Parameter description - Continuation

d12 = Fan & defrosting control probe
sd1 = ambient probe.
sd2 = defrosting probe
sd3 = product probe
d13 = Intelligent defrosting
off = disabled
Jup = skip defrosts
Cic = vary defrosting cycle
d14 = Units to count the defrosting cycle
rt = according to the time of working of the controller.
ct = according to the time of working of the compressor.
d15= minimum evaporator set
If evaporator temperature is above d15 the time for defrosting cycle is not counted. Only enabled if d3 is not set to off.
d16= maximum defrost time %
Percentage of d2 set as normal defrosting time.
d17= Cycle time variation
Value of increment or decrement of d8
Hde = Hour(Hde):Minutes(Mde) of next defrost
Mde =Hour(Hde):Minutes(Mde) of next defrost
if **d14=ct or d13 different of oFF** Hde:Mde is the time until next defrost
JdF= Smart defrost information
d13= jup Defrosts to skip
d13= CiC increment of d8

PROBES (Pro)

P0 = ºC or ºF, Temperature scale
P1 = Ambient probe calibration
Degrees shift of the ambient probe.
P2 = Defrosting probe calibration
Degrees shift of the defrosting probe.
P3 = Product probe calibration
Degrees shift of the product probe.
P4 = Decimal point
P5=Probe to be viewed normally on the display.
sd1 = ambient probe.
sd2 = defrosting probe.
sd3 = product probe
P6 = Probe 2 Defrosting present.
If there is a probe 2 connected to thermostat
P7 = Probe 3 Product present.
If there is a probe 3 connected to thermostat

ALARMS(ALA)

A0 = Fan & alarm differential.
This is the temperature difference between the on and off cycle of the alarms and fan
A1 = Maximum alarm.
High alarm ON at Set+A1. High alarm OFF at Set+A1-A0.
A2 = Minimum alarm.
Low alarm ON at Set-A2. Low alarm OFF at Set-A2+A0.
A3 = Digital Input alarm time validation.
If E0=In or E0=Al, time since the situation occurs, until it is given.
A4 = Temperature alarm exclusion time after defrosting.
During the defrosting, and this time after it, temperature alarms will be ignored.
A5 = Temperature alarm exclusion time after opening the door.
While the door is open (if A5>0) and time A5 after closing it, alarms will be ignored.
A6 = Temperature alarm exclusion after connection.
Until this time has elapsed since the connection, temperature alarms will be ignored.
A7 = Temperature alarm time validation.
Time since the alarm situation occurs, until it is given.
A8 = Probe Alarm.
sd1 = ambient probe
sd2 = defrosting probe
sd3 = product probe

INITIALIZATION (INI)

Hor = Hour
Min = Minutes
E0, E1 = Digital input configuration.
Off = Digital input disabled.
Al = External alarm. There is an alarm if input is short-circuited.
In = Door open if input is short-circuited.
def = Order to initiate a defrost if input is short-circuited (only E0).
ndf = No defrosting will be made if input is short-circuited.
rst= If input is short-circuited Set Point becomes Set+r4
H0 = Factory Configuration. Record Factory Configuration.
H1 = Master/Slave
H1=Master. The thermostat issues defrosting orders to slave connected thermostats through the digital input
H1=Slave. The thermostat performs defrosting ordered by the master connected to its digital input.
In both cases the input must be E0=def
H2 = Keyboard protection.
Yes =Keyboard protected. To modify Set, activate/de-activate defrosting and activate/de-activate continuous cycle we have to enter the code and then quit. The protection is removed momentarily. It is activated again 1 minute after the last key is pressed.
No = Keyboard not protected.
H3 = Delay time on connecting.
Until this time has elapsed since turning-on power, the compressor will not start-up.
H4 = Address for serial communication.
H5 = Input code to parameters.
This code is set to 00 from factory.
H6 = Type of Probe
PTC or NTC
H7 = Configuration Relay 2 , H8 = Configuration Relay 3
H9 = Configuration Relay 4 and H10 = Configuration Relay 5
We can choose that it is Light (Lit), Fan (Fan), Alarm (ALA), Defrosting (dEF) or 2nd compressor (Con (Only H10)).
H11 = HACCP
Enables temperature alarm recording.
dat = Date Day, month, year
td = Display refresh time
If the measures temperature increases over 1 degree in this time, displayed temperature only will be increased 1 degree

Model Table

	End of defrosting Probe	Third Probe	Compressor Relay 16A	Second Relay 8A	Third Relay 8A	Fouth Relay 8A	Fifth Relay 16A	Heat or Cooling Control	Digital Inputs	Smart defrosting	Buzzer	Real Time Clock
EKTDIN11			*					*				
EKTDIN11I			*					*	1			
EKTDIN11IB			*					*	1		*	
EKTDIN12	*		*					*				
EKTDIN12I	*		*					*	1			
EKTDIN12IB	*		*					*	1		*	
EKTDIN23I	*	*	*	*					2	*		
EKTDIN23IB	*	*	*	*					2	*	*	
EKTDIN23IR	*	*	*	*					2	*	*	*
EKTDIN33I	*	*	*	*	*				2	*		
EKTDIN33IR	*	*	*	*	*				2	*		*
EKTDIN43I	*	*	*	*	*	*			2	*		
EKTDIN43IR	*	*	*	*	*	*			2	*		*
EKTDIN53I	*	*	*	*	*	*	*		2	*		
EKTDIN53IR	*	*	*	*	*	*	*		2	*		*

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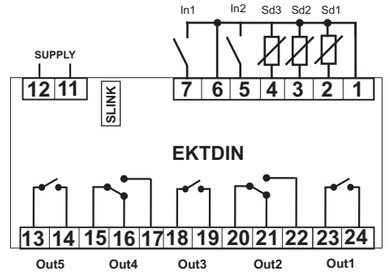
ETDT1516I_170823

EKTDIN
Digital Temperature Controller
Specification and Operating Instructions

Wiring Diagram



Description

EKTDIN series controllers have been specifically designed for refrigeration applications. Friendly use thanks to the display with symbols and 6 keys to make it easy to program the parameters and access to functions such as turning on/off the control, the light or forcing defrost.

Models up to 5 relays are available. First relay drives the compressor and the other four can be configured to drive defrost, fan, light or alarm. It also includes 3 temperature probe inputs and 2 configurable digital input.

NTC/PTC probe and ºC / ºF scale can be set by the parameters.

The control features defrost synchronization among several thermostats, intelligent defrost to reduce the power consumption, control for two compressors, night set, error indication and alarms through the display and the buzzer, communication and real-time clock.

It also features HACCP logging to record temperature and time of alarms caused by out of limit temperatures or power fails.

SLINK multipurpose input allows to connect a KLKEY to easily program the parameters or a communication module.

Model references

The model reference is given by: EKTDIN XDYZ
Each suffix can take the following values:

X	Model	depending on table
D	Probe	PTC/NTC selectable by parameter
Y	Color	**R**:Red, **G**:Green, **B**:Blue
Z	Supply voltage	**230**=230Vac, **115**=115Vac, **24**:24Vac/dc, **12**:12Vac/dc

Installation

The thermostat must be located in a place protected from vibrations, impacts, water and corrosive gasses.
DIN rail mounting.

Wiring

Avoid installing the cables of the probes and the digital input in the proximity of any power cables.

Maintenance

After the installation there are no maintenance tasks required.
Clean the surface of the controller with a soft, damp cloth.
Never use abrasive detergents, petrol, alcohol or solvents.
All the repairs must be carried out by authorised people.

Technical Data

Supply voltage	115Vac+/-10%, 230Vac+/-10% 12Vac/dc +/-10% , 24Vac/dc +/-10%
Supply powers	6VA
Storage temperature	from -20ºC to 80ºC (from -4ºF to 176ºF)
Operating temperature	from 0ºC to 55ºC (from 32ºF to 131ºF)
Temperature probe	PTC / NTC
Probe range	PTC from -50ºC to 150ºC (from -58 to 302ºF) NTC from -50ºC to 110ºC (-58 to 230ºF)
Accuracy	Better than 1% of full scale
Resolution	0.1º
Display	3-digits plus sign
SLINK	For KLKEY and Communication
Outputs	
OUT1, OUT5	SPST Relay Resistive Load 16A 1HP 240Vac -- 10FLA, 60LRA 240Vac
OUT2, OUT4 OUT3	SPDT Relay Resistive Load 8A 240Vac SPST Relay Resistive Load 8A 240Vac
Maximum current per position	20A
Dimensions	71 x 90 x 58 mm (2.79 x 3.54 x 2.28 in)
Front Protection	IP54

Front Operation

Set Point Setup
- Press key **Set** The Set label appears.
- Press **Set** again. Current set point value appears blinking.
- Press ▲ or ▼o increase or decrease the value.
- Press **Set** to confirm the new value.
- Press **Set** and ▼to exit

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Front Operation

Time programming
- Press key **Set**. The Set label appears.
- Press ▲ or ▼ to go to Hour or Minute
- Press **Set** to see the value.
- With ▲ and ▼ set the desired new value.
- Press **Set**. for 8 seconds, Pro will appear on the display once the time has been correctly programmed

-Press **Set** and ▼ to quit or wait for 1 minute (keyboard timeout).

Parameter programming
- The parameters are grouped in the menus COM, DEF, PRO, ALA, INI, HAC
- Press **Set** for 8 seconds. Value 00 appears blinking.
- Set the code with ▲ and ▼ (it is set to 00 from factory).
- Press **Set** to confirm the code. If it is right, the label of the first menu will appear.
- With ▲ and ▼ go to the desired menu.
- Press **Set**, the label of the first parameter of menu will appear.
- With ▲ and ▼ go to the desired parameter label of the list of parameters.
- Press **Set** to see the value.
- With ▲ and ▼ set the desired new value.
- Press **Set** to confirm it and exit to the parameter label.

-Press **Set** + ▼ to go to menu list.

-Press **Set** + ▼ to quit programming or wait 1 minute (keyboard timeout).

Date programming
Access to parameter as explained in Parameter programming, select **INI** menu and **dat** parameter.
- Press key **Set**. The day (d00) appears.
- Press ▲ or ▼ to go to Day or Month or Year.(d00, M00, Y00)
- Press **Set**. for 8 seconds, display will blink.
- With ▲ and ▼ set the desired new value.
- Press **Set**. for 8 seconds, Pro will appear on the display.

To record a standard configuration
- Access to parameter H0 as explained in Parameter programming.

EKTDIN1: H0 = 0; EKTDIN2: H0 = 1; EKTDIN3: H0 = 2; EKTDIN4: H0 = 3; EKTDIN5: H0 = 4

- Press **Set** for 8 seconds, and the thermostat will be reset.

Manual Defrost.
Pressing key for 8 seconds defrost is activated. Repeating the operation is deactivated.

Continuous cold cycle.
Pressing ▼ key for 8 seconds a continuous cold cycle begins. Repeating the operation the cycle finalizes.

Setting keyboard code to zero
The keyboard code can be programmed to zero by turning off the controller, and turning it on again, while the key **Set** is pressed.

Alarm validation
An active alarm can be validated (the alarm output will be turned off) pressing the **Set** + ▼ keys simultaneously.

ON/OFF
Pressing key for 5 seconds the thermostat will turn-on or turn-off.

ON/OFF Light
If we have a relay setup as light, pressing key for 5 seconds the thermostat will turn-on or turn-off the light

Led Indications

It indicates Compressor connected. It blinks when a continuous cold cycle has to be initiated and has to wait until the minimum compressor stoppage time is over.

OUT2 It indicates Compressor 2 connected. It blinks when a continuous cold cycle has to be initiated and has to wait until the minimum compressor stoppage time is over.

It indicates that a defrost is running

It indicates that fan is connected

It indicates error or alarm. It is blinking when the alarm is validated for user

HACCP It indicates HACCP record is activated

-Display Messages

In normal operation the probe temperature selected by P5 will be displayed. The following messages can also appear :
- **Err** Memory reading error.
- **ErP1, ErP2, ErP3** Probe1 , 2 or 3 error
- **Eri** Internal parameter error. In this case, enter the standard configuration, as it is indicated in "To record a standard configuration".
- **ALH** High temperature alarm.
- **ALL** Low temperature alarm.
- **ALE** External alarm.
- **AEH** High temperature and external alarm.
- **AEL** Low temperature and external alarm.
- **ooo** Open probe.
- **---** Short-circuited probe.
- **DON** Defrosting activated.
- **DOF** Defrosting de-activated or cannot be done.
- **CON** Continuous cold cycle activated.
- **COF** Continuous cold cycle de-activated or cannot be done.
- **-d-** Thermostat on defrosting.
- **OFF** Thermostat OFF.

To view the probe not chosen by P5, press **Set**+▲

The display blinks when there is an error recording a parameter in memory or when awaiting confirmation of a value.

Operation in Error Case

If the ambient probe fails, the thermostat will connect the compressor according to parameters c2 and c3, being able to perform defrosting and continuous cold cycles.
If the memory fails the thermostat will connect the compressor ON for 5 minutes and OFF for 5 minutes, not being able to perform defrosting or continuous cold cycles.

Operation with 2 compressors

In this case when Sd1>=Set+r0 the compressor with less hours of working is turned on first and after c6 delay the second compressor is turned on.
When Sd1<Set+r0/2 the second compressor is turned off and when Sd1<Set the first compressor is turned off.
If before turning off the first compressor Sd1>=Set+r0 the second compressor is turned on again.

HACCP

If this option is activated, the thermostat registers up to 5 alarms of the types High, Low, and blackout. These alarms can be seen in the menu Registry of Alarms (HAC). To access to this menu, proceed as for the parameters menu.
The first value that appears is the number of registered alarms. Afterwards, for each alarm (if it has existed), the value of the temperature, the time and date (only models with real time clock) and elapsed time of the alarm. For the disconnection alarm, the temperature, the time and date (only models with real time clock) when returning the connection is registered, as well as the time until the correct values are reached. (Probe<Set+A1-A0)
When the elapsed time is showed it will appear xxd (days).Pressing ▲ xxH (Hours) will be shown, and pressing ▲ again, xxn (Minutes) will be displayed. When located over a temperature of alarm or time, pressing ▲+▼ during 2 seconds, both recorded data of the alarm (time and temperature value) are deleted.
In the HAC menu, and pressing ▲+▼ keys during 2 seconds, all the recorded data of alarms are deleted.

Defrosting Cycles

The cycles of defrosting can be performed counting total time (d14= rt) or counting the time only when the compressor is connected (d14= ct).
If d14= rt, first defrosting will be always made at the hour d3 and the others with the cycle given by d8.
If d14= ct, defrosting will be always made with the cycle given by d8.
Manual defrosting do not modify the programmed.

Intelligent Defrosting

By d13 parameter the time between defrost cycles can vary. The time is only counted if defrost probe is below the evaporator set d15.
Selecting d13=jup some of the defrosts will be skipped. After a defrost the following JdF defrosts will be ignored. JdF is initially 0. If a defrost ends before a time d16*d2 then JdF is incremented, otherwise is decremented. Maximum value for JdF is 3. When JdF is 3 if the next defrost ends before a time d16*d2 then JdF is set to 1, otherwise is set to 0.
Selecting d13=Cic the defrosting cycle can vary.
If a defrost ends before a time d16*d2 then time between defrosts is incremented d17 minutes, otherwise is decremented. The initial and minimum value for time between defrost is d8. The number of times that it is incremented it can be seen in JdF.

SLINK

This input allows to connect a programming key to read or to write the parameters.
It also admits a clock module so that the hour of the thermostat goes with a real time clock.
If the system is managed with a PC it can be connected it to the thermostat through this input with a communication module

Parameter list

Con	Description	Units	Range	Factory
Set	Set point	Degrees	r1 to r2	3.0
r0	Differential or hysteresis	Degrees	0.1 to 20	1.0
r1	Minimum value for set point	Degrees	-99.9 to r2	-50.0
r2	Maximum value for set point	Degrees	r1 to 302	150.0
r4	Night Set Point Variation	Degrees	-20.0 to 20.0	0.0
r6	Fan operation	Range	off /on /con	con
F0	Fan stoppage temperature	Degrees	-99.9 to 302	28.0
F1	Fan/compressor stop if door opened	Option	no/yes/Con/Fan	yes
c0	Minimum compressor stoppage time	Minutes	0 to 240	1
c1	Continuous cycle time	h - m	0.0 to 18	1.0
c2	ON time of fault cycle	Minutes	0 to 999	5
c3	OFF time of fault cycle	Minutes	0 to 999	5
c4	Minimum ON time of the compressor	Minutes	0 to 240	0
c5	Minimum time between two connections of the compressor	Minutes	0 to 240	1
c6	Time delay for 2nd compressor	Seconds	0 to 999	30

DEF	Description	Units	Range	Factory
d0	Type of defrosting (EKTDIN(2 to 5))	Range	re /in	re
d0	Heat or Cooling (EKTDIN1)	Range	re /in	re
d1	Temperature at which defrosting will stop	Degrees	-99.9 to 302	80.0
d2	Maximum defrosting time	Minutes	0 to 240	30
d3	First Hour of Day for Defrosting	h-m	00.0 to 18.0	00.0
d4	Delay of first defrosting	Minutes	0 to 999	0
d5	Display on defrosting	Range	off/on/-d-	-d-
d6	Display return limit.	Minutes	0 to 240	15
d7	Compressor drip time.	Minutes	0 to 240	0
d8	Interval between defrosting	h - m	00.0 to 18.0	8.0
d9	Fan works on defrosting	Range	no/yes	no
d10	Fan drip time	Minutes	0 to 240	0
d11	Minimum Defrosting time	Minutes	0 to 240	0
d12	Fan/defrosting control probe	Range	sd1/sd2/sd3	sd2
d13	Smart Defrosting	Option	off / jup / Cic	off
d14	Units to count the defrosting cycle	Option	rt / ct	rt
d15	Evaporator set	Degrees	-50.0 to 20.0	-10.0
d16	d2 maximum time %	Numeric	0 to 100	50
d17	CiC time variation	Minutes	0 to 120	10
HdE	Next defrost time(hours)	Hours	(read only)	
MdE	Next defrost time (minutes)	Minutes	(read only)	
JdF	Defrosts to skip	Numeric	(read only)	

Pro	Description	Units	Range	Factory
P0	Temperature scale	Option	ºC/ºF	ºC
P1	Ambient probe 1 calibration	Degrees	-20.0 to 20.0	0.0
P2	Defrosting probe 2 calibration	Degrees	-20.0 to 20.0	0.0
P3	Product probe 3 calibration	Degrees	-20.0 to 20.0	0.0
P4	Decimal point	Option	no/yes	yes
P5	Probe to display	Range	sd1/sd2/sd3	sd1
P6	Probe 2 present	Option	no/yes	yes
P7	Probe 3 present	Option	no/yes	no

ALA	Description	Units	Range	Factory
A0	Fan and alarm differential	Degrees	0.1 to 20.0	4.0
A1	Maximum alarm temperature	Degrees	0.1 to 99.9	8.0
A2	Minimum alarm temperature	Degrees	0.1 to 99.9	8.0
A3	Digital Input alarm time validation	Minutes	0 to 999	10
A4	Time without temperature alarm after Defrosting	h - m	0.0 to 18.0	1.1
A5	Time without temperature alarm after opening the door	h - m	0.0 to 18.0	1.1
A6	Time without temperature alarm after connection	h - m	0.0 to 18.0	1.1
A7	Alarm verification time	h - m	0.0 to 18.0	1.1
A8	Probe for alarm	Range	sd1/sd2/sd3	sd1

Inl	Description	Units	Range	Factory
Hor	Hour	Hours	0 to 23	0
Min	Minutes	Minutes	0 to 59	0
E0	Configure digital input	Range	off/Al/In/def/rst	off
E1	Configure digital input	Range	off/Al/In/rst	off
H0	Factory Settings	Range	0 to 4	
H1	Master/Slave	Range	Mst / slu	Mst
H2	Keypad protection	Option	no/yes	no
H3	Delay time on connecting	Seconds	0 to 240	0
H4	Address for serial communication	Numeric	0 to 999	0
H5	Keyboard code	Numeric	0 to 999	0
H6	Type of probe	Option	ptc / ntc	ptc
H7	Relay 2 Setup	Option	Au/Lit/FAn/ALA/dEF	dEF
H8	Relay 3 Setup	Option	Au/Lit/FAn/ALA/dEF	Fan
H9	Relay 4 Setup	Option	Au/Lit/FAn/ALA/dEF	Lit
H10	Relay 5 Setup	Option	Au/Lit/FAn/ALA/dEF/Con	ALA
H11	HACCP Activated	Option	no/yes	no
dat	Date	Day/Month/Year		1.1.0
td	Display refresh time	Seconds	0 to 999	0

Some of the parameters may not be present depending on the model.

Hour/Minutes Parameters H-M

It is a way to show hours and minutes in 3 digits
The two first digits are the hours and the third the tens of minutes. E.g.
2.4 2 hours 40 minutes
8.0 8 hours 0 minutes
10.3 10 hours 30 minutes

Parameter description

COMPRESSOR (CON)

SET = Work set point.
Temperature we wish to maintain the machine. Variable between r1 and r2.
r0 = Differential.
For EKTDIN1 with d0 = re and for EKTDIN2, EKTDIN3 y EKTDIN4, EKTDIN5:
When ambient probe temperature >= Set+r0 : Out ON
When ambient probe temperature <= Set : Out OFF
For EKTDIN1 with d0 = in :
When ambient probe temperature =< Set-r0 : Out ON
When ambient probe temperature >= Set : Out OFF
r4 = Night Set Point Variation
When the digital input is closed the Set Point is incremented r4. On this purpose set E0= rst or E1= rst.
r6 = Fan operation on regulation.
Off = Fan does not connect on regulation.
On = Fan is always connected on regulation.
Con= Fan linked to compressor start-up.
(Fan ON if allowed by the temperature given by F0)
F0 = Fan temperature limit.
Fan OFF on regulation when probe temperature setup in d12 is >= F0.
Fan ON on regulation, when temperature is =< F0-A0.
The operation of the fan on regulation is determined also by r6.
F1 = Fan stop if door opened.
On regulation and continuous cycle when opening the door
No = The fan and compressor do not stop.
Yes = Both stop.
Con = The compressor stops.
Fan = The fan stops.
c0 = Minimum compressor stop time
Minimum time since compressor stops until it is starts again.
c1 = Continuous cycle time.
Duration of a continuous cold cycle.
c2 = ON time of fault cycle, when ambient probe is broken
c3 = OFF time of fault cycle, when ambient probe is broken
c4 = Minimum time of working of the compressor
Minimum time since compressor starts until it stops.
c5 = Minimum time between two connections of the compressor
Minimum time since compressor starts until it starts again.
c6 = Time delay for 2nd Compressor
Time from first compressor is turned on until second compressor is turned on (if it is necessary and H9=Con).

Defrosting (DEF)

d0 = Type of defrosting. (EKTDIN2, EKTDIN3, EKTDIN4, EKTDIN5)
re = defrosting without connecting the compressor.
in = defrosting by connecting the compressor.
d0 = Cold/Heat (EKTDIN1)
re=Cold
in=Heat
d1 = End of defrosting temperature.
When this temperature is reached the defrosting will end.
d2 = Maximum defrosting time.
The defrosting will stop when this time is reached.
If it is zero there will be no defrosting.
d3 = first Hour defrosting of the day
From 00:00 hours the first defrosting is at d3 hours.
Until this time no defrosting is performed
d4 = Delay first defrosting.
Time without defrosting after turning the thermostat on.
d5 = Display during the defrosting.
Off = The current temperature will be shown during defrosting.
On = The temperature at defrost beginning is frozen on display until the end of defrosting and until the current temperature is equal or lower than the initial one, or until d6 time elapses.
def = Label -d- is displayed during defrosting, until the end of defrosting and until the current temperature is equal or lower than the initial one, or until d6 time elapses.
d6 = Display return limit.
Maximum time before viewing the current temperature again after defrosting.
d7 = Compressor drip time.
Time since defrosting ends until the compressor can be connected.
d8 = Interval between defrosting.
Time between the start of a defrosting and the start of the following one.
If it is zero defrosting is not done automatically by time.
d9 = Fan operation during defrosting time.
It determines if the fan is connected or not during defrosting.
d10 = Fan drip time.
Time since defrosting ends until fan can be connected.
d11 = Minimum Time duration defrosting
Once defrosting begins it stays at least during this time