GUARDIAN CONTROLS
international

GUARDIAN

ITC-1085

Intelligent Temperature Controller for supermarket cases and coldstores

* **case or coldroom temperature control**
* **control-air temperature alarm monitor**
* **blown-fuse trip alarm monitor**
* **evaporator temperatures monitor & display**
* **liquid valve and defrost cycle control**
* **coil superheat control by modulating Danfoss AKV-10 expansion valve**
* **hotgas, bypass and suction valve control**
* **serial panel display and setup**
* **off/fans mode selection from panel keyswitch**
* **control mode selection from remote panel**
* **real time calendar clock**
* **remote communications to Woodley System 5 or GUARDIAN Autograph Terminal**

* **10 temperatures**
* **3 control mode inputs**
  1 coldstore door input
  1 defrost input or trim heater trip
  3 fan-fuse trips
* **4 control relays**
  1 defrost mode output

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OVERVIEW

The ITC-1085 Intelligent Temperature Controller is a mains-powered, refrigerated case or coldroom temperature and defrost controller which provides setup and display facilities via a serial display panel .
Communications with a GUARDIAN Autograph Terminal or a Woodley System 5 provide centralized alarm monitoring and parameter setup via a RS485 multi-drop highway.

The system comprises a) control unit,
b) serial display panel
c) up to 10 6-metre thermistor probes

The Controller provides facilities for:-

a) Measurement of up to 10 refrigeration temperatures including:- return air, discharge air off each of up to 3 coils, inlet and outlet temperatures for each of up to 3 coils.
Calculated product temperature is displayed as a percentage of the mean of discharge and return air.

All temperatures are displayed in degree Centigrade as sign plus 2 digits on the 4-digit LED display panel.
Values are rounded down ie -30.5 is displayed as -31.

Channel identification of displayed temperatures alternates with the temperature value.

b) Detection and optional display of 240vac input states on upto 4 blown fuse alarms (Fans a,b,c,trim heater d).
The trim heater input may be selected as a mains defrost input.
Fan-C input may be selected as a coldroom door input.
A volt-free contact input is aternatively available for low-voltage coldstore door inputs.

c) Detection of control air Hi,Lo alarms after guardtime.
Alarms are inhibited during defrost cycles or case OFF.

d) Liquid solenoid valve control dependent on control air temperature, control setpoint and differential. The valve is de-energised when defrost or setup are in operation or on failure of the control air probe.

e) Defrost sequence initiatiation using internal defrost timeclock settings , draindown time and fan delay times if coldstore. (see Fig.2)

f) Display of Defrost in progress by -dEF, or pulldown after defrost by -Pd, instead of calculated product

temperature.

g) control of the Defrost valve dependent on defrost termination temperature and termination cut-in setpoint and differential while defrost is in operation . Defrost is inhibited during setup or on failure of the termination termperature probe.(see FIG.2)

h) Fan inhibit control output during 'Case OFF' or Hot Gas defrost cycles if coldstore.

i) Hotgas valve termination control for complete stub and Trim/Pan Heater control in defrost, Fans or OFF modes.

j) staggered restart delay dependent on stub number before opening liquid valves to prevent compressor start-up overload after trip or power fail.

k) Local modification and display of temperatures,unit number and control settings and defrost times via pushbuttons on the serial display panel.

l) Remote modification and display of temperatures, control settings,defrost times, control and alarm status via the RS485 multi-drop serial highway.

m) Provision for upgrade to model ITC1088 with 3 additional outputs for modulating valve control.

Additional features provided by the 1085 Version 2.0C include

n) solid state control outputs providing electronic expansion valve control on 1 (optionally 3) evaporator coils. When selected for electronic expansion valve control, pulse width modulation of the expansion valve outputs provides optimimum superheat setpoint control using dynamic compensation of the setpoint.

p) new Glass-door freezer defrost sequence (fans off during defrost)

q) Delay second defrost by x hours if it is required to avoid defrosts during store open hours.

r) OFF/FANS/AUTO keyswitch on the serial display changes control mode as an alternative to selecting from Stub switches

CONTROL UNIT

The control unit comprises a printed circuit board which has overall dimensions approximately:-

base 150mm * hight 65mm * length 220mm.
power 240vac at 5 watt
12vdc at 10ma for status inputs

Input/output signals

analogue inputs (thermistor) (-40 to +40 deg.C)
CPt/Dc2 1 case / discharge coil-2 temperature
DEL 2 discharge air temperature
rEt 3 return air temperature
Ei1 4 Evaporator inlet 1 temperature
Eo1 5 Evaporator outlet 1 temperature
Ei2 6 Evaporator inlet 1 temperature
Eo2 7 Evaporator outlet 1 temperature
Ei3 8 Evaporator inlet 1 temperature
Eo3 9 Evaporator outlet 1 temperature
Dc3 10 discharge coil-3 temperature

Status input (12vdc 10 ma per input)
IA Coldstore Door contact
IB OFF for cleaning
IC FANS only
ID DEFROST request P/B

alarm trip input
(240vac or 48vac)
IE Trim Heater fail/defrost request input
(240vac only)
IF Fans c circuit fail/coldstore door
IG Fans b circuit fail
IH Fans a circuit fail

Relay output (4 Amp 240Vac with suppressors)
C R1 liquid valve control (n/o)
d R2 defrost termination control (c/o)
H R3 Hotgas valve/trim/pan heater control(n/o)
F R4 Fan control (n/o)

Status output (12vdc)
DEFROST request to other cases in stub
(same terminal as defrost status input)

Modulating valve Extension outputs (12vdc)
1 coil-1 modulating valve
2 coil-2 modulating valve
3 coil-3 modulating valve

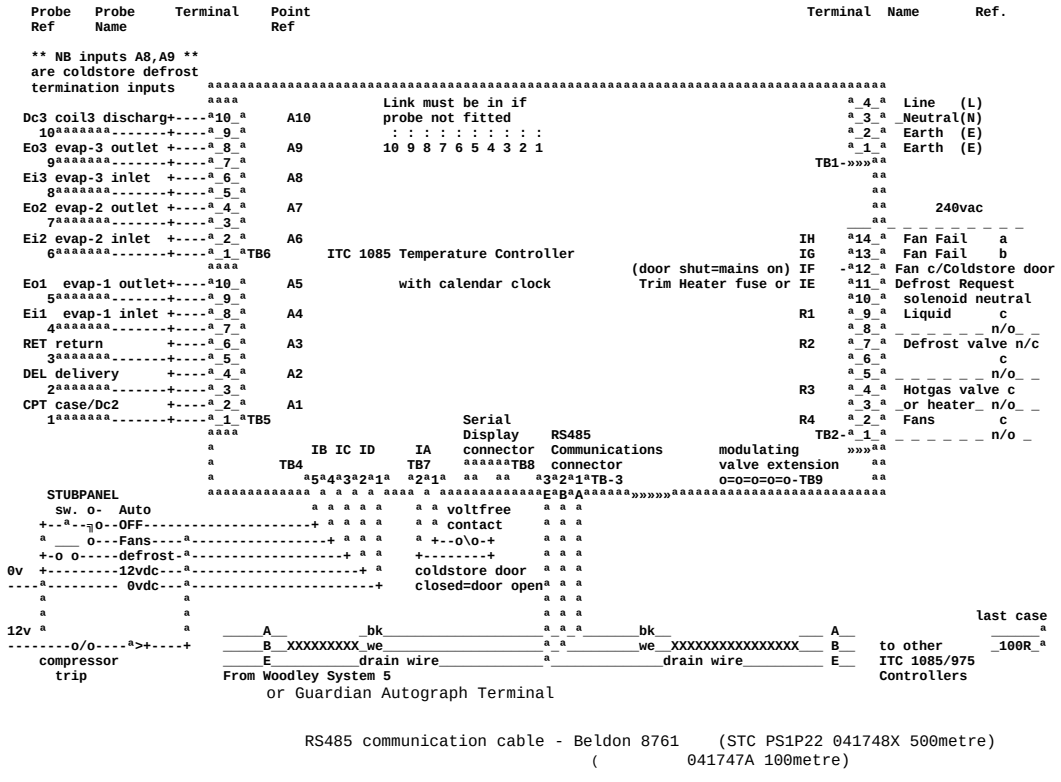
Modulating valve control requires the addition of the Modulating Valve SCR Module which provides pulse width modulation at 240vac or 240vdc for up to three valves.
This combination of controller is referred to as ITC1088.

Serial keypad/display connections
1 LED serial data output 4 Keypad/display clock

2 LCD serial data output 5 12vdc
3 Keypad serial data input 6 0vdc

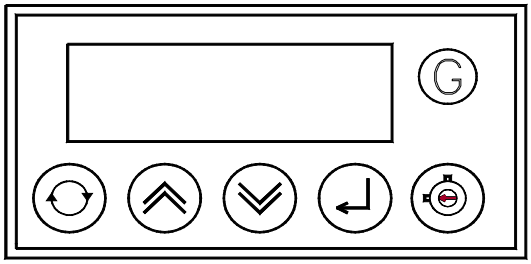
Communications RS485 serial link selectable at 1200,2400,4800 and 9600 baud.

ITC 1085 TERMINATION WIRING



SERIAL DISPLAY PANEL
The Serial Display Panel comprises a plastic enclosure containing a PCB with four membrane pushbutttons, four LED displays and a socket for the optional hand-held LCD Case Temperature Monitor which displays all temperatures and superheats simultaneously.
The serial display panel is connected to the ITC1085 controller PCB by a 1.2 metre, 6-core telephone cable.
The serial display panel is connected to the Case Temperature Monitor by a 3 metre, curly , 6-core telephone cable.

The plastic enclosure has bezel dimensions 94 x 48 x 3.5 mm and clips into the 90 x 44 mm mounting aperture in the case facia with a maximum behind-panel depth of 32mm.



next raise lower enter

The front panel houses:-

4 7-segment LED displays for channel/function/alarm indication and a sign plus 2-digit temperature/setpoint display.
4 pushbuttons next, raise, lower, enter, used in conjunction with LED Displays to provide setup and display facilities.

The temperature display flashes with control air alarm or blown fuse fail conditions.

The enclosure has a top-hinged flap which covers the pushbuttons and LCD socket whilst providing a transparent window for the 4 LED temperature display digits.

DEFAULT DISPLAY

The controller reverts to the default display if no buttons have been pressed for 3 minutes and displays the case temperature CPT.
The default display is replaced by a status message if any of the following conditions occur.

-dEF while defrost is in progres

-Pd Pulldown from end of defrost cycle until control air temperature is within alarm band

-FAn selected for Fans Only prior to cleaning from local display or switch input

-OFF - selected OFF for cleaning from local display or switch input

Auto - after power on or case OFF waiting for restart delay before opening liquid valve.

8888 - after power on until restart routine is complete

TEMPERATURE DISPLAYS

Pressing the NEXT push button displays the next channel identification which then alternates every 3 seconds with the temperature value for the channel. Repeated pressing of next displays in sequence the points listed below.

identity	Temperature on display
CPt	Calculated Product Temperature
dEL	delivery air temperature * note 1 *
rEt	return air * note 2 *
Ei1	evaporator inlet coil-1
Ei1	evaporator outlet coil-1
Sh1	superheat evaporator -1
Ei2	evaporator inlet coil-2
Ei2	evaporator outlet coil-2
Sh2	superheat evaporator -2
Ei3	evaporator inlet coil-3 * note 3*
Ei3	evaporator outlet coil-3 * note 3*
Sh3	superheat evaporator -3
rLy	

C if Liquid Control relay R1 energised - bar if not
d if Defrost relay R2 energised - bar if not
H if Hotgas/trim/pan Heater R3 energised - bar if not
F if Fan relay R4 energised - bar if not

Etnn Elapse time (Defrost mode only)
where nn= minutes into defrost.

SEt - goto Setup Mode when Enter pressed.

*** note 1 * Normal Control input**
*** note 2 * Control input if coldstore**
- **note 3 * Coldstore & HGt8 termination inputs**

ALARM INDICATIONS

Alarms alternately flash with selected temperature channel during Default and Normal operation.
a,b,c,h, Hi, Lo, OC, SC, nF.
Alarms are not displayed during Setup operation.
All alarms are reset automatically when the fault has diappeared.

Blown Fuse Alarms
Blown fuse Alarms are identified on LED display A-D as below
a fan 1 display A
b fan 2 display B
c fan 3 display C
h trim heater display D (IF HTR selected for relay 3)
All alarm trips are inhibited when fans only, case off or during defrost

Control Air alarms (return air if coldstore)
Discharge (return) Air alarms are indicated on LED displays
Hi if discharge air temperature is above the control setpoint plus alarm differential for longer thas the guardtime
Lo discharge air temperature is below the setpoint minus alarm differential for longer than the guardtime
Return air not discharge air alarms are given for coldstores
Temperature alarms are inhibited during defrost cycles and during case cleaning.
Guardtime count is reset each time the discharge air returns within limits. Alarm states Hi , Lo are automatically reset when the discharge air returns within limits
Probe Fails
open circuit probes indicate OC on displays and value
shortcircuit probes indicate SC "
not fitted probes indicate nF (requires shorting link)
The liquid valve is closed on any failure of the control air probe.

SETUP OPERATION

Setup operation lasts for a maximum of 5 minutes after being activated by pressing enter with SEt on the display panel.
During setup operation, alarms, temperature and defrost controls are inhibited.
On entry to Setup passcode PP00 is displayed.
To change any settings passcode PP05 or PP09 must be first selected using raise and enter pushbuttons.
If the correct passcode is not entered then setup values may be displayed but any attempted changes are ignored.

NEXT pushbutton sequences through the menu selections below;-

PP05 menus	PP09 menus
CasE change control mode or cooling setpoint	rtc real time clock time and date (set at factory)
DEFr defrost type, times and settings (commissioning only)	SySt system settings times and alarms (set at factory)
unit stub and case identity (commissioning only)	
test toggle output relays (faulty valve check)	
End return to normal operation	End return to normal

ENTER menu selection or new value button
- pressing the ENTER button selects the displayed menu above or stores the displayed value as the new value of the selected function. The display 'winks' after a valid entry.

RAISE pushbutton -increments the displayed setpoint value. If the raise button is held on for more than 1 seconds then the value increases automatically

LOWER pushbutton - decrements the displayed setpoint value. If the lower button is held on for more than 1 seconds then the value decreases automatically

SETUP FUNCTIONS (level 1)

Menus or functions are sequenced by pressing NEXT button.
Menus are selected by pressing ENTER button.
Mode and Type Functions are selected by pressing ENTER.
settings are increased by RAISE followed by ENTER
settings are decreased by LOWER followed by ENTER
new values are ignored if incorrect passcode is entered

Setup Functions available for setpoint change and display are

Menu	Function	Range	Units
PPOO	Passcode 5 must be entered before any changes are accepted		
CASE			
	c cut-in setpoint for Liquid Valve	-40 to +40	'C
	idEF / FAnS / OFF / Auto mode selection initiate defrost (only if in auto)		
	FAns Fans only prior to cleaning (not allowed for coldstore)		
	OFF select case OFF for cleaning		
	Auto return to Automatic control		
	*** These selections only operate when switch selection inputs for OFF or FAnS are not present.		
DEFr			
	O-C ,HG-C,HG-t,Stor,HGt4,GdFr, defrost type		
	O-C = Off-cycle defrost		
	HG-C = Hotgas Cycle on differential		
	HG-t = Hotgas terminate on discharge air		
	Stor = Coldstore terminate on probe T4		
	HGt4 = Hotgas terminate on probe T4		
	GdFr = Glassdoor Freezer -fans off in defrost		
dn	number of defrosts per day	0 to 6	
1h	first defrost time T1 hours	0 to 5	hrs
d2dx	delay 2nd defrost by x hours if dn=2	0 to 9	hrs
1t	first defrost time T1 minutes	0 to 59	min
dP	defrost period	0 to 60	min
d	defrost termination temperature (not Off-Cycle cases)	0 to +40	'C
dd	defrost termination differential (for Hotgas-Cycle cases only)	1 to +10	'C

EEU Electronic Expansion Valve Parameters
(Only if 1088 selected) default
SH Superheat High. Maximum superheat (0 to 99 deg C 8)
SL Superheat Low. Minumum superheat (0.0 to 9.9 deg C 3)
SA Superheat Alarm Limit at which superheat recovery is actioned. (0 to 99 deg.C 0)
Sb Stable Band. Taken +/- about current superheat setpoint. (0 to 9.9 deg.C 0)
Oscillations of superheat outside Sb cause increase in

superheat towards SH. If superheat remains within Sb then superheat is reduced towards SL.(0= function not active)

Sd Stable band Delay time (0 to 99 mins. 30)
Time after which Sb setpoint change is applied.

EEU (cont)

E Evaporating temperature of pack system (-40 to 40 degC 0)
if the coil in temperature is reading 5øC above this limit then the controller goes into superheat recovery mode.

dr Defrost Recovery Valve position. (0 to 99% 50)
default

So Starting Output. (0 to 99% 50)
Valve position after power restart or thermostatic cycle of AKV10

tF Superheat Alarm Time OFF (0 to 15 min 1)
Valve is shut for this time after superheat alarm before attempting recovery procedure

tn Superheat Alarm Time ON (0 to 15 min 1)
Valve is open for this time after superheat alarm and TF time above whilst attempting recovery procedure

Unit
1085/1088/1080/975 model type selection

1085 standard case/coldroom controller
1088 model fitted for modulating valve control
1080 model suitable for alarm monitoring on 9 temperature and 8 digital inputs.
975 model for Autograph Software V2 compatibility

Sn Stub number 1 to 80
Cn Case number (normally 3 max.) 1 to 4
Annn Woodley MkV address number 1 to 255
***** Woodley MDM address automatically calculated is (Sn x 3) + Cn-1 eg stub 30 case 2 has MDM address (30 x 3) + 2-1 = 91.**
Htr /HgaS/ 3 /ALr. control relay 3 selection as
Htr = trim heater control
Hgas = pack hotgas valve control output
Alr. = alarm unit (see later).

PR00 Product ratio % (see later) 0 to 99
tP22, tP20. temperature probe thermistor resistance
where tp22 is 2.2 Kohm at 25C (standard)
tP20 is 2.0 Kohm at 25C
ndad/nda / dad digital alarm detection and display
ndad = no digital alarm display
nda = no digital alarms required
dad = digital alarms displayed

teSt force output relays on/off
C liquid valve control relay on / oFF
d defrost relay output on / oFF
H 3-way Hotgas valve relay output on / oFF
F Fans relay output on / oFF
5 Stubcontrol 12vdc defrost latch output on / oFF

All outputs return to automatic control when SETUP

is ended.

End return from SETUP to normal operation

Test Control outputs

Pressing ENTER with Test on displays relay outputs C,D,h,f. in sequence with their current state e.g.

C on liquid valve cooling relay energised
doff Defrost output relay de-energised
3 on 3-way(or pan heaters) relay energised
Foff Fans relay de-energised

The state of a relay may be toggled by pressing ENTER when the particular control output is on display. Relay outputs return to automatic settings when SETUP is terminated.

Cut-in Setpoint for Liquid Valve (c)

To change the cooling cut-in setpoint for the liquid valve the procedure is as follows:-

BUTTON	DISPLAY
keep pressing next button until	SEt is displayed
press enter button	
	display now reads PP00
press raise button until display reads PP05	
press enter button	
press next button	
	display now reads CASE
press enter button	
	display now reads c xx (xx = old cut-in)
press raise or lower until display is c yy (yy = new cut-in)	
press enter button	
display winks and still reads c-yy	
press next button	
	display now reads idEF
press next button	
	display now reads OFF
press next button	
	display now reads FAnS
press next button	
	display now reads Auto
press next button	
	display now reads dEFr
press next button	
	display now reads unit
press next button	
	display now reads test
press next button	
	display now reads End
press enter button	

display winks and displays case temperature -zz

The unit controls to the new discharge air cut-in setpoint (yy).

CASE FANS ONLY

To switch to FANS ONLY prior to case cleaning the procedure is as follows except for Coldstores which may not be selected for FANS only.

BUTTON	DISPLAY
keep pressing next button until	SEt is displayed
press enter button	
	display now reads PP00
press raise button until display reads PP05	
press enter button	
press next button	
	display now reads CASE
press enter button	
	display now reads c nn
press next button	
	display now reads idEF
press raise button until display reads FAns	
press enter button	
	display now reads -FAn

When the unit displays -Fan instead of the case temperature, all alarms, liquid valve control and defrost cycles are turned off but the fans are kept running.
FANS mode may be selected remotely via a 12vdc status switch input or RS485 communication command.
The case is switched OFF by selecting OFF mode.
The case is switched back on by selecting Auto mode.

CASE OFF for Cleaning

To switch off a case /coldstore for cleaning the procedure is as follows:-

BUTTON	DISPLAY
keep pressing next button until	SEt is displayed
press enter button	
	display now reads PP00
press raise button until display reads PP05	
press enter button	
press next button	
	display now reads CASE
press enter button	
	display now reads c nn
press next button	
	display now reads idEF
press raise button until display reads OFF	
press enter button	
	display now reads -OFF

When the unit displays -OFF instead of the case temperature, all alarms, liquid valve control, defrost cycles and fan outputs are turned off.

OFF mode may be selected remotely via a 12vdc status switch input or a RS485 communication command.
The case is switched back on by selecting Auto mode.

CASE AUTO MODE .

To return a case/coldstore back into Auto after cleaning the procedure is as follows:-

BUTTON	DISPLAY
keep pressing next button until	SEt is displayed
press enter button	
	display now reads PP00
press raise button until display reads PP05	
press enter button	
press next button	
	display now reads CASE
press enter button	
	display now reads c nn
press next button	
	display now reads Auto
press enter button	
	display winks and still reads Auto

When the unit displays Auto instead of the case temperature, all alarms are allowed and fan outputs are turned on.
Time scheduled defrosts are restarted immediately if required.
Liquid valve control is inhibited until the restart delay timer has finished.
The restart delay timer prevents overloading the compressor on restart after a total power fail or compressor fault and is automatically calculated using the stub number of the case.
When the restart delay is complete,the liquid valve returns to automatic control and the case temperature value is displayed .

Initiate DEFROST

To initiate a manual defrost request the procedure is as follows:-

BUTTON	DISPLAY
keep pressing next button until	SEt is displayed
press enter button	
	display now reads PP00
press raise button until display reads PP05	
press enter button	
press next button	
	display now reads CASE
press enter button	
	display now reads c nn
press next button	
	display now reads idEF
press enter button	
	display now reads -dEF

When the unit displays -dEF instead of the case temperature, all alarms and liquid valve control are turned off.
The defrost cycle performed is dependent on the DEFROST TYPE selection ie Off-Cycle,Hotgas Terminate,Hotgas Cycle or Coldstore.

DEF mode may be selected remotely via a 12vdc status pushbutton input or RS485 communication command.
The defrost may be terminated (after draindown delay) by selecting Auto mode.

Product Ratio.

If probe 1 (case) has no probe wired to it and a 'not fitted' link inserted then the default temperature value displayed and logged for probe 1 is the PR% ratio of the discharge and return air.
If PR%=0 then the return air value is displayed
If PR%=99 then the discharge air value is displayed
If PR%=50 then the mean of discharge and return air value is displayed

The Product Ratio PR% is setup using passcode 5 under UNIT selection provided the 'not fitted' link has been inserted.
If the 'not fitted' link is not present then case displays ' oc ' and the PR% menu is not displayed.

The required PR% value is entered using raise or lower followed by enter as for other parameters.

Product Ratio may be used to save the cost of a probe and to display return air as the default temperature for a coldstore.

ALARM UNIT
The ITC 1085 may be configured as a supermarket central alarm indicator and teledialler unit for systems using the Guardian GUARDIAM Autograph Terminal.

The required settings are

UNIT Sn=80 stub number
Cn=1 case number
A=249 unit address
ALr. Alarm selection for relay 3 (only if A=249)

Any alarm detected and printed by the Autograph Terminal causes the alarm unit to be selected to AUTO which results in

relay 2 (defrost) closes n/c contacts for 5 seconds to initiate an alarm via the store teledialler
relay 3 (Heater) flashes the alarm lamp every half second until the ACCEPT pushbutton is pressed when it goes steady.
relay 4 (fans) energises remote flashing beacon in store which stops when ACCEPT pushbutton is pressed.
input 4 (heater fail) is used for the ACCEPT pushbutton input.

Any new alarms cause the cycle to be repeated with a contact closure for the teledialler and a flashing alarm lamp and beacon.

The flashing or steady alarm lamp is extinguished when Function key F8 -Accept Alarms is pressed at the Autograph Terminal by

switching the alarm unit into OFF mode.

The correct unit address 249 must be setup for stub 80 on the Autograph Terminal to make the system function correctly.

SETUP FUNCTIONS (level 2)
normally FACTORY settings

Menus or functions are sequenced by pressing NEXT button.
Menus are selected by pressing ENTER button.
settings are increased by RAISE followed by ENTER
settings are decreased by LOWER followed by ENTER
new values are ignored if incorrect passcode is entered

Setup Functions available for level 2 change and display are

Menu	Function	Range	Units	FACTORY SETTING
PPOO	Passcode 9 must be entered before any changes are accepted			
rtc	real time clock			
rh	rt clock time hours	0 to 23	hrs	correct
rt	rt clock time minutes	0 to 59	min	"
Syst				
cd	cooling differential for control	0 to 5	'C	0
Lt	defrost Liquid draindown delay time	1 to 20	min	1
Ft	defrost Fan delay time	0 to 20	min	1
gt	control air temp. alarm Guardtime	0 to 99	min	45
Ad	Alarm differential control air	2 to 40	'C	5
	Calculated defrost times - display only			
1h	Defrost T1 time hours	0 to 23	hrs	
1t	Defrost T1 time minutes	0 to 59	min	
2h	Defrost T2 time hours	0 to 23	hrs	
2t	Defrost T2 time minutes	0 to 59	min	
3h	Defrost T3 time hours	0 to 23	hrs	
3t	Defrost T3 time minutes	0 to 59	min	
4h	Defrost T4 time hours	0 to 23	hrs	
4t	Defrost T4 time minutes	0 to 59	min	
5h	Defrost T5 time hours	0 to 23	hrs	
5t	Defrost T5 time minutes	0 to 59	min	
6h	Defrost T6 time hours	0 to 23	hrs	
6t	Defrost T6 time minutes	0 to 59	min	
End	return from SETUP to normal operation			

SETUP FUNCTIONS (level 3) passcode 11
normally FACTORY settings only

Port serial communications port
9600 communications baud rate 9600/nonE 9600
'None' removes PC FAIL if no PC present
8n_2 parity selection 8n_2, 8e_1, 8n_1, 8n_2
off future log modes off

LOOP. Control PID Loop Parameters

		default
P Poportional Gain	**(0 to 9.9**	**3.0)**
i Integral Gain	**(0.00 to 0.99**	**0.01)**
d Differential Gain	**(0.0 to 9.9**	**0.0)**
bL Bleed position.	**(0 to 99%**	**5)**
Sets minimum valve position.		
r Ramp rate.	**(0.0 to 9.9 deg.C**	**0)**
Sets rate of change of superheat from SH to SL.		
it Integral Time	**(0 to 99 mins**	**3)**
Delayed time for loop integral action.		
Pd Loop Period	**(0 to 99 secs.**	**2)**
ct Coil Time	**(0 to 99mins.**	**1)**
Time delay to establish coil-in/coil-out temperatures before control action starts.		
rt Ramp Time	**(0 to 99 secs.**	**12)**
Time at which ramp rate, r, is applied.		

End return from SETUP to normal operation

CONTROL

FIG.1 LIQUID VALVE CONTROL

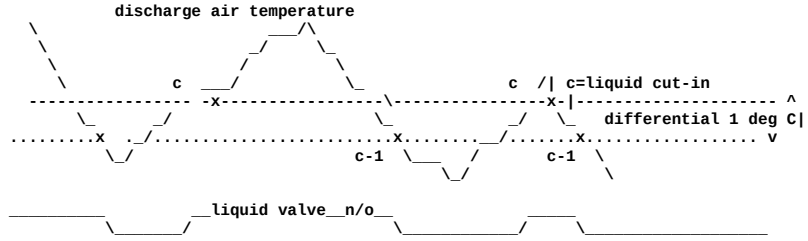
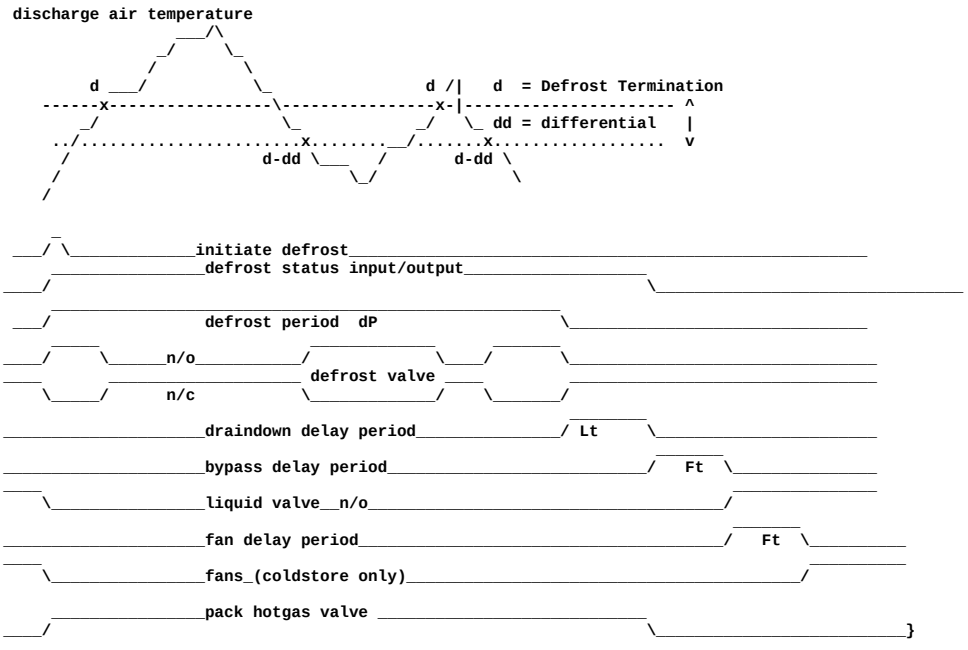
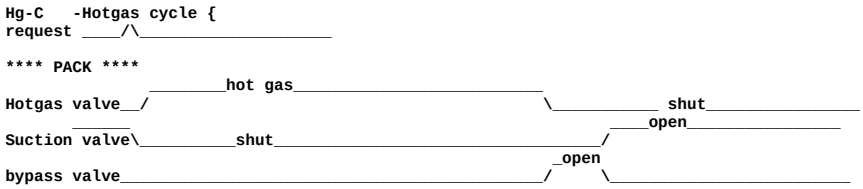
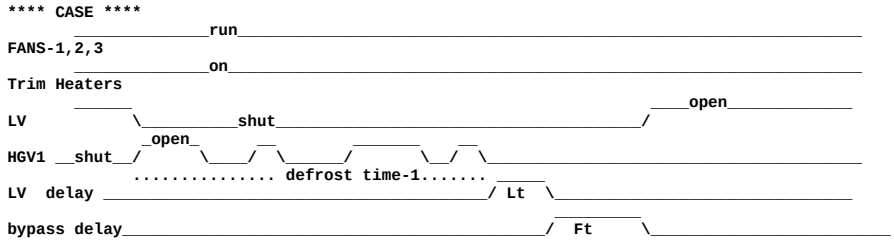


FIG.2 DEFROST CYCLE VALVE CONTROL

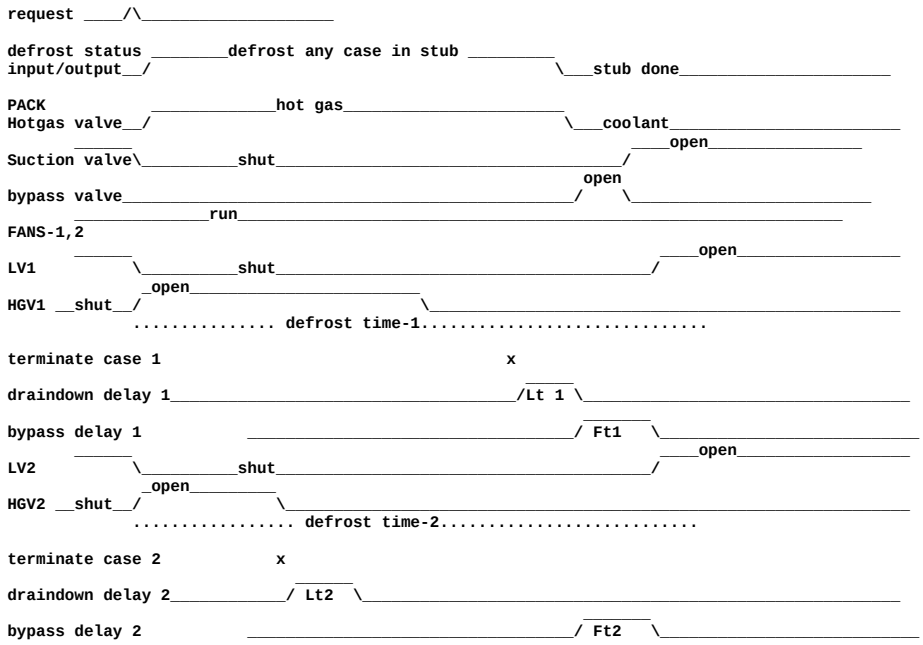


DEFROST CONTROLS Hg-C, Hg-t, O-C , Stor.

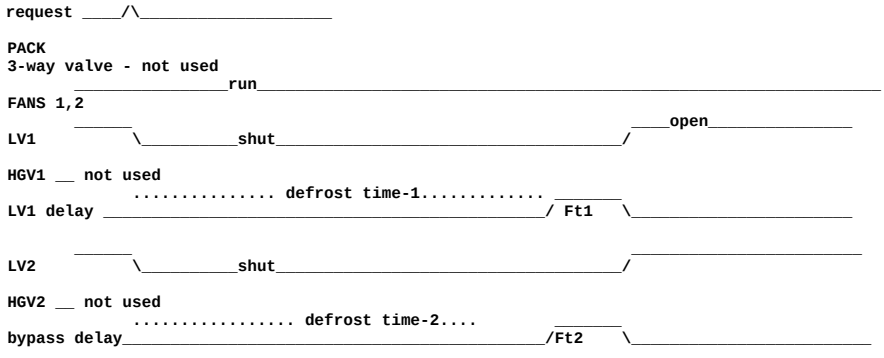




Hg-t - Hotgas terminate



O-C Off-Cycle Defrost



}

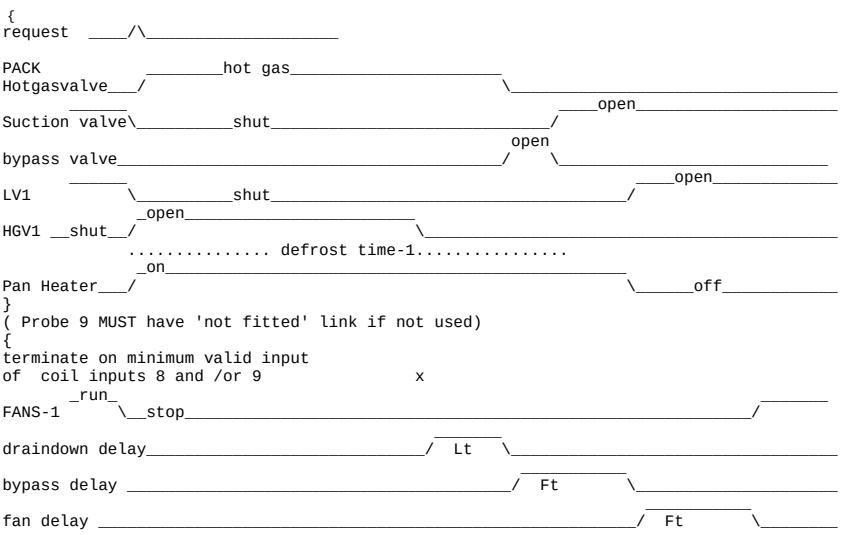
Stor - Coldstore Defrost

(similar to Hotgas terminate HG-T except FANS are switched off)

Coldstores control the liquid valve on the return air probe
and NOT on discharge probe.

Coldstores terminate on lowest valid coil probe 8 and 9
and NOT on discharge probe.

Coldstore door input is monitored by input c
door closed = contact closed = mains present
door open = contact open = no mains present
Coldstores fans are switched off until fan delay is complete



COMMUNICATIONS

Communication facilities are available for interrogation of temperatures, status and modification/display of setpoints, limits and timeclock settings. All communication is via a daisy chain RS485 link which connects all ITC-1085 units in series.

Communication commands and replies are checked for parity and block length and automatically retransmit if errors are detected.

Each ITC-1085 has a unique unit number address UU/u which is used to select the appropriate unit for interrogation or modification. UU is stub no. 1-80

u is case /coldstore number 1-3.

i.e case 3 stub 56 has addresss 56/3

coldstore stub 45 has address 45/1

Some communication commands may use 'wildcard' stub number 99 and 'wildcard' case number 9 to access all stubs on the highway or all cases in a stub.

ITC-1085 units are inactive until they are addressed.

When the organisation of commands on the RS485 highway is under the control of a Woodley Mk V then the ITC-1085 units only accept status requests which transmit case, discharge and return air temperatures and defrost status.

GUARDIAN Autograph or RM-256 Refrigeration Monitor Communication commands available are

a) Transmit Unit Status which replies with command plus stub status & case temperature

b) Transmit Values which replies with stub address plus latest signed temperature values ,time, trip states, relay states and internal status

c) Transmit Setpoints which replies with setpoints and limits

UUu Addresses may not be changed via the link

f) Receive setpoints with new setpoint values

h) Receive Time and Date with new hours and minutes, day, month and year for real time clock

i) Initiate/Terminate a hot gas or off-cycle defrost

m) ON auto/FANS only/case OFF selection for case cleaning

GENERAL

Temperature specification 0-40 C for box and cases.
All setup parameters are saved in EEPROM.
A battery-backed real-time clock provides all defrost times.
Auto restart is performed after power-up and watchdog fail.
All termination is by two-part screwclamp connectors
Auto Restart
After power or WDT fail the unit automatically performs an auto restart routine which

a) Reinitialises all parameters from EEPROM
b) Sets up all internal microprocessor settings
c) Tests all display segments (8888) for a five second period.
d) starts restart delay timer which inhibits liquid valve control to give staggered start.
e) checks to see if a scheduled defrost cycle should be in progress and continues remainder of cycle if required.

Item a) is also performed if a sumcheck error on the memory is detected.
Item b) is also performed every time the Watchdog timer is addressed .

ITC-1085 supermarket case/coldroom controller

'Sticks in AUTO ' Fault

ITC 1085 issue A3 controllers sometimes get stuck with 'Auto' on display after power up during a defrost time or request.
The 'Auto' display can only be removed by

a) powering off and on again 60 minutes later when the defrost is over.
b) using the stub control panel switch or the laptop PC to switch the controller to OFF so that addresses and defrost times can be setup prior to switching back to AUTO.
c) fit an issue V2.0A EPROM chip.

The problem is caused by a software fault on issue A3 which only allows the restart timer to count up when the controller is in normal control mode. This condition excludes defrost mode and consequently the controller doesn't perform the necessary restart timing to remove the 'AUTO' from display and allow keypad operation.
The counter is allowed on issue A3 with condition '=AUTO' This condition has been corrected on issue A7 and issue V2.0A to do restart counting provided condition 'NOT=OFF'is present.

1085 SOFTWARE MODIFICATIONS

issue A7 (Abingdon only)

i) 'Sticks in AUTO' fault corrected

ii) d2dn Facility
- Delay the second defrost by 'n' hours (0-9)
so this defrost occurs outside store open hours for cases with 2 defrost per day.
d2dn can only be changed after doing
SET PP05 Defr dn=2
the d2dn message is not displayed if dn<>2
If d2dn=0 is selected then
defrosts occur at the normal time

issue V2.0A 24/04/95

i) all modifications issued on A7

ii) Defrost type 'gdFr' added = glass door freezer
This is similar to a 'HGt8' defrost except that the fans are switched OFF during defrost.
a) controls on discharge temp
b) defrost terminates on probe 8 or 9
c) heaters run all the time.
d) Fans are switched off during defrost.
This new defrost type requires Version 4.6 Laptop software to support it and is not supported by earlier issues.

iii) supports the new GUARDIAN Keyswitch display panel and allows authorised operator selection of
AUTO, FANS, OFF, AUTO
for individual case cleaning using the keyswitch on the new display panel.

iv) provides 'PC fail' message on case keypad display if no RS485 communications have been received for 10 minutes
This RS485 Comms Watchdog message is removed if :-
a) normal RS485 communications are resumed
b) SET PP11 port is changed from '9600' to 'none' for systems with no PC communications.
c) SET PP05 unit 'dad' changed to 'ndad' or 'nda'