

Radford Control Systems
SGM22_11_DAC

PC1000

**Compressor / Condenser
Controller**

Set-up Guide

Software revision

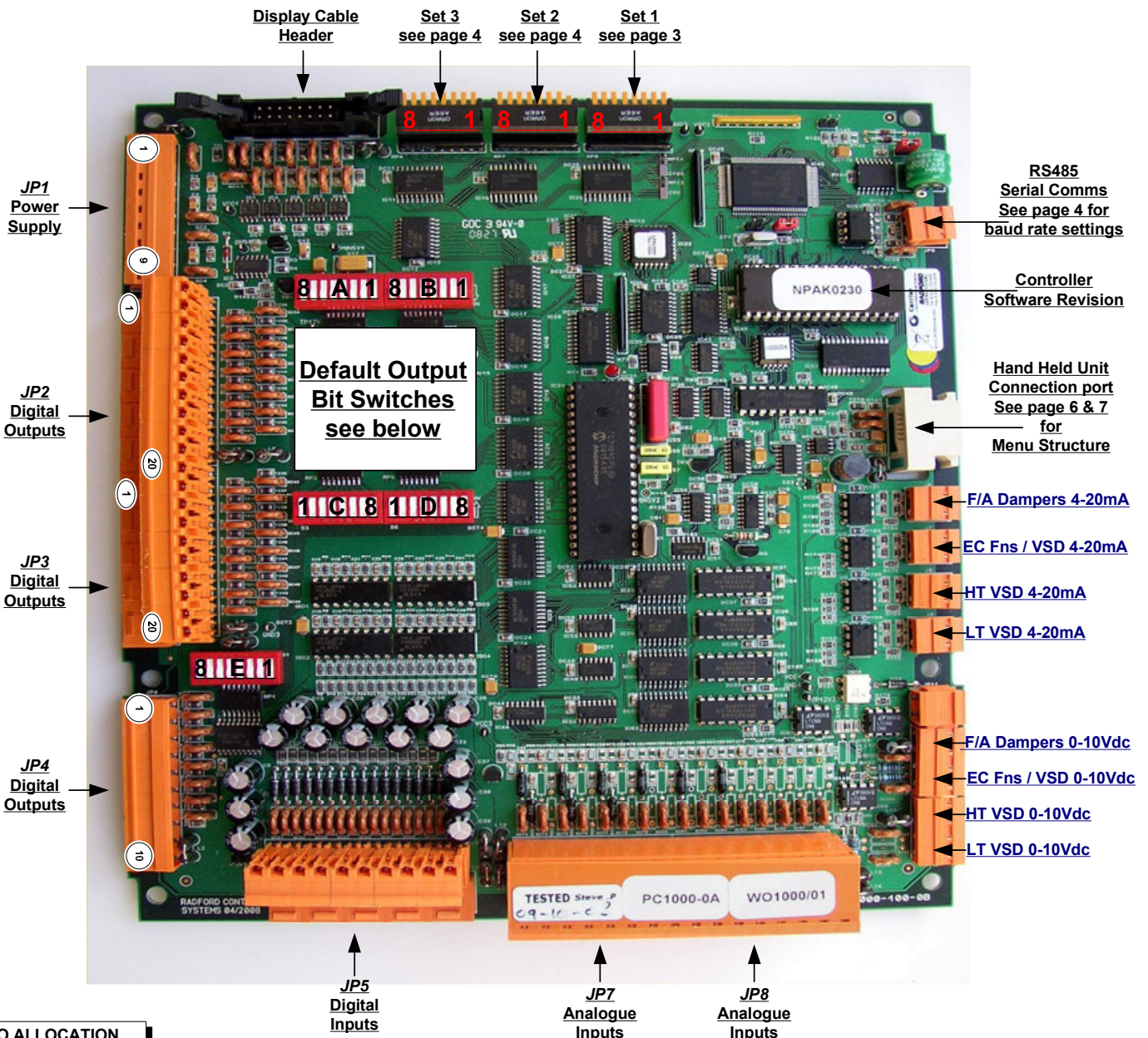
NPAK0230 *only*

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SPLIT LT / IT PAK CONTROLLER SET UP GUIDE. NPAK0230

BOARD LAYOUT

Configuration Switches



I/O ALLOCATION

DIGITAL OUTPUTS (Output No / Bit Switch No / Pin)

1	C1 Start	1	9	C3 Start	1	17	C5 Start	1	25	Heat Reclaim SV	1	33	C7 Start	1	41	C9 Start	1	49	C11 Start	1	57	C13 Start	1	65	C15 Start	1	73	C17 Start	1	81	C19 Start	1	89	C21 Start	1	97	C23 Start	1	105	C25 Start	1	113	C27 Start	1	121	C29 Start	1	129	C31 Start	1	137	C33 Start	1	145	C35 Start	1	153	C37 Start	1	161	C39 Start	1	169	C41 Start	1	177	C43 Start	1	185	C45 Start	1	193	C47 Start	1	201	C49 Start	1	209	C51 Start	1	217	C53 Start	1	225	C55 Start	1	233	C57 Start	1	241	C59 Start	1	249	C61 Start	1	257	C63 Start	1	265	C65 Start	1	273	C67 Start	1	281	C69 Start	1	289	C71 Start	1	297	C73 Start	1	305	C75 Start	1	313	C77 Start	1	321	C79 Start	1	329	C81 Start	1	337	C83 Start	1	345	C85 Start	1	353	C87 Start	1	361	C89 Start	1	369	C91 Start	1	377	C93 Start	1	385	C95 Start	1	393	C97 Start	1	401	C99 Start	1	409	C101 Start	1	417	C103 Start	1	425	C105 Start	1	433	C107 Start	1	441	C109 Start	1	449	C111 Start	1	457	C113 Start	1	465	C115 Start	1	473	C117 Start	1	481	C119 Start	1	489	C121 Start	1	497	C123 Start	1	505	C125 Start	1	513	C127 Start	1	521	C129 Start	1	529	C131 Start	1	537	C133 Start	1	545	C135 Start	1	553	C137 Start	1	561	C139 Start	1	569	C141 Start	1	577	C143 Start	1	585	C145 Start	1	593	C147 Start	1	601	C149 Start	1	609	C151 Start	1	617	C153 Start	1	625	C155 Start	1	633	C157 Start	1	641	C159 Start	1	649	C161 Start	1	657	C163 Start	1	665	C165 Start	1	673	C167 Start	1	681	C169 Start	1	689	C171 Start	1	697	C173 Start	1	705	C175 Start	1	713	C177 Start	1	721	C179 Start	1	729	C181 Start	1	737	C183 Start	1	745	C185 Start	1	753	C187 Start	1	761	C189 Start	1	769	C191 Start	1	777	C193 Start	1	785	C195 Start	1	793	C197 Start	1	801	C199 Start	1	809	C201 Start	1	817	C203 Start	1	825	C205 Start	1	833	C207 Start	1	841	C209 Start	1	849	C211 Start	1	857	C213 Start	1	865	C215 Start	1	873	C217 Start	1	881	C219 Start	1	889	C221 Start	1	897	C223 Start	1	905	C225 Start	1	913	C227 Start	1	921	C229 Start	1	929	C231 Start	1	937	C233 Start	1	945	C235 Start	1	953	C237 Start	1	961	C239 Start	1	969	C241 Start	1	977	C243 Start	1	985	C245 Start	1	993	C247 Start	1	1001	C249 Start	1	1009	C251 Start	1	1017	C253 Start	1	1025	C255 Start	1	1033	C257 Start	1	1041	C259 Start	1	1049	C261 Start	1	1057	C263 Start	1	1065	C265 Start	1	1073	C267 Start	1	1081	C269 Start	1	1089	C271 Start	1	1097	C273 Start	1	1105	C275 Start	1	1113	C277 Start	1	1121	C279 Start	1	1129	C281 Start	1	1137	C283 Start	1	1145	C285 Start	1	1153	C287 Start	1	1161	C289 Start	1	1169	C291 Start	1	1177	C293 Start	1	1185	C295 Start	1	1193	C297 Start	1	1201	C299 Start	1	1209	C301 Start	1	1217	C303 Start	1	1225	C305 Start	1	1233	C307 Start	1	1241	C309 Start	1	1249	C311 Start	1	1257	C313 Start	1	1265	C315 Start	1	1273	C317 Start	1	1281	C319 Start	1	1289	C321 Start	1	1297	C323 Start	1	1305	C325 Start	1	1313	C327 Start	1	1321	C329 Start	1	1329	C331 Start	1	1337	C333 Start	1	1345	C335 Start	1	1353	C337 Start	1	1361	C339 Start	1	1369	C341 Start	1	1377	C343 Start	1	1385	C345 Start	1	1393	C347 Start	1	1401	C349 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Start	1	1849	C461 Start	1	1857	C463 Start	1	1865	C465 Start	1	1873	C467 Start	1	1881	C469 Start	1	1889	C471 Start	1	1897	C473 Start	1	1905	C475 Start	1	1913	C477 Start	1	1921	C479 Start	1	1929	C481 Start	1	1937	C483 Start	1	1945	C485 Start	1	1953	C487 Start	1	1961	C489 Start	1	1969	C491 Start	1	1977	C493 Start	1	1985	C495 Start	1	1993	C497 Start	1	2001	C499 Start	1	2009	C501 Start	1	2017	C503 Start	1	2025	C505 Start	1	2033	C507 Start	1	2041	C509 Start	1	2049	C511 Start	1	2057	C513 Start	1	2065	C515 Start	1	2073	C517 Start	1	2081	C519 Start	1	2089	C521 Start	1	2097	C523 Start	1	2105	C525 Start	1	2113	C527 Start	1	2121	C529 Start	1	2129	C531 Start	1	2137	C533 Start	1	2145	C535 Start	1	2153	C537 Start	1	2161	C539 Start	1	2169	C541 Start	1	2177	C543 Start	1	2185	C545 Start	1	2193	C547 Start	1	2201	C549 Start	1	2209	C551 Start	1	2217	C553 Start	1	2225	C555 Start	1	2233	C557 Start	1	2241	C559 Start	1	2249	C561 Start	1	2257	C563 Start	1	2265	C565 Start	1	2273	C567 Start	1	2281	C569 Start	1	2289	C571 Start	1	2297	C573 Start	1	2305	C575 Start	1	2313	C577 Start	1	2321	C579 Start	1	2329	C581 Start	1	2337	C583 Start	1	2345	C585 Start	1	2353	C587 Start	1	2361	C589 Start	1	2369	C591 Start	1	2377	C593 Start	1	2385	C595 Start	1	2393	C597 Start	1	2401	C599 Start	1	2409	C601 Start	1	2417	C603 Start	1	2425	C605 Start	1	2433	C607 Start	1	2441	C609 Start	1	2449	C611 Start	1	2457	C613 Start	1	2465	C615 Start	1	2473	C617 Start	1	2481	C619 Start	1	2489	C621 Start	1	2497	C623 Start	1	2505	C625 Start	1	2513	C627 Start	1	2521	C629 Start	1	2529	C631 Start	1	2537	C633 Start	1	2545	C635 Start	1	2553	C637 Start	1	2561	C639 Start	1	2569	C641 Start	1	2577	C643 Start	1	2585	C645 Start	1	2593	C647 Start	1	2601	C649 Start	1	2609	C651 Start	1	2617	C653 Start	1	2625	C655 Start	1	2633	C657 Start	1	2641	C659 Start	1	2649	C661 Start	1	2657	C663 Start	1	2665	C665 Start	1	2673	C667 Start	1	2681	C669 Start	1	2689	C671 Start	1	2697	C673 Start	1	2705	C675 Start	1	2713	C677 Start	1	2721	C679 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Start	1	3609	C901 Start	1	3617	C903 Start	1	3625	C905 Start	1	3633	C907 Start	1	3641	C909 Start	1	3649	C911 Start	1	3657	C913 Start	1	3665	C915 Start	1	3673	C917 Start	1	3681	C919 Start	1	3689	C921 Start	1	3697	C923 Start	1	3705	C925 Start	1	3713	C927 Start	1	3721	C929 Start	1	3729	C931 Start	1	3737	C933 Start	1	3745	C935 Start	1	3753	C937 Start	1	3761	C939 Start	1	3769	C941 Start	1	3777	C943 Start	1	3785	C945 Start	1	3793	C947 Start	1	3801	C949 Start	1	3809	C951 Start	1	3817	C953 Start	1	3825	C955 Start	1	3833	C957 Start	1	3841	C959 Start	1	3849	C961 Start	1	3857	C963 Start	1	3865	C965 Start	1	3873	C967 Start	1	3881	C969 Start	1	3889	C971 Start	1	3897	C973 Start	1	3905	C975 Start	1	3913	C977 Start	1	3921	C979 Start	1	3929	C981 Start	1	3937	C983 Start	1	3945	C985 Start	1	3953	C987 Start	1	3961	C989 Start	1	3969	C991 Start	1	3977	C993 Start
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CONTROLLER CONFIGURATION BIT SWITCHES

Configuration set 1
(Nearest Software Chip)

		NUMBER OF COMPRESSORS								
HT	LT	0	1	2	3	4	5	6	7	8
0	0									
1	1									
2	2									
3	3									
4	4									
5	5									
6	6									
7	7									
8	8									

= OFF
 = ON

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CONTROLLER CONFIGURATION BIT SWITCHES Page 2

Configuration set 2 (Middle)

Condenser Fans =2	Single Speed (2 Stages)	
	Dual Speed (4 Stages)	

= OFF

= ON

Condenser Fans =3	Single Speed (3 Stages)	
	Dual Speed (6 Stages)	

Condenser Fans =4	(4 Stages)	
		1 2 3 4 5 6 7 8

Condenser Fans =5	(5 Stages)	
		1 2 3 4 5 6 7 8

Condenser Fans =6	(6 Stages)	
		1 2 3 4 5 6 7 8

Condenser Fans =8	(4 Stages)	
		1 2 3 4 5 6 7 8

Condenser Fans =10	(5 Stages)	
		1 2 3 4 5 6 7 8

Condenser Fans =12	(6 Stages)	
		1 2 3 4 5 6 7 8

Fan Fault Input	Fault Low (Open)	
	Fault Hi (Closed)	

Comps Fault Input	Fault Low (Open)	
	Fault Hi (Closed)	

Minimum No. Comps To Run	0 No Dump	
	1 Dump Enabled	

RS485 Baud Rate	600	
	9600	

Configuration set 3 (Nearest Display Header)

Refrigerant	R22	
	R404A (HP62)	
	R134A	

= OFF

= ON

Pressure Units For Display	PSI	
	Bar	

Pressure Transmitter type in use	Voltage 0-6v	
	Current 4-20mA	

Discharge Pressure Control	Floating SP	
	Fixed SP EC Fans	

Damper Control Enabled	Disabled A-01	
	Enabled A-01	

VSD Comps Enabled	Disabled A-01	
	Enabled A-01	

Discharge Pressure Override	Disabled	
	Enabled	

O/VIEW MENU

IT View	Alarms / F4
ITSucPress	LT/ACLowSP
ITContBand	LT/ACHighSP
ITSPChngeRate	ITLowSP
IT Auto/Man	ITHighSP
ITTargetStgs	HighDPOffload

LT View
DischPressure
LTsucPress
LTContBand
LTSPChngeRate
LT/ACAuto/Man
LT/ACTrgtStgs

Pak View
LTTotalStgs
ITTotalStgs
C1StgsRunning
C2StgsRunning

C8StgsRunning
LTSatRunning
ITSatRunning
C1CurrentMax
C2CurrentMax

C8CurrentMax
C1StartTimer
C2StartTimer

C8StartTimer

Startup
Load Defaults
Unit Number
Refrig Type
MaxFanStages
MaxFans
MinCompStgs
CompFitSense
FanFitSense
C1 Usage
C2 Usage

C8 Usage
Baud Rate
WaterFitted
AirOnFitted
AirOffFitted
ROMChecksum
ESEnableTmr
1stFanOnPress
DP Override
ECFanOvrOfst
ECFanOvrDbnd

PAK MENU

Pak Setup	I/O 2 Lst
CondTmpOffset	C1 Motor
Fan On Range	C1 Stage2
Fan Off Range	C1 Stage3
LastFanOnMax	C8 Motor
LastFanOffMin	C8 Stage2
FnStage1On(H)	C8 Stage3
UseFixedDPSP	LTSatRun i/p
FixedDPSP	ITSatRun i/p
DPForDecrease	LTSatFaulti/p
HtRecSpiltDB	ITSatFaulti/p
SplitShutSpt	E Alarms
SplitOpenDB	Unit Number
LiqInjectSP	RAM
InjectDB	ROM
LiqInjEnabl	DataCorrupt
HighDPWarning	Prog Counter
C1 Stages	Stack Pointer
	Background

E Alarms
Unit Number
RAM
ROM
DataCorrupt
Prog Counter
Stack Pointer
Background

Startup
Load Defaults
Unit Number
Refrig Type
MaxFanStages
MaxFans
MinCompStgs
CompFitSense
FanFitSense
C1 Usage

SatComps
MonAUsage
MonBUsage
MonCUsage
MonDUsage
Monitor A
Monitor B
Monitor C
Monitor D
IT SP Input Max
IT SP Input Min
LT SP Input Max
LT SP Input Min
DP Input Max
DP Input Min

I/O 1 Lst
BMS Heat i/p
LowRefrig i/p
Fan fault i/p
FnStg1OP

FnStg6OP
HeatRecValve
Inlet
Split o/p
Pak Alarm o/p
LT Sub-Cooler
IT Sub-Cooler
LT Dump Valve
IT Dump Valve
Liquid Valve
Liq Inj OP
Fans Slow OP
C1 fault i/p

C8 fault i/p

Alarms / F4
LT/ACLowSP
LT/ACHighSP
ITLowSP
ITHighSP
HighDPOffload
HighDP
Low Refrig
PressSensor
AirOffSensor
LT/ACStopped
LT/AC2CompFit
ITStopped
IT2CompFit
C1 Fault

C8 Fault
Fan Stage Fit
LT Sat Comp
IT Sat Comp
Unit Number
Processor
LTMixComp
ITMixComp

POWER UP LIST

Power Up
Menu Select
Unit Number
Software Ver
Any Alarms?
LTSeqTimer
ITSeqTimer
Press.Units
TimeOfDay

Use MENU SELECT to select one of the four available menus. Pressing ESC will then take you to the chosen menu.

To select a different menu, return to the power up list (using ESC) and use MENU SELECT again.

HAND HELD UNIT MENUS AND LISTS

LT MENU	IT MENU																																										
<table border="1"> <thead> <tr> <th>LT Setup</th> </tr> </thead> <tbody> <tr> <td>LTDBUpperLim</td> </tr> <tr> <td>LT SP DBWidth</td> </tr> <tr> <td>LTCondIncBand</td> </tr> <tr> <td>LTCondDecBand</td> </tr> <tr> <td>LTInhibDecRte</td> </tr> <tr> <td>LTInhibIncRte</td> </tr> <tr> <td>LT Stg2 H/Off</td> </tr> <tr> <td>LT Stg3 H/Off</td> </tr> <tr> <td>LTDecPeriod</td> </tr> <tr> <td>LTDemndPeriod</td> </tr> <tr> <td>LTLowSPLim</td> </tr> <tr> <td>LTHighSPLim</td> </tr> <tr> <td>LTGDumpEnable</td> </tr> <tr> <td>LTSUBCoolEnbl</td> </tr> <tr> <td>LTPressEndES</td> </tr> <tr> <td>LTESStartHO</td> </tr> <tr> <td>LTESStopHO</td> </tr> <tr> <td>LTRestart</td> </tr> <tr> <td>LT VSD Spt</td> </tr> <tr> <td>LT VSD CtlBd</td> </tr> </tbody> </table>	LT Setup	LTDBUpperLim	LT SP DBWidth	LTCondIncBand	LTCondDecBand	LTInhibDecRte	LTInhibIncRte	LT Stg2 H/Off	LT Stg3 H/Off	LTDecPeriod	LTDemndPeriod	LTLowSPLim	LTHighSPLim	LTGDumpEnable	LTSUBCoolEnbl	LTPressEndES	LTESStartHO	LTESStopHO	LTRestart	LT VSD Spt	LT VSD CtlBd	<table border="1"> <thead> <tr> <th>IT Setup</th> </tr> </thead> <tbody> <tr> <td>ITDBUpperLim</td> </tr> <tr> <td>IT SP DBWidth</td> </tr> <tr> <td>ITCondIncBand</td> </tr> <tr> <td>ITCondDecBand</td> </tr> <tr> <td>ITInhibDecRte</td> </tr> <tr> <td>ITInhibIncRte</td> </tr> <tr> <td>IT Stg2 H/Off</td> </tr> <tr> <td>IT Stg3 H/Off</td> </tr> <tr> <td>ITDecPeriod</td> </tr> <tr> <td>ITDemndPeriod</td> </tr> <tr> <td>ITLowSPLim</td> </tr> <tr> <td>ITHighSPLim</td> </tr> <tr> <td>ITGDumpEnable</td> </tr> <tr> <td>ITSubCoolEnbl</td> </tr> <tr> <td>ITPressEndES</td> </tr> <tr> <td>ITESStartHO</td> </tr> <tr> <td>ITESStopHO</td> </tr> <tr> <td>ITRestart</td> </tr> <tr> <td>IT VSD Spt</td> </tr> <tr> <td>IT VSD CtlBd</td> </tr> </tbody> </table>	IT Setup	ITDBUpperLim	IT SP DBWidth	ITCondIncBand	ITCondDecBand	ITInhibDecRte	ITInhibIncRte	IT Stg2 H/Off	IT Stg3 H/Off	ITDecPeriod	ITDemndPeriod	ITLowSPLim	ITHighSPLim	ITGDumpEnable	ITSubCoolEnbl	ITPressEndES	ITESStartHO	ITESStopHO	ITRestart	IT VSD Spt	IT VSD CtlBd
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COMMON LISTS (always available)

Startup	F2	F3	Alarms / F4
Load Defaults	LT SucPress	LTDBUpperLim	LT/ACLowSP
Unit Number	LTSuctionTemp	LT SP DBWidth	LT/ACHighSP
Pak Type	IT SucPress	LTCondIncBand	ITLowSP
MaxFanStages	ITSuctionTemp	LTCondDecBand	ITHighSP
MaxFans	DischPressure	LTInhibDecRte	HighDPOffload
MinCompStages	CombDischTemp	LTInhibIncRte	HighDP
CompFitSense	WaterInTemp	LT Stg2 H/Off	Low Refrig
FanFitSense	WaterOutTemp	LT Stg3 H/Off	PressSensor
C1Usage	Air On Tmp	ITDBUpperLim	LT/ACStopped
C2Usage	Air Off Tmp	IT SP DBWidth	LT/AC2CompFit
	FanStgsRun	ITCondIncBand	ITStopped
C8Usage	FirstStgOn	ITCondDecBand	IT2CompFit
Baud Rate	FansRunning	ITInhibDecRte	C1 Fault
WaterFitted	LT/ACDmndSt	ITInhibIncRte	C2 Fault
AirOnFitted	ITDemandState	IT Stg2 H/Off	C8 Fault
AirOffFitted	BMS Heat i/p	IT Stg3 H/Off	Fan Stage Fit
ROMChecksum	C1 Run Hours	AOffSpt	LT Sat Comp
	C2 Run Hours	AOffCtlBnd	IT Sat Comp
		SplyRrcrOffs	Unit Number
	C8 Run Hours		Processor

SPLIT LT / IT PLANT CONTROLLER SET UP GUIDE. NPAK0230

HHU EDITING EXAMPLES

LOADING DEFAULT PARAMETERS

```
→ Menu Select O/View
Unit Number 1.0
Software NPAK 2.04
Any Alarms? NO
```

The Load Defaults item is on the Startup list. This list can be accessed from any of the menus.
To reach the currently selected menu from the Power Up list (or from any other list) press 'ESC'.

The Power Up List

```
→IT View Alarms
LT View
Pak View
Startup
```

Use the arrow keys to move the arrow to 'Startup' and press 'ENT'.
(This example shows the O/View menu, but 'Startup' will appear somewhere whichever menu is selected).

The O/View Menu

```
→ Load Defaults DONE
Unit Number 301.0
Pak Type REFRIG
MaxFanStages 4
```

The Load Defaults item is at the top of the list.(Don't be fooled by it saying 'DONE' next to this item...it isn't done yet).
Press 'ENT' to enter this item.

The Startup List

```
Edit: Load Defaults
DONE
```

It says done... but it still isn't.
Press the down arrow key until this item says 'BEGIN'.

The Load Defaults Item

```
Edit: Load Defaults
BEGIN
```

With the item set to 'BEGIN' press 'ENT' to cause default parameters to be loaded.
(Pressing 'ESC' twice at this point would return you to the Startup list without loading default parameters).

The Load Defaults Item

```
→ Load Defaults DONE
Unit Number 0.0
Pak Type REFRIG
MaxFanStages 4
```

The Startup list reappears, and all parameters have been set to their default values.
(Note that since Unit Number is a parameter it has returned to its default value of 0.0: Unit Number must always be set up again after loading defaults).

The Startup List

SETTING UP MAXIMUM COMPRESSOR STAGES

```
→ Menu Select O/View
Unit Number 1.0
Software NPAK 2.04
Any Alarms? NO
```

The desired items (C1 Max Stages etc) are on the Pak Setup list which is accessed via the Pak menu.

With the arrow pointing at the Menu Select item on the Power Up list, press 'ENT'.

The Power Up List

```
Edit: Menu Select
O/View
```

The O/View Menu is selected. Press the up or down arrows until this says 'Pak'.
Once 'Pak' is showing, press 'ENT' to select it followed by 'ESC' to actually go to the menu.

Changing the Selected Menu

```
→PakSetup E Alarms
SatComps Startup
IO 1 Lst Alarms
IO 2 Lst
```

From this menu there are seven possible lists that can be accessed.

Press 'ENT' with the arrow pointing at 'PakSetup'. This takes you to the Pak Setup List.

The Pak Menu

```
→ CondImpOffset 5.0
Fan On Range 3.40
Fan Off Range 2.04
LastFanOnMax 17.69
```

The Pak Setup List appears with the arrow pointing at the first item.

Pressing the down arrow key scrolls the arrow down the list.

The Pak Setup List

```
HighDPWarning 220.0
→ C1 Stages 3
C2 Stages 3
C3 Stages 3
```

Once the required item is reached, press 'ENT' to edit it.

(For a brief description of the item you are pointing at press the 'F1 HELP' key).

Pak Setup List (after scrolling)

```
Edit: C1 Stages
Max Value: 3
Min Value: 0
```

You can now change the value for this parameter using the numeric keys, or the up and down arrow keys.

If you make a mistake, press 'ESC' and the item returns to its original value. Once you are happy with your changes press 'ENT' to confirm them.

Editing the C1 Stages Parameter

SPLIT LT / IT PLANT CONTROLLER SET UP GUIDE. NPAK0230

Explanation of new control strategies & recommended commissioning parameters

Discharge Pressure Control	Floating SP	1 2 3 4 5 6 7 8
	Fixed SP EC Fans	1 2 3 4 5 6 7 8

When selected the following HHU parameters are significant:-

STARTUP MENU - **ECFanOvrOfst** = If the discharge pressure is below this setpoint (default value 290.0psi) the analogue output 2 (JP12 1-2 0-10V or J3 1-2 4-20mA) will vary linearly between 0 and 70% of the full scale. When the discharge pressure rises above the **ECFanOvrOfst** the scale of analogue output 2 operates linearly between 0 and 100%.

STARTUP MENU - **ECFanOvrDdnd** = This is the deadband (default value 10.0psi) that determines at which pressure the analogue output returns to 0-70% of full scale. Therefore using the default values mentioned in text above, the output will operate at 0-70% until the discharge pressure exceeds 290.0psi at which point the output will operate between 0-100% and remain so until the discharge pressure fall below the **ECFanOvrOfst (290.0)** minus the **ECFanOvrDdnd (10.0)** i.e. 280.0psi.

Discharge Pressure Override	Disabled	1 2 3 4 5 6 7 8
	Enabled	1 2 3 4 5 6 7 8

When selected the following HHU parameters are significant:-

STARTUP MENU - **DP Override** = Indicates the state of the discharge pressure override output (Formally the slow fans output - see I/O allocation table on page 2)

PAKSETUP MENU - **HighDPWarning** = This is the Setpoint at which the DP Override output will be switched on. Once this pressure has been exceeded the override output will remain on until the discharge pressure falls below the last fan off setpoint pressure.

This output is intended to remove the necessity for refrigeration contractors to fit additional pressure safety switches for the control of condenser backup systems.

Damper Control Enabled	Disabled A-O1	1 2 3 4 5 6 7 8
	Enabled A-O1	1 2 3 4 5 6 7 8

When selected the following HHU parameters are significant:-

F3 - **AOffSpt** = The condenser air off temperature setpoint that the controller is attempting to maintain via damper actuation and fan control. (Default value 30DegC)

F3 - **AOffCtlBnd** = The deadband associated with the condenser air off setpoint over which the controller allows the air off temperature to rise before fresh air dampers are modulated. (Default value 2DegC). Therefore using the default parameter values mentioned above the condenser air off temperature will be maintained by the controller within the band of 30DegC to 32DegC.

F3 - **SplyRrcrOffs** = The offset from the lower limit of the condenser air off setpoint at which fresh air dampers are closed fully and the recirc damper is opened. The motorised supply dampers are closed in this state. (Default value is 4DegC).

VSD Comps Enabled	Disabled A-O1	1 2 3 4 5 6 7 8
	Enabled A-O1	1 2 3 4 5 6 7 8

When selected the following HHU parameters are significant:-

(LT and IT VSD parameters are located within the LT and IT setup menus). Examples used below are for IT

IT SETUP - **IT VSD Spt** = The target suction pressure setpoint that the controller maintains by modulating the analogue output to the variable speed drive on the first compressor. (Default is 45.0psi)

IT SETUP - **IT VSD CtlBd** = The deadband associated with the VSD SETPOINT. (default is 4.0psi) The deadband is positioned equally either side of the VSD setpoint. Therefore using the default values identified above the suction pressure will be maintained within a band of 47.0psi to 43.0psi.

Recommended commissioning values:-

	R134A	R404A	R22
IT VSD Setpoint	16.0psi	48.5psi	36.0psi
IT VSD Deadband	4.0psi	4.0psi	4.0psi
LT VSD Setpoint	-----	8.0psi	5.5psi
LT VSD Deadband	-----	4.0psi	4.0psi
Lt / IT Restart periods	04:00		
IT Deadband Upperlim	18.5	51.0	38.5
IT SP Deadband Width	5.0	5.0	5.0
LT Deadband Upperlim	-----	10.5	8.0
LT SP Deadband Width	-----	5.0	5.0

Floating Head Pressure Fan Control in the Split LT/IT Pak Controller

INTRODUCTION

Fixed Head Pressure Control

Previous versions of the Split LT/IT Pak Controller attempted to maintain a fixed discharge pressure. The First Stage On Setpoint parameter specified the discharge pressure at which the first fan stage was brought on whilst the Fan On Range and Fan Off Differential parameters specified how 'tight' or 'loose' the control was. A high Fan On Range, for example, allowed the discharge pressure to rise further above the First Stage On Setpoint before bringing on more fan stages.

This control strategy worked well but there was a problem on very hot days. Fans were being brought on to cool the condenser and hence lower the discharge pressure but - once the condenser had been cooled to the temperature of the outside air - blowing more air onto it was achieving no further effect. In other words the controller was wasting electricity trying to maintain a discharge pressure which, given the temperature outside, could not possibly be maintained. There was also a missed opportunity on very cold days when the controller could easily have maintained a lower discharge pressure.

Floating Head Pressure Control

Floating Head Pressure control addresses this problem and exploits this opportunity by allowing the controller to adjust it's first stage on pressure according to the outside temperature instead of having it set up as a parameter.

Instead of trying to maintain a particular fixed discharge pressure the controller now attempts to maintain a discharge pressure that corresponds to a condenser temperature which is a small fixed offset above the current outside air temperature. This means that the controller is always trying to maintain a reasonably low discharge pressure, but one that is still achievable given the outside air temperature.

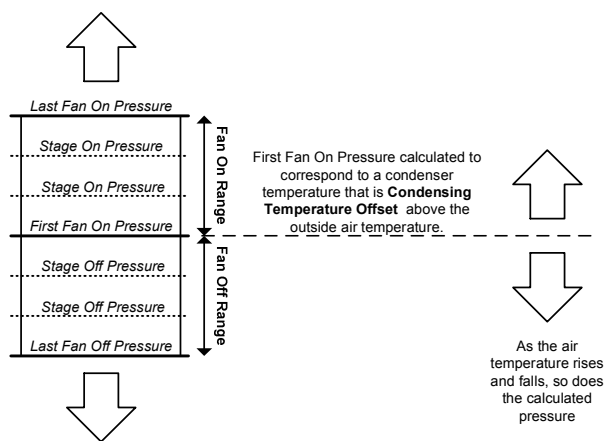
The calculated pressure to maintain is called the First Stage On Pressure. It can be seen - but not adjusted - on the hand held unit.

Control During BMS Heat Reclaim

On sites where there is a BMS heat reclaim system the controller still needs to maintain a higher discharge pressure when heat reclaim is active. On these sites the controller uses floating head pressure control when heat reclaim is inactive, but switches to a higher fixed discharge pressure to maintain whenever heat reclaim is active.

ILLUSTRATION (Parameters Shown In Bold>

Last Fan On Maximum



Last Fan Off Minimum

The entire fan control band 'floats' so that the first fan stage is always brought on when the discharge pressure indicates that the condenser temperature is now more than the **Condensing Temperature Offset** above the outside air temperature.

The control band is not, however, allowed outside of the limits set by **Last Fan On Maximum** and **Last Fan Off Minimum**.

PARAMETERS

CONDENSING TEMPERATURE OFFSET (degrees)

Range: 0 to 20 degrees
Default: 5 degrees

The temperature above outside air temperature that the controller attempts to maintain in the condenser. It is added to the air on temperature to give the absolute temperature that the controller will attempt to maintain, and the controller then calculates a discharge pressure corresponding to this temperature which it uses as First Fan On Pressure.

FAN ON RANGE (PSIG)

Range: 10 to 100 PSIG (subject to parameter limiting)
Default: 50 PSIG

The pressure range over which the available fan stages will be brought on once the discharge pressure has exceeded First Fan On Pressure.

FAN OFF RANGE (PSIG)

Range: 10 to 70 PSIG (subject to parameter limiting)
Default: 30 PSIG

The pressure range over which the available fan stages will be turned off once the pressure falls below First Fan On Pressure.

LAST FAN ON MAX (PSIG)

Range: 150 to 300 PSIG (subject to parameter limiting)
Default: 260 PSIG

Limit which Last Fan On Pressure must not exceed. If the calculated First Fan On Pressure becomes so high that Last Fan On Pressure reaches this limit it will not be allowed to rise any further, even if the outside air temperature rises.

LAST FAN OFF MIN (PSIG)

Range: 100 to 200 PSIG (subject to parameter limiting)
Default: 140 PSIG

Limit which Last Fan Off Pressure must not fall below. If the calculated First Fan On Pressure becomes so low that Last Fan Off Pressure reaches this limit it will not be allowed to fall any further, even if the outside air temperature falls.

FIRST FAN ON HEAT (PSIG)

Range: 210 to 240 PSIG
Default: 230 PSIG

The fixed discharge pressure which the controller attempts to maintain on BMS sites when heat reclaim is active.

PARAMETER LIMITING

The controller allows a wide range of settings for the floating head pressure parameters. Because of this flexibility it must make sure that the floating head pressure parameter settings "make sense" and disallow settings which do not. Specifically, the controller can only accept parameter settings which meet the following condition:

Fan On Range plus Fan Off Range
must be no greater than

Last Fan On Maximum minus Last Fan Off Minimum

In other words, the control band (Fan On Range + Fan Off Range) must not be so wide that it cannot fit inside the limits placed on its movement by Last Fan On Maximum and Last Fan off Minimum. To make set up easy set Last Fan On Maximum to its maximum and Last Fan off Minimum to its minimum. Set the fan ranges and then the Last Fan On Maximum and Minimum to limit the float range.

WHENEVER YOU CHANGE A PARAMETER THAT IS SUBJECT TO PARAMETER LIMITING, EXIT AND RE-ENTER THE HHU LIST IT IS ON BEFORE CHANGING ANOTHER ONE.

To reduce the float to zero, deduce the desired Last Fan On Maximum, Minimum and the First Fan On Pressure. Set the Fan On Range to Last Fan On Maximum Minus First Fan On Pressure. Set the Fan Off Range to First Fan On Pressure minus Last Fan On Minimum.

Condenser Analogue Output Operation

Analogue Output

