Blind, curtain and motor control with Dynalite Relay controllers

New Curtain Control Feature

As of firmware v1.79 and EP 3.11.7, the DDRC810DT-GL has a new Curtain Control feature available which provides correct relay switching logic without a need for scripted interlocking, and also greatly simplifies programming. This functionality is similar to DDMC802 with Curtain Modules installed.

This document explains the two methods for bidirectional motor control wiring and configuration for controllers with single pole double throw relays.

Related Products

Products with new curtain control feature available with firmware upgrade.

- DDRC810DT-GL
- DDRC810DT-GL-MOT

Products without curtain control feature

- DDRC810DT
- DDRC810DT-MO

Terminology

- 'Curtain Control' describes the new channel configuration option in EP which supports motor control without the need for tasking
- Blinds/curtains' will be used to describe any bidirectional motorized load.
- 'Up/down open/close, will be used to describe the direction of travel.
- 'N/O' (Normally Open) and 'N/C' (Normally Closed), describes the relay states.
- 'Direction' refers to energizing one of the two motor coils causing the blinds to travel towards their extents. The same wiring can apply to security or Venetian shutters, fans, or any suitable motor that changes direction.
- 'Blind/curtain Task' refers to an EnvisionProject (EP) script to handle the switching logic when the controller cannot use the new Curtain Control feature.
- Examples will show CH1 (Channel 1) for Power switching and CH2 (Channel 2) for Direction switching, in accordance with the wiring requirements.

⚠ Please ensure the motors are turned off before attempting to upgrade the firmware or attempting to reset/configure the device.

Purpose

When a channel is not configured for Curtain Control, mitigations must be applied to avoid situations where inrush current could overload the relay contacts.

This may be due to specific motor design or incorrect switching sequences that switch both outputs on simultaneously and create a situation where severe arcing and contact damage can occur. Inrush currents greater than 200 Amps can be produced due to motor energy being released.

These situations can occur during:

- Initial configuration
- Device or load identification methods (Flash, Preset control or cycling power when motor and controller supplies are on different feeds)
- Override buttons misuse
- Misconfigured DyNet messages such as switching using Presets or misconfigured Tasks.
- New installations where Area 1 messages may be activated from user interfaces.
- See the Logical Configuration section in this document for a task to handle motor control operation and relay latching.

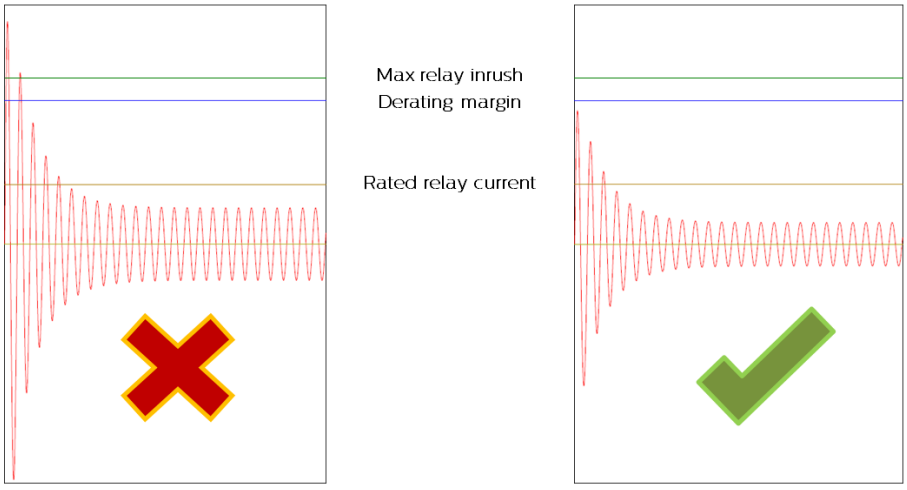
Relay ratings

Relays typically have two significant contact ratings for a particular type of load:

1. Rated current - maximum continuous current that contacts can carry.
2. Inrush current - maximum transient current when switching on the load.

If inrush current is not specified then it is equal to rated current. In that case load derating may be required to ensure contact ratings are not exceeded. It is recommended to de-rate by 20% or more.

The diagrams below show a typical scenario for inrush current produced from induction motors.



Overloaded relay

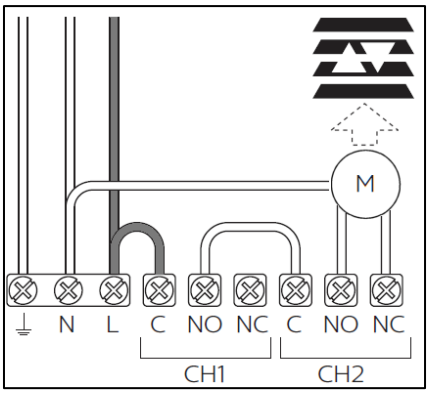
Correctly loaded relay

In the left diagram, the motor starting current exceeds the relay inrush current rating. The relay is expected to fail prematurely under these conditions, typically with the contacts welded in the closed position.

The diagram on the right shows a correctly loaded device operating normally. The motor starting current exceeds the relay's rated current for a short period of time, but it stays below the inrush current limit. In this case, the relay's expected lifetime is not compromised.

Direct motor control wiring

This wiring method uses separate N/O relays for power and direction control as this covers most blind types including dry contact, low and high voltage. The blind power supply must come from the same feed or, be looped as shown in the following diagram.

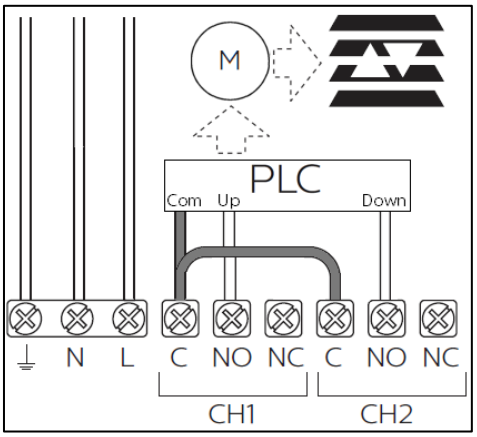


- For CH1, the N/O contact is used for power switching as it has higher specified inrush current rating.
- CH2 handles direction, and must only be switched when CH1 (power) is in the N/C position (not energized) to avoid inrush current damage.

PLC motor control wiring

The second method for wiring uses dual relays to control third party PLCs or group controllers. The PLC may accept mains, low voltage or dry contacts. Where required, provide additional insulation segregation according to local wiring codes to ensure safety.

If the PLC interface requires SELV isolation, ensure no mains supply is connected to the output. You would need to skip at least one channel position between the PLC wiring terminals and any other live terminals to achieve the required safety distance.



- For CH1, the N/O contact is used for controlling the up/open direction.
- For CH2, the N/O contact is used for controlling the down/close direction.

Without Curtain Control feature

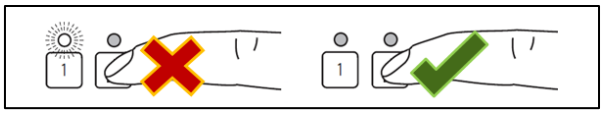
Override Switch

Before using the manual overrides, ensure that the wiring matches the recommended installation method.

⚠ Do not operate the manual override for CH2 when the LED indicator for CH1 is ON, as this may cause relay contact damage.

➤ Correct use of the override panel

1. Switch CH1 (Power) OFF.
2. Set CH2 (Direction) to the desired state.
3. Switch CH1 ON and allow the blind to travel as required.
4. Ensure CH1 is OFF before changing the state of CH2.



Load Identification

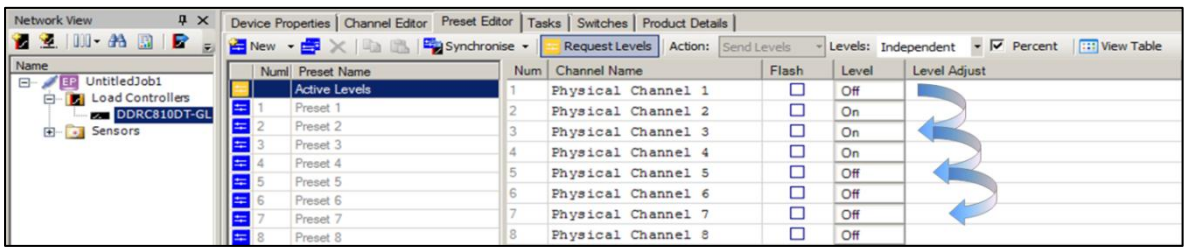
When verifying the motor wiring attached to relays, Presets and Flash must not be used as these may cause relay contact damage. As a precaution, before creating logical areas and channels, first do the following:

- Until the blind channels are configured to a separate logical area (NOT unassigned Area 1) you must isolate the controller from other DyNet devices on the bus. This ensures that preset messages are not sent to the controller.
- If using the floor plan window, ensure Settings → User Settings → Flashing → Auto Flash is set to **False**.
- In EP's Physical View, Preset Editor, set Action: **Mute**. This step avoids broadcasting levels when selecting a normal preset.

➤ Identify blinds connected to a controller without curtain control enabled

1. Connect EP to the network and in the Physical View, Preset Editor, select Active Levels (Using active levels allows single Channel level messages to be sent, avoiding broadcasts)
2. Click Request levels (Note: manually overridden channels may not be shown in the correct state).
3. Turn all odd channels Off (0%)
4. Turn all even channels Off (0%).
5. Begin identification by turning the first odd channel On.
6. Check for blind movement, then turn the channel Off.
7. Update the Channel Name for future identification (example: 'Bedroom Blind – Power')
8. If a blind has not travelled, turn On its matching even channel then repeat steps 3 - 5.
9. Label the direction channel (example: 'Bedroom Blind – Direction')

If a blind still has not travelled then there is an electrical problem. Isolate the controller and rectify the issue, then repeat the procedure.



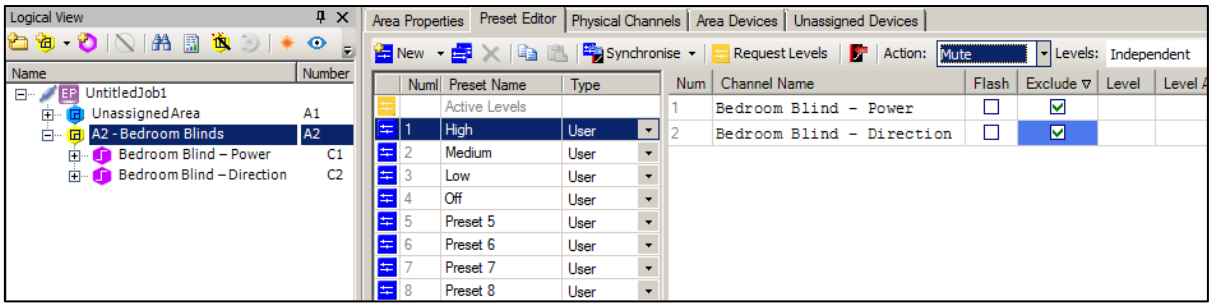
Logical Configuration

Without the Curtain Control feature, the blind control relays are controlled with channel level messages, and are only switched between 0% and 100%. Presets must not be used due to the difficulty ensuring correct latching.

Isolate relay outputs before applying software configuration changes. If isolation is not possible, ensure that the Preset Editor's Action menu is set to **Mute** to avoid switching loads before they are properly configured.

➤ Configure blind control channels:

1. Create one logical area for both relays
2. Configure the Power relay as Channel 1
3. Configure the Direction relay as Channel 2
4. Configure the levels for any Presets that could be recalled as **Exclude** using the checkbox in List View or the 'X' key in Table View (this prevents preset messages controlling the blinds).



Controlling blinds

➤ Use Channel level messages from a task to control the blinds:

1. Set channel 1 with a value of 0% to de-energize the blinds.
2. Set the direction to Up on channel 2 with a value of 1% to 100% or set the direction to Down with a value of 0%.
3. Then set channel 1 with a value of 1% to 100% to energize the blinds.
4. The blind should travel for a period as specified in the task
5. To Stop the blinds during travel set channel 1 with a value of 0% to de-energize the blinds.

Stop fade is not ideal as it typically refers to the whole area.

Task control for direct motor control wiring

Use channel level logic to manage switching using tasking similar to below.

```
// 4 Tasks to control a motor load attached to DDRC810DT. This script
// is for instructive purposes and is not optimised. Adjust the travel
// timeout delay to suit your project. Some motor loads may not have
// inbuilt limits, or may slow over time. Use with caution and always
// review the motor documentation before integrating.

Task1()
{
Name="Blinds Up"
       CancelTask(2,4)                  // Cancel travel timeout
       StartTask(4)                     // Restart travel timeout
       Channellevel(A=2,C=1,L=0,F=0)    // Power off
       Delay(0.2)                       // Delay for latching and comms
       Channellevel(A=2,C=2,L=100,F=0)  // Direction down
       Delay(0.2)                       // Delay for latching and comms
       Channellevel(A=2,C=1,L=100,F=0)  // Power on
       Null
}

Task2()
{
Name="Blinds Down"
       CancelTask(1,4)                  // Cancel travel timeout
       StartTask(4)                     // Restart travel timeout
       Channellevel(A=2,C=1,L=0,F=0)    // Power off
       Delay(0.2)                       // Delay for latching and comms
       Channellevel(A=2,C=2,L=0,F=0)    // Direction down
       Delay(0.2)                       // Delay for latching and comms
       Channellevel(A=2,C=1,L=100,F=0)  // Power on
       Null
}

Task3()
{
Name="Blinds Stop"
       CancelTask(1,2,4)                // Cancel travel timeout
       Delay(0.2)                       // Delay for latching and comms
       Channellevel(A=2,C=1,L=0,F=0)    // Power off
       Null
}

Task4()
{
Name="Motor timeout"
       Delay(60)                        // Max travel time
       Channellevel(A=2,C=1,L=0,F=0)    // Power off
       Null
}
```

Task control for PLC motor control wiring

Use channel level logic to manage switching using tasking similar to below.

```
// 5 Tasks to control a PLC attached to DDRC810DT. This script is for
// instructive purposes only and is not optimised. Edit to suit PLC
// system. Some PLCs may allow/require both inputs on for a stop, Use
// with caution. Always review the PLC documentation before integrating.

Task1()
{
Name="PLC Input - Blinds Up"
       CancelTask(2,4)                    // Cancel travel timeout
       StartTask(4)                       // Restart travel timeout
       Channellevel(A=2,C=0,L=0,F=0)      // All channels zero
       Delay(0.2)                         // Delay for comms
       Channellevel(A=2,C=1,L=100,F=0)    // PLC input for Up
       Null
}

Task2()
{
Name="PLC Input - Blinds Down"
       CancelTask(1,4)                    // Cancel travel timeout
       StartTask(4)                       // Restart travel timeout
       Channellevel(A=2,C=0,L=0,F=0)      // All channels zero
       Delay(0.2)                         // Delay for comms
       Channellevel(A=2,C=1,L=0,F=0)      // PLC input for Down
       Null
}

Task3()
{
Name="PLC Input - Blinds Stop"
       CancelTask(1,2,4)                  // Cancel travel timeout
       Delay(0.2)                         // Delay for comms
       Channellevel(A=2,C=0,L=0,F=0)      // PLC input Off
       Null
}

Task4()
{
Name="PLC Input - Motor timeout"
       Delay(60)                          // Max travel time
       Channellevel(A=2,C=0,L=0,F=0)      // PLC input Off
       Null
}

Task5()
{
Name="PLC Input - Motor Stop"
//     If PLC system allows this, use with caution.
       Delay(0.2)                         // Delay for comms
//     Channellevel(A=2,C=0,L=100,F=0)    // PLC input Stop - All channels 100
       Null
}
```

Without the Curtain Control feature, Preset control may be used only if relay latching is managed within the PLC.

With Curtain Control feature

Configuring the new Curtain Control feature

The Curtain Control option should be used instead of the tasking method to simplify commissioning.

Consecutive pairs of channels must be used with the Power channel being on an ODD numbered channel and the Direction channel being an even numbered channel.

➤ Enable Curtain Control

1. From an EVEN numbered channel select the Output Type drop down menu for Curtain Control.
2. Once Curtain Control is selected the ODD channel will become blank.

Number	Channel Name	Logical	Logic	Flash	Switching	Duplicate	Load shedding	Output Type	Join (hex)
1	Curtain Power	2	1	☐	☐	☐	Full Participation		FF
2	Curtain Direction	2	2	☐	☐	☐	Full Participation	Curtain Control	FF
3	Blind Power	3	1	☐	☐	☐	Full Participation	Relay	FF
4	Blind Direction	3	2	☐	☐	☐	Full Participation	Relay	FF
5	Spare	1	1	☐	☐	☐	Full Participation	Curtain Control	
6	Spare	1	2	☐	☐	☐	Full Participation	Relay	
7	Spare	1	3	☐	☐	☐	Full Participation	Relay	FF
8	Spare	1	4	☐	☐	☐	Full Participation	Relay	FF

Blind/curtain travel time is set using the On Delay column for the EVEN channels. This is typically the maximum amount of time in seconds for the curtain to travel from one limit to the other. You can add some extra time in case the time extends for mechanical degradation reasons. If no limit switches are provided, use exact timing.

Number	Channel Name		R-Mask	Base Link Area	Area link bits	On Delay	Off Delay
1	Curtain Power	3 2 1	00	Disabled		0	0
2	Curtain Direction	3 2 1	00	Disabled		45	0
3	Blind Power	3 2 1	00	Disabled		0	0
4	Blind Direction	3 2 1	00	Disabled		30	0
5	Spare	3 2 1	00	Disabled		0	0
6	Spare	3 2 1	00	Disabled		0	0
7	Spare	3 2 1	00	Disabled		0	0
8	Spare	3 2 1	00	Disabled		0	0

Override Switch

If a channel has been configured for Curtain Control, its matching override button may be pressed at any time as internal safety interlocking will prevent any damage from occurring. An ODD numbered override will not operate and an EVEN numbered override will change direction.

After the travel time specified in the On Delay property has completed, the blind will stop. The default On Delay is listed as zero, but is actually 10 seconds when set to Curtain Control. Manually entering a new value will be accepted.

Load Identification

Controllers with the curtain control feature can verify the motor wiring using any of the usual methods such as, override buttons, channel levels and Flash.

⚠ If you have not first configured the channels for Curtain Control then you must use the 'Identify blinds connected to a controller without curtain control enabled' procedure.

Logical Configuration

As there is no need to modify presets or use channel level messages with this feature, there is no special logical configuration required. Assign both the ODD and EVEN channels to the same area.

Controlling blinds

Presets or Ramp messages will control the blinds. Preset 1 or Ramp Up will open the blinds, Preset 4 or Ramp Down will close the blinds. To stop the blind at any time, issue a Stop Fade message. The simplicity of this feature allows tasking to be avoided or minimized.

Replacing tasking with the Curtain Control feature

- Ensure the delays used in the task are transferred to the On Delay field in the controller.
- Replace the channel level messages and their associated message delays with a single preset or ramp message.
- Replace any channel level commands used to stop the blinds with a Stop Fade message.

More information

These guidelines are relevant for other Philips Dynalite controllers that can provide similar up/down blind control functionality, such as the GRMS product range.

The firmware discussed must not be used in other products.

Further example tasks and information can be found on the Philips Dynalite distributor website: www.dynalite.org.