value	Output
Scaling Type	0	
Exponent	3	
Top of Range	50	
Bottom of Range	-175	
Upper Limit	50	
Lower Limit	-40	



Item	Label	Parent	Pin Level		Item	Label	Parent	Pin Level		Item	Label	Parent	Pin Level
1	Root	0	0										
2		0	0										
3		0	0										
4		0	0										
5		0	0										
6		0	0										
7		0	0										
8		0	0										
9		0	0										
10		0	0										
11		0	0										
12		0	0										
13		0	0										
14		0	0										
15		0	0										
16		0	0										
17		0	0										
18		0	0										
19		0	0										
20		0	0										
21		0	0										
22		0	0										
23		0	0										
24		0	0										
25		0	0										

Item	Module	Direct.	Pin Level	Item	Module	Direct.	Pin Level	Item	Module	Direct.	Pin Level	Item	Module	Direct.	Pin Level
1		0	0	61		0	0	121		0	0				
2		0	0	62		0	0	122		0	0				
3		0	0	63		0	0	123		0	0				
4		0	0	64		0	0	124		0	0				
5		0	0	65		0	0	125		0	0				
6		0	0	66		0	0	126		0	0				
7		0	0	67		0	0	127		0	0				
8		0	0	68		0	0	128		0	0				
9		0	0	69		0	0	129		0	0				
10		0	0	70		0	0	130		0	0				
11		0	0	71		0	0	131		0	0				
12		0	0	72		0	0	132		0	0				
13		0	0	73		0	0	133		0	0				
14		0	0	74		0	0	134		0	0				
15		0	0	75		0	0	135		0	0				
16		0	0	76		0	0	136		0	0				
17		0	0	77		0	0	137		0	0				
18		0	0	78		0	0	138		0	0				
19		0	0	79		0	0	139		0	0				
20		0	0	80		0	0	140		0	0				
21		0	0	81		0	0								
22		0	0	82		0	0								
23		0	0	83		0	0								
24		0	0	84		0	0								
25		0	0	85		0	0								
26		0	0	86		0	0								
27		0	0	87		0	0								
28		0	0	88		0	0								
29		0	0	89		0	0								
30		0	0	90		0	0								
31		0	0	91		0	0								
32		0	0	92		0	0								
33		0	0	93		0	0								
34		0	0	94		0	0								
35		0	0	95		0	0								
36		0	0	96		0	0								
37		0	0	97		0	0								
38		0	0	98		0	0								
39		0	0	99		0	0								
40		0	0	100		0	0								
41		0	0	101		0	0								
42		0	0	102		0	0								
43		0	0	103		0	0								
44		0	0	104		0	0								
45		0	0	105		0	0								
46		0	0	106		0	0								
47		0	0	107		0	0								
48		0	0	108		0	0								
49		0	0	109		0	0								
50		0	0	110		0	0								
51		0	0	111		0	0								
52		0	0	112		0	0								
53		0	0	113		0	0								
54		0	0	114		0	0								
55		0	0	115		0	0								
56		0	0	116		0	0								
57		0	0	117		0	0								
58		0	0	118		0	0								
59		0	0	119		0	0								
60		0	0	120		0	0								

Group	Module	Label	Alarm Type	Group	Module	Label	Alarm Type	Group	Module	Label	Alarm Type

Strategy Index

Appendix 4 – Building Heat Gain Calculations

Holland I

Heat Loss/Gain Calculation

Heat Gain	10263	Watts
Ventilation Load	1903	Watts
Heat Loss	17947	Watts

Values used in the Calculations:			
Differential - heat	22.0 ºC	Ceiling height downstairs	5.91
Differential - cool	8.0 ºC	Ceiling height upstairs	2.52
Wall U	0.65		
Window U	3.10		
Gnd Floor U	0.35	Front of Building faces º	
Gnd Ceiling U	0.55		
A/C U	0.33		
1st Floor U	0.75		
1st Ceiling U	0.67		

Holland I Submarine Area

	Length	Width	Height	Area	Volume	'U'	W/ºC	ºC diff		Loss	Gain
South Wall		22.150	5.910	130.91		0.65	85.1	8.0	22.0	1872	681
Window		0.000	0.000	0.00		3.10	0.0	8.0	22.0	0	0
West Wall	5.520		5.910	32.62		0.65	21.2	8.0	22.0	467	170
Window	0.000		0.000	0.00		3.10	0.0	8.0	22.0	0	0
North Wall		22.030	5.910	130.20		0.65	84.6	8.0	22.0	1862	677
Window		0.000	0.000	0.00		3.10	0.0	8.0	22.0	0	0
East Wall	5.520		5.910	32.62		0.65	21.2	8.0	22.0	467	170
Window	0.000		0.000	0.00		3.10	0.0	8.0	22.0	0	0
Floor	5.520	22.090		121.94		0.75	91.5	8.0	22.0	2012	732
Ceiling	5.520	22.090		121.94		0.67	81.7	8.0	22.0	1797	654
Ventilation	5.520	22.090	5.910		720.65	0.33	237.8	8.0	22.0	5232	1903
Wall Solar		22.090	5.910	130.55		0.85	111.0	8.0	22.0	2441	888
Ceiling Solar	5.520	22.090		121.94		0.67	81.7	8.0	22.0	1797	654
People	6						135				810
PC's	0			0.00			250				0
Light & Power	5.520	22.090		121.94			24				2926
										17947	10263