UNI-PRO

DEVELOPMENT ENVIRONMENT FOR PROGRAMMABLE CONTROLLERS

REFRIGERATION CONTROL LIBRARIES MANUAL

CODE 144UPRORBE10

Important notice

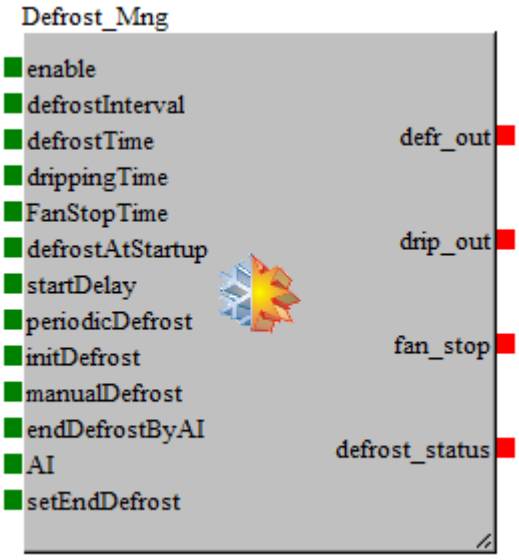
Read this document carefully before use and take all the prescribed precautions. Keep this document for future consultation.

Summary

1 REFRIGERATION Control Libraries

1.1 Refrigeration Control

Defrost_Mng Library



Inputs defined as "optional" do not need to be connected, they will automatically assume their default value

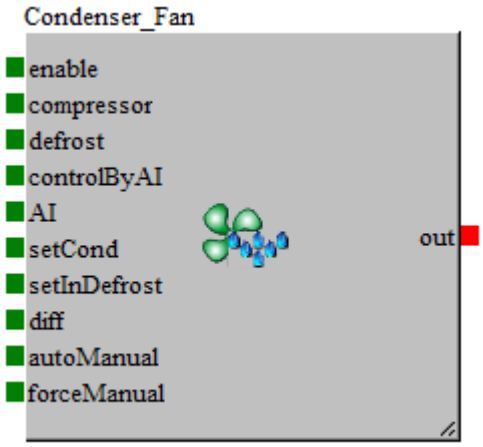
Input	***Type***	***Range***	***Description***
enable	CJ_BIT	0..1	Enable library (optional, default = 1)
defrostInterval	CJ_WORD	0..1440[min]	Defrost interval between defrost cycles or maximum defrost time
defrostTime	CJ_WORD	0..240[min]	Defrost duration
drippingTime	CJ_WORD	0..240[min]	Dripping duration (during dripping the compressor will remain switched off and defrost output remain deactivated)
FanStopTime	CJ_WORD	0..240[min]	Fan stop duration (during this phase also the fan output remains switched off)
defrostAtStartup	CJ_BIT	0..1	Defrost when device is switched on 1 = YES (optional, default = 0)
startDelay	CJ_BYTE	0..120[min]	Delay time before defrost cycle is started

periodicDefrost	CJ_BIT	0..1	It enables the next cycle after DefrostInterval time expires. 1 = defrost will be ciclically activated (optional, default = 0)
initDefrost	CJ_BIT	0..1	If DefrostAtStartup is not enabled, InitDefrost is the condition that starts the defrost cycle (trigger input)
manualDefrost	CJ_BIT	0..1	It is the condition to manually start and stop the defrost
endDefrostByAi	CJ_BIT	0..1	It enables to control the end of the defrost when an analog input value reaches a setpoint threshold
AI	CJ_ANALOG		Analog input value to be compared with the defrost end threshold If the AI is in error, the control is not active
setEndDefrost	CJ_SHORT	-3276.8..3276.7	Setpoint to be compared with an AI to end defrost

Output	***Type***	***Range***	***Description***
sbr_out	CJ_BIT	0..1	Defrost phase in progress
drip_out	CJ_BIT	0..1	Dripping phase in progress
fan_stop	CJ_BIT	0..1	Fan stop phase in progress
defrost_status	CJ_BYTE	0..6	Defrost status: SBR_OFF 0 SBR_INIT 1 SBR_WAIT 2 SBR_ON 3 DRIP_ON 4 FAN_STOP 5 SBR_NEXT 6

- All intervals, timeouts and delays are in minutes.
- The first defrost has to be started by one of the two conditions: *defrostAtStartup* or *initDefrost*. After first defrost, the periodic defrost set to 1 is sufficient condition to repeat the defrost after the interval.
- Defrost time is a portion of the defrost interval, so it should be smaller than the interval period. If defrost time is greater or equal to defrost interval, the defrost will be "continuously" in progress. Please set the limits of these two parameters in accordance to this rule.

Condenser_Fan Library

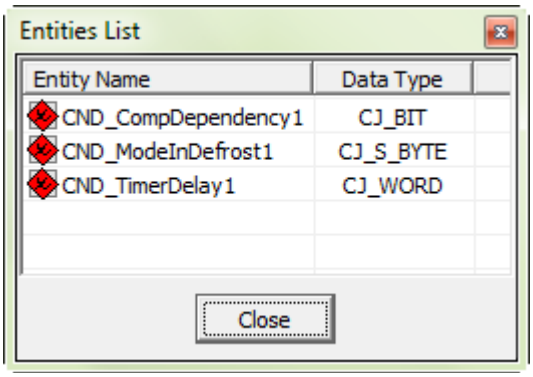


Inputs defined as "optional" do not need to be connected, they will automatically assume their default value

Input	***Type***	***Range***	***Description***
enable	CJ_BIT	0..1	Enable library (optional, default = 1)
compressor	CJ_BIT	0..1	Compressor's OR input If the internal parameter *CompDependency* is set to 1, the fan follows the compressor operations (optional, default = 0)
defrost	CJ_BIT	0..1	Defrost in progress input When active, it follows the logic of the internal parameter *ModeInDefrost* (see below) (optional, default = 0)
controlByAi	CJ_BIT	0..1	It enables to control the condenser fan comparing an analog input value with a setpoint and its differential (optional, default = 0)
AI	CJ_ANALOG		Analog input value to be compared with a setpoint thereshold for fan control If the AI is in error, the control is not active (optional, default = 0)

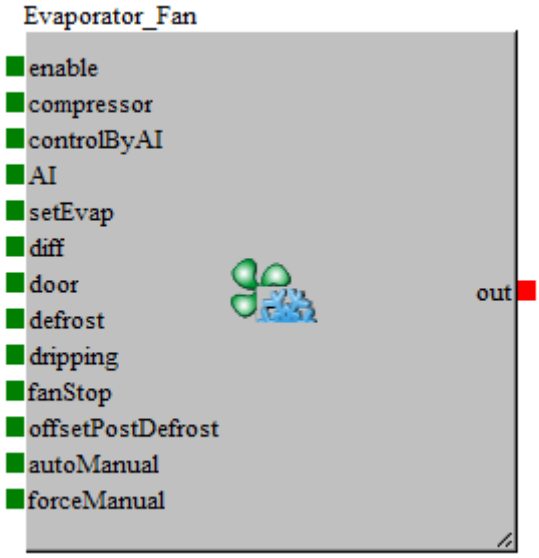
setCond	CJ_SHORT	-32768..32767	Setpoint to compare with an Analog input value for generic fan control. If *controlByAi=1* and *Defrost=0* When *AI<=setCond* the condenser fans are stopped (optional, default = 0)
setInDefrost	CJ_SHORT	-32768..32767	Setpoint to compare with an Analog input value for fan control during the defrost. If *controlByAi=1* and *Defrost=1* When *AI<=setInDefrost* the condenser fans are stopped (optional, default = 0)
diff	CJ_SHORT	-32768..32767	Differential used to command the fans. If *controlByAi=1* and *Defrost=1* When *AI>set+diff* the condenser fans are switched on (optional, default = 0)
autoManual	CJ_BIT	0..1	It enables the possibility to manually command the condenser fan output with the value *forceManual* (optional, default = 0)
forceManual	CJ_BIT	0..1	It is the value to manually command the fan output

Output	***Type***	***Range***	***Description***
out	CJ_BIT	0..1	Condenser fan output



Internal Parameters	***Type***	***Range***	***Description***
CompDependency	CJ_BIT	0..1	Condenser fan mode during normal operation 0=indipendent 1=same as compressor (default = 0)
ModeInDefrost	CJ_S_BYTE	-1, 0, 1	Condenser fan mode during defrost -1=OFF 0=Normal operation 1=ON (default = 0)
TimerDelay	CJ_WORD	0..999 [sec]	Counter of condenser fan switch-off delay time (default = 0)

Evaporator_Fan Library



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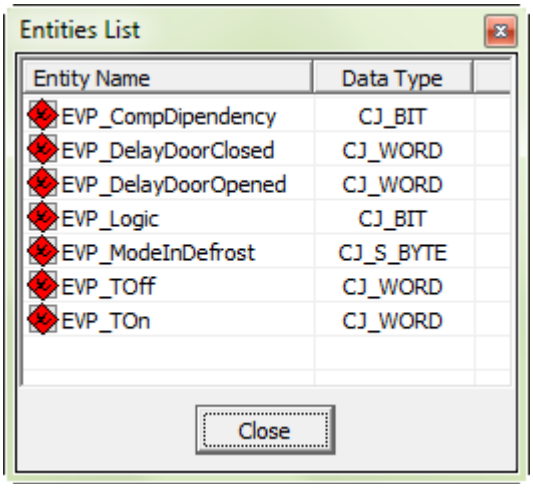
Input	***Type***	***Range***	***Description***
enable	CJ_BIT	0..1	Enable library (optional, default = 1)
compressor	CJ_BIT	0..1	Compressor's OR input
controlByAI	CJ_BIT	0..1	It enables to control the evaporator fan comparing an analog input value with a setpoint thereshold (optional, default = 0)
AI	CJ_ANALOG		Analog input value to be compared with a setpoint thereshold for fan control If the AI is in error, the control is not active (optional, default = 0)
setEvap	CJ_SHORT	-32768..32767	Setpoint to be compared with an Analog input value for fan control If *controlByAi=1* When *AI>=setEvap* the evaporator fans are stopped (optional, default = 0)

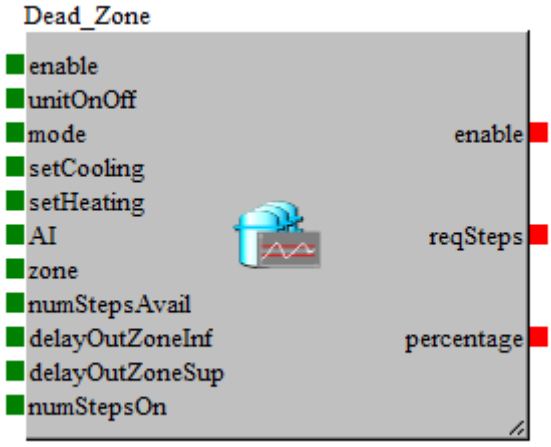
diff	CJ_SHORT	-32768..32767	Differential used to command the fans If *controlByAi=1* and *Defrost=1* When *AI<set-diff* the evaporator fans are switched on (optional, default = 0)
door	CJ_BIT	0..1	Door input If open (= 1), it stops the fans (optional, default = 0)
defrost	CJ_BIT	0..1	Defrost in progress input (optional, default = 0)
dripping	CJ_BIT	0..1	Dripping in progress input (optional, default = 0)
stopFans	CJ_BIT	0..1	Fan stop in progress input (optional, default = 0)
autoManual	CJ_BIT	0..1	It enables the possibility to manually command the evaporator fan output with the value *forceManual* (optional, default = 0)
forceManual	CJ_BIT	0..1	It is the value to manually command the fan output

Output	***Type***	***Range***	***Description***
out	CJ_BIT	0..1	Evaporator fan output



Internal Parameters	***Type***	***Range***	***Description***
CompDependency	CJ_BIT	0..1	Evaporator fan mode during normal operation 0=indipendent 1=same as compressor (default = 0)
DelayDoorClosed	CJ_WORD	0..999 [sec]	Delay time before switching on the fans after door closing (default = 0)
DelayDoorOpened	CJ_WORD	0..999 [sec]	Delay time before switching on the fans after door opening (default = 0)
Logic	CJ_BIT	0..1	Fan output logic 0=Direct 1= Reverse (default = 0)
ModeInDefrost	CJ_S_BYTE	-1, 0, 1	Evaporator fan mode during defrost -1=OFF 0=Normal operation 1=ON (default = 0)
Ton	CJ_WORD	0..999 [sec]	Evaporator fan ON minimum time (default = 0)
Toff	CJ_WORD	0..999 [sec]	Evaporator fan OFF minimum time (default = 0)

Dead_Zone Library



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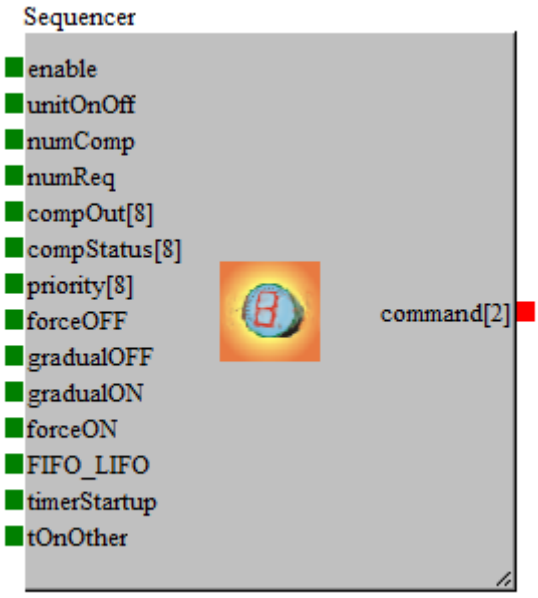
Input	***Type***	***Range***	***Description***
enable	CJ_BIT	0..1	Enable library (optional, default = 1)
unitOnOff	CJ_BIT	0..1	Unit status If status ON: normal operation. If status OFF: the steps are progressively decreased to 0
mode	CJ_BIT	0..1	0 = Cooling 1 = Heating
setCooling	CJ_SHORT	-32768..32767	Summer setpoint.
setHeating	CJ_SHORT	-32768..32767	Winter setpoint.
AI	CJ_ANALOG		Analog input value determining whether regulation is inside or outside the neutral zone, in order to activate/deactivate steps accordingly If the AI is in error, the steps are decreased to 0
zone	CJ_SHORT	-32768..32767	Neutral zone
numStepsAvail	CJ_BYTE	1..8	Number of steps that can be used
delayOutZoneInf	CJ_WORD	0..65535	Stand-by time (in seconds) below the neutral zone before switching on/off a further step
delayOutZoneSup	CJ_WORD	0..65535	Stand-by time (in seconds) above the neutral zone before switching on/off a further step

Output	***Type***	***Range***	***Description***
enable	CJ_BIT	0..1	Copy of the enable input
reqSteps	CJ_BYTE	0..*numStepsAvail*	Number of steps requested by the regulation in neutral zone
percentage	CJ_WORD	0..100	Percentage of requested steps

Sequencer Library



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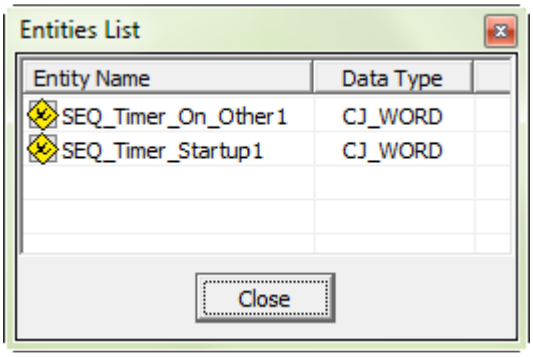
Input	***Type***	***Range***	***Description***
enable	CJ_BIT	0..1	Enable library (optional, default = 1)
unitOnOff	CJ_BIT	0..1	Unit status If status ON: normal operation If status OFF: the compressors are forced to OFF.
numComp	CJ_BYTE	1..8	Number of compressors that can be used
numReq	CJ_BYTE	1..8	Number of steps/compressors that are requested to be ON by the regulation
compOut[8]	CJ_BIT	0..1	Array[8] Actual value of the compressor outputs
compStatus[8]	CJ_BYTE	0..255	Array[8] Internal status and diagnostic of the compressors: Bit0 = compressor alarm Bit4 = manual mode Bit5 = excessive operating hours Bit6 = excessive starts Bit7 = delay time in progress

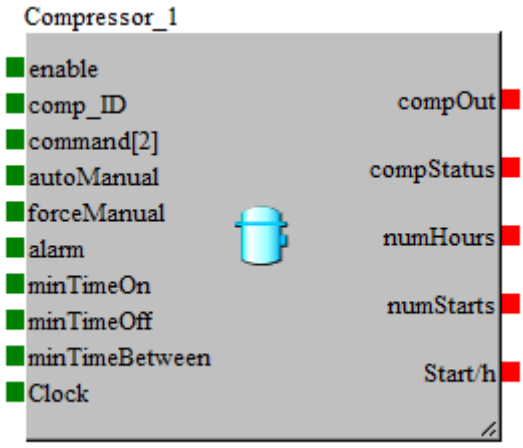
priority[8]	CJ_DWORD		Array[8] Value used to give priority to each step/compressor (e.g. compressor operating hours or number of starts)
forceOFF	CJ_BIT	0..1	1 = Force OFF all the compressor outputs immediately (optional, default = 0)
gradualOFF	CJ_BIT	0..1	1 = Force OFF all the compressor outputs gradually (optional, default = 0)
gradualON	CJ_BIT	0..1	1 = Force ON all the compressor outputs gradually (optional, default = 0)
forceON	CJ_BIT	0..1	1 = Force ON all the compressor outputs immediately (optional, default = 0)
FIFO_LIFO	CJ_BIT	0..1	It defines the logic to switch OFF/ON the compressors, in case of equal priority (e.g. same operating hours) 0 = FIFO 1 = LIFO (optional, default = 1 LIFO)
timerStartup	CJ_WORD	0..65535 [sec]	Bypass delay at startup, before requesting the activation of the compressors (optional, default = 0)
tOnOther	CJ_WORD	0..65535 [sec]	Bypass delay after a compressor transition, before requesting the activation/deactivation of the next compressor (optional, default = 0)

Output	***Type***	***Range***	***Description***
command[0]	CJ_S_BYTE	0..8	Compressor identifier which to send the command to: 0 = configuration in progress 1..8 = Compressor index
command [1]	CJ_S_BYTE	1..8	Command to the compressor corresponding to the index: -2 = Force OFF -1 = Gradual OFF 0 = Stand still 1 = Gradual ON 2 = Force ON



Internal Status	***Type***	***Range***	***Description***
Timer_Startup	CJ_WORD	0..65535 [sec]	Counter in seconds of compressor activation delay after startup
Timer_On_Other	CJ_WORD	0..65535 [sec]	Counter in seconds of the delay for activation/deactivation of next compressor

Compressor Library



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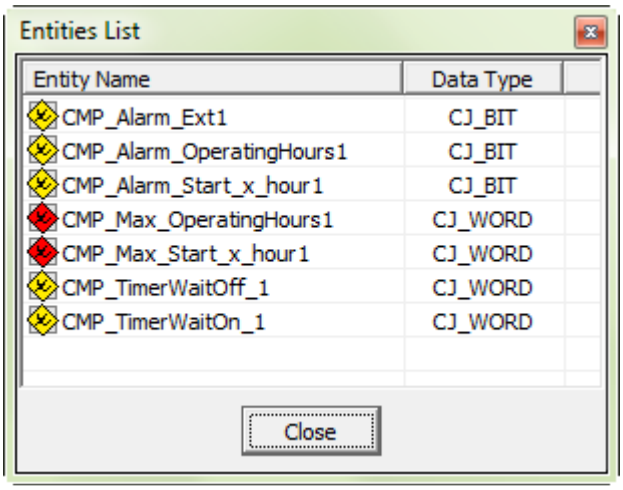
Input	***Type***	***Range***	***Description***
enable	CJ_BIT	0..1	Enable library (optional, default = 1)
comp_ID	CJ_BYTE	1..8	Compressor Index. This value must be univocal in the application.
command[0]	CJ_S_BYTE	0..8	Value received from the Sequencer output: 0 = during changing of configuration 1..8 = Value to be compared with the Compressor index
command[1]	CJ_S_BYTE	1..8	Value received from the Sequencer output: -2 = Force OFF -1 = Gradual OFF 0 = Stand still 1 = Gradual ON 2 = Force ON
autoManual	CJ_BIT	0..1	It enables the possibility to manually command the compressor output with the value *forceManual* (optional, default = 0)
forceManual	CJ_BIT	0..1	It is the value to manually command the compressor
alarm	CJ_BIT	0..1	It is the condition for compressor generic alarm

minTimeON	CJ_WORD	0..999 [sec]	Once activated, the compressor will remain ON for this period of time before it can be switched OFF
minTimeOFF	CJ_WORD	0..999 [sec]	Minimum time that shall elapse from last switch-OFF before the compressor can be switched back ON again
minTimeBetween	CJ_WORD	0..999 [sec]	Minimum time that that shall elapse between two switch ONs of the same compressor
Clock	CJ_DATETIME	-	It allows the correct calculation of the number of starts in an hour, even in the event of a power failure (optional)

Output	***Type***	***Range***	***Description***
compOut	CJ_BIT	0..1	Compressor command: 0 = OFF 1 = ON
compStatus	CJ_BYTE	0..255	Internal status and diagnostic of the compressors: Bit0 = compressor alarm Bit4 = manual mode Bit5 = excessive operating hours Bit6 = excessive starts Bit7 = delay time in progress
numHours	CJ_DWORD		Number of compressor operating hours
numStarts	CJ_WORD	0..65535	Number of times the compressor has turned on
Start/h	CJ_BYTE	0..255	Number of times the compressor has turned on in the last hour



Internal Status & Parameters	***Type***	***Range***	***Description***
Alarm_Ext	CJ_BIT	0..1	It is the condition for compressor generic alarm
Alarm_OperatingHours	CJ_BIT	0..1	It is the condition for compressor operating hours exceeding the threshold limit Max_OperatingHours (see below the parameter)
Alarm_Start_x_hour	CJ_BIT	0..1	It is the condition for number of compressor starts exceeding the threshold limit in the last hour Max_Start_x_hour (see below the parameter)
Max_OperatingHours	CJ_DWORD		Limit threshold of compressor operating hours (default = 0 → no alarm)
Max_Start_x_hour	CJ_WORD	0..65535	Limit theshold of number of compressor starts in the last hour (default = 0 → no alarm)
TimerWaitOff	CJ_WORD	0..65535 [sec]	Countdown of compressor ON minimum time
TimerWaitOn	CJ_WORD	0..65535 [sec]	Countdown of compressor OFF minimum time

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HEADQUARTERS
Evco
Via Mezzaterra 6, 32036 Sedico Belluno ITALY
Tel. +39 0437-852468
Fax +39 0437-83648
info@evco.it
www.evco.it

OVERSEAS OFFICES
Control France
155 Rue Roger Salengro, 92370 Chaville Paris FRANCE
Tel. 0033-1-41159740
Fax 0033-1-41159739
control.france@wanadoo.fr

Evco Latina
Larrea, 390 San Isidoro, 1609 Buenos Aires ARGENTINA
Tel. 0054-11-47351031
Fax 0054-11-47351031
evcolatina@anykasrl.com.ar

Evco Pacific
59 Premier Drive Campbellfield, 3061, Victoria Melbourne, AUSTRALIA
Tel. 0061-3-9357-0788
Fax 0061-3-9357-7638
everycontrol@pacific.com.au

Evco Russia
111141 Russia Moscow 2-oy Proezd Perova Polya 9
Tel. 007-495-3055884
Fax 007-495-3055884
info@evco.ru

Every Control do Brasil
Rua Marino Félix 256, 02515-030 Casa Verde São Paulo SÃO PAULO BRAZIL
Tel. 0055-11-38588732
Fax 0055-11-39659890
info@everycontrol.com.br

Every Control Norden
Cementvägen 8, 136 50 Haninge SWEDEN
Tel. 0046-8-940470
Fax 0046-8-6053148
mail2@unilec.se

Every Control Shangai
B 302, Yinhai Building, 250 Cao Xi Road, 200235 Shangai CHINA
Tel. 0086-21-64824650
Fax 0086-21-64824649
evcosh@online.sh.cn

Every Control United Kingdom
Unit 19, Monument Business Park, OX44 7RW Chalgrowe, Oxford, UNITED KINGDOM
Tel. 0044-1865-400514
Fax 0044-1865-400419
info@everycontrol.co.uk