

ER1C-DFC installation guide



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Product Overview

The Echoflex Fixture Controller provides distributed control of any standard lighting fixture by using wireless technology. Used with Echoflex wireless sensors and decorator style rocker switches, the fixture controller provides a simple method of retrofitting an existing light fixture or adding new lights to any space. Use the fixture controller for occupancy based lighting, daylight harvesting or the manual ON / auto-OFF feature and start saving energy by shutting off un-needed lights.

The fixture controller includes Echoflex's intelligent configuration software Smart Click™ allowing installers and facility operators access to the controller's configuration parameters making it easy to set-up and make changes in the future. Using just a wireless wall switch, the facility maintenance engineer can adjust setting on the installed controllers eliminating a service call to an electrician.

This guide covers model numbers ER1C-BFC and ER1C-DFC which are equipped with EnOcean 315 MHz radios. The DFC model has an external antenna. **NOTE: DO NOT CUT OR CONNECT THE ANTENNA.**

Included in the package

The package includes the ER1C-DFC controller and installation guide.

ER1C-DFC Operation

The ER1C-DFC is a controller that can activate lighting loads when a received input from a linked sensor or switch is changed.

As a lighting controller, the ER1C-DFC operates lights based on:

- ambient light levels monitored by an Echoflex light sensor
- occupancy state monitored by Echoflex motion sensors
- switch action from an Echoflex wall switch

ER1C-DFC and Wall Switches

The ER1C-DFC works with the wireless PTM single and dual rocker wall switches. A switch ON action activates the relay closed (light's on) and the OFF action opens the relay (light's off).

ER1C-DFC and Timed Switches

The ER1C-DFC can be configured so the single and dual rocker PTM switches become timed switches. An ON action closes the relay (light's on) and a timer is set to count down. Once the timer expires, the relay opens (light's off).

The time period is configurable and has 5 settings:

no timer (default), 5 minutes, 15 minutes, 30 minutes and 1 hour. Additionally, if the user presses the wall switch ON multiple times (to a total of 5 presses), the timer interval is added for each ON press. If ON is pressed while the light's are on and the timer is counting down, an additional period of time is added to the timer total.

For example: if the timer setting is 1 hour and the user pressed the switch ON twice, the total timer period is 2 hours. If there is 30 minutes left on the timer and ON is pressed again, the timer is extended to 1 hour 30 minutes before the light's will turn off.

The ER1C-DFC will toggle the relay (flick-warn) 1 minute before the timer is due to expire to warn users of the pending OFF event.

To configure, the time period, refer to the section on "**Configuring the ER1C-DFC**".

ER1C-DFC and Daylight Harvesting Applications

The ER1C-DFC controller will turn the lights on or off based on the ambient light level in the room. An Echoflex light sensor monitors light levels and must be linked to the ER1C-DFC controller to provide the light level in the room. The Light-ON-Setpoint is the light level at which the light will turn on; the Light-OFF-Setpoint is the light level at which the light will turn off. Setting these set-points is covered later in this document under "**Configuring the ER1C-DFC**".

The daylight harvesting application will override the Auto-ON feature of occupancy sensors if the light level is above the Light-OFF-Setpoint.

For example: If the daylight application calls for the

light to be off, the motion sensor will not turn the lights back on.

The daylight harvesting application can be overridden by a manual wall switch when the light is off by clicking on. If the light level remains above the Light-OFF-Setpoint, the controller will turn the light off again after 250 seconds.

The daylight harvesting application does not affect the operation of the wall switch or motion sensor when the light is on. If the light is on, either the switch or motion sensor can override the light off.

Occupancy Based Lighting Applications

The ER1C-DFC will turn the lights OFF when there is no motion detected in the room indicated by an Echoflex motion sensor. The ER1C-DFC can be configured to turn the lights ON immediately (Auto-ON) if the motion sensor detects motion, see the section titled "**Configuring the ER1C-DFC**".

There is a configurable time period between the last detected motion and the point where the lights turn off. There are 6 settings for this time out period. The time out period is 15 minutes by default but can be set to a value of 5 to 25 minutes in 5 minute increments, see the configuration section. The timer will reset if the sensor detects motion. If the timer expires, the light will turn off.

Multiple motion sensors can be ganged together logically so if only one sensor detects motion or the internal timer has not expired, the light will remain on.

Turning the lights on with a linked wall switch will reset the timer. Turning the light off with the wall switch will override Auto-ON (if enabled) for the duration of the time out period. Any motion detected by the sensor during this period will reset the timer. Once the timer has expired, the override will be released. If the wall switch is used to turn the light on during the time period, the override will also be released.

Radio Range Planning

The ER1C-DFC controller is intended to be used with switches, sensors and actuators enabled with EnOcean PTM or STM transmitters. Locating the wireless transmitters to work with the installed ER1C-DFC controller requires planning. Careful consideration should be made for locating the controllers based on the construction materials in the space and possibility of tenant's furniture disrupting the transmissions. Fire doors, elevator shafts, stairwells, storage areas and any large metal products create radio shadows and will disrupt wireless transmissions.

On floor-plan drawings, draw 100 feet (30m) diameter circles to identify optimal transmitter and controller locations. Refer to the table for range considerations with other building materials.

Material	Attenuation
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Wood	0 - 10%
Plaster	0 - 10%
Glass	0 - 10%
Brick	5 - 35%
MDF	5 - 35%
Ferroconcrete	10 - 90%
Metal	90 - 100%
Aluminum	90 - 100%

Material	Range-typical
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Line of site:	100' (30m) corridors
Line of site:	330' (100m) open halls
Plasterboard:	100' (30m) through 5 walls
Brick:	65' (20m) through 3 walls
Concrete:	65' (20m) through 3 walls
FerroConcrete:	33' (10m)
Ceiling:	1 ceiling

For more information about range planning, please refer to the range planning guide downloaded from www.echoflexsolutions.com

Layout Hints

- ⇒ Avoid transmitting down a length of wall to reduce signal reflection.
- ⇒ Avoid transmissions that must penetrate walls at acute angles. This increases the wall material the telegram must pass through, greatly reducing the signal power.
- ⇒ Avoid large obstructions. Place receivers in alternate locations to avoid the radio shadow or use repeaters to go around the obstacle.

⇒ Do not locate receivers close to other high frequency transmitters. Leave at least 2' between the receiver and any other source of interference including lighting ballasts, computers, video equipment, Wi-Fi/LAN routers, GSM modems and monitors. Transmitters are not affected by these sources of interference.

Preparing to Install

The ER1C-DFC is mounted to an electrical junction box or panel with a 3/4" threaded nipple. The ER1C-DFC must be mounted on the outside of a junction box either directly at the electrical load or before the load in the circuit. The ER1C-DFC is for indoor use only.

You will require hand tools to gain access to the junction box and remove any cover plates or other hardware. A pin or pen is needed for pressing the controller buttons when assigning the wireless switches.

Important Safety Instructions

WARNING:

ELECTRICAL SHOCK HAZARD



THE ER1C-DFC USES HIGH VOLTAGE AND SHOULD ONLY BE INSTALLED BY A QUALIFIED INSTALLER OR ELECTRICIAN. FOLLOW ALL APPLICABLE ELECTRICAL CODES IN THE COUNTRY OF INSTALLATION. FOR INDOOR USE ONLY.

Installing the ER1C-DFC

Review these instructions completely before installing the ER1C-DFC controller.

- 1) Locate the circuit breaker panel and turn off the power to the circuit.
- 2) Remove all face plates and other hardware from the junction box so you can access the high voltage wires.
- 3) The ER1C-DFC is mounted to the exterior of the junction box or panel with the 3/4" threaded nipple.
- 3) Refer to the wiring diagram to connect the ER1C-DFC to the line power, neutral and load wires. Use

wire nuts on all connections and cap any bare wires.

4) Replace the junction box faceplate.

5) Restore power to the circuit.

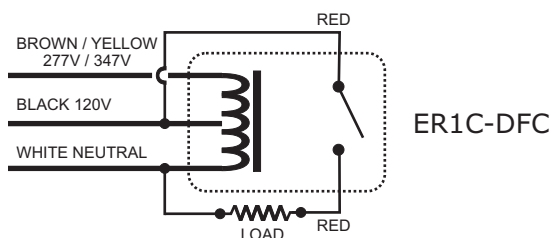
6) Refer to the section in this guide titled **LEARN Button** to assign a switch or sensor to the controller. Alternatively, refer to the Smart Click instructions on page 4 for assigning switches and sensors remotely.

Wiring Instructions

Power to the controller is connected between the White (Neutral) and the Black (120V). Optionally, based on model number, commercial voltages are applied between the White (Neutral) and the Brown(277V) or Yellow(347V). (see wiring diagram).

The ER1C-DFC has an orange external antenna. Do not cut this wire or connect.

Use only approved wire. Cap off all unused wires except the orange antenna wire.



Do not cut/ connect or cap the orange antenna wire

Connection	Color	Specification
LOAD x 2	Red	14AWG, 600V
Neutral	White	18AWG
Line 120VAC	Black	18AWG
Line 227VAC*	Brown	18AWG
Line 347VAC*	Yellow	18AWG

***not used in all models**

Using the ER1C-DFC with a wired wall switch:

If the circuit will have an additional hard wired switch, wire the ER1C-DFC in series before the switch.

Diagnostic LED's and buttons

LEARN button – The LEARN button is used to link a switch or switch to the ER1C-DFC controller.

1. Press the button in the LEARN hole for a half second. In link mode the POWER led will stay ON and the LEARN led will toggle every 2 seconds.

2. Using the switch that you want to link to the controller, press the wall switch three times or press the sensors TEACH button. The LEARN led will remain lit for 4 seconds while it links the new device. It will resume toggling allowing you to link another device up to a total of 30 devices. Linking a switch or sensor that is already linked to a controller, will remove or un-link it from the controller.

3. To exit link mode, press the LEARN button on the ER1C-DFC controller again for a half second. Link mode will time out after no activity in 30 seconds.

CLEAR button – The CLEAR button erases all devices linked to the ER1C-DFC controller and resets the controller to factory default settings.

Press the button in the CLEAR hole for 5 seconds. The LEARN led will flash ON for 1 second and then OFF to complete the step.

The table below describes the LED activity and associated mode of the controller. The POWER LED is always ON when the controller is powered.

Description	LEARN
LINK mode	Toggle 2 sec.
Storing ID	ON 4 sec.
CLEAR mode	ON 1 sec.
Normal operation	
w/o linked switch	ON w/relay closed, factory default
w/ linked switch	Long blink followed by short blinks counting the switches linked, repeated.
Wireless Occ.sensor	Learn led-two long blinks followed by short blinks counting sensors learned
Wireless Photo Sensor	Learn led-three long blinks followed by short blinks counting sensors learned

Configuring the ER1C-DFC

There are two methods of configuring parameters in the ER1C-DFC controller. Simple TAP is a quick method of changing a parameters setting, one at a time. For accessing the complete set of configuration parameters, use the Smart Click process on the following pages.

Simple TAP Instructions

Simple TAP uses the switches and sensors that are linked to the ER1C-DFC controller to set the associated configuration parameters. You must be able to access the sensors teach button or the switches to perform the simple tap process. If the sensor is linked to multiple controllers and you do not want to make changes to all, turn the controllers relay off (lights off) to ignore the Simple TAP changes.

Simple TAP allows you to:

- Enable or disable the motion sensor Auto-ON feature
- Set the motion sensor Auto-OFF timer
- Set the Light ON/OFF Setpoints

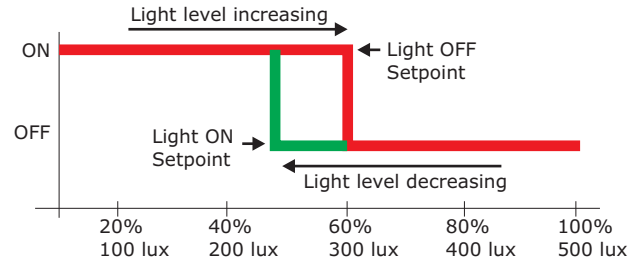
Disable/Enable the Auto-ON feature - With the light on, tap the occupancy sensors teach button followed by three quick consecutive clicks of a linked wall switch ON. To enable Auto-ON, click once more ON, to disable click OFF. The light will blink once to confirm the change.

Set the Motion Sensor Auto-OFF timer - With the light on, tap the occupancy sensors teach button to reset the timer period. There are 6 possible settings and the number of taps on the button counts the number according to the time period, see the table below. Level 1 (time out 0 seconds - demo mode) is set by tapping 3 times, consecutive taps up to a maximum of 8 taps is Level 6 (time out 25 minutes).The relay/light will blink once on the third tap and then begin counting the level set after 3 seconds.

Taps	Occ.Sensor Timer	Light Blinks
3 taps	0 sec.	1 blink
4 taps	5 min.	2 blinks
5 taps	10 min.	3 blinks
6 taps	15 min.	4 blinks
7 taps	20 min.	5 blinks
8 taps	25 min.	6 blinks

Set the Lighting Set-points: The controller will turn the light on or off based on the measured light level from the light sensor. The set-point values are a percentage of the full range of the sensor.

*For example: A 500 lux light sensor has a full range from 0 lux to 500 lux. The lux value of any set-point is the percentage of 500 lux. If the Light-OFF-Setpoint is 60% then the lux value when the light turns off is 300 lux [60% of 500 lux] measured at the sensor. The Light-ON-Setpoint is 15% below this value [15%*60=51%] or 255 lux.*



There are two methods of setting the lighting set-points. You can adjust the light level to a comfortable setting and have the controller maintain this light level. This process is useful in closed loop sensor applications where the sensor reading is affected by the fixture output (ceiling mount, near a window, office applications). The ON set-point is adjusted 7.5% below and the OFF set-point 7.5% above the optimum room light level.

You may also set the OFF set-point to an absolute value useful in open-loop sensor applications.

1. Setting the light level set points - With the light on, tap the light sensors teach button 3 times to set the light level set points using the current existing light level recorded at the sensor. The light will blink once to acknowledge the change. You must move away from the sensor to avoid affecting the light level. The next transmitted light value from the sensor will be used to set the light-on and light-off set points. The light-on and light-off set points will become the current value plus/minus 7.5%. The light will blink once again to complete the process.

2. Setting the Light-OFF-Setpoint to an Absolute Value - With the light on, tap the light sensors teach button 4 times to set the Light-ON-Setpoint to 20%. Tap the button additional presses incrementing the set-point value in 20% values.

Five (5) taps would equal 40%, seven (7) taps would be 80%. The Light-ON-Setpoint becomes 85% of the Light-OFF-Setpoint. The light will blink once at three taps and then begin blinking according to the level set to confirm the change after 3 seconds.

Taps	Light-OFF SP	Light-ON SP	Blinks
3 taps	Sensor+7.5%	Sensor-7.5%	1 blink
4 taps	20%	17%	2 blinks
5 taps	40%	34%	3 blinks
6 taps	60%	51%	4 blinks
7 taps	80%	68%	5 blinks
8 taps	100%	85%	6 blinks

Smart Click Instructions for ER1C-DFC

Configuring the ER1C-DFC controller requires that at least one wireless PTM wall switch is linked to the controller.

Level 1	Learn Mode
Level 2	Clear Switch/Clear All
Level 3	Repeater Function
Level 4	Status Telegram Function
Level 5	Time out Periods
Level 6	Auto-ON with Motion Function
Level 7	Not used
Level 8	Light-OFF-Setpoint
Level 9	Not used

Linking the first switch

⇒ With the ER1C-DFC controller in the factory default state, click the PTM switch ON three times, OFF three times and ON three times quickly.

Using this method of linking a switch will only work on the first PTM switch. Use Smart Click to link additional switches or to configure the controller parameters.

Using Smart Click to Configure the ER1C-DFC

It is important to have feedback (light) from the ER1C-DFC controller during configuration.

- ⇒ Using a linked switch (see above), turn the light OFF.
- ⇒ Click and hold the switch OFF for 10 seconds. The

light will blink once and then turn on. If the switch is linked to more than 1 ER1C-DFC controller you will have to click the ON side of the switch until the controller you wish to configure is selected indicated by the light turning ON.

- ⇒ Press ON for 5 seconds. The light will begin blinking once.

Linking an additional switch or sensor

- ⇒ Enter Smart Click configuration mode and with the light blinking once, press ON for 3 seconds. The light will begin blinking ON/OFF every second.
- ⇒ Add additional PTM switches by clicking ON 3 times quickly. Add sensors by pressing the TEACH button on the sensor.
- ⇒ To continue with configuration, press the switch ON for 3 seconds, the light will resume blinking once. To exit Smart Click press OFF for 5 seconds.

Clear switches or sensors (restore factory defaults)

- ⇒ Enter Smart Click configuration mode and click the switch ON or OFF until the light is blinking twice. Press ON for three seconds.
- ⇒ Click the switch ON 5 times to clear the switch, click ON 5 times again to clear ALL switches and sensors and reset the ER1C-DFC to factory defaults.
- ⇒ Press OFF for 5 seconds to complete clearing.

Repeater Function - repeats any telegram within range. EnOcean telegrams can only be repeated once.

The repeater function can be enabled/disabled by accessing the controller buttons. Press the Clear button and hold then quickly press the Learn button once to disable, twice to enable. The learn led will blink once when disabling, twice when enabling the repeater function. Release the Clear button. If there is no access to the controllers buttons, follow the Smart Click steps below.

- ⇒ Enter Smart Click configuration mode and click the switch ON or OFF until the light is blinking three times.
- ⇒ Press ON for 3 seconds. If the repeater function is enabled the light will turn ON, if disabled the light

will be OFF.

- ⇒ Click ON to activate this function, OFF to deactivate.
- ⇒ To continue with configuration, press ON for 3 seconds, the light will resume blinking three times. To exit Smart Click press OFF for 5 seconds.

Status Telegram - the ER1C-DFC can broadcast a status telegram per EEP: 07-11-01. The telegram will broadcast every 100 seconds. Refer to the table on page 8 for a detailed explanation of the telegram.

The status telegram can be enabled/disabled by accessing the controller buttons. Press the Learn button and hold, press the Clear button once to disable, twice to enable. The learn led will blink once when disabling, twice when enabling this telegram. Release the Learn button. If there is no access to the controllers buttons, follow the Smart Click steps below.

- ⇒ Enter Smart Click configuration mode and click the switch ON or OFF until the light is blinking four times
- ⇒ Press ON for 3 seconds. If the status telegram function is enabled the light will turn ON, if disabled the light will be OFF
- ⇒ Click ON to activate this function, OFF to deactivate
- ⇒ To continue with configuration, press ON for 3 seconds, the light will resume blinking four times. To exit Smart Click press OFF for 5 seconds

Timeouts - the ER1C-DFC can be configured to wait a period of time after an ON event from a PTM switch or occupancy sensor before turning the load OFF (auto-off).

- ⇒ Enter Smart Click configuration mode and click the switch ON or OFF until the light is blinking five times.
- ⇒ Press ON for 3 seconds. The light will turn OFF and then ON per the table settings below.

<u>Light</u>	<u>Timed Switch</u>	<u>Occ.Sensor Timer</u>
OFF	no auto-off	0 sec.
1 Blink	5 min.	5 min.
2 Blinks	15 min.	10 min.
3 Blinks	30 min.	15 min.
4 Blinks	60 min.	20 min.
5 Blinks	n/a	25 min.

- ⇒ Click ON to move down the table, OFF to move up.
- ⇒ To continue with configuration, press ON for 3 seconds, the light will resume blinking five times. To exit Smart Click press OFF for 5 seconds.

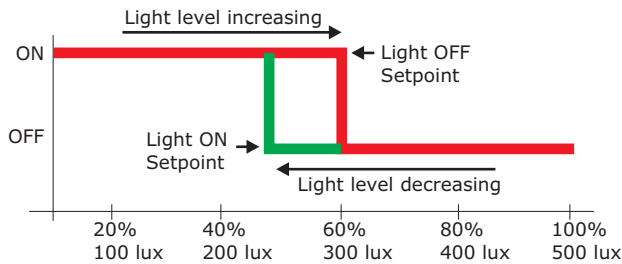
Auto-ON Function - use with an motion sensor to turn lights ON automatically when motion is detected. If a motion sensor is used with no switch then Auto-ON is enabled automatically. If a switch is linked later, Auto-ON is disabled.

- ⇒ Enter Smart Click configuration mode and click the switch ON or OFF until the light is blinking six times.
- ⇒ Press ON for 3 seconds. If the auto-on function is enabled the light will turn ON, if disabled the light will be OFF
- ⇒ Click ON to activate this function, OFF to deactivate
- ⇒ To continue with configuration, press ON for 3 seconds, the light will resume blinking six times. To exit Smart Click press OFF for 5 seconds.

Light OFF Set point - use with a open-loop photo sensor(light sensor) to automatically turn lights on or off depending on ambient light levels. If the light from the fixture does not impact the light reading at the sensor then it is an open loop application.

- ⇒ Enter Smart Click configuration mode and click the switch ON or OFF until the light is blinking eight times.
- ⇒ Press ON for 3 seconds. Default setting is 60% of the light sensors full range. There are 5 steps from 20% to 100% - the light will blink the step count.

<u>Light Blinks</u>	<u>Light-OFF-Set point</u>
1 Blink	20%
2 Blinks	40%
3 Blinks	60% default
4 Blinks	80%
5 Blinks	100%



In the diagram, the red line indicates the light off event, the green line indicates the light on event. The light on event is 85% of the light off set-point. For example: 85% of 60 = 51% of the light sensors full range.

- ⇒ Click on to increase the set-point, off to decrease the set-point.
- ⇒ To continue with configuration, press ON for 3 seconds, the light will resume blinking eight times. To exit Smart Click press OFF for 5 seconds.

Default Settings for ER1C-DFC

Repeater	disabled
Status	disabled
Time-outs	
motion sensor	15 minutes
switch	no time out
Auto-ON	enabled with no linked switch, disabled with linked wall switch
Light-OFF-Setpoint	60% of sensor FSR
Light-ON-Setpoint	85% of Light-OFF-Setpoint

Status Feedback Telegram

- EEP:07-11-01
- DB_3 Illumination
0 ... 510lx, linear n=0...255
- DB_2 Illumination Set Point
Min. ... Max., linear n=0...255
- DB_1: Dimming Output
Level Min. ... Max., linear n=0...255
- DB_0.BIT_7: Repeater
0b0 disabled, 0b1 enabled
- DB_0.BIT_6: Power Relay Timer
0b0 disabled 0b1 enabled
- DB_0.BIT_5: Daylight Harvesting
0b0 disabled 0b1 enabled
- DB_0.BIT_4: Dimming
0b0 switching load 0b1 dimming load
- DB_0.BIT_3: Learn button
0b0 Teach-in telegram 0b1 Data telegram
- DB_0.BIT_2: Magnet Contact
0b0 open 0b1 closed
- DB_0.BIT_1: Occupancy
0b0 unoccupied 0b1 occupied
- DB_0.BIT_0: Power Relay
0b0 off 0b1 on

FCC and IC Licensing

Contains FCC ID: SZV-TCM2XXC

The enclosed device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:
(I.) this device may not cause harmful interference and
(ii.) this device must accept any interference received, including interference that may cause undesired operation.

Contains IC: 5713A-TCM2XXC