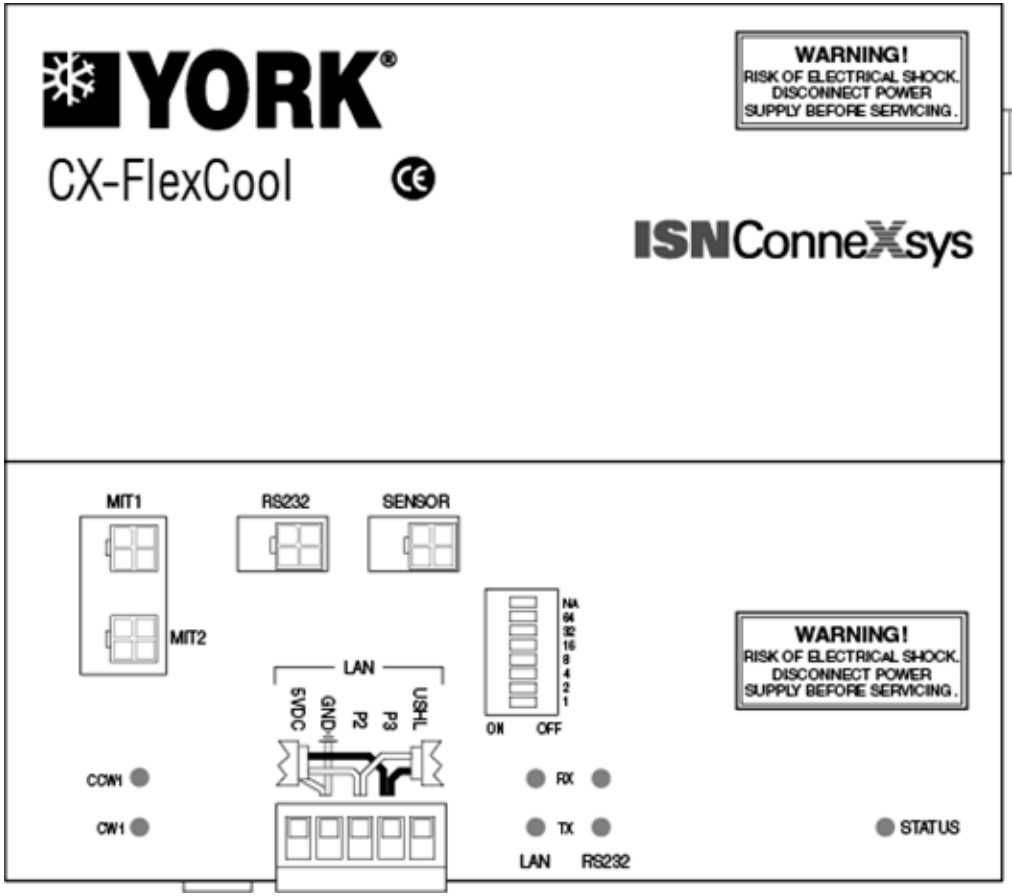
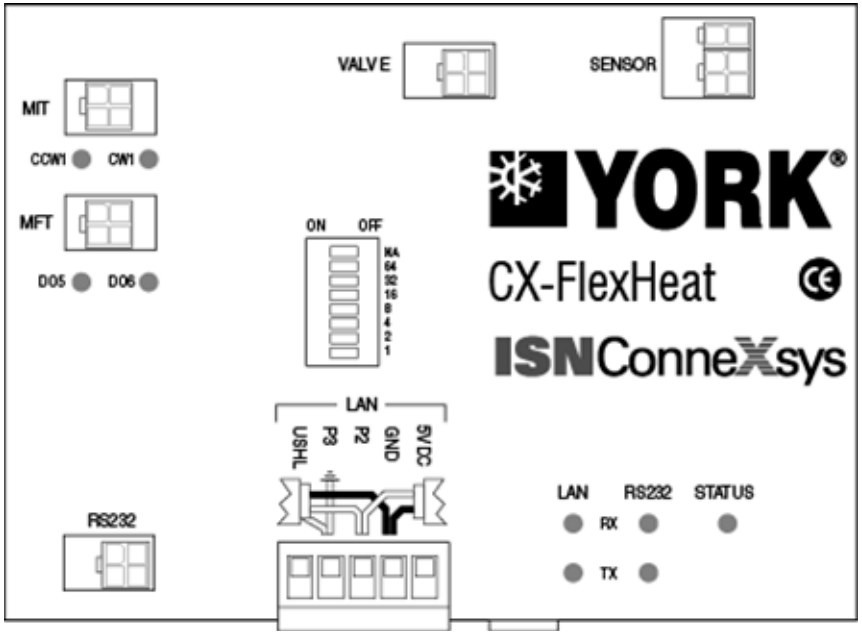
CX-XZN - FlexCool/Heat





For Factory Use Only

Flowcharts Deemed Accurate, but not for Public Scrutiny

FILE	DESCRIPTION	DATE
CX-XZN-V25-001d	701 Heater PI directed to 321 as per flow chart, config file only had error.	09/30/05
CX-XZN-V25-001c	Addition of MAXMASTERS and APDU T/O to User Reports	08/31/05
CX-XZN-V25-001b	BACnet Network Adjustments	07/15/05
CX-XZN-V25-001a	Correction to Transfer Out Report	09/16/04
CX-XZN-V25-001	Full Release - BACnet Counterpart to ISN Version of 8/15/03 (Identical Software Features)	07/30/04

PROJECT: **FLEXSYS - FLEXCL/HT**

PAGE: **Title Page**

CONFIG: **CX-XZN-V25-001**

YORK INTERNATIONAL

S/W Rev: **OCS-1**

S/W Engineer: **B. LEACH**

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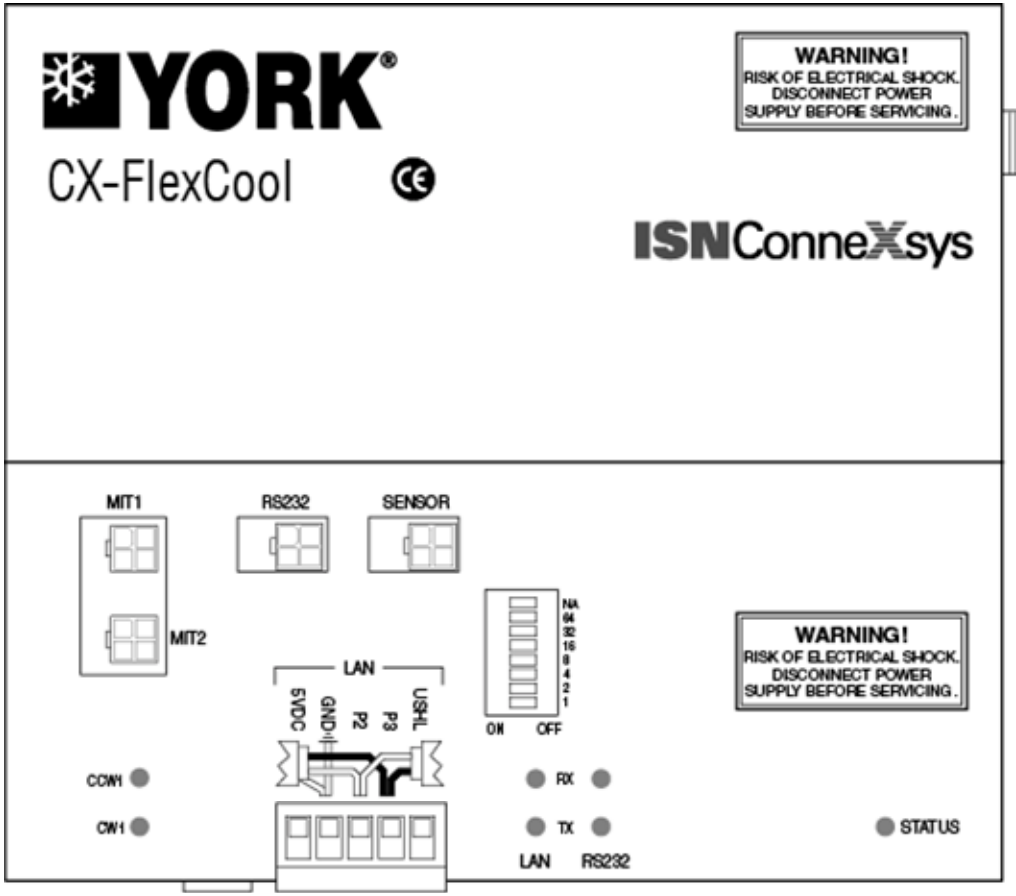
MIT 1 & 2	PAP-A Cable to MIT Boxes				
Pin	**Point**	**Color**	**Channel**	**Address**	**Description**
1	24 VAC	BRN			
2	CW1	WHT	1	634	DMP.CLOSE
3	CCW1	BLU	2	635	DMP.OPEN
4	NC				

RS232	PAP-B Cable to Temperature Sensor (RJ12)				
Pin	**Point**	**Color**	**Channel**	**Address**	**Description**
1	N/C				
2	TX	WHT			Transmit
3	RX	BLU			Receive
4	GND	BLK			Ground

SENSOR	PAP-B Cable to Temperature Sensor				
Pin	**Point**	**Color**	**Channel**	**Address**	**Description**
1	AI1	BRN	I/P 01	211	ZONE.T
2	RET	WHT			
3	AI2	BLU	I/P 02	212	ZONE.ADJ
4	RET	BLK			



PROJECT :	**FLEXSYS - FLEXCL/HT**
PAGE:	**FlexCool Input/Output**
CONFIG:	**CX-XZN-V25-001**

YORK INTERNATIONAL	S/W Rev: **OCS-1**	S/W Engineer: **B. LEACH**
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MIT	PAP-A Cable to T'Stat Connector (T1)				
Pin	**Point**	**Color**	**Channel**	**Address**	**Description**
1	24 VAC	BRN			
2	CW1	WHT	1	634	DMP.CLOSE
3	CCW1	BLU	2	635	DMP.OPEN
4	24 RET	GRN			

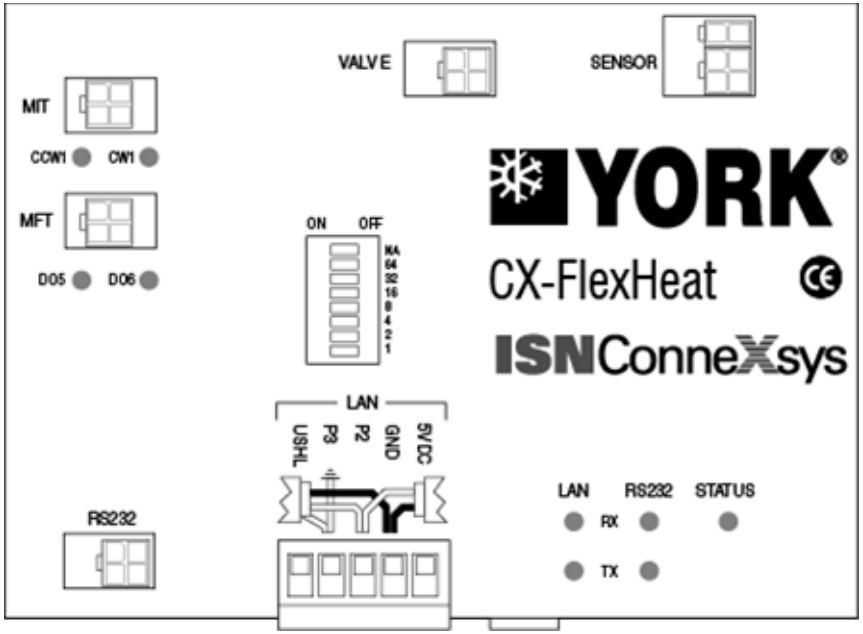
MFT	PAP-A Cable to Heat Input (T3)				
Pin	**Point**	**Color**	**Channel**	**Address**	**Description**
1	24 VAC	BRN			
2	DO5	WHT	5	636	DO5
3	DO6	BLU	6	637	DO6
4	N/C				

RS232	PAP-B Cable to Temperature Sensor (RJ12)				
Pin	**Point**	**Color**	**Channel**	**Address**	**Description**
1	N/C				
2	TX	WHT			Transmit
3	RX	BLU			Receive
4	GND	BLK			Ground

VALVE	PAP-B Cable to Hot Water Valve (0-10VDC)				
Pin	**Point**	**Color**	**Channel**	**Address**	**Description**
1	24 VAC	BRN			
2	AO1	WHT	A/O 1	702	HTG.VLV
3	RET	BLU			
4	RET	BLK			

SENSOR	PAP-B Cable to Temperature Sensor				
Pin	**Point**	**Color**	**Channel**	**Address**	**Description**
1	AI1	BRN	I/P 01	211	ZONE.T
2	RET	WHT			
3	AI2	BLU	I/P 02	212	ZONE.ADJ
4	RET	BLK			

SENSOR	PAP-B Cable to ?????				
Pin	**Point**	**Color**	**Channel**	**Address**	**Description**
1	AI3	BRN	I/P 03	215	SPARE
2	RET	WHT			



PROJECT :	**FLEXSYS - FLEXCL/HT**
PAGE:	**FlexHeat Input/Output**
CONFIG:	**CX-XZN-V25-001**

YORK INTERNATIONAL	S/W Rev: **OCS-1**	S/W Engineer: **B. LEACH**
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SUMMARY

ZONE TEMP ###.#			307p01f2	
OCCUPIED AAA	TIMER ###.#		605p01f2	322p01f2
OCC. CLG.SP ###.#	HTG.SP ###.#		310p01f2	311p01f2
UNOCC. CLG.SP ###.#	HTG.SP ###.#		312p01f2	313p01f2
DAMPER POSITION ###.#			214p01f2	
HEATING PERCENT ###.#				701p01f2
XZN- NODE: ##			6001p01f2	4501p04f2

LOCAL SETUP

ZONE TEMP ###.#	CALIBR ###.#		211p01f2	211p02f4
SP ADJ RANGE ###.#	ACTUAL ###.#		210p08f02	306p01f2
OCC. CLG.SP ###.#			209p08f2	
CLG-HTG DEADBAND ###.#			213p08f2	
UNOCC. OFFSET ###.#			204p01f2	
FAN ON IN DEADBAND? AAA	AAAA		632p01f2	511p04f2
PERIMETER HEAT? AAA	AAAA		633p01f2	512p04f2
STORE CONFIGURATION? 5555			5001p20f2	

CALIBRATION

ACTUATOR TRAVEL ### (SEC)			3801p09f2	
ACTUATOR SCALE FACTOR ###			245p05f2	
ACTUATOR CALC. INTERVAL ### (SEC)			3801p10f2	
HTG PI CALC. INTERVAL ### (SEC)			4013p10f2	
HTG PI CALC. CONSTANT ###			244p05f2	
DMPR. FORCE OPEN AAAA	POS ###.#		509p04f2	214p01f2
DMPR. FORCE CLSE AAAA	POS ###.#		510p04f2	214p01f2
HEATER CONTROL ###.#	MANUAL			701p01f1
POWERUP CALIBRATION TIMER ###			324p01f2	701p01f2
STORE CONFIGURATION? 5555			5001p20f2	

NETWORK COMMAND

DEVICE NODE NUMBER ##			4501p04f2	
OCC. CLG.SP ###.#			201p01f2	
SP ADJ RANGE ###.#	ACTUAL ###.#		202p01f2	306p01f2
OVERRIDE MINUTES ###.#			203p01f2	
UNOCC. OFFSET ###.#			204p01f2	
OCCUPIED AAAA	TIMER ###.#		5601p04f4	322p01f2
DMPR. FORCE OPEN AAAA	POS ###.#		5601p05f4	214p01f2
DMPR. FORCE CLSE AAAA	POS ###.#		5601p06f4	214p01f2
FAN ON IN DEADBAND AAA			632p01f2	
PERIMETER HEAT AAAA			633p01f2	

TRANSFER OUT

FLX FLR MAC: 0	XFER RESET: AUTOMATIC		5701P2f1	617P1f3
DE INSTANCE: 103 AUT			4501p8f1f3	
DE NAME: XZN- 103 AUT			4501p9f1f2	4501p9f3
DE MODIFIER: 1			4501p12f1f2	
VIRTUAL DE: 5700			4501p14f1f2	
STORE CONFIGURATION? 5555			5001p20f1	5001p20f2

This was added to "TRANSFER OUT" Report on Page 6:

MAX MSTRS: 127 APDU T/O: 6000 MSEC

4501p100f2f3 4501p110f2f3

RESET

RESET SYSTEM? 5555			5001p17f1	5001p17f2
APPLICATION NAME: OCS TDCL			5001p01f1	5001p01f2
APPLICATION VERSION: 1			5001p02f1-2	
PROGRAM VERSION: XZN-V25-1B				5001p26f2
LAN TYPE: BACNET	SPEED: 38K4			4501p05f2
LOCATION NAME: XZN-				6001p01f2
OWS GRAPHIC: FX-ZN-CL.GPC				4501p15f1 4501p[illegible]2
STORE CONFIGURATION? 5555			5001p20f1	5001p20f2

PROJECT:	**FLEXSYS - FLEXCL/HT**	
PAGE:	**User Reports**	
CONFIG:	**CX-XZN-V25-001**	
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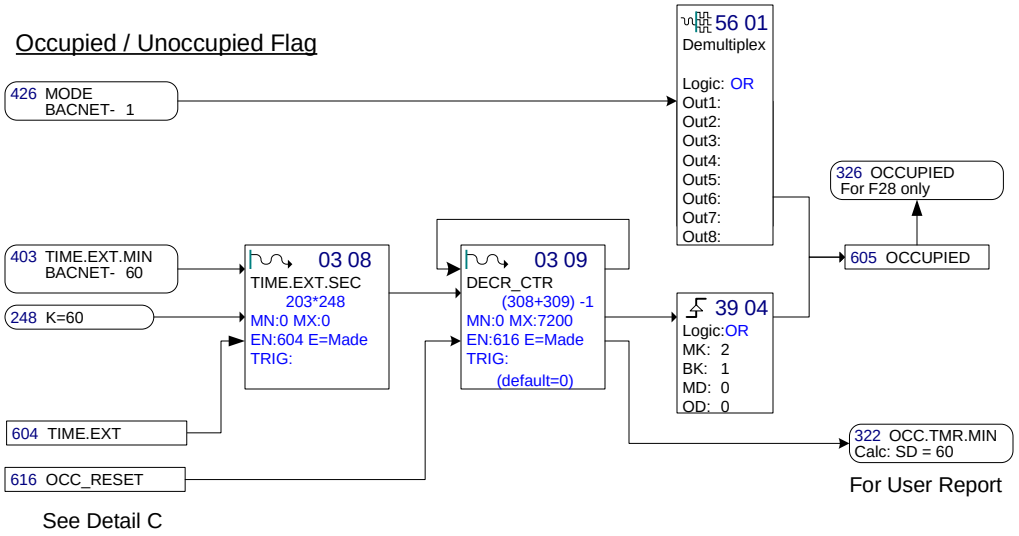
Occupied / Unoccupied Flag

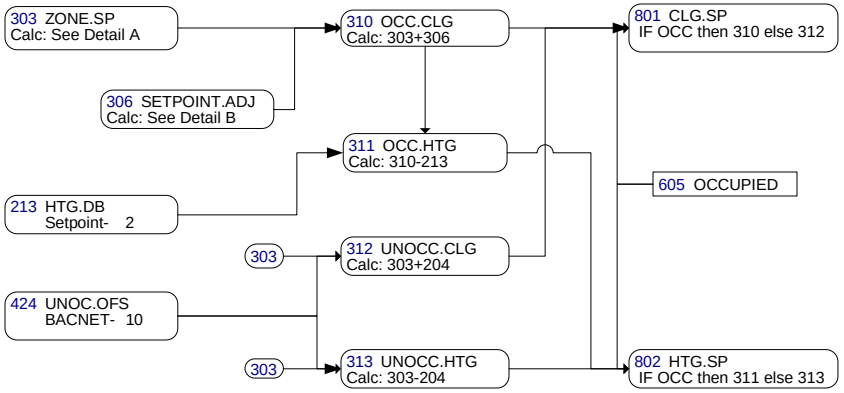


Occupied Flag

To make use of the occupied/unoccupied feature a network is assumed, if a network does not exist then the box is assumed to be in occupied mode.

1. The occupied flag [605] is typically controlled via a de-muxed analog signal [206-5601]
2. [605] can be controlled by the override on the temperature sensor:
   a. If the override is active, [604=ON] then [308] equals the override time in seconds.
   b. The decrementing counter [309] is loaded with the override time and begins counting down.
   c. The occupied flag [605] will be held ON by [3904] until the timer = 0.
   d. If the reset is active [616=ON] then [309] defaults to zero resetting the timer.

Occupied / unoccupied, Cooling / Heating Setpoints



Occpupied/Unoccupied, Cooling/Heating Setpoints

[310] The occupied cooling setpoint is the Zone setpoint (entered locally or via the network) adjusted by the zone adjust on the sensor.

[311] The occupied heating setpoint is 2 degF less than the occupied cooling setpoint. Heating deadband [213] is adjustable between 1 & 5 deg.

[312] The unoccupied cooling setpoint is the zone setpoint plus the unoccupied offset.

[313] The unoccupied heating setpoint is the zone setpoint minus the unoccupied offset.

The final cooling [801] and heating [802] setpoints are selected based on the occupied [605] flags.

PROJECT:	**FLEXSYS - FLEXCL/HT**	
PAGE:	**Zone Setpoints**	
CONFIG:	**CX-XZN-V25-001**	
YORK INTERNATIONAL	S/W Rev: **OCS-1**	S/W Engineer: **B. LEACH**
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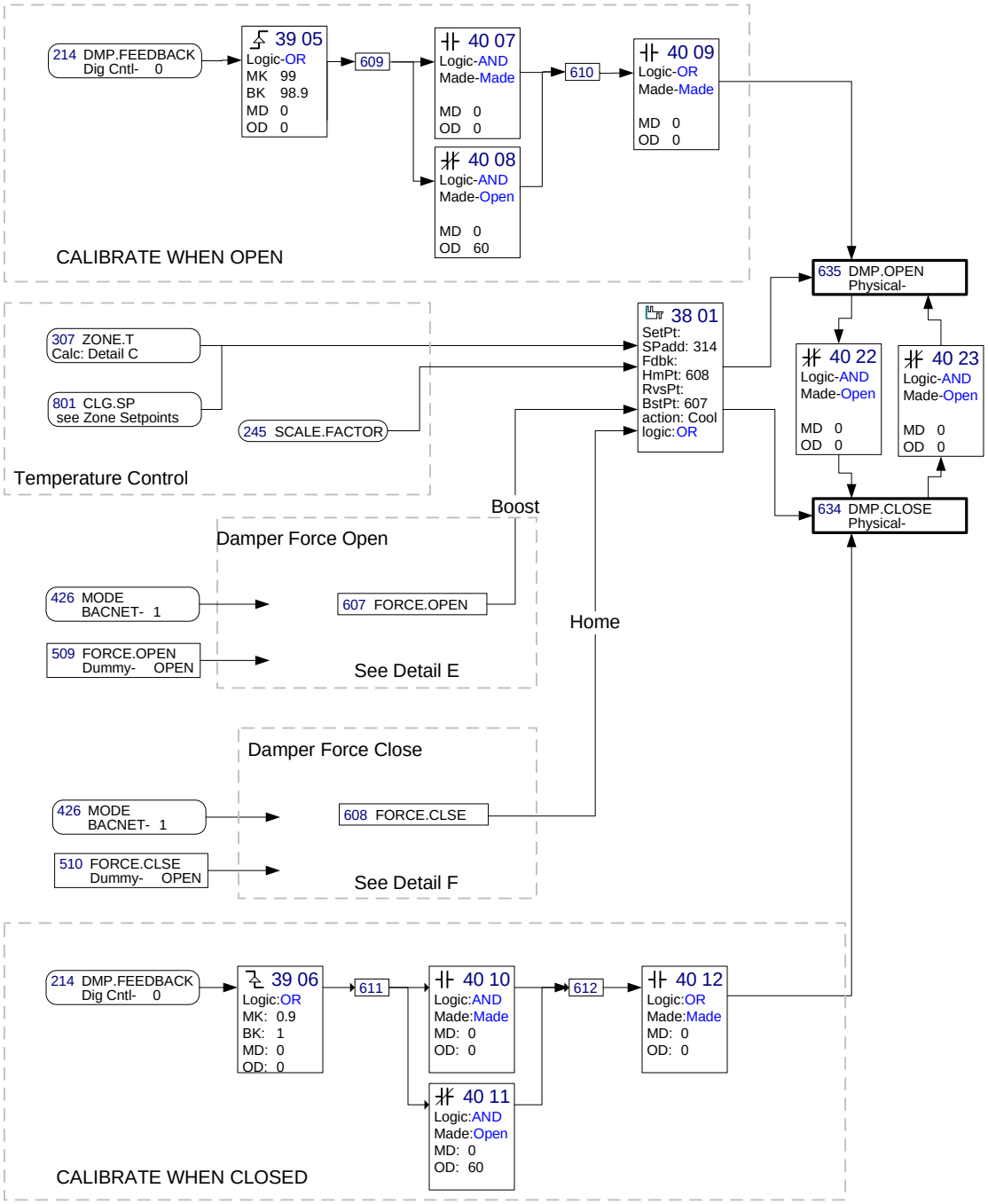

Cooling Damper Control & Startup Sequence

1. F38 - Damper Control: when Zone Temperatue [307] is above Setpoint [801] then the damper is forced open [635], when below setpoint then the damper is forced closed [634].
2. Damper Force Open: The damper is forced open if
   a. remote force open [502=ON] or
   b. local force open [509=ON] is received.
   Note : the damper motor will not be held on for longer than 550 seconds.
3. Damper Force Close: The damper is forced close if
   a. remote force close [503=ON) or
   b. local force close [502=ON] is received.
   Note : the damper motor will not be held on for longer than 550 seconds.
   c. the first 550 seconds after a power restore.
4. If the damper is opening [635=ON] then [4022] hold the damper close command off [634=OFF]. Similar logic exists for the damper close command.
5. Calibrate if open will force the damper open when feedback indicates the damper is open. This will maintain calibration continuously.
   a. [3905] turns ON [609] whenever damper feedback [204] is 100%.
   b. Whenever [609] is ON then CAL.OPEN [610] is forced ON by [4007] and forced OFF 60 seconds later by [4008].
   c. CAL.OPEN is ORed with the open command from F38- Digital Control.
   d. Should Damper Control close the damper during a calibration open command then feedback will fall below 100% and calibration will end.
   e. Similar logic exists at damper close or feedback=0%.

PROJECT:	**FLEXSYS - FLEXCL/HT**	
PAGE:	**Damper Control**	
CONFIG:	**CX-XZN-V25-001**	
YORK INTERNATIONAL	S/W Rev: **OCS-1**	S/W Engineer: **B. LEACH**
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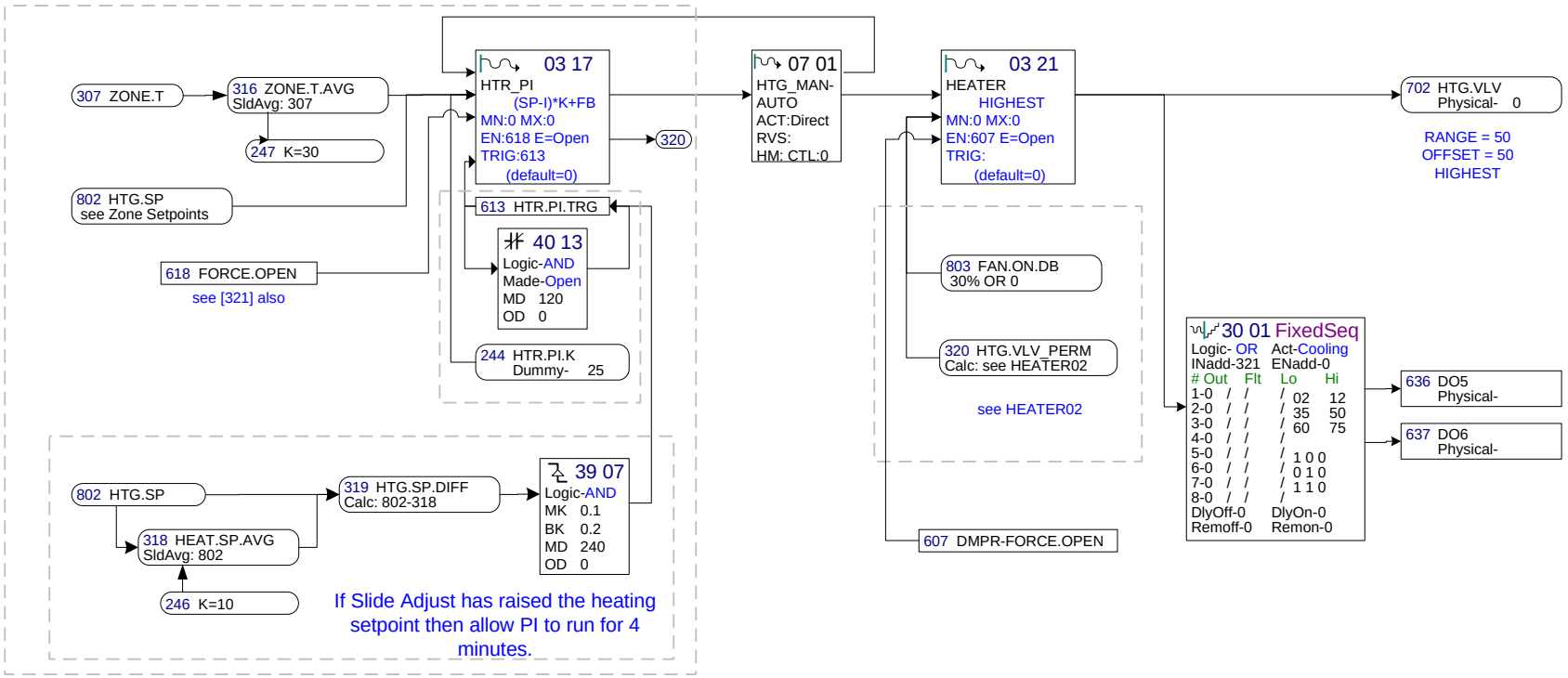

Heater Sequence

Assumed is an MFT with two stages of heat (hot water or electric) and the fan does not run in the heating deadband.

1. A PI routine [317] calculates the heating position (0 to 100%).
2. The PI routine operates by performing the calculation O/P = (SP-I)*K+last value. This calculation is allowed to run every 240 cycles [4013].
3. The PI value [317] is sent [through 321] to the hot water valve and the sequencer [3001].
   a. The sequencer will operate the fan above 25%, the 1st stage above 50% and the 2nd stage above 75%.
   b. The valve will modulate between 50 & 100%
4. The heating setpoint is typically 2 degF less than the cooling, hence the damper should be closed.
5. Should someone raise the heat sepoint rapidly, the time average [318] will trail the setpoint [802] . This difference [319-3907] will freeze the PI loop for 240 seconds thereby allowing the damper to close.
6. If damper is forced open the heater sequence is locked out [618-321enable].
7. The Sequencer [3001] controls the fan and stages of heat in a binary fashion.

	Status	F/H-1	F/H-2
1	Fan ON	ON	OFF
2	Fan & 1 Stg	OFF	ON
3	Fan & All Stg	ON	ON

8. A F07 will accept input from a single F03 hence the selection of which input must be handled in [321]. The three routines are:
   a. typical (see above)
   b. maintain fan in heating deadband [803] which will be 0 or 30%.
   c. perimeter heat [320].

PROJECT:	**FLEXSYS - FLEXCL/HT**	
PAGE:	**Heater 1**	
CONFIG:	**CX-XZN-V25-001**	
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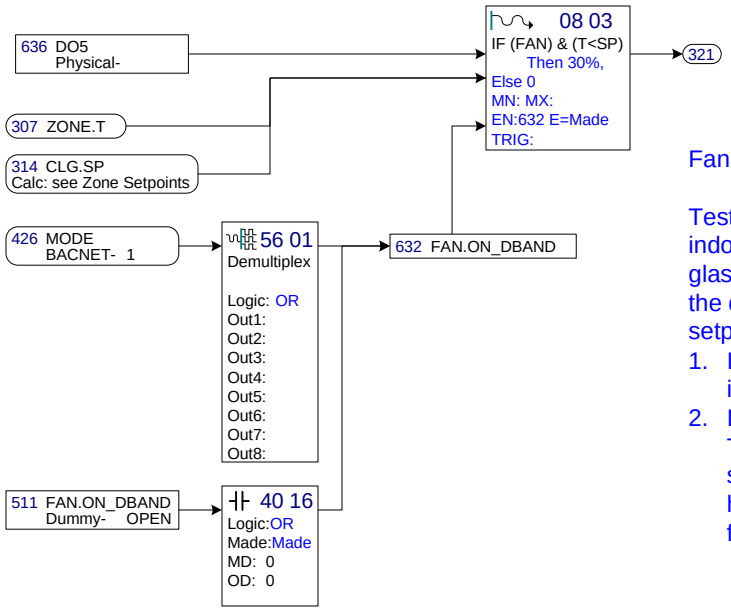
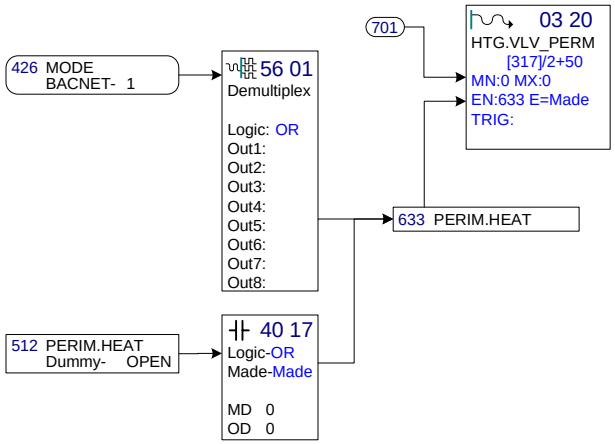


To Heating Max select

Fan operates in the DeadBand (YES/NO)

Testing revealed that in very cold weather with moderate indoor humidity condensate can form on poorly insulated glass, hence one may wish to keep the MFT fan operating in the deadband when approached from below the heating setpoint.

1. If the option is selected [206] or [511] is ON) then [803] is enabled.
2. If the MFT Fan is operating [636 = ON] AND the Zone Temperature [307] is below the Cooling Setpoint [314] set [803] to 30% else 0%. Note: 30% is just above the high limit required to enter the first stage of heating (the fan only is ON).



Hot Water Perimeter Heat (YES/NO)

If Permimeter heating is used then a PCM is used rather than a MFT. The fan or stages of heat do not exist hence MFT outputs can be ignored and the water valve is enabled immediately.

1. Assuming perimeter heat is selected ([206] or [512] is ON) then the [320] is enabled.
2. Since the heating valve [701] is configured to operate between 50 and 100% the PI output [317] must be rescaled so that the valve operates between 0 and 100%, hence the need for [320].

PROJECT:	**FLEXSYS - FLEXCL/HT**
PAGE:	**Heater 2**
CONFIG:	**CX-XZN-V25-001**
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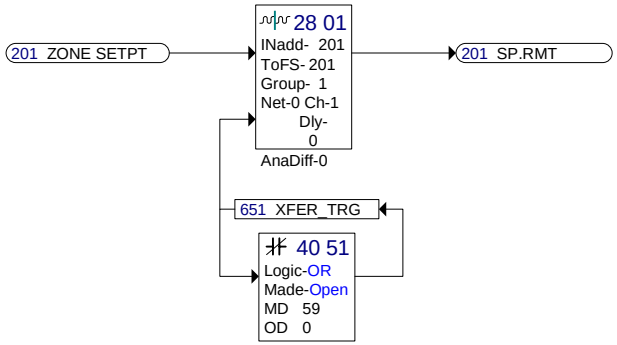
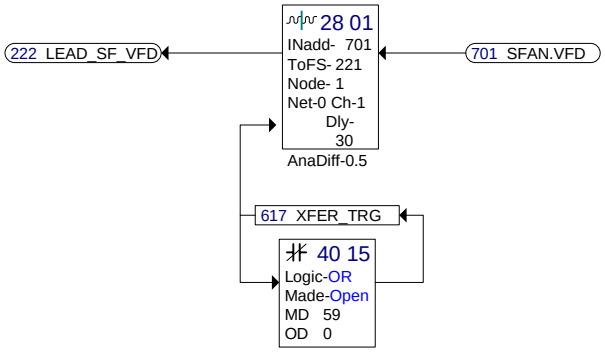
FlexFloor to FlexCoolHeat Transfers (Modified at FlexFloor)

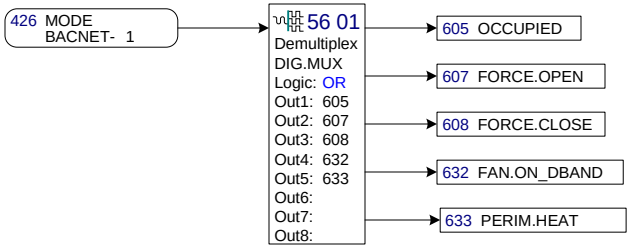


FlexFloor to FlexHeat/FlexCool Transfers				
AHU (Nd=64)			MIT/MFT (Nd=1 thru 63)	
	Zone Temperatue Setpoint	2801	421	SP.RMT
	Zone Setpont Adjustment	2802	422	ZONE.ADJ.RMT
	Override Time Extend (minutes)	2803	423	TIME.EXT.MIN
	Unooccupied Deadband	2804	424	UNOCC.DB
		2805		
	Muxed Digital Commands	2806	426	MODE

FlexCoolHeat to FlexFloor Transfers



FlexHeat/FlexCool to FlexFloor Transfers				
AHU (Nd=64)			MIT/MFT (Nd=1 thru 63)	
2701		2801	307	ZONE.T
2702		2802	323	HTG-DB-CLG
2703		2803	214	DMP.FEEDBACK
2704		2804	701	HTR.FEEDBACK
2705		2805	326	OCCUPIED



PROJECT :	FLEXSYS - FLEXCL/HT
PAGE:	Network Transfers
CONFIG:	CX-XZN-V25-001

YORK INTERNATIONAL

S/W Rev:	S/W Engineer:
OCS-1	B. LEACH
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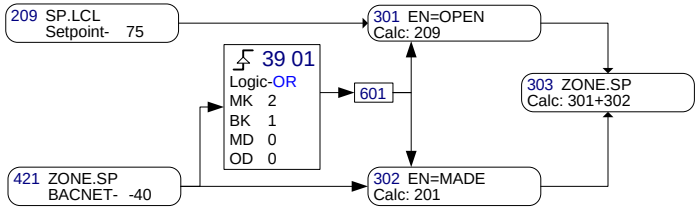
Zone Setpoint (Network or Local)

Detail A

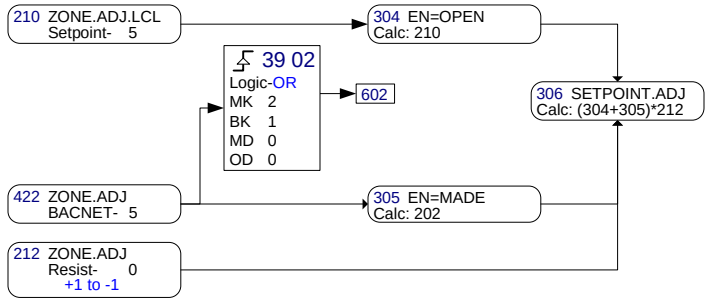


Zone Temperature setpoint is either a local setpoint or a Remote setpoint, Remote is preferred.

1. [3901]: if remote [201] is greater than 2 then [601] is ON.
2. Either [301] or [302] is enabled based on [601]
3. [303] equals (LCL+0) or (0+RMT).

Zone Setpoint Adjustment Deadband (Network or Local)

Detail B

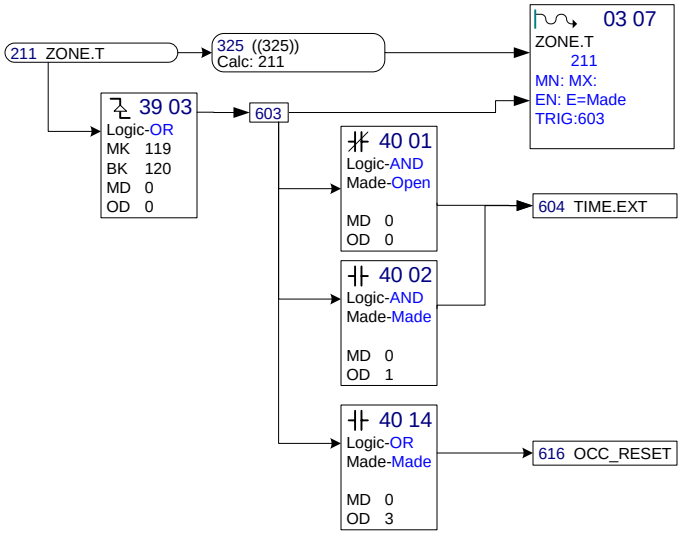


Each Zone sensor has a warmer/cooler adjustment which is scalable, hence the deadband. The deadband is either local or remote with the remote preferred.

1. [3902]: if remote [202] is greater than 2 then [602] is ON.
2. Either [304] or [305] is enabled based on [602].
3. [212]: the adjustment on the sensor reads between +1.0 and -1.0.
3. [306] is equal to the deadband * adjustment
   (LCL + 0) * [212]
   (0 + RMT) * [212]

Time Extend Push Button

Detail C



The time extend button on a sensor works by breaking the temperature signal to the controller. The temperatue must be maintained during this time to ensure smooth operation.

1. When zone temperature [211] is broken and reads high [3903] turns OFF [603]
2. When [603] is OFF
   a. [307] is frozen at the previous value: input from the previous scan (note: 325 > 307).
   b. a one-shot forces TIME.EXT [604] ON for one cycle which triggers a timer (see Occupied/Unoccupied Flag)
   c. If OFF for more than 3 cycles [4014] then [616] is forced ON which resets the timer.
3. When [603] is ON, then [307] is allowed to change with the sensor.

PROJECT:	**FLEXSYS - FLEXCL/HT**	
PAGE:	**Details 1**	
CONFIG:	**CX-XZN-V25-001**	
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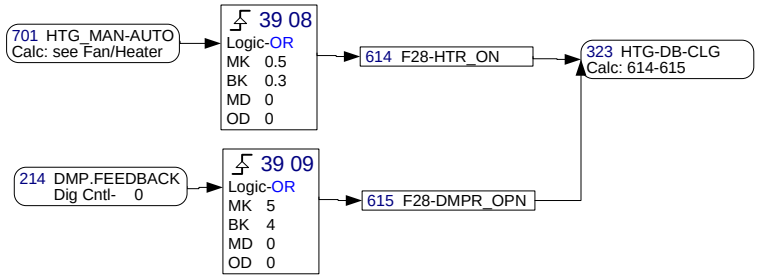
Heating/Ventation/Cooling for Transfer to FlexFloor

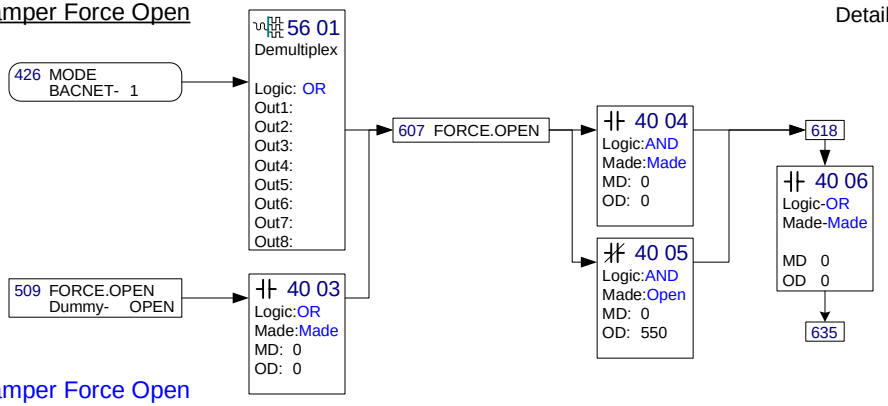
Detail D



[323] HTG-DB-CLG will be either +1, 0 or -1 depending on whether the box is on Heating, deadband or Cooling. The automation system can then poll the boxes to get a count for the system.

Damper Force Open

Detail E



Damper Force Open

1. The damper is forced open if
   a. remote force open [502=ON] or
   b. local force open [509=ON] is received.
2. This triggers a 550 second one-shot which:
   a. enables the boost setpoint [618] and forces F38-Damper Control to chase an impossibly low setoint (0 deg) thereby opening the damper.
   b. and forces the damper open [635=ON].
3. Note the damper can also be forced open or closed as part of the calibration routine.

PROJECT:	**FLEXSYS - FLEXCL/HT**		
PAGE:	**Details 2**		
CONFIG:	**CX-XZN-V25-001**		
YORK INTERNATIONAL	S/W Rev: **OCS-1**	S/W Engineer: **B. LEACH**	
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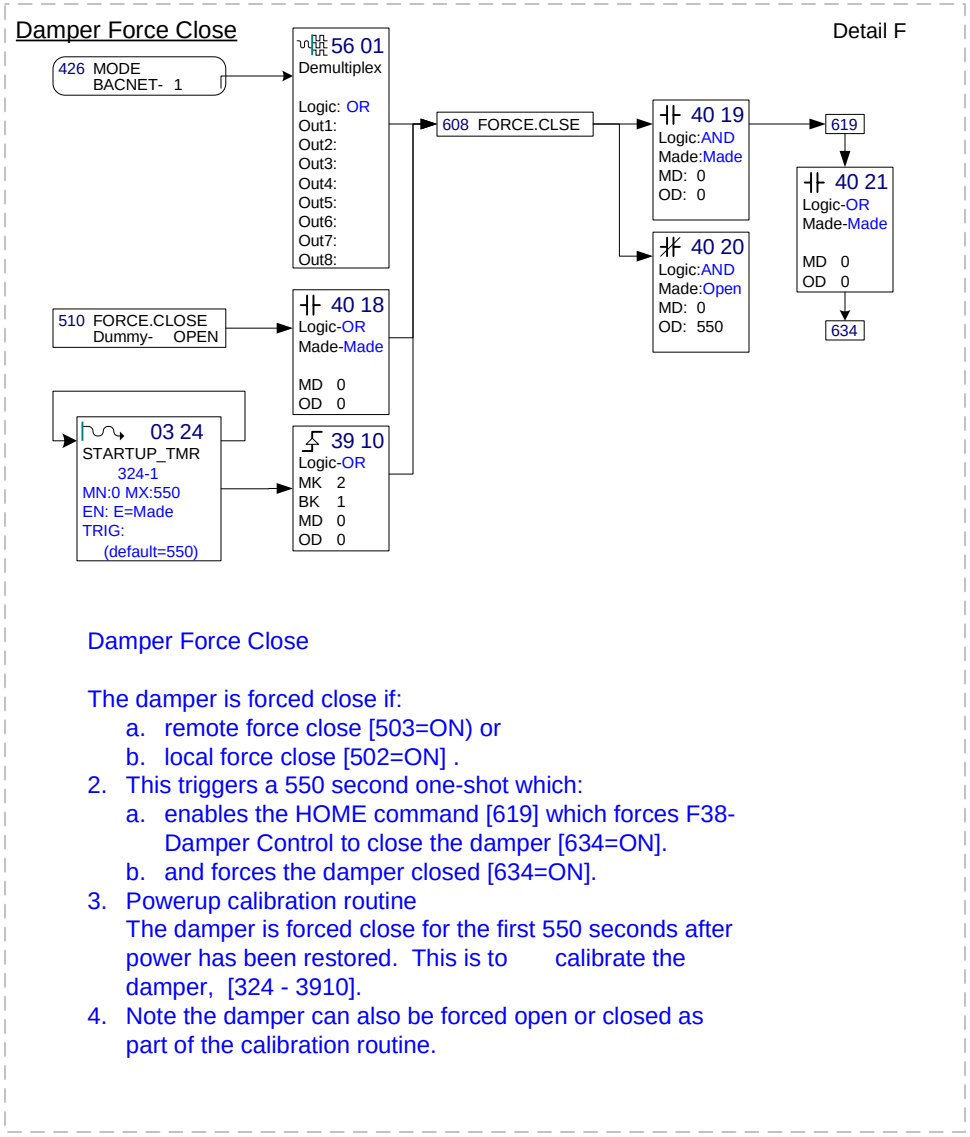

Damper Force Close

The damper is forced close if:

a. remote force close [503=ON) or
b. local force close [502=ON] .

2. This triggers a 550 second one-shot which:
   a. enables the HOME command [619] which forces F38-Damper Control to close the damper [634=ON].
   b. and forces the damper closed [634=ON].
3. Powerup calibration routine
   The damper is forced close for the first 550 seconds after power has been restored. This is to calibrate the damper, [324 - 3910].
4. Note the damper can also be forced open or closed as part of the calibration routine.

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