EWDR 973(/S) rel. 1/97 ing

freezer controls

WHAT IT IS

The EWDR 973 and EWDR 973/S are micro-processor based digital controllers designed for refrigeration systems; they are particularly suited for medium or low temperature "forced air" units.

HOW IT IS MADE

- **Housing: plastic 4-Din module 70x85 mm (2.75x3.34")**
- **Mounting: Din-rail (Omega 3) or surface mounting**
- **Connections: telephone type receptacle for connection with the EWDR SLAVE (973 version) and one (two on EWDR 973/S) screw terminal blocks (2.5 mm^2; one wire only per each terminal, in compliance with VDE norms) for the remaining electrical wiring**
- **Display: 12.5 mm LED (0.50")**
- **Real time clock memory retention: approximately 6 hours**
- **Outputs: three (3) output signals 12 Vdc/30 mA to control the auxiliary relays of the EWDR SLAVE Din-module (compressor, evaporator fan control and defrost)**
- **Output 12 Vcc/20 mA: voltage output for external alarm system**
- **Inputs: two (2) PTC probes for temperature control and defrost termination; these are connected to the EWDR SLAVE module only; 1 ON/OFF input for a door switch**
- **Serial connection: dual RS-485 port for connection to the TELEVIS system (EWDR 973/S only)**
- **Televis system compatibility: software rel 1.0.0 or greater (EWDR 973/S only)**
- **Resolution: 1 °C (°F)**
- **Accuracy: better than 0.5% of full scale**
- **Power supply: 12 Vdc (supplied by the EWDR SLAVE)**

GENERAL DESCRIPTION

The EWDR 973 and EWDR 973/S are micro-processor based digital controllers designed for refrigeration systems; they are particularly suited for medium or low temperature "forced air" units. They incorporate three 12 Vdc/30 mA outputs to activate the auxiliary and external relays for (1) compressor, (2) defrost system and (3) evaporator fan control. This instrument must be used with the Din-rail mounted EWDR SLAVE (973 version) module which contains the auxiliary relays; connection is achieved through a compatible MULTI-LEAD CABLE, equipped on both ends with telephone type quick-disconnect and polarized connectors.

This MULTI-LEAD CABLE conducts all signals, i.e. input signals from the PTC probes, output signals to energize the relays in the module, as well as the power supply to the EWDR 973(/S).

The EWDR 973(/S) has in addition a 12 Vdc/20 mA output for an external alarm, as well as an ON/OFF input for a door switch. Furthermore, the EWDR 973/S is equipped with a dual RS-485 port (for easy field wiring) for the purpose of connecting it into a TELEVIS system. The EWDR 973(/S) have an on-board time clock for the defrost management. An on-board back-up device makes it possible for the time count to continue during a power failure

A number of parameters are displayed alphanumerically to set up the EWDR 973(/S) for each specific application.

The EWDR 973(/S) and the EWDR SLAVE (973 version) modules come in a 4-module 70x85 mm housing suitable for either Din-rail (Omega 3) or surface mounting and are manufactured (EWDR SLAVE: 220 Vac version only) according to VDE norms.

OPERATION

The temperature control is always subject to a positive temperature differential (make on rise): the compressor stops when setpoint is reached and starts again upon reaching the setpoint temperature plus the differential.

A choice of two defrost types is available: electric defrost (during which the compressor stops) or hot gas defrost (during which the compressor is running).

The defrost start frequency, as well as the time count mode are programmable. As an alternative however, via the time clock option (see the sections "description of parameters" and "real time programming") up to 6 different real-time-hours can be programmed to start the defrost. Other programming options include: defrost frequency time, time count mode, defrost termination temperature, and a defrost safety limit (time-out).

The evaporator probe is used to control the defrost cycle as well as the evaporator fan: a selection can be made of the temperature above which the fan is OFF, the post-defrost fan delay time and the link between fan, compressor and door-switch.

A number of compressor short-cycle protection solutions (i.e., delay on start, delay at switching off, delay between two successive starts) are incorporated in the system.

Thanks to a wide selection of other available parameters the controller can be adapted to virtually any application require-

ment.
This instrument (/S version) is compatible with TELEVIS software rel 2.4 or greater.
In case its use with different software releases is required contact your supplier or Eliwell Customers' Service.

FRONT KEYPAD

SET: push and release to display the setpoint for 7 seconds. During this period the "SET" status light is on and the setpoint can be changed with the "UP" or "DOWN" button only. As soon as these buttons are not touched for 7 seconds, then the display will switch to normal read-out and memorise the last entered setpoint selection.
UP: used to increase the setpoint value, as well as the parameter when in programming. When held down for a few seconds, the change rate accelerates.
DOWN: used to decrease the setpoint value, as well as the parameter when in programming. When held down for a few seconds, the change rate accelerates.
DEFROST: this momentary push button will start a manual defrost cycle whenever it is activated for at least 7 seconds; not accessible when in setpoint or parameter programming. The programmed interval to the next defrost cycle is automatically reset.
CLOCK: button to set the actual time; see the "real time programming" section.
Led "COMP": status light of the internal compressor relay. On steady when the compressor is ON; blinking when a time delay or a lock as determined by parameters "cdP", "odo" and "dod" is in progress.
Led "SET": it is on during Setpoint display and programming; it blinks during parameter programming.
Led "DEF": status light of the defrost. On steady during a programmed defrost; blinking in case of manual defrost.
Led "ALARM": on steady, in the event of a high or low temperature alarm, or probe failure. Blinking in case the remote alarm output is de-activated (until the situation has been rectified; see further).
Note: the remote alarm output signal can be de-activated by pushing any of the four front panel buttons.

PROGRAMMING OF REAL TIME

The EWDR 973(/S) has an on-board time clock for the defrost management. Push and hold down the "CLOCK" button for 7 seconds; the actual time will be displayed; the display will alternate between the hour (preceded by "h") and minutes (followed by "'"). To change the time, use the "UP" or "DOWN" button within 7 seconds. The display will become steady and show either the hour or the minutes; use "SET" to switch from one to the other.
The time setting can now be changed with the "UP" or "DOWN" button. After the hour and minutes have been set, simply wait; after 30 seconds the system will automatically exit the time setting mode. The new time setting stays in memory.
The EWDR 973(/S) has an on-board back-up device which enables the continuation of the clock in case of a power failure for up to approximately 6 hours. After this time, the instrument will loose its time memory. Upon return of power the time clock will start at "h00-00" and at the same time display alternately "dtE" (defrost time Error) and the box temperature (only if the clock option was activated - see parameter "dit"). This serves as a warning that the time memory has been lost and needs to be reset.

PARAMETER PROGRAMMING

Programming is easily accessed by holding the "SET" plus the "UP" button down for more than 7 seconds; the first parameter is displayed while the status light "SET" remains blinking during the programming period.
Other parameters are accessed with the "UP" and "DOWN" button. With the "SET" button, the actual setting of each parameter is displayed. To change a parameter setting, push the "UP" (or "DOWN").
The system will automatically return to its normal operating mode a few seconds after the programming procedure is completed or interrupted.

DESCRIPTION OF PARAMETERS

diF: diFferential.
Switching differential (histeresis); it will always be set with positive value (make on rise).
LSE: Lower SEt.
This is the lower limit below which the user cannot change the setpoint.
HSE: Higher SEt.
Similar to "LSE", however setting an upper limit for the setpoint.
dty: defrost type selection.
EL = ELectric defrost;
in = hot gas (reverse cycle) defrost.
dit: defrost interval time.
Defrost initiation frequency in hours. A setting of "0" must be selected to activate the real time option for the defrost initiation (see further parameters "dt1…dt6").
dct: defrost count type.
dF = digiFrost®; defrost starting time ("dit") is calculated based on accumulative compressor running time.
rt = real time; defrost initiation frequency is based on real time. Time between defrost starts is always the same.
SC = Stop Compressor; a defrost cycle is activated each time the compressor stops.
Fr = Free (the compressor relay has no relation with the defrost functions and continues to regulate on Setpoint).
dt1…dt6: defrost time 1 to 6.
Setting of the real time for each defrost start (up to 6 within 24 hours). These parameters can be used only if "dit" is set at "0".
0…23 = real time;
oF = OFf (disabled).
Note: it is not necessary that the settings of each of the 6 parameters "dt1…dt6" are performed in the exact corresponding time sequence.
doh: defrost offset.
Time delay of defrost start, expressed in minutes.
dEt: defrost Endurance time-out.
Defrost safety limit, expressed in minutes. Defrost cycle is terminated, regardless whether fully completed.
dSt: defrost Stop temperature.
Adjustable defrost termination temperature.
POS: POStpone defrost.
This provides for a postponement of a scheduled defrost cycle until such a moment that the condition which prevented the defrost to start (i.e. evaporator temperature higher than the defrost termination temperature) has corrected itself.
n = the prevailing defrost cycle is cancelled;
y = the defrost cycle is not cancelled, however is postponed.
FSt: Fan Stop temperature.
Setting of temperature (measured by the evaporator defrost probe) above which the fan is always OFF.
Fdt: Fan delay time.
Selection of post-defrost fan delay, in minutes.
dt: drainage time.
Upon defrost completion, evaporator fan and compressor remain OFF for this amount of time to allow coil drainage; expressed in minutes.
dPo: defrost (at) Power on.
Selects whether the system should go through a defrost cycle at start-up (or after a power failure).
n = no; y = yes.
ddL: defrost display Lock.
Select whether or not to lock in the actual box temperature display during a defrost.
n = no; during defrost the actual box temperature is displayed.
y = yes; the temperature displayed at the start of a defrost is locked in and does not change during this cycle.
Lb = Label; during the defrost the label "dEF" is displayed to indicate a defrost is in progress.
Note: with the "y" and "Lb" selection, the display remains locked until the box temperature is pulled down again and reaches setpoint value.
dFd: defrost Fan disable.
Fan OFF during defrost.
n = no; y = yes.
HAL: High ALarm.
This sets the deviation above the setpoint at which the led "ALARM" will activate, as well as the 12 Vdc/20 mA remote alarm output signal.
LAL: Low ALarm.
This sets the deviation below the setpoint at which the led "ALARM" will activate, as well as the 12 Vdc/20 mA remote alarm

DEFAULT SETTINGS - STANDARD MODELS

Parameter	Description	Range	Default	Unit
diF	diFferential	1…15	2	°C / °F
LSE	Low SEt	–99…HSE	–55	°C / °F
HSE	High SEt	LSE…99	40	°C / °F
dty	defrost type selection	EL / in	EL	flag
dit	defrost interval time	0…31	6	hours
dct	defrost count type	dF / rt / SC / Fr	dF	flag
dt1…dt6	defost time 1…6	0…23 / oF	0	hours
doh	defrost offset	0…59	0	minutes
dEt	def. Endurance time-out	1…99	30	minutes
dSt	def. Stop temperature	–70…99	8	°C / °F
POS	POStpone defrost	n / y	n	flag
FSt	Fan Stop temperature	–70…99	2	°C / °F
Fdt	Fan delay time	0…99	10	minutes
dt	drainage time	0…99	0	minutes
dPo	defrost (at) Power on	n / y	n	flag
ddL	defrost display Lock	n / y / Lb	y	flag
dFd	defrost Fan disable	n / y	y	flag
HAL	High ALarm	1…50	5	°C / °F
LAL	Low ALarm	1…50	5	°C / °F
AFd	Alarm (and) Fan differential	1…50	2	°C / °F
PAo	Power-on Alarm Override	0…10	2	hours
dAo	defrost Alarm override	0…10	1	hours
oAo	output (door) Alarm override	0…10	1	hours
Fco	Fan compressor off	oF / on	on	flag
Fod	Fan off (with opened) door	oF / on	oF	flag
cPP	comp. Probe Protection	oF / on	oF	flag
ctP	comp. type Protection	nP / don / doF / dbi	doF	flag
cdP	comp. delay Protection	0…15	0	minutes
odo	output delay (at) on	0…99	0	minutes
dod	disable (with) opened door	n / y	y	flag
EPr	Evaporator Probe read-out	/	/	°C / °F
CAL	CALibration	–20…20	0	°C / °F
dEA	dEvice Address	0…14	0	number
FAA	FAmily Address	0…14	0	number
tAb	tAble of parameters	/	/	/

output signal.
AFd: Alarm (and) Fan differential.
The allowable temperature swing between ON and OFF of the alarms and fan functions (see parameters “FSt”, “HAL” and “LAL”).
PAO: Power-on Alarm Override.
Time delay after start-up during which the alarm will not activate; expressed in hours.
dAo: defrost Alarm override.
Period after defrost during which the alarm will not activate, expressed in hours.
oAo: door Alarm override.
Time delay after door opening during which the alarm will not activate; expressed in hours.
Fco: Fan compressor off.
The evaporator fan is OFF whenever the compressor is cycled OFF.
oF = yes; on = no.

Fod: Fan off (with opened) door; select whether the fan should go off when the door is opened.
oF = yes (fan off);
on = no (fan continues to run).
cPP: compressor Probe Protection.
Select compressor relay status in case of room probe defect.
oF = compressor OFF in case of probe defect;
on = compressor ON in case of probe defect.
ctP: compressor type Protection.
Select the type of (short-cycle) protection best suited for the compressor; the actual delay time is programmed with the next parameter.
nP = no Protection.
don = delay on start; delay applies when relay is energized.
doF = delay at switching oFf. Delay after stop, i.e. time between stop and subsequent start.
dbi = delay between two successive starts. Limits the number of start-ups per hour.
cdP: compressor delay Protection.
The time delay - in minutes - applicable to the previous parameter “ctP”.
odo: output delay (at) on.
Time delay in minutes applied to activation of the relays after start-up.
dod: disable with opened door.
Compressor and fan to be off when door is opened.
n = no; y = yes.
EPr: Evaporator Probe read-out.
With this parameter the evaporator temperature can be displayed, even during normal operation.
CAL: CALibration.
Temperature read-out offset to allow for a fixed adjustment up or down due to probe location, if desired.
dEA: dEvice Address.
To select the (address) label of the device in relation to the supervisory system; this applies to the TELEVIS compatible EWDR 973/S version only.
FAA: FAmily Address.
To select the (family) label of the device in relation to the supervisory system; further as “dEA”.
tAb: tAble of parameters.
This shows the configuration of the parameters as set in the factory; can not be modified (for factory identification and diagnostic purposes only).

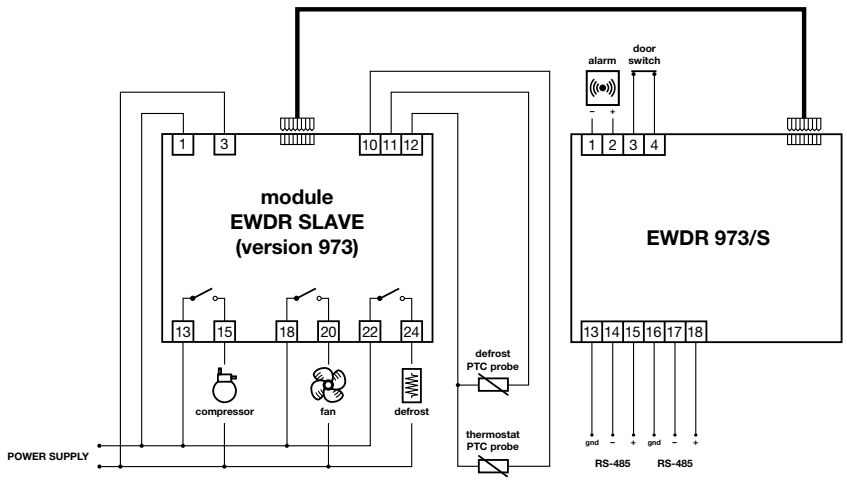
INSTALLATION

Both the EWDR 973(/S) and the EWDR SLAVE (973 version) are designed for surface mounting (pull out both plugs) or for Din-rail mounting (Omega 3).
Connection between these two units is achieved through a compatible MULTI-LEAD CABLE, equipped on both ends with quick-disconnect and polarized connectors.
The ambient temperature around the instrument should be kept between -5 and 65 °C (23…149 °F). Select a location which will not be subject to high humidity or condensation.

ELECTRICAL WIRING

The EWDR 973(/S) has a telephone connector for the EWDR SLAVE (973 version) and one (two on EWDR 973/S) screw terminal blocks (2.5 mm^2; one wire each terminal only according to VDE rules) for the remaining electrical wiring.
The EWDR SLAVE (973 version) module - aside from the telephone connector for the EWDR 973(/S) - has two screw terminal blocks (2.5 mm^2; one wire each terminal only according to VDE rules) for the remaining electrical wiring.
Make sure that the power supply to the EWDR SLAVE corresponds with the rating

CONNECTIONS



shown on the instrument. The two 2-lead PTC probe cables do not require polarity and can easily be extended by using regular 2-lead stranded wire.
It is strongly recommended to run the probe cable and the MULTI-LEAD CABLE separate from line voltage wiring. Also, it is good practice to install the tip of the probe in upright position, to avoid moist from entering into the stainless steel sensor housing.
The compressor relay contacts are voltage-free and are suitable for in-line switching of compressors up to 1.5 HP at 220 Vac. For larger loads, an external contactor must be used.

ERROR ANNOUNCIATION

The EWDR 973(/S) causes the display to read “dtE” (defrost time Error) to indicate that the memory lost its time clock setting (see the section “PROGRAMMING OF REAL TIME“).
Furthermore, the EWDR 973(/S) causes the display to read “E1” in the event of a problem with the box probe. This could mean: either an open or shorted sensor, sensor not connected, temperature “under range” (below –55 °C or –67 °F) or temperature “over range” (over 99 °C or 210 °F).
An error reading “E2” means a problem with the evaporator probe.
It is recommended to double-check the sensor wiring before diagnosing a probe as defective.

EWDR 973(/S) TECHNICAL DATA

Housing: plastic 4-Din module 70x85 mm (2.75x3.34").
Depth: 61 mm (2.40").
Mounting: Din-rail (Omega 3) or surface mounting.
Connections: telephone type receptacle for connection with the EWDR SLAVE (973 version) and one (two on EWDR 973/S) screw terminal blocks (2.5 mm^2; one wire only per each terminal, in compliance with VDE norms) for the remaining electrical wiring.
Display: 12.5 mm LED (0.50").
Push buttons: located on front panel.
Data storage: non-volatile EEPROM memory.
Real time clock memory retention: approximately 6 hours.
Operating temperature: –5…65 °C (23…149 °F).
Storage temperature: –30…75 °C (–22…167 °F).
Outputs: three (3) output signals 12 Vdc/30 mA to control the auxiliary relays of the EWDR SLAVE Din-module (compressor, evaporator fan control and defrost).
Output 12 Vcc/20 mA: voltage output for external alarm system.
Inputs: two (2) PTC probes for temperature control and defrost termination; these are connected to the EWDR SLAVE module only; 1 ON/OFF input for a door switch.
Serial connection: dual RS-485 port for connection to the TELEVIS system (EWDR 973/S only).
Televis system compatibility: software rel 1.0.0 or greater (EWDR 973/S only).
Resolution: 1 °C (°F).
Accuracy: better than 0.5% of full scale.
Power supply: 12 Vdc (supplied by the EWDR SLAVE).

EWDR SLAVE (973 v.) TECHNICAL DATA

Housing: plastic 4-Din module 70x85 mm (2.75x3.34").
Depth: 61 mm (2.40").
Mounting: Din-rail (Omega 3) or surface mounting.
Connections: telephone type receptacle for connection with the EWDR 973(/S) and two screw terminal blocks (2.5 mm^2; one wire only per each terminal, in compliance with VDE norms) for the remaining electrical wiring.
Operating temperature: –5…65 °C (23…149 °F).
Storage temperature: –30…75 °C (–22…167 °F).
Outputs: three (3) SPST relays for compressor 15(6)A 250V AC, defroster and evaporator fan 10(4)A 250V AC.
Inputs: two (2) PTC probes for temperature control and defrost termination.
Power supply (depending on model): 220 (VDE version), 110, 24, 12 Vac ±10%, 50/60 Hz.

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