**How to Guide: Controlling Blinds in C-Bus**

This document is a guide to controlling electrical blinds with C-Bus. Part 1 shows how the blind could be controlled by C-Bus directly and part 2 shows how C-Bus could control dedicated blind controllers made by blind manufacturers.

*Prior knowledge of C-Bus is assumed as in how to program units such as the C-Bus key input units, relay modules and Touch Screen (C-Touch).*

A blind controlled by electrical motors is typically a single-phase forward-reverse motors. The forward and reverse direction is achieved by reversing the magnetic field in the winding by physically changing switching positions on the windings. Only forward or reverse should be switched on at any one time. The changeover between forward and reverse should occur after a delay, typically 500ms to 1s. This allows enough time for the motor to release its energy before changing directions. This is bit like driving a car in the forward direction and going into neutral and then (after the car has stopped) switching to reverse. The delay between the changeover allows the motor to discharge its energy and stop before changing directions. If there is no delay then it can be compared to driving a car in the forward direction and putting it into reverse without going into neutral. So basically the two main criteria for controlling a blind motor;

1. **Interlocking** – so that forward and reverse are never switched simultaneously.

2. **Delay** – typically 500ms to 1s. This allows the motor to stop before changing directions.

*If both these criteria are not met it is very likely that damage to the motor will occur either immediately or overtime.* This is one of the reason blind manufacturers recommend dedicated blind controllers that require pulses to be sent for On, Off and Stop functions. The controllers take care of the interlocking and delay. This guide shows how to achieve these two criteria in C-Bus. *It is important to check with the blind manufacturer what the requirements are.* Always test the installation on the relay outputs without the motor connected and only connect the motor after testing has been completed.
**Part 1: How to Control Blinds using C-Bus Only**

**INTERLOCKING**

To satisfy this you could use 2 channels of the C-Bus 4 channel interlocking relay L5504RVFC or L5504RVFCP or alternatively you could use a standard C-Bus relay in conjunction with the interlocking relay. Please see diagrams below.

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**Figure 1 : Wiring Diagram for C-Bus Changeover Relay**

**Figure 2: Wiring Diagram 2 (Alternate Wiring Arrangement using 4-ch Changeover Relay and a standard 12-ch Relay)**
There are other means of wiring for interlocking using say conventional 240V relays driven by C-Bus relays.

**Whichever method is used the Up and Down channel on the motor MUST be wired for electrical interlocking.**

In the Options discussed in the next few pages the C-Bus units used are;

1. 1 x standard C-Bus 4 key input unit
2. 1 x C-Bus changeover relay module
3. 1 x C-Bus touch screen

Assuming we have two Blinds called Blind 1 and Blind 2 to control, the following options will show how to individually control the blinds via a C-Bus key input unit and C-Touch, C-Touch only and also perform group control of both blinds.

**How it all works**

**Up Action**

Blind 1 Up: A key on C-Bus key input is programmed to trigger two scenes in the C-Touch where “Blind 1 Up” Scene is triggered on a Short Press and also starts a timer x where x is a few seconds more than the length of time it takes for the blind to go up. This is achieved by the Recall 1 function in the C-Bus key input unit set to 1%.

Blind 1 Up Scene is programmed in the C-Touch and it says – Reset all groups assigned for Blind 2 Down. Ramp Blind 1 Up to On over 4 seconds. If the blind was going down then all groups related to the Down action are set to Off. As the “Blind 1 Up” is ramped and because of the Turn On threshold in the Relay module set to 25% the relay “Blind 1 Up” is assigned to turns On after 1s.

Blind Fully Up - When the blind has gone fully up after a time x sec “Blind 1 Fully Up” scene in the C-Touch is triggered which sets every group address related to Blind 1 to 0. This is achieved by the Recall 2 function in the C-Bus key input unit set to 8%. If timer x is set to less than the time it takes for the blind to go up the blind will stop before it reaches fully up so it is important to set time x correctly.

*In summary the C-Bus key is not controlling the blind motor directly. All it is doing is triggering two scenes for the Up Action and two scenes for the Down Action. The scenes are stored in the C-Touch which contains the groups that control the blind motor. If the C-Touch is disconnected off the bus then control of the blinds is lost. This is indicated by the leds on the keys not turning off when pressed (this is how I have programmed it to be).*
Stop – To stop the blind a Long Release on the key will set Recall 2 which triggers the same “Blind Fully Up” scene which stops the blind.

*The Down Action is the reverse of the Up Action.*

The Changeover relay is programmed as in the following diagrams. The “Turn On” thresholds are set to 25% which corresponds to 1 second if the Group Address assigned to the channel is ramped over a time period of 4s.

\[
\text{Delay} = \text{Ramp time} \times \text{Turn On Threshold} \\
= 4 \text{ sec} \times 25 \% \\
= 1 \text{ sec}
\]

Figure 3: C-Bus Changeover Relay Setup (L5504RVFC or L5504RVFCP)
Figure 4: Turn On threshold set to 25%
Option 1: Control of Blinds via C-Bus Key Input Unit

In this option a C-Bus key input unit is programmed as follows:

Figure 5: C-Bus 4 Key Input Unit

Basically how the Blind would function is as follows; On a Short Press of Key 1 (Up key) the blind 1 would start moving up after a delay (1s). After a time x (10s) seconds the blind would have moved completely up. A Long Release at any time would stop the blind. To continue the up motion the Up key would have to be short pressed again and the blind would move after 1s. If at any time the user presses the Down key while the blind is moving Up then the blind would first stop and then after 1s delay the blind would start its way down. A Long Release on the Down key while the blind is moving down will stop the blind. The delay time is selectable by setting the “Turn On” threshold in the relay as described earlier.

Short Press – Recall 1 – set to 1%, this triggers scene “Blind 1 Going Up”. This scene sets groups assigned to the Down action to 0 and ramps the Blind Up to On over 4s.

Short Release – Start – starts timer x set to 10s in this case, this is a few seconds more that the time is takes for the blind to go fully up.

Long Press – Idle

Long Release – Recall 2 – set to 8%, this triggers scene “Blind 1 Fully Up” which sets all groups to 0.
After time x has lapsed Recall 2 is issued which then triggers “Blind 1 Fully Up” which in turn sets all groups to 0.

C-Touch : C-Bus Touch Screen

In the Touch Screen the scenes to be programmed for Blind 1:

1. Blind 1 Going Up - for UP Action
2. Blind 1 Fully Up – to set all groups to Off
3. Blind 1 Going Down – for Down Action
4. Blind 1 Fully Down – to set all groups to Off.

Note : When choosing time x allow for 2 to 5 seconds extra as error margin as electric motors normally slow down over time.

The sequence of scenes in C-Touch are shown below. Notice the “Triggered By” setting is set to Tags which are basically levels on the Blind Up/Down Sc group at 1% and 8%.

Figure 6: Blind 1 Going Up Scene
Figure 7: Blind 1 Fully Up Scene

Figure 8: Blind 1 Going Down Scene
Figure 9: Blind 1 Fully Down Scene
Option 2: Control of Blinds via C-Touch only

The functions of the C-Bus key input unit in Option 1 is duplicated using a timer function in the C-Touch triggering the same scenes as in Option 1.

The timer for Blind 1 for Up Action is programmed in C-Touch shown below.

Figure 10: Timer in C-Touch equivalent to C-Bus Key Input Unit

Figure 11: Blind 1 Going Up Scene

Figure 12: Blind 1 Fully Up Scene
Figure 12: An example of the actual Touch Screen page:

The timer settings are programmed as shown in figure 10.
Option 3: Group Control of Blinds via C-Bus Key Input Unit

In figure 5 shown earlier Key 1 and Key 2 are for Blind 1 Up and Blind 1 Down. Keys 3 and 4 are programmed for group control of Blind 1 and 2. In the same principle as in option 1 the keys are programmed to trigger two scenes for Up Action and two scenes for Down Action. The only difference is that within the scenes the individual scenes for the blinds are triggered (triggering another scene within a scene is called circular triggering which pops a warning message in C-Touch-this is normal just Click Ok). As an example see this screenshot:

![Scene Item Edit](image)

Figure 14: All Blinds Up Scene

All this scene is doing is by setting the corresponding groups for Blind 1 and 2 to 1% “Blind 1 Going Up” and “Blind 2 Going Up” scenes are triggered. “Blind 1 Going Up” scene is shown in figure 6 earlier. “Blinds All Down Sc” group is set to 0 to cancel the Down timer if it was in process (like a software interlock).
Figure 15: All Blinds Fully Up Scene

All this scene is doing is by setting the corresponding groups for Blind 1 and 2 to 8% causes “Blind 1 Fully Up” and “Blind 2 Fully Up” scene to be triggered. “Blind 1 Fully Up” scene is shown in figure 7 earlier. “Blinds All Down Sc” and “Blind All Up Sc” group is set to 0 to reset these group addresses.

*The Down Action is the reverse of the up action.*
Option 4: Group Control of Blinds via C-Touch Only

This option is very similar to Option 3. The only difference is that instead of C-Bus keys triggering the scenes the scenes are triggered by timers in C-Touch. Hoping screenshots are self-explanatory! These screenshots are for controlling All Blinds Up or Down.

![C-Touch Screenshot for Group Control of Blinds](image1)

Figure 16: C-Touch Screenshot for Group Control of Blinds

![Timer for Up Action as show in figure 16](image2)

Figure 17: Timer for Up Action as show in figure 16

The scenes triggered by the timer in figure 17 are shown in figures 14 and 15.
Important Points to Remember

Power Fail (Recovery)

When there is a power failure the default levels that the blinds will restore can be set in the settings for the relay under the “Recovery” tab. I have set the relay channels to restore to 0% which means that the blinds will stay in the position they were just before the power failure. The reason for this is that if the blinds were forced to recover to Up or Down the channel would stay On until something else turned it off. The limit switches in the blind would stop power to the motor but this would not be good practice. To overcome this it could be possible to detect “real power failure” by a conventional relay with N.O/N.C outputs connected to C-Bus coupler (5104BCL) and trigger events in C-Bus via a scene that could set events to how they should be after a power failure…long story short…this could be done if required.

Ensure that both up and down channels are never set to “recover to 100%” since both up and down will come on at the same time. Even though the interlocking prevents both channels to be physically on at the same this would not be good programming practice.

For the key input units I have selected under the “Power Fail” tab restore preset settings of 0%. This resets all groups. Since the keys are programmed as a timer and set to trigger scenes in C-Touch, if a power failure does occur when the blind is moving up or down, the timer would be lost and it would be impossible to recover from that state.

So basically if a power failure does occur and the blinds are fully up or down they would stay in that position on recovery. If a blind was moving when the power failure occurred then the blind would stay on recovery in the same position it stopped just before the failure.

Another option is to have a “power-up” delay set under the Delay Tab if required. This allows power to be delayed to the channel upon power recovery and minimum time is 10s.

Disable Local Toggle (Relay)

This feature allows the user to manually override the relay channels. Disable this feature by unchecking “Enable Local Toggle” under the ‘Global” Tab otherwise it would be possible for the user to turn on both up and down channels at one time. It is common practice for most people (hey we have all done this!) to manually turn everything on when something is not working so by disabling this feature we can be sure that the user will not damage the motor by this means.

Disable Learn Mode (Relay)

Disable “Enable Learn Mode” under “Global” tab as this could also cause both Up
and Down channels to be on at once. Learn mode could cause the settings to be lost which would not desirable.

**Reserve Group Address**

Ensure Group Addresses used for blind control are *reserved* and not used elsewhere. The blinds are directly controlled by group addresses within scenes so for example “Blind 1 Up” should not be assigned to any other scene or key input device. This is to avoid something else apart from the C-Touch scenes triggering the group address.
Part 2: How to Control Blinds with C-Bus using Dedicated Blind Controllers

Typically blind controllers made by manufacturers take care of the interlocking and delay required when controlling blind motors. Some of the blind control manufacturers that I have come across are Somfy and Silent Gliss. See links for more;

http://www.somfysystems.com/

For the purpose of this guide I am using the Somfy IGC controller as an example. See this line for more info;


In the case of the IGC it require short pulses to be sent to the Up/Down inputs. In short;

1. A short pulse to the Up to start the blind Up motion
2. A short pulse to the Down to start the blind Up motion
3. A short pulse to both Up and Down to stop the blind

The interlocking and delay is all built into the blind controller. A 3-wire connection typically exists Up/Down/ Common. Two channels of a standard C-Bus relay can be wired to (just like you normally would to a load) to the Up side and Down side. Refer to the blind manufacturer for wiring details.

Two keys of a C-Bus key input unit could be programmed as follows;

Key 1 - Up Action: Pulse the UP group for 1s
Key 2 – Down Action: Pulse the UP group for 1s

To stop the blind both key 1 and 2 have to be pressed simultaneously.

Note if the user does a quick Short Press and Short Release then the pulse can be within < 1s + 48s or 1.048s. (48ms is the default debounce time for a Short release to be detected). If the user hold on to the key for longer than 48ms then the pulse can be a maximum 1s + 400ms = 1.4s where 400ms is the default time when Long Press command is issued. These default times can be adjusted under the Global tab of the key input unit.
If pressing both keys simultaneously is an issue (irritating!) then a 3rd key can be assigned to the stop function. Here I have used a “dummy” group address for the 3rd key just to turn on the led on the 3rd key but all it does is simultaneously issues the commands for keys 1 (Up) and 2 (Down).

Figure 18: C-Bus Key Input Unit (Pulse On/Off)

Figure 19: C-Bus Key Input Unit (Pulse On/Off/Stop)
So 3 keys in C-Bus would be required very similar to how it is shown in the Somfy documentation. Since a 3 key or multiple of 3 key combination is only available in Reflection, Neo and Saturn these switches could be used for example a 6 key Neo where the left 3 keys is for Blind 1 and right 3 keys is for Blind 2. Otherwise using the option shown in figure 18 two keys would be adequate in which case a standard 4 key input should do for two blinds.

If the blind is to be controlled via C-Touch only then it is very easy to send pulses via timers. The time is limited to 1s and above. To stop the blind 2 pulses simultaneously have to be sent and I have used 2 scenes triggered by a timer set to 1s.

Figure 20: Example of C-Touch Page for Blind control using timers and scenes to send pulses

Figure 21: Timer for “1 Up” Button
Figure 22: Timer for “Blind 1 Stop” Button

Figure 23: “Blind 1 Pulse Stop On” scene triggered by “Blind 1 Pulse Sc” at 1%
Figure 24: “Blind 1 Pulse Stop Off” scene triggered by “Blind 1 Pulse Sc” at 8%

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Dated: 03 Sep 2004

*Views expressed are my own and not that of Clipsal Integrated Systems Pty Ltd.*