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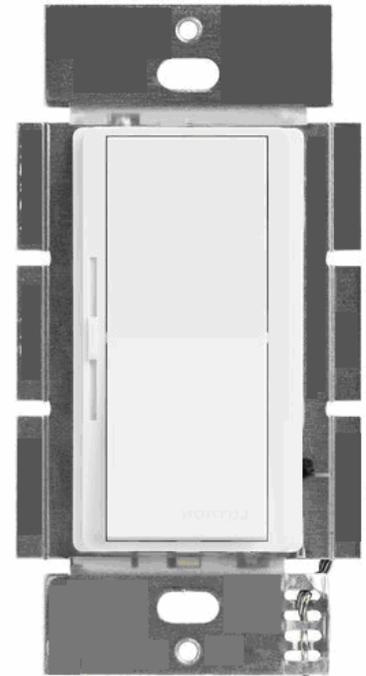
AL-WS-Carro Motor Controller

Decorator style Fan Switch

Used for Direction and speed of
0-10v Ceiling Fans

Local Control

(See AL-WS-DR2 for light kit control)



Many Carro Fans are in stock @ 120vac, remove their
transformer, use ATX 48vdc board



SKU of 120vac Carro fans that can be converted:

<https://atxled.com/pdf/ProdListDC.pdf>

For lowest cost, you can sometimes find the SKU of Carro fans at smafan.com

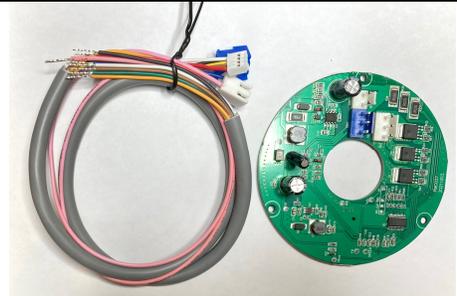
Converting a 120vac Carro to ATX 48v / 51v

OLD Carro Board
operates from 24vdc

120vac to 24 vdc
brick not shown



Cable and 48vdc Board Kit



New 48v board



New 48v cabling installed



0-10v Motor Control signals

Fan Operation	Control Line 1 (speed)	Control Line 2 (direction)
Fan Full Forward (air down, summer)	Open or 10v	Open (> 6 volts)
Fan Full Reverse	Open or 10v	Shorted (< 4 volts)
Fan Off	0-1 volt	Not significant
Fan Speed 50% Forward	5 volt	Open (> 6 volts)
Fan Speed 50% Reverse	5 volt	Shorted (< 4 volts)

Local Motor Control - AL-WS-Carro wall switch

Use the AL-WS-Carro switch with a Carro / SMAfan Ceiling fan. No power required (powered by the ceiling fan)

It provides the control for

- Forward operation at full speed (airflow down)
- Speed control – stepless, to zero
- Direction change
- Reverse operation at reduced speed (national code)

The Slider on the left controls the speed – **install with Slider on the left side so UP is fast, DOWN is slow.**

The momentary push control turns the Fan On / Off, press and hold the control switch to reverse directions



Specifications of AL-WS-Carro

Power source	Powered by the Ceiling fan
Input voltage range	4v to 10v – powered by the direction signal
Output control voltage	0v to 10v on the speed output 4v to 10v on the direction output
Standby power consumption	250 microwatts
Protection	Reverse protection and static protection
Operating Temperature	0°C ~ 50°C
Size	108H (metal) 70H x 34 D x 42 W mm
Speed Control	0 to 100%, stepless
FCC and interference	No radiating components, FCC tested

Operation – speed control

Install the switch with the slider on the left. Press the switch to start the fan, move the slider up for faster spin and down for slower. Press and release again to turn the fan off.

If no Home Automation - use the AL-WS-Carro

Control is local – not web enabled, use the AL-WS-010v for home automation

Direction Control

With the fan off, press and hold the control switch to operate in the reverse direction.

Notice that when you press the switch, the fan starts turning in the original direction, observe when the fan slows down, then release the switch. The direction has been changed, and the fan will start to rotate in the opposite direction. Please set the speed to the middle setting or higher when changing direction.

Speed / Direction operation AL-WS-Carro

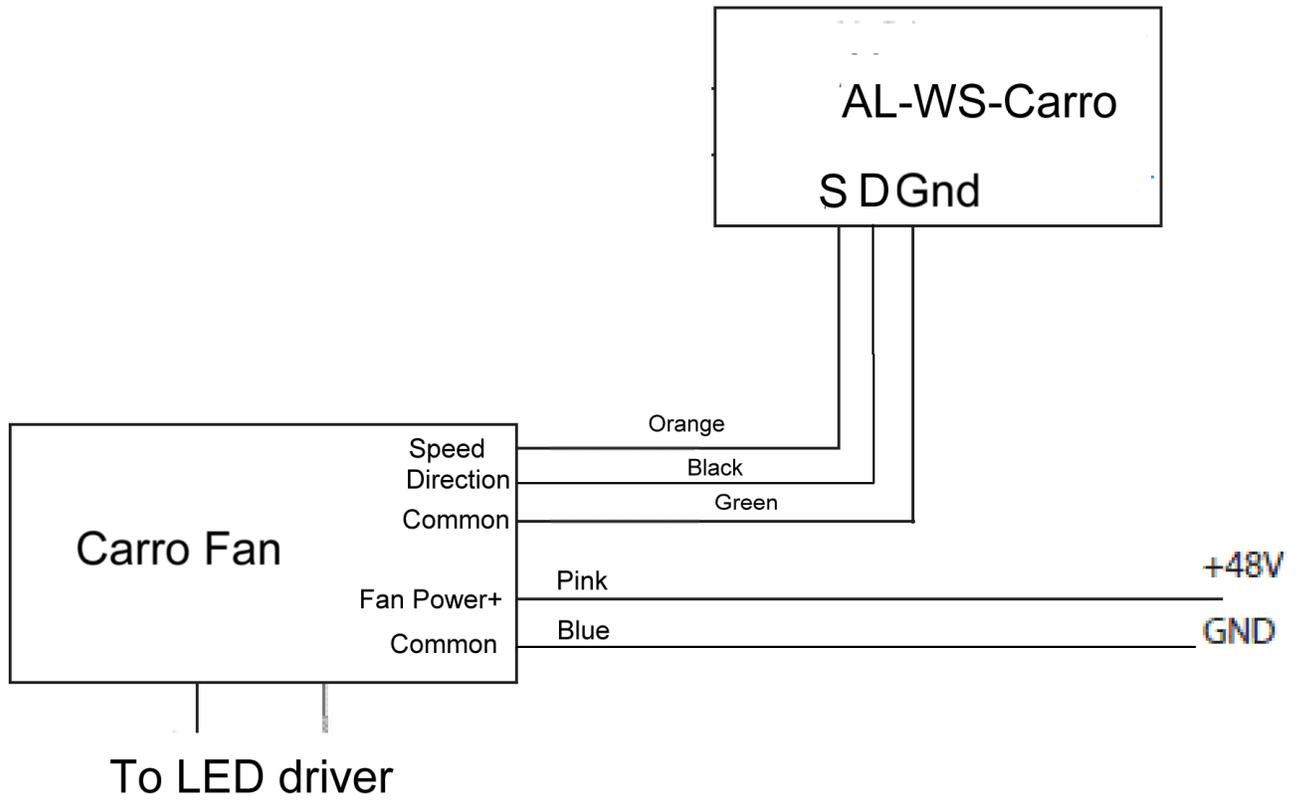
Fan Operation	Direction	Switch	Slider	Speed voltage	Direction voltage
Off	Off			0	10
Startup	Reverse	Momentary		> 4	10
Off *	Off	Momentary		0	10
Startup *	Reverse	Momentary		>4	10
Slow	“		Low	1.5	10
Fast	“		High	9.5	10
Turn Off	“	Momentary		0	10
Off	Off			0	10
Startup	Reverse	Hold		>4	10
Reverse	Goes Off	> 3 seconds		>4	4
Run	Forward	Release	> 25% **	>4	4
Off *	Off	Momentary		0	4
Startup *	Forward	Momentary		>4	4
Slow	“		Low	1.5	4
Fast	“		High	9.5	4
Turnoff	Off	Momentary		0	4

* These are shown as the user turns the fan on and off many times between changing direction.

** If the fan does not turn after changing the direction, move the slider to a faster speed, then back to low – if low is intended.

Example 1: Without Home Automation

Connecting a AL-WS-Carro motor control to a Ceiling Fan



Example 2: With Home Automation

The AL-WS-010v is supported by ZWD and other DALI masters. It is a DT8 device. Therefore, setting it to CCT = Warm (353) will set the device to winter mode (direction). The 'brightness' control of the fan is then the fan speed.

Smart Motor Control AL-WS-010v wall switch v4

For smart controls, use the AL-WS-010v switch with your Carro / SMAfan Ceiling fan. No power required (powered by DALI bus)

It provides the control for

- Forward operation at full speed (airflow down)
- Speed control – stepless, to zero
- Direction change
- Reverse operation at reduced speed (national code)

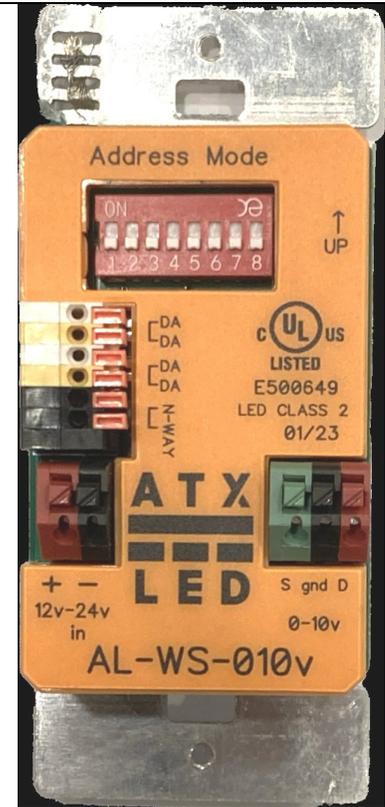
The Slider on the Right controls the speed.

The rocker switch turns the Ceiling Fan On / Off.

See the AL-WS-010v data sheet for full info.

0-10vA is the Speed control

0-10vB is the direction control



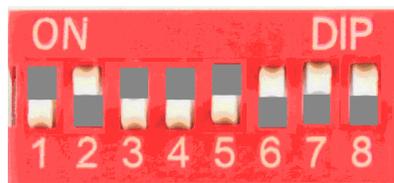
Specifications

Power source	Powered by the DALI bus
Output control voltage	0v to 10v on the speed output 2v to 10v on the direction output
Standby power consumption	4 mA from DALI bus, 64 mW
Protection	Reverse protection and static protection
Operating Temperature	0°C ~ 50°C
Size	108H (metal) 70H x 34 D x 42 W mm
Speed Control	0 to 100%, stepless
FCC and interference	No radiating components, FCC tested

Two Models of AL-WS-010v

	Direction	Speed
Green Cover	A	B
Orange Cover	D	S

Jumper Setting for DALI control



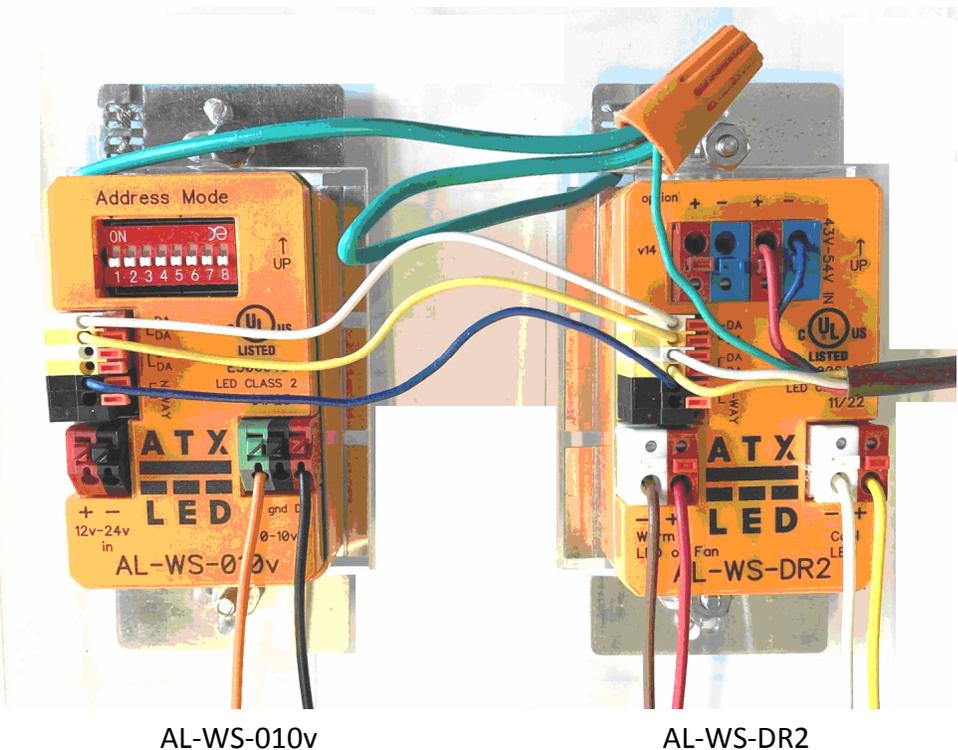
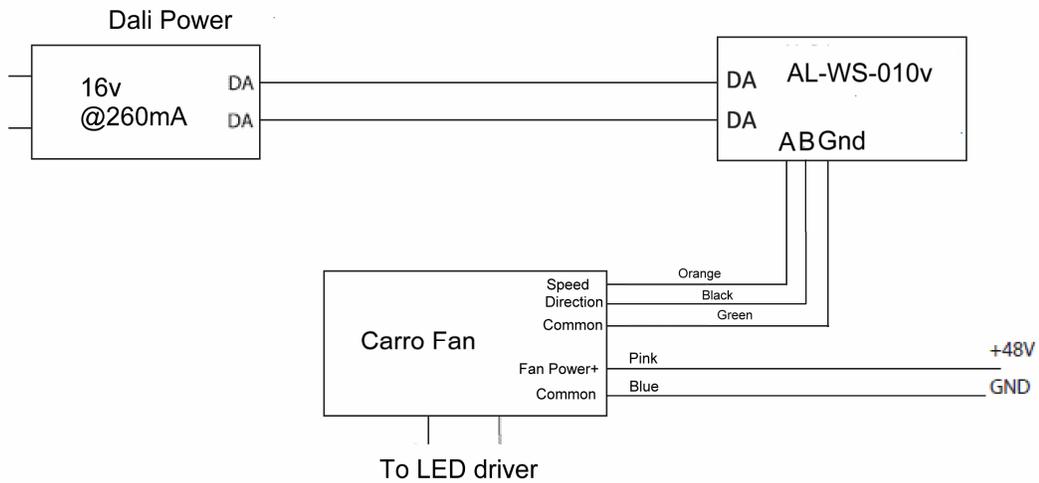
Operation – speed control

Install the switch with the slider on the Right. Press the switch on to start the fan, move the slider up for faster spin and down for slower. Press the switch off to stop.

Direction Control

With the fan off, move the slider – up will set the winter direction (heating) and down will select the summer cooling. Turn the fan switch on and off to stop the fan from rotating.

Connecting a AL-WS-010v to a Carro Fan



Example 2: With Home Automation and Light Kit

This AL-WS-Carro is for wall switch type control – the fan control is manually from the switch. For fan control by app, schedule or voice, please upgrade to the AL-WS-010v smart motor control. Neither controls the light.

For tunable white (CCT) dimming of the built in light kit, the AL-WS-DR2 is recommended for local wall switch and smart control of both the brightness and the warm / cool color of the light.

For fixed color temperature dimming and local control, the AL-WS-DR1 can be used for the light kit.

Do not connect the light kit directly to 48v – it will fail.

Light Kit Control

Light Mode	Specs	Wattage	Wiring option	Dimmer
Warm white full 2700K 6 x 11 LEDs	660 mA @ 18 volt	12	2 wires	AL-WS-DR1
Cool white full 5000K 6 x 11 LEDs	660 mA @ 18 volt	12	2 wires	AL-WS-DR1
Both lights full 3850K 6 x 22 LEDs	Warm @ 330 mA + Cool @ 330 mA	12	2 wires	AL-WS-DR1
Tunable White	Variable	12	4 wires	AL-WS-DR2

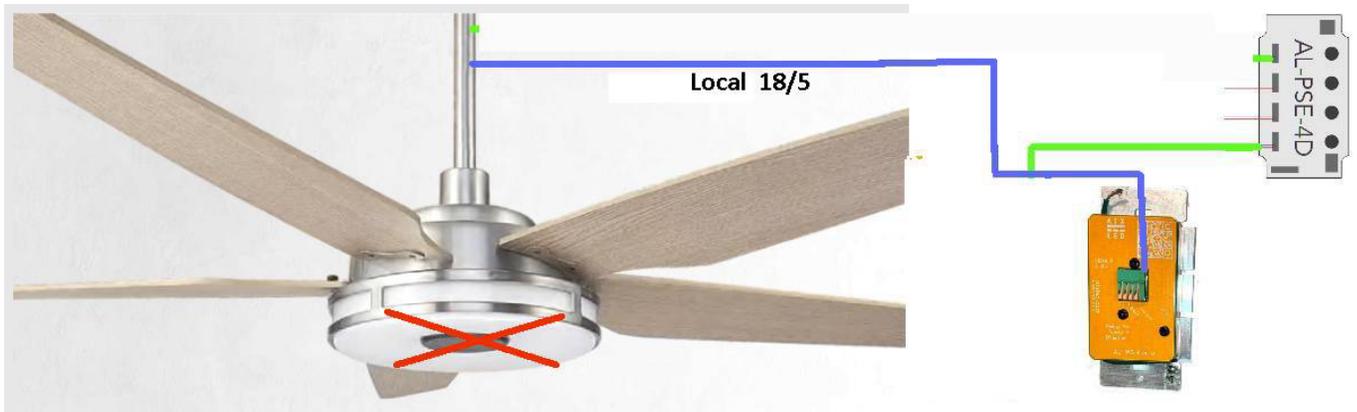
Typical Room Bill of Materials

Example	A	B	C	D	E	F	G
Function	Fan only	Fan + LightKit	Fan + LightKit	FAN + 2 Cans+ Lightkit	Fan + 4 Cans+ Lightkit	Fan + 2 Cans+ LightKit	Fan + 4 Cans+ LightKit
Automat ion	No	No	Yes	No	Yes	Yes	Yes
Ceiling Cans				2	4	2	4
LED driver		AL-WS- DR1	AL-WS- DR2	AL-WS- DR1	AL-WS- DR2	AL-WS- DR2	AL-WS- DR2
CCT		Fixed	Tunable	Fixed	Fixed	Tunable	Tunable
Color Tuning			Yes			Yes	Yes
Fan Motor Control	AL-WS- Carro	AL-WS- Carro	AL-WS- 010v	AL-WS- Carro	AL-WS- 010V	AL-WS- 010V	AL-WS- 010V
Switches @ door	1	2	2	2	2	2	2
Light Switch @ Bedside		"R3"	"M"	"R3"	"M"	"M"	"DR2"
Motor Switch @ Bedside			"M"		"M"	"M"	"M"
total Power Watts	28	40	40	52	64	52	64

M = AL-WS-M, R3 = AL-WS-R3, DR2 = AL-WS-DR2

Carro Fan - no Light: 5 Wires

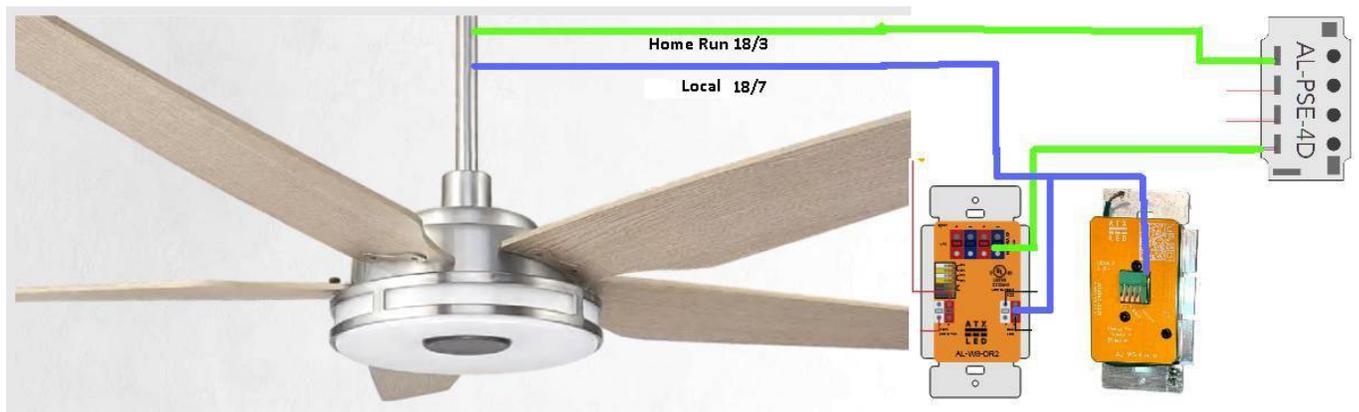
- 24 watts per motor (from home run)
- 18/5 Fan to wall switch (power and control)



Fan Cable 5 Wires + Earth	Wall Gang cable 5 wires 18/5	Function	Connect to Carro or 010v
Red	Red	+ 48 / 51v	
Blue	Blue	- 48 / 51v	Carro - Common
Yellow/Green	Green		Earth
Yellow	Yellow	speed	Carro - Speed
White	White	direction	Carro - Direction

Carro Fan + Light: 2+7 = 9 Wires – Method 1

- Fan Split wiring – Motor + Light kit
- 24 watts per motor (from home run)
- Light kit 12 watts (from the wall switch)
- 36 watts total
- 18/3 to home run (shared with 3 others)
(2 power plus earth ground)
- 18/7 to wall switch (light and motor)



Method 1

- 4 Motors share 18/3 or 18/5 to the LV Panel with other motors
- Wall Switches share 18/5 to LV panel with other lights
- 18/7 from Fan to Wall box
- See next page for multiple fans per switch

Fan Cable 9 Wires	Home Run cable 5 wires 18/5	Wall Gang cable 7 wires 18/7	Function	Connect to DR2 (V14)	Connect to Carro or 010v
Pink	Red		+ 48 / 51v		
Blue	Blue		- 48 / 51v		
Yellow/Green	Green				
Future	White , Yellow				
Red		Red	Warm LED +	Warm Red	
Brown		Brown	Warm LED -	Warm White	
Yellow		Yellow	Cool LED +	Cool Red	
White		White	Cool LED -	Cool white	
Green		Green	ground		Carro - Common
Orange		Orange	speed		Carro - Speed
Black		Blue	direction		Carro - Direction

Fan to Wall box: 9 wires method 2

36 watts for Motor and LEDs

- Motor and light kit share 18/9 wire from Ceiling to Wall
- 2 Fans share 18/9 to wall switch
- Wall Box home runs 18/5 per ATX LED standard



Fan Cable 9 Wires + earth	18/9 from Fan to Wall Box	Function Note	Connect to DR2 V14	Connect to Carro or 010v
Pink	Pink	+ 48 / 51v	Red Input	
Blue + Green	Blue	- 48 / 51v	Blue Input	
Yellow/Green	Green	Earth	Earth / metal plate Green	Earth / metal plate Green
Red	Red	Warm LED +	Warm Red	
Brown	Brown	Warm LED -	Warm White	
Yellow	Yellow	Cool LED +	Cool Red	
White	White	Cool LED -	Cool White	
Orange	Orange	Speed		Speed (010VA)
Black	Black	Direction		Direction (010VB)
		Ground	N-Way "N" <----->	Common "GND"

Carro Fan – 2+ in parallel

Shared motor and light control

- Connect 18/2 from Wall box to #1 fan
- Connect 18/7 traveler between fans
- Connect 18/7 from #2 fan to Wall box

FAN #1

Fan Cable 9 Wires	Home Run 18/5	Traveler cable 18/7	Function
Pink	Red		+ 48 / 51v
Blue	Blue		- 48 / 51v
Yellow/Green	Green		
Future	White Yellow		
Red		Red	Warm LED +
Brown		Brown	Warm LED -
Yellow		Yellow	Cool LED +
White		White	Cool LED -
Green		Green	0-10v ground
Orange		Orange	0-10v speed
Black		Blue	0-10v direction

FAN #2

Fan Cable 9 Wires	Home Run 18/5	Traveler cable 18/7	Function	Wall Cable 18/7
Pink	Red		+ 48 / 51v	
Blue	Blue		- 48 / 51v	
Yellow/Green	Green			
Future	White Yellow			
Red		Brown		NC
		Red	Warm LED +	Traveler Red
Brown			Warm LED -	Fan Brown
Yellow		White		NC
		Yellow	Cool LED +	Traveler Yellow
White			Cool LED -	Fan White
Green		Green	0-10v ground	3x Green
Orange		Orange	0-10v speed	3x Orange
Black		Blue	0-10v direction	3x Black

Ordering part numbers

Model	Feature
AL-WS-Carro	Manual Motor speed and direction
AL-WS-010v	DALI control Motor speed and direction
AL-WS-DR2	DALI Light Kit Brightness and Color control