ILLUMIDEL
ARCHITECTURAL LIGHTING

Installation
Manual

COB / Strip Lighting System

16–17W PER METER

V2 · 24 V DC · 5 M / 10 M reels · high power density

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FOR ILLUMIDEL CERTIFIED INTEGRATORS

Technical document for IllumiDEL Certified Integrators.
Warranty applies only to installations performed in accordance with this manual.

DO NOT BEND
DO NOT STEP ON
DO NOT FORCE A CURVE

This strip contains many small solder joints along its entire length.

Bending it, standing on it, or forcing it around a radius fractures those joints. The damage is often invisible at the time and appears days or weeks later as dead sections, flicker, or colour faults that cannot be traced to a connection.

DO NOT BEND

No sharp bends, folds or twists. Handle the strip flat. **There is no accessory for this and no exception.**

DO NOT STEP ON

Never walk on, kneel on, or set tools down on the strip.

DO NOT FORCE A CURVE

A radius is only made through the **IllumiDEL 90° plastic corner** for the 2200B XL. Never by hand.

Keep the strip on its reel until the moment of installation. Damage caused by bending, crushing, stepping on, or forcing a curve outside the 90° plastic corner is not covered by warranty.

00 CONTENTS

01 INTRODUCTION

The IllumiDEL COB / Strip Lighting System is a permanent architectural lighting system built around continuous 24 V COB and SMD strip rated at 16–17 W per metre, mounted in aluminum extrusion and driven by an IllumiDEL 24 V power box.

This manual covers planning, installation, wiring, commissioning and service. It is written for IllumiDEL Certified Integrators. Warranty applies only to systems installed in accordance with this document.

> **THIS IS A HIGH POWER-DENSITY PRODUCT**
>
> At 16–17 W/m the strip draws roughly 0.67–0.71 A per metre. Load limits are reached far sooner than on lower-density systems, and the extrusion forms part of the heatsink. Section 05 is not optional reading.

How this manual is organised

- **Sections 02–04** — what the system is, how to work on it safely, and what to bring to site.
- **Section 05** — the load and cable calculations that must be done before anything is mounted. At this power density, most field faults originate here.
- **Section 06** — the installation sequence, in order.
- **Sections 07–10** — commissioning, faults, service, and warranty.
- **Appendix A** — the seven wiring diagrams referenced throughout.

02 SPECIFICATIONS

Strip

PARAMETER	VALUE	NOTE
Product	IllumiDEL COB / Strip — V2	Continuous strip in aluminum extrusion
Circuit construction	Double layer, 3 oz copper	V2 — carries a full 5 m from a single feed
Reel formats	5 m (16 ft) · 10 m (32 ft)	Determines the feed pattern — see 05.2
Nominal voltage	24 V DC	Class 2 / LPS regulated
Power per metre	16–17 W/m	At full output
Current per metre	0.67–0.71 A/m	Calculated at 24 V
Maximum run per feed	16 W/m → 20 ft (6.1 m) 17 W/m → 18 ft (5.5 m)	Set by the 100 W limit — see 05.2
LED / pixel density	Per SKU — see the reel label	Required for the app's LED count — see 07
Mounting	Aluminum extrusion, full length	Required for heat dissipation
Cut points	Every 4 in / 101.6 mm	12 LED segments between marks — see Fig. 6
Cut point pads	+24V · DO / DI · GND	DO on the box side, DI on the outgoing side

Power box

PARAMETER	VALUE	NOTE
Controller	ILMC-24V-450W (4 outputs) ILMC-24V-600W (5 outputs)	Converts 120 V to 24 V and drives the strip
Input voltage	100–240 V AC	—
Output voltage	24 V DC	—
Power per output	100 W — electronically limited	Power sensing blocks the output at 100 W
Equivalent current	4.17 A at 24 V	Sensing trips before the 5 A fuse
Fuse rating	5 A	Device protection, not the working limit
Compliance	Class 2 / LPS	100 VA ceiling per output
Fused outputs	4 (450 W) / 5 (600 W)	One pair per output — OUT n+ and OUT n−
Output terminals	OUT1+/- … OUT n+/-	Each output has its own + and − terminal

PARAMETER	VALUE	NOTE
Expansion	Power box, 5 further outputs	Same enclosure without the data board
Data outputs	8	Independent of the power outputs
Enclosure dimensions	292 × 206 × 105.5 mm	Outdoor-rated enclosure
Connectivity	Wi-Fi · RJ45 Ethernet	Ethernet preferred where available

The power box

Runs of any size exhaust the fused outputs long before they exhaust the supply, because every pair needs its own output. A power box is fitted beside the controller to add five more. It is the same enclosure with the same supply and output board, but no data board and no antenna — it distributes power only.

Data always comes from the controller waterproof box. The power box never carries data.

Coverage per box

Every fused output covers 20 ft (6.1 m) of 16 W/m strip, or 18 ft (5.5 m) of 17 W/m strip. Output count, not supply rating, is the binding limit.

BOX	CAPACITY	COVERAGE AT 16 W/M	COVERAGE AT 17 W/M
ILMC-24V-450W	4 outputs · 400 W usable	80 ft / 24.4 m · 390 W	72 ft / 21.9 m · 373 W
ILMC-24V-600W	5 outputs · 500 W usable	100 ft / 30.5 m · 488 W	90 ft / 27.4 m · 466 W

TWO SEPARATE COUNTS

The box has **8 data zones** and **4 or 5 power outputs**. These are counted independently. A single data zone normally spans several power outputs. Do not assume they pair up.

Why the limit is 100 W

Each output is held to 100 VA so it remains a Class 2 circuit. Usable capacity is therefore 4 × 100 W = 400 W on the 450 W box, and 5 × 100 W = 500 W on the 600 W box. Class 2 is what allows the low-voltage wiring methods used throughout this manual — no conduit, standard stranded copper, ordinary connectors — and it is a safety limit, not a performance figure.

The limit is enforced by power sensing on the output board, not by the fuse. At 24 V, 100 W is 4.17 A, so the sensing acts before the 5 A fuse ever sees the fault. An overloaded output does not sag or gradually dim: it blocks.

DESIGN TO 100 W, NOT TO 5 A

Sizing a run against the 5 A fuse rating gives 120 W and an output that will refuse to turn on. Always calculate against 100 W.

03 SAFETY GUIDELINES

WARNING

Installation must be performed by a qualified person in accordance with the Canadian Electrical Code (CSA C22.1, Part 1) and all applicable provincial or municipal regulations. Complete all low-voltage wiring before energizing the power box.

1. **Handle flat.** No bends, folds, twists or forced curves. Never walk or kneel on the strip, and never rest tools on it.
2. **Wire before power.** Connect all conductors before plugging in the power box.
3. **Wire preparation.** Strip conductors 10–12 mm for proper contact.
4. **Polarity.** Positive (+) to positive, negative (−) to negative. Reversed polarity damages the strip and is not covered by warranty.
5. **Do not screw through conductors.** Keep fixings clear of all wiring.
6. **Insulate every connection.** Use WAGO connectors, then heat shrink or tape.
7. **Disconnect before service.** Always unplug the power box before maintenance.
8. **Do not overload.** Never exceed 100 W on any one output. The output is power-sensed and will block, keeping the circuit within Class 2.
9. **Heat.** The strip must sit in aluminum extrusion over its full length. Never energize strip while it is coiled on the reel.
10. **Cutting.** Cut only on the printed marks, at 4 in (101.6 mm) intervals, with power off. An off-mark cut destroys the segment. **Every cut end is sealed** — a COB end cap plus silicone or epoxy, without exception. See Fig. 6.
11. **Environment.** Install within the rated temperature and humidity range, and seal all penetrations.

HANDLING — SEE THE WARNING PAGE AT THE FRONT OF THIS MANUAL

Do not bend, step on, or curve the strip. It contains many small solder joints along its entire length, and the V2 double-layer circuit is stiffer than single-layer strip — it does not tolerate being forced. Bending, crushing or forcing a radius fractures those joints. The damage is frequently invisible and shows up later as dead sections, flicker or colour faults. Keep the strip on its reel until installation and handle it flat.

CORNERS — THE 90° PLASTIC CORNER IS THE ONLY PERMITTED CURVE

On the 2200B XL channel, a 90° change of direction is made with the **IllumiDEL plastic corner**, which carries the strip through the turn at a controlled radius. That accessory is the only place the strip is ever curved.

Anywhere else — any other angle, any other channel — the extrusion is cut and mitred, and the strip is cut on the nearest printed mark and rejoined. Nothing else in this manual authorises bending the strip by hand.

SEALING

Any hole drilled through a structure into a building interior must be sealed. This prevents water, air and insect infiltration and is part of a compliant installation.

04 TOOLS AND ACCESSORIES

Access equipment

- 4–5 ft stepladder for low work; telescopic stepladder for intermediate access
- 24 ft ladder for medium heights; 32 ft ladder for high or awkward areas

Hand tools

- Drill and screws · 30 mm metal drill bit for clean round holes · triangular bracket for tight angles
- Aluminum scissors or saw · file · square · measuring tape · pencil and black marker
- Mitre box or mitre saw for corner cuts in the extrusion
- Wire strippers · crimp tool · pliers · tool belt
- Soldering iron with a fine point tip and 60/40 rosin-core solder. Adjustable irons are set to 340–360 °C; the Milwaukee M12 runs at a fixed 400 °C (750 °F) and is used as-is — see 06.4 and Fig. 7

IllumiDEL accessories

The connectors and channel parts below are stocked for this system and are ordered from the dealer portal at **illumidelshop.com**, under COB 24V.

- **Strip-to-strip connector, COB 840 WP RGBW** — joins two cut ends without a soldered joint
- **Strip-to-wire starter connector, COB 840 WP RGBW** — feeds a cut end from a home-run cable
- **Waterproof connector** — for joints exposed to moisture
- **90° plastic corner for strip** — the only permitted curve, on the 2200B XL channel
- **COB end cap** — fitted to every cut end, sold separately
- **2200B XL end caps**, with or without a cable hole

Clip connectors are a convenience, not the default. On any run where the strip is visible, solder the injection — see 06.4.

Consumables and accessories

- WAGO connectors for all joints; electrical tape, heat shrink or solderless connectors
- Loom tubing with ½" clips, and a wire insertion tool
- Extension cables — **14/2 and 14/4 stranded copper only** (see 05.4 for sizing and length limits)
- T-power injection connectors
- White, black and beige silicone and duck seal for sealing penetrations
- Silicone adhesive or two-part epoxy for sealing cut ends — one cartridge or kit per job

05 PLANNING THE INSTALLATION

Planning determines whether the system works. At 16–17 W/m the margins are narrow, so complete Sections 05.1 through 05.4 on paper before mounting anything.

05.1 — Power box location

- Place the box **within 20 ft of the input end of the run where the layout allows, and never beyond 30 ft.** The cost of that distance in volts is set out in 05.4.
- Choose an accessible position near a 120 V outlet, with room to open the enclosure for service.
- Verify Wi-Fi signal strength at the box location with a phone before committing. If the signal is weak, move the box closer to the router, add a Wi-Fi extender, or run an RJ45 cable.
- On large installations, divide the job into zones and give each zone its own box.

05.2 — Feed pattern and segment planning

V2 strip uses a double-layer 3 oz copper circuit. The extra copper carries a full 5 m from a single feed without visible drop, and this is what sets the feed pattern.

THE ONE RULE THAT GOVERNS EVERYTHING

Maximum per fused output

STRIP	MAXIMUM PER OUTPUT	LOAD AT THAT LENGTH
16 W/m	20 ft (6.1 m)	97.5 W
17 W/m	18 ft (5.5 m)	93.3 W

Never exceed 100 W on any output. Every calculation in this section follows from these two figures.

Feed pattern by reel format

REEL	FEEDS REQUIRED	OUTPUTS USED	LOAD PER OUTPUT
5 m / 16 ft	Power and data on one side only. No injection at the far end.	1	80 W at 16 W/m 85 W at 17 W/m
10 m / 32 ft	Power and data on one side, plus power injection at the far end.	2	80 W at 16 W/m 85 W at 17 W/m

Both formats load an output identically, because both work out to 5 m of strip per output — comfortably inside the 20 ft ceiling. A 10 m reel is simply two 5 m halves fed from opposite ends. A segment may be fed from both ends, with one dedicated output per end: **maximum total segment length is 40 ft (12.2 m) at 16 W/m, or 36 ft (11.0 m) at 17 W/m.**

> **THE 20 FT CEILING IS SET BY WATTS, NOT BY FEET**
>
> 20 ft is 6.1 m, which is 97.5 W at 16 W/m — just inside the 100 W limit. The same 20 ft on 17 W/m product is 103.6 W and the output will block. **On 17 W/m strip, hold each output to 18 ft (5.5 m, 93 W)** and a both-end-fed segment to 36 ft.

Counting outputs

- **5 m segments:** 16.4 ft each, so one output covers a whole segment. One 14/2 feed per segment; a run of N segments needs N outputs. Nothing is connected at the far end of the run. See Fig. 5.
- **10 m segments:** 32.8 ft, fed from both ends — 16.4 ft per output. The start of the run and the end of the run take a 14/2 (one output each); every joint carries the previous segment's end injection and the next segment's feed, so it takes a 14/4 and two outputs. A run of N segments needs 2N outputs. See Fig. 1.

A four-segment run of 10 m strip therefore needs 8 outputs. A single box provides 4 or 5, so a power box is added beside the controller. The same run in 5 m segments — four segments, 20 m — needs only 4 outputs and one box.

> **A SEGMENT MUST BE FED FROM ONE BOX ONLY**
>
> Where a 10 m segment is fed at both ends, both feeds must come from the same box. Feeding one end from the controller and the other from the power box links the two supplies' positives through the strip. **Never link 24+ between boxes.**

> **BUT THE 24– OF THE TWO BOXES MUST BE BONDED**
>
> The data signal is referenced to the controller's ground. A segment powered from the power box, on a data line driven by the controller, has no shared reference between the two unless their negatives are tied together — and an unreferenced data line produces flicker, random colour, or a run that ignores data intermittently.
>
> **Run one dedicated 14 AWG bonding conductor between a 24– terminal on the controller waterproof box and a 24– terminal on the power box.** That conductor is the only electrical link between the two enclosures. The 24+ is never linked. See 06.8.

05.3 — Data planning

The controller is the source of the data signal. Data leaves a data terminal in the controller waterproof box, enters the strip at its input end, and travels along the strip in the direction of the arrows printed on it. Everything below follows from that.

- The box provides 8 independent data zones. Assign one continuous run to one zone.
- **Orient the strip so the printed arrows point away from the box.** The input end of the run is the end nearest the controller; the far end of the run is where the data ends.
- Data enters at the input end only, and passes through every joint uninterrupted.
- **Data is never injected mid-run.** Power is injected mid-run; data is not.
- Power injection has no direction. A segment can be fed from either end or from the centre; only the data has an input side.
- For addressable product, confirm the LED or pixel count per metre from the reel label or datasheet, and check it against the controller's refresh budget before committing to a zone layout. The same figure is entered in the app at commissioning — see 07.

05.4 — Cable selection

Home-run cables carry power only, from a fused output to an injection point. Use stranded copper. The cable at a given point depends on how many segments that point feeds, which depends on the reel format.

10 m segments

INJECTION POINT	CABLE	WHY
Start of the run	14/2	One pair, one output. Runs alongside the data conductor.
At a joint	14/4	A joint feeds two segments — the end of the upstream segment and the start of the downstream one. Two pairs, four conductors, two fused outputs.
End of the run	14/2	Injection only — one pair, one output.
At the centre of a run	14/4	A centre feed serves two directions — two pairs, two outputs. See Fig. 3.

5 m segments

INJECTION POINT	CABLE	WHY
Start of each segment	14/2	One output covers the whole 5 m segment from a single feed. One pair per segment.
At a joint	14/2	The upstream segment is already fed at its own start. The joint feeds the downstream segment only.
End of the run	—	**Nothing.** No end injection on 5 m strip.

CRITICAL — THE TWO MEANINGS OF GREEN

Inside a 14/4 home-run cable, **green is 24 V negative**. On the strip's own pigtail, **green is the data signal**. These are different conductors with the same colour. Connecting a 14/4 green to a data terminal puts 24 V onto the data line and destroys the strip.

14/4 conductor assignment

CONDUCTOR	FUNCTION	GOES TO
Red	24 V positive	Segment 1 (upstream)
Black	24 V negative	Segment 1 (upstream)
White	24 V positive	Segment 2 (downstream)
Green	24 V negative	Segment 2 (downstream)

Conductor size and cable length

A fused output at its 80 W design load draws 3.33 A, and 3.54 A on 17 W/m strip. Size every home run against **3.5 A**. Voltage drop is round-trip — both conductors of the pair count — and the figures below are the drop between the output terminal and the injection point at full white.

HOME-RUN LENGTH	DROP IN 14 AWG AT 3.5 A	VERDICT
10 ft / 3.0 m	0.58 V	Preferred
15 ft / 4.6 m	0.87 V	Preferred
20 ft / 6.1 m	1.16 V	Acceptable
25 ft / 7.6 m	1.45 V	Verify at handover
30 ft / 9.1 m	1.74 V	Absolute maximum

14 AWG stranded copper at 3.5 A, round trip, 20 °C. Drop rises with conductor temperature — derate in hot ceilings and enclosed soffits.

SHORTEN THE CABLE — DO NOT ACCEPT THE DROP

14/2 and 14/4 are the only home-run cables in this system, and they are correct for the short runs it is designed around. Where the drop is too high, the answer is always to **move the box closer** or add a zone with its own box — not to run further and live with it.

Moving the box 10 ft closer removes more drop than any change of gauge would, and 05.1 already requires it to sit within 30 ft of the strip start. The strip is the last thing in the circuit and it absorbs every millivolt lost upstream.

06 INSTALLATION STEPS

06.1 — Prepare the strip and extrusion

1. Cut the extrusion with an aluminum blade and file the ends. At a 90° change of direction, fit the IllumiDEL plastic corner for the 2200B XL channel. Fit end caps before mounting.
2. Measure the actual run and plan it in 5 m or 10 m reel lengths. Add 5% margin and round up to the next cut mark — marks fall every 4 in (101.6 mm), so the worst case is 4 in of waste per cut.
3. Cut the strip square, on the printed mark only, with power disconnected. Each mark carries three pads — +24V, DO/DI and GND. Clean them with isopropyl alcohol. See Fig. 6.
4. **Seal every cut end, always.** Fit a COB end cap — sold separately on the IllumiDEL shop — and bed it in silicone adhesive or two-part epoxy so the cut face is fully covered. This applies to every cut on every run, indoors and out, IP-rated or not. Allow 24 h cure before moisture exposure.

> **A CUT END IS AN OPEN END**
>
> Cutting the strip opens the copper and the phosphor layer to air. Left bare, the pads corrode and the cut face wicks moisture along the circuit — a failure that surfaces well after handover and reads as a dead section with no wiring fault.
>
> A COB end cap alone is not a seal. **The cap holds the geometry; the silicone or epoxy does the sealing.** Use both, on every cut.

06.2 — Mount the extrusion and strip

1. Fasten mounting clips at 300–500 mm centres, and 50 mm from each end. Tighten to 250 mm centres on ceilings and wherever the extrusion changes plane. **The only permitted curve is through the 90° plastic corner for the 2200B XL channel** — see 03.
2. Clean the extrusion channel with 99% isopropyl alcohol. The surface must be dry and above 10 °C.
3. Peel the adhesive liner progressively and lay the strip without stretching and without bending, centred in the channel, arrow oriented along the run.
4. Press evenly along the full length so the strip is in continuous contact with the aluminum.
5. Leave a 100 mm service loop of conductor at each injection point, then fit the diffuser and end caps.

> **HEAT**
>
> At 16–17 W/m the extrusion is part of the heatsink. Strip mounted outside the channel, or partly lifted off it, will run hot and fail early. Outdoors or above 35 °C ambient, add mechanical retention clips — adhesive alone releases as it heats.

06.3 — Set the data direction

The controller drives the data line, so the strip is oriented with its input end toward the box and the printed arrows pointing away from it. Mount the first segment at the input end, beside the box, and work outward along the run, making joints as you go. See Fig. 1 for 10 m strip and Fig. 5 for 5 m strip.

Confirm the orientation on the first segment before committing the rest. A run mounted with the arrows facing the wrong way lights nothing past the first controller and has to come off the wall.

06.4 — Make the joints

At every joint between two segments, power is injected and data passes straight through. On 10 m strip the joint feeds both sides and takes a 14/4; on 5 m strip it feeds the downstream segment only and takes a 14/2. See Fig. 2.

1. Bridge data straight across every joint: **DO (upstream) → DI (downstream)**. Do not inject a new data signal at the joint. See Fig. 6.
2. **The green conductor inside the 14/4 home-run cable is 24 V negative and must never be connected to data.** Only the strip's own green pigtail carries the signal.
3. Connect the upstream segment's red and black to the 14/4 red and black.
4. Connect the downstream segment's red and black to the 14/4 white and green.
5. Use a separate WAGO for each of the four connections. Each segment keeps its own pair — no cross-bonding between segments at the joint.
6. Insulate every connection and dress the joint into loom tubing.

Soldered injection or clip connector

A clip connector at an injection point leaves a visible dark spot. Four causes add up, and three of them are mechanical rather than electrical:

- **Phosphor removal.** On COB, 10–20 mm of silicone and phosphor has to be scraped back to expose the pads. That length stops emitting, and on a continuous line it reads as a gap immediately.
- **Shadow.** The connector body is thicker than the strip and sits under the diffuser, blocking light on both sides of the contact and widening the gap.
- **Contact resistance.** A spring clip touches the copper over a very small area. At 3.3–3.5 A, a few tens of milliohms is enough to drop voltage at the injection itself, and everything downstream steps down in brightness.
- **Ageing.** That resistance heats, the copper oxidises and the spring pressure relaxes over thermal cycles. This is the fault that appears months after handover as gradual dimming or flicker with no wiring error to find.

Soldering removes all four. **Solder every injection on any run where the strip is visible, grazing a surface, or otherwise unforgiving.**

1. Cut on the printed mark with power disconnected and clean the three pads with 99% isopropyl alcohol. Red lands on +24V, green on DO or DI, black on GND.
2. Tin the pads first, then the conductor. Fine point tip, and **two seconds per pad at most**. On an adjustable iron, set 340–360 °C (644–680 °F). The Milwaukee M12 is not adjustable — its tip runs at a fixed 400 °C (750 °F), which is fine for this work provided the two-second rule is kept: the hotter the tip, the less dwell the pad tolerates. The V2 double-layer 3 oz circuit sinks heat quickly, so what matters is an iron that holds temperature rather than a long dwell. See Fig. 7.
3. Dress the conductor along the back of the strip and into the channel. Never route it over the emitting face.
4. Heat shrink over each joint, then leave the 100 mm service loop called for in 06.2.
5. Seal the joint with silicone adhesive or epoxy and fit a COB end cap over any exposed cut face. Allow 24 h cure before moisture exposure.

SOLDERING CHANGES THE METHOD, NOT THE SPACING

The maximum per output is unchanged: **20 ft on 16 W/m strip, 18 ft on 17 W/m strip, never beyond 100 W.** Soldering removes the dark spot at the injection; it does not extend the interval between injections, and it does not raise the 100 W ceiling.

06.5 — Run the home-run cables

1. Feed the start of the run — power (red and black) alongside the data conductor. On 10 m strip, also inject at the far end of every segment; on 5 m strip, do not.
2. Run one cable from each feed point back to the boxes. Keep the routing tidy and supported.
3. One pair = one fused output. A 14/4 therefore occupies two outputs. Never land two pairs on the same output.
4. Use 14/4 at 10 m joints and centre feeds, 14/2 at the start and end of a run and at every 5 m joint.
5. Label each cable at the box end before it disappears into the loom. Record which joint it serves.
6. Where a run is long, consider feeding at the centre rather than the end — it covers twice the distance for the same drop. See Fig. 3.

06.6 — Loom tubing

1. Bundle the conductors and feed them into the split loom with the insertion tool, or open the tube and lay them in.
2. Secure the tube with ½" clips at regular intervals so it cannot move.
3. Seal both ends with electrical tape against dust and moisture.

06.7 — Install the power box

1. Mount in an accessible spot near the run and a power source. Wood screws into timber; drill, plug and Tapcon into masonry.
2. Level the box before final tightening.
3. Bring the loom through the enclosure gland. The tube must be secured and the conductors must not be in tension.
4. Seal every penetration through the structure with silicone or duck seal.

06.8 — Connect inside the box

See Fig. 4 for the interior layout.

1. Land each pair on its own output: 24+ on OUT n+, 24− on OUT n−. A 14/4 uses two outputs — red/black on one, white/green on the next.
2. Each output has its own + and − terminal. Do not double up two pairs on one output.
3. Land the data conductor on the assigned data zone, D1–D8, in the controller waterproof box. The power box carries no data.
4. Never link the positives of two outputs together, and never feed the two ends of one segment from two different boxes.
5. Where a power box is fitted, bond its 24− to a 24− terminal in the controller waterproof box with a dedicated 14 AWG conductor. This gives the data signal a common reference. The 24+ is never bonded.
6. Confirm every terminal is tight, then close and seal the enclosure.

07 COMMISSIONING AND APP SETUP

Power on

1. Plug the power box into a 120 V outlet.
2. Turn the system on and confirm the whole run responds. Unconfigured strip commonly shows blue until the LED settings are set.
3. Set a colour other than blue before saving settings, so changes are easy to see.
4. Visually inspect all connections and extrusion alignment.

Connect to the app

1. Open Wi-Fi settings on your phone near the box and connect to the **Illumidel** AP network. The IllumiDEL app launches automatically.
2. Tap **Config**, open the **LED** section, and set the strip type, the data zone, and the LED count for the installed length. LED count = LED/m from the reel label × installed metres. Tap the green checkmark to save.
3. Open the **WiFi** section and tap **SCAN**. Choose the correct network, enter the password, and save.
4. Confirm an IP address appears under **IP**. If it does not, the box has not joined the network.

Handover checklist

- [ ] Polarity verified on every segment
- [ ] Each pair on its own output, 24+ to OUT n+ and 24− to OUT n−
- [ ] Both ends of every 10 m segment fed from the same box, each cable labelled
- [ ] No output exceeding 100 W — calculated, not estimated
- [ ] Strip type, data zone and LED count set in the app and saved
- [ ] Where a power box is fitted, its 24− bonded to the controller waterproof box
- [ ] Network joined and IP address confirmed
- [ ] Smooth dimming with no flicker
- [ ] **22.5 V minimum measured at the far end of every segment, at full white**, with the probe on the strip's own pads and not on the home-run cable
- [ ] All penetrations sealed; loom secured and capped
- [ ] Client trained; manual and warranty details handed over

> **WHAT THE 22.5 V FIGURE MEANS**
>
> It is an end-to-end budget. A 20 ft home run in 14 AWG spends about 1.16 V before the strip is reached, and the strip itself drops the remainder over its length. A reading below 22.5 V points at an over-long home run, a loose or partly seated connection, or a segment being fed further than 5 m from one output.

08 TROUBLESHOOTING

SYMPTOM	LIKELY CAUSE	REMEDY
Strip does not light	Reversed polarity, or a connection not made	Check polarity and every connection before anything else
Flickering or random colour changes	A loose 24– or data connection. This is the most common fault on this system.	Re-seat every ground and data joint. Confirm no conductor is crushed or damaged.
Strip dark after a certain point	Off-mark cut, failed joint, or a segment past a bad connection	Work outward from the last lit section and remake the joint at the nearest valid cut mark
Section fails days or weeks after handover, with no wiring fault found	Solder joints fractured by bending, crushing or stepping on the strip during installation	Replace the affected section. Review handling practice — this failure is caused on site, not in service.
Strip stays blue and ignores colour changes	Powered but receiving no data	Check the data conductor, the arrow direction on the strip, and the data zone assigned under Config → LED
Nothing lights past the first section, or the run responds backwards	Strip mounted with the arrows pointing toward the box instead of away from it	The data input must be the end nearest the controller. Re-lay the affected segment — see 06.3.
Flicker or random colour only on the segments fed by the power box	The 24– of the two boxes is not bonded, so the data line has no common reference	Run the 14 AWG bonding conductor between the two boxes — see 06.8
Brightness falls off toward the end of a segment	Segment fed beyond the per-output maximum — 20 ft at 16 W/m, 18 ft at 17 W/m — or a home run longer than 30 ft	Add an injection point, or move the box closer — see 05.4
Extrusion unusually hot	Strip lifted off the channel, or mounted outside the extrusion	Correct the mounting; reduce output where the ambient is high
An output will not turn on, or shuts off under load	Power sensing has blocked the output at its 100 W Class 2 limit. Check what else shares that output.	Calculate the actual load. Move a segment to another output, or shorten it. Do not attempt to defeat the limit.
Whole segment dead after wiring a joint	A 14/4 green landed on a data terminal instead of 24–	Disconnect immediately and inspect. See the warning in Section 05.4.
Visible dark spot at an injection point	Phosphor scraped back for a clip connector, plus the shadow of the connector body under the diffuser	Replace the clip with a soldered injection — see 06.4. On a visible run, solder from the outset.

SYMPTOM	LIKELY CAUSE	REMEDY
Gradual dimming downstream of one injection, months after handover	Contact resistance at a clip connector, rising as the copper oxidises and the spring relaxes	Remake that injection as a soldered joint. Check the voltage at the far end of the segment afterwards — see 07.
App loses connection	Weak Wi-Fi at the box	Add a Wi-Fi extender, or connect RJ45 for a stable link
Short circuit	Damaged conductor or connector	Disconnect power immediately and inspect all wiring and connectors

09 MAINTENANCE

- **Visual inspection.** Check the condition of the strip, diffusers and cables periodically.
- **Cleaning.** Use a soft, dry cloth on all components.
- **Power box.** Keep the enclosure clean and confirm the fuses are sound.
- **Connections.** Test voltage and re-tighten terminals where needed.

10 SUPPORT AND WARRANTY

Warranty

- **Duration:** 3 year limited warranty
- **Coverage:** manufacturing defects and hardware failures
- **Exclusions:** incorrect installation and mishandling, including bending, crushing, stepping on, or curving the strip other than through the 2200B XL 90° corner, reversed polarity, outputs loaded beyond 100 W, cross-bonded positives, a 14/4 green landed on a data terminal, off-mark cuts, cut ends left without a COB end cap and silicone or epoxy seal, and strip installed outside an aluminum extrusion

Making a claim

1. Provide proof of purchase.
2. Describe the issue encountered.
3. Include photos or video where possible, plus the installed length per output and the box model.

Technical support

EMAIL	PHONE	HOURS
support@illumidel.com	1-514-900-4018	Monday to Friday, 9 AM – 5 PM EST

Guides, FAQs and video are available on the IllumiDEL website. Strip, channel, connectors and accessories are ordered from the dealer portal at illumidelshop.com.

A APPENDIX A — WIRING DIAGRAMS

The seven diagrams that follow are the reference wiring for this system. They are printed landscape on the following pages.

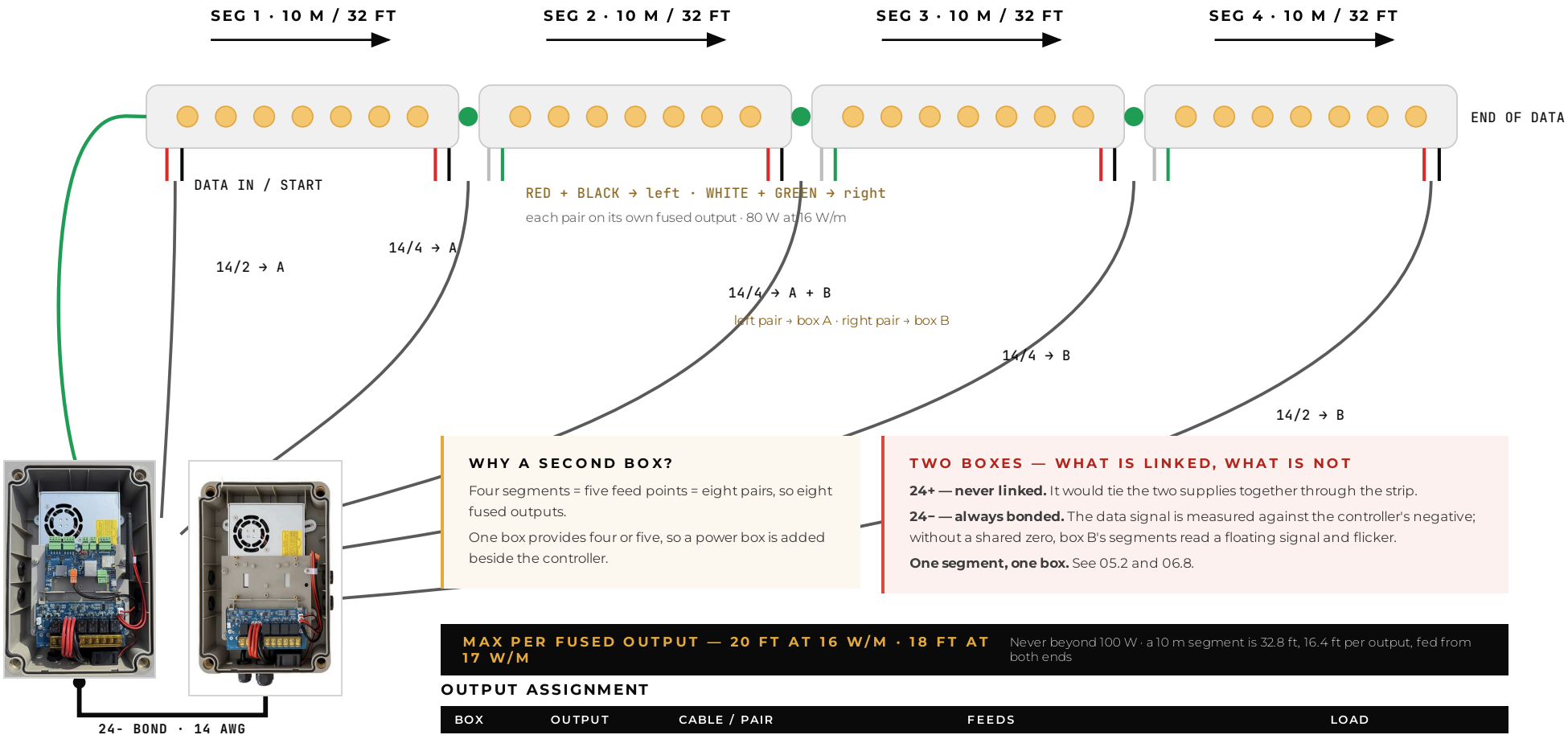
FIGURE	TITLE	COVERS
Fig. 1	Run overview — 10 m	Feeds at start, joints and end; one pair per output; controller waterproof box plus power box
Fig. 2	Joint detail (TAP)	A dedicated pair per segment; data passing straight through
Fig. 3	Centre feed	Why a centre feed covers twice the distance of an end feed
Fig. 4	Controller waterproof box	Interior layout, OUT n+ / OUT n− terminals, output assignment
Fig. 5	Run overview — 5 m	One feed per segment, all 14/2, single box, no end injection
Fig. 6	Cutting the strip	Cut marks and interval, the three pads, how to cut, DO-to-DI reconnection
Fig. 7	Soldering the strip	Iron settings, which conductor lands on which pad, the five-step joint, inspection

NOTE ON THE DIAGRAMS

All seven diagrams are labelled in English. A French set is available on request. Conductor colours are named throughout — red, black, white and green — and match the legend printed on each diagram.

FIG. 1 — RUN OVERVIEW / 10 M STRIP

Data enters beside the box and runs with the arrows · power injected at both ends of every segment · eight fused outputs



WHY A SECOND BOX?

Four segments = five feed points = eight pairs, so eight fused outputs.

One box provides four or five, so a power box is added beside the controller.

TWO BOXES — WHAT IS LINKED, WHAT IS NOT

24+ — never linked. It would tie the two supplies together through the strip.

24− — always bonded. The data signal is measured against the controller's negative; without a shared zero, box B's segments read a floating signal and flicker.

One segment, one box. See 05.2 and 06.8.

MAX PER FUSED OUTPUT — 20 FT AT 16 W/M · 18 FT AT 17 W/M Never beyond 100 W · a 10 m segment is 32.8 ft, 16.4 ft per output, fed from both ends

OUTPUT ASSIGNMENT

BOX	OUTPUT	CABLE / PAIR	FEEDS	LOAD
A	OUT 1	14/2 start — R+B	Segment 1 (start)	80 W
A	OUT 2	14/4 joint 1 — R+B	Segment 1 (end)	80 W
A	OUT 3	14/4 joint 1 — W+G	Segment 2 (start)	80 W
A	OUT 4	14/4 joint 2 — R+B	Segment 2 (end)	80 W
B	OUT 1	14/4 joint 2 — W+G	Segment 3 (start)	80 W
B	OUT 2	14/4 joint 3 — R+B	Segment 3 (end)	80 W
B	OUT 3	14/4 joint 3 — W+G	Segment 4 (start)	80 W
B	OUT 4	14/2 end — R+B	Segment 4 (end)	80 W

A — CONTROLLER

Controller waterproof box

8 data zones + 5 outputs
4 used · 320 W

B — POWER BOX

No data board

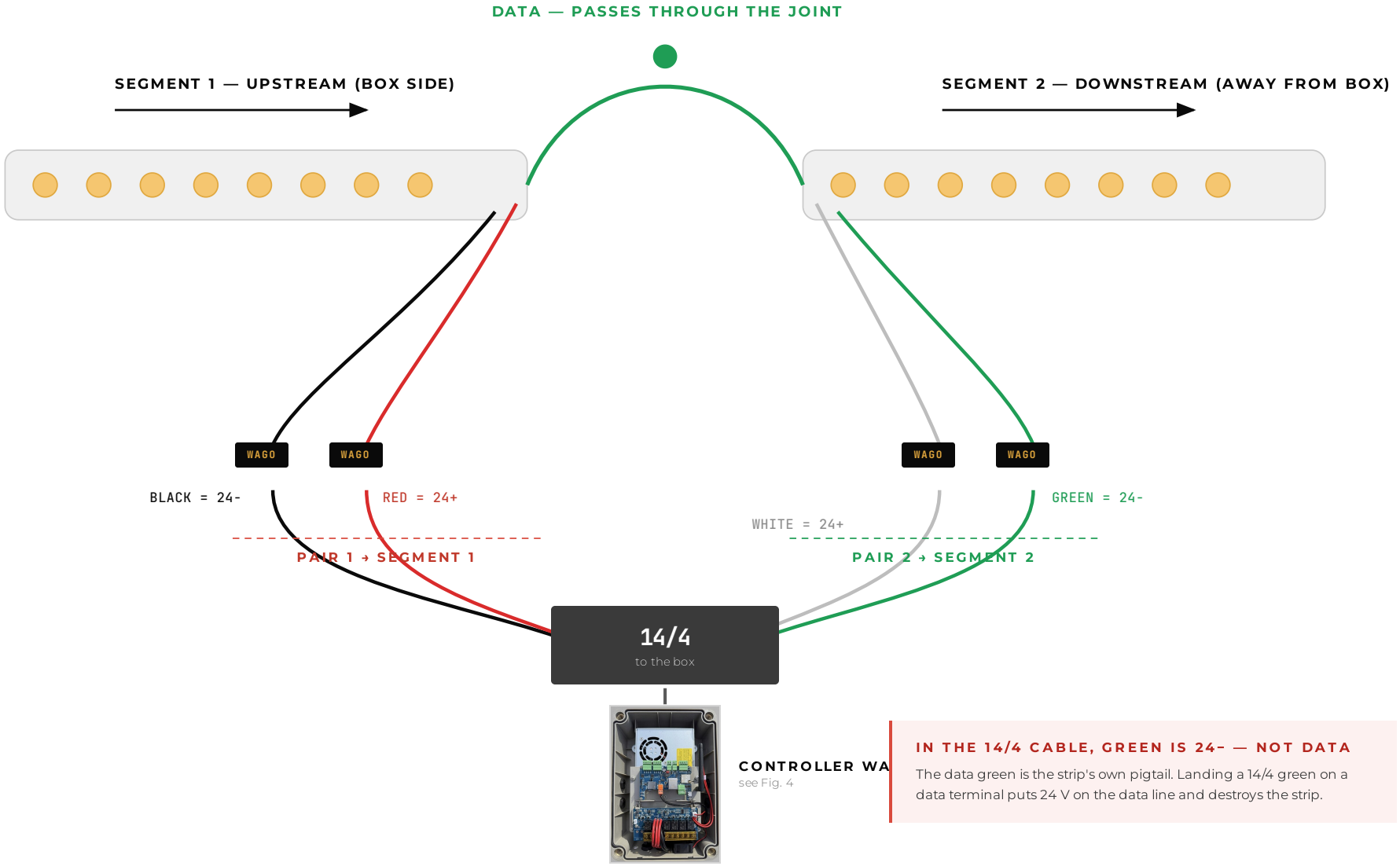
5 outputs · no data
4 used · 320 W

RED	24+
BLACK	24-
WHITE	24+
GREEN	24- (inside the 14/4 cable)
GREEN	data — from the box, with the arrows
14/4 · 14/2	home run to the box
24− BOND	one 14 AWG between the boxes

Green in the 14/4 is 24− — never data.

FIG. 2 — JOINT DETAIL / TAP

One 14/4 cable · a dedicated pair per segment · data arrives from the controller side and passes straight through



IN THE 14/4 CABLE, GREEN IS 24– — NOT DATA

The data green is the strip's own pigtail. Landing a 14/4 green on a data terminal puts 24 V on the data line and destroys the strip.

14/4 CONDUCTOR ASSIGNMENT

RED	24+ → segment 1
BLACK	24- → segment 1
WHITE	24+ → segment 2
GREEN	24- → segment 2

Each segment gets its own pair — no cross-bonding between them at the joint.

JOINT RULES

1 — Data passes straight through the joint: DO (upstream) → DI (downstream). Never inject a second data signal at a joint.

2 — 24– stays common system-wide, through the box.

3 — Never link the 24+ of two different boxes. Do bond their 24–.

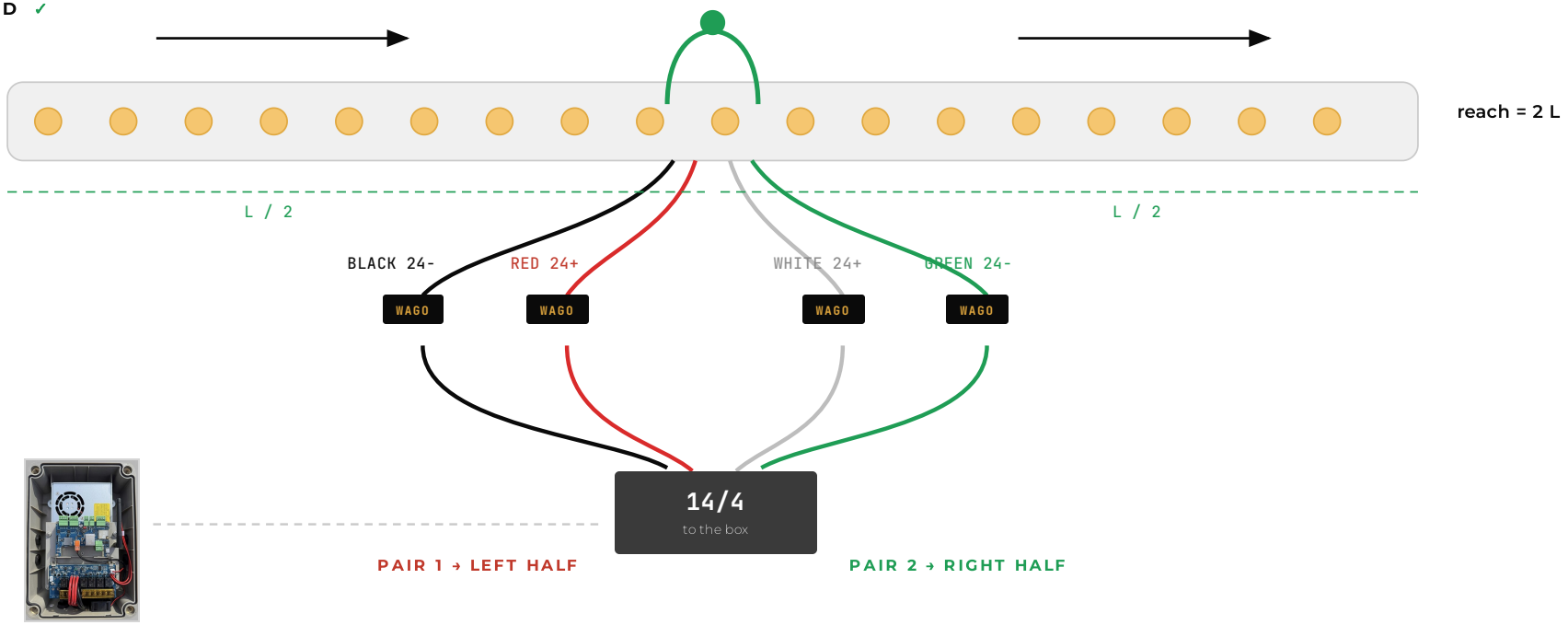
4 — WAGO on every connection, then insulate and dress into loom.

FIG. 3 — CENTRE FEED

A centre feed covers twice the distance of an end feed · power only, data still runs end to end with the arrows

A — END FEED

B — CENTRE FEED ✓



CONTROLLER WATERPROOF BOX

see Fig. 4

WHY IT WORKS

Voltage drop depends on the current **and** on the distance it travels. Feeding at the centre halves both: each half carries half the current over half the length, so the drop falls by roughly four times for the same installed length.

REMEMBER

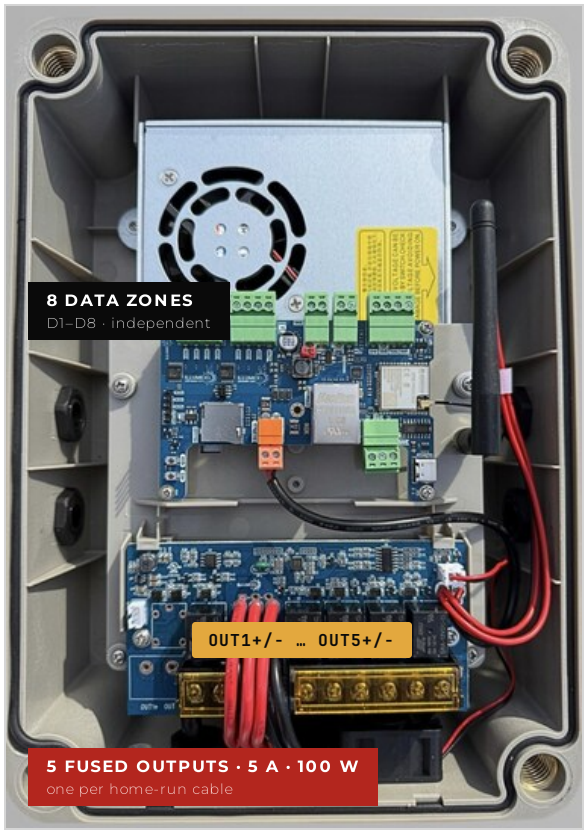
A centre feed carries **power only**. Data still enters at the input end beside the box and runs end to end, uninterrupted.

Each half keeps its own pair — exactly as at a joint (Fig. 2).

Never exceed 100 W per output. The sensing blocks it.

FIG. 4 — CONTROLLER WATERPROOF BOX

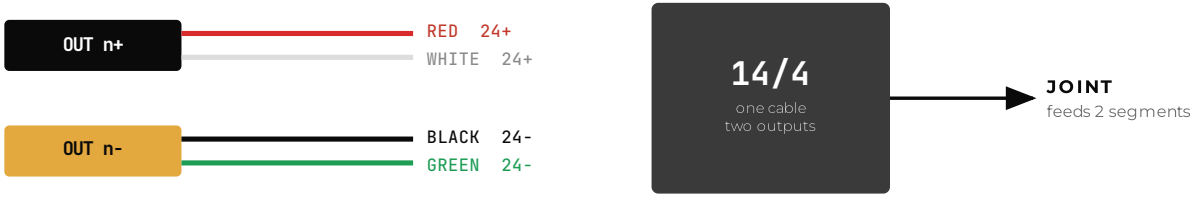
One fused output per pair · eight independent data zones · interior view



IllumiDEL 600 W controller waterproof box — interior view

ONE OUTPUT = ONE PAIR

24+ lands on OUT n+ · 24– lands on OUT n– of the same output



Each pair occupies its own fused output — 20 ft of 16 W/m strip, 18 ft of 17 W/m strip, never beyond 100 W. A 14/4 therefore uses two outputs — red/black on one, white/green on the next. Never land two pairs on the same output.

TYPICAL ASSIGNMENT

Controller waterproof box A on the Fig. 1 run — four 10 m segments

OUTPUT	CABLE	FEEDS	LOAD
OUT 1	14/2	Start of run — segment 1 (start)	80 W
OUT 2	14/4 R+B	Joint 1 — segment 1 (end)	80 W
OUT 3	14/4 W+G	Joint 1 — segment 2 (start)	80 W
OUT 4	14/4 R+B	Joint 2 — segment 2 (end)	80 W
OUT 5	–	Spare	–

Limit 100 W per output. The remaining four pairs of the Fig. 1 run land on power box B: joint 2 (W+G), joint 3 (R+B), joint 3 (W+G), and the end of run in 14/2.

600 W box: 4 outputs used × 80 W = 320 W of the 500 W available.

Data: the whole run on a single data zone. Eight data zones and five power outputs are independent counts.

NEVER

Put two pairs on the same output.

Link the 24+ of two different fused outputs.

Exceed 100 W on one output — it is a Class 2 limit.

ALWAYS

One pair = one dedicated fused output.

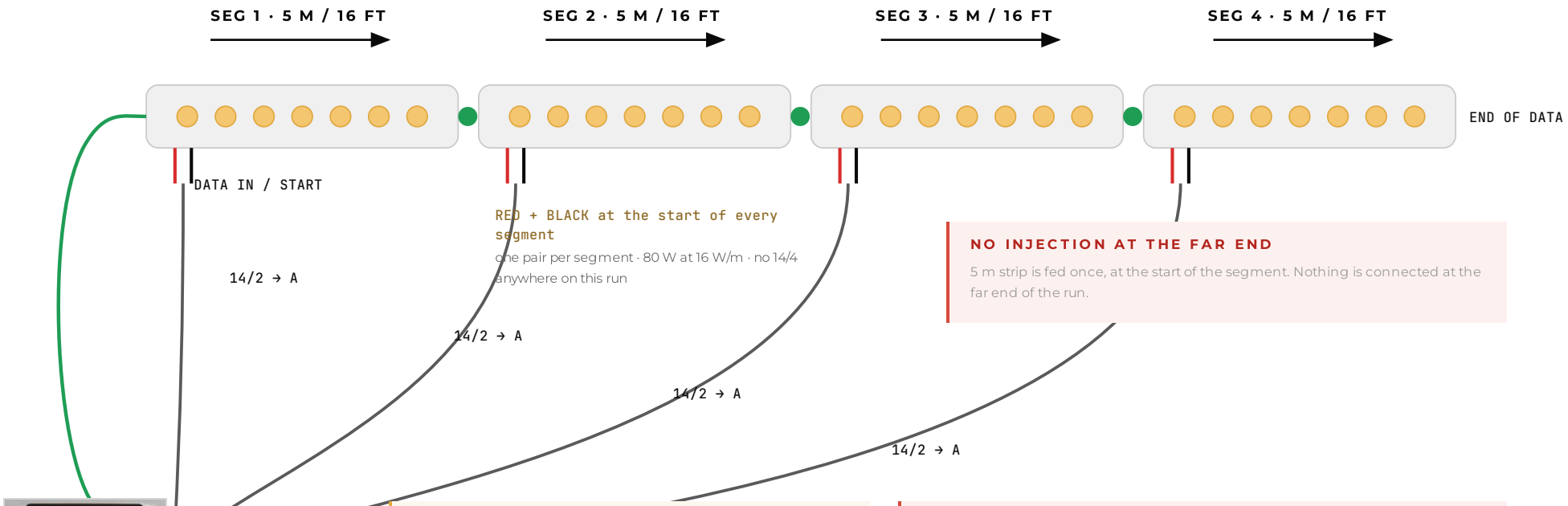
24+ on OUT n+ and 24– on OUT n– of that same output.

Label every cable where it enters the box.

Bond the 24– of the power box to a 24– terminal here — the data line needs a common reference.

FIG. 5 — RUN OVERVIEW / 5 M STRIP

Data enters beside the box and runs with the arrows · one feed per segment · no injection at the far end



A — CONTROLLER

Controller waterproof box

8 data zones + 4 or 5 outputs
4 used · 320 W

RED	24+ → start of segment
BLACK	24- → start of segment
GREEN	data — from the box, with the arrows
14/2	home run to the box

No 14/4 here — the 14/4 is only used at 10 m joints (Fig. 1).

ONE BOX IS ENOUGH

Four segments = four feed points = four pairs, so four fused outputs.

The same run in 10 m strip would need eight outputs and a second box.

DATA PASSES THROUGH EVERY JOINT

Data passes straight through: **DO (upstream) → DI (downstream)**. Never inject a second data signal at a joint.

Data enters at the input end beside the box and travels away from it, following the printed arrows.

MAX PER FUSED OUTPUT — 20 FT AT 16 W/M · 18 FT AT 17 W/M Never beyond 100 W · a 5 m segment is 16.4 ft, one output covers it

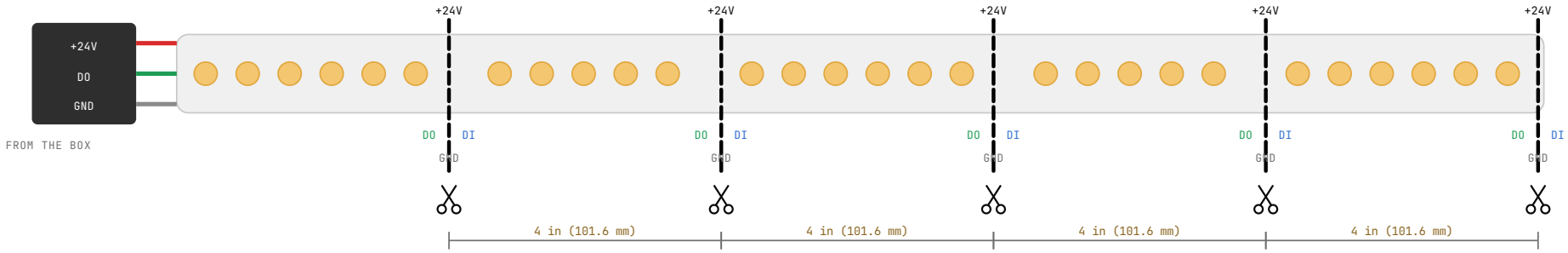
OUTPUT ASSIGNMENT

BOX	OUTPUT	CABLE / PAIR	FEEDS	LOAD
A	OUT 1	14/2 — R+B	Segment 1 (start)	80 W
A	OUT 2	14/2 — R+B	Segment 2 (start)	80 W
A	OUT 3	14/2 — R+B	Segment 3 (start)	80 W
A	OUT 4	14/2 — R+B	Segment 4 (start)	80 W
A	OUT 5	—	Spare (600 W box only)	—

Data: the whole run on a single data zone (D1). 20 m of strip · 320 W · four outputs of four (450 W box) or of five (600 W box).

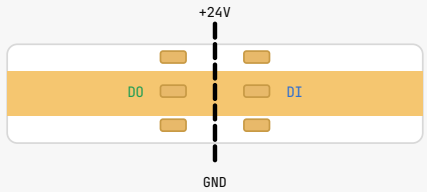
FIG. 6 — CUTTING THE STRIP

Cut only on the printed mark · DO faces the box, DI faces the outgoing side · three pads per cut point



WHERE TO CUT

Cut **only** on the printed dashed line at a marked cut point. A cut anywhere else destroys the segment — the copper track is severed between pads and the section past the cut goes dark.



Data out (DO) is on the box side of the cut. **Data in (DI)** is on the outgoing side. +24V and GND sit on both sides of the same cut.

PAD AND CONDUCTOR LEGEND

+24V	power — red
DO	data out — green
DI	data in — receiving side
GND	ground — black
PAD	exposed copper

The strip's green is DATA. In a 14/4 home run, green is 24– — see Fig. 2.

CUTTING INTERVAL

4 in

101.6 mm

every 12 LED segments

NEVER CUT A LIVE STRIP

Disconnect the box first. Cutting under power shorts the pads across the blade.

HOW TO CUT

1 FIND THE MARK

Locate the printed cut line. DO is on the box side, DI on the outgoing side.

2 CUT STRAIGHT

Sharp scissors or a precision cutter, square across, straight through the copper pads.

3 SEPARATE

Part the two pieces gently. Never pull on the COB silicone — it lifts the phosphor.

4 SEAL, THEN RECONNECT

Cut end / termination: COB end cap in silicone or epoxy. **Soldered joint:** heat shrink each conductor as well. See 06.1 and Fig. 7.

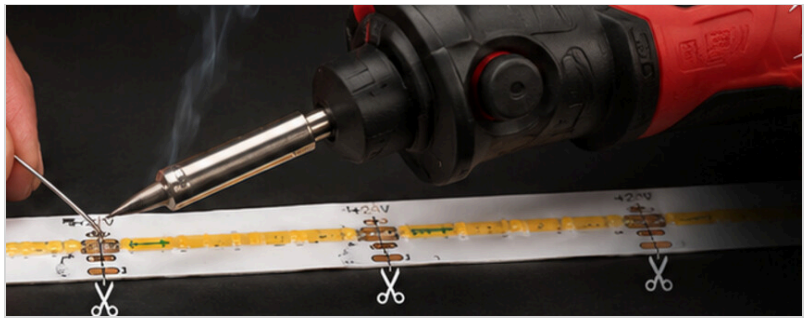
RECONNECTION — DO OF ONE PIECE GOES TO DI OF THE NEXT

Data direction is preserved across every cut · +24V to +24V, GND to GND

A cut piece rejoined the wrong way round breaks the chain: the section past the joint receives nothing and stays at its power-on colour. Confirm the arrows still point the same way on both pieces before sealing, and test the run before the diffuser goes on.

FIG. 7 — SOLDERING THE STRIP

The default method at every injection and every joint on a visible run · three pads, three conductors



Fine point on the pad · solder fed from the side · cut marks visible on the strip

RECOMMENDED TOOL

Milwaukee M12 soldering iron

Fast heat-up · stable recovery · sized for field work. Its tip is **not adjustable** — it runs at 400 °C. That is usable here, but the hotter the tip, the less dwell the pad tolerates.

What matters is recovery, not wattage. The V2 double-layer 3 oz circuit pulls heat out of the pad quickly, so the tip must hold temperature rather than sag between joints. An iron that sags forces the long dwell that lifts pads.

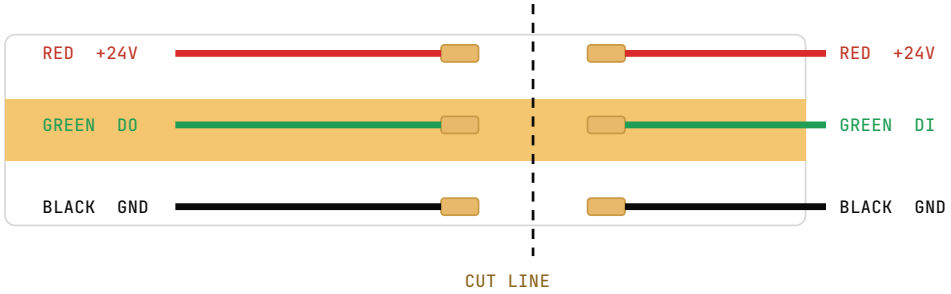
IRON SETTINGS

ADJUSTABLE IRON	340–360 °C 644–680 °F
MILWAUKEE M12	400 °C fixed 750 °F · not adjustable
TIP	Fine point
SOLDER	60/40 rosin core

WHAT LANDS ON WHICH PAD

Three pads on each side of every cut mark. The centre pad changes name across the cut — **DO** on the side facing the box, **DI** on the side facing away.

Tin the pad first, then the conductor, then bring the two together. Feeding solder into a cold joint is what produces the dull grey bead that fails a season later.



DO GOES TO DI

Across a joint, the DO of the upstream piece lands on the DI of the downstream piece. +24V to +24V, GND to GND. See Fig. 6.

TWO SECONDS PER PAD

The rule holds at any tip temperature and matters most at 400 °C. Beyond two seconds the pad lifts and the segment is scrap. A joint that will not flow in two seconds means a dirty tip, not too little dwell.

HOW TO SOLDER

1 PREPARE

Strip and tin all three conductors. Red to +24V, green to DO, black to GND. A tinned conductor takes a fraction of the heat an untinned one does.

2 TACK

Lay the tinned conductor on the tinned pad and touch the iron briefly to tack it in place. Nothing is fed at this stage.

3 SOLDER

Heat pad and conductor together, then feed solder until it flows and wets both. Two seconds, then off.

4 REPEAT

Work the remaining pads one at a time, letting the strip cool between them. Never bridge two pads with a single bead.

5 INSPECT AND SEAL

A sound joint is shiny, smooth and immovable. Heat shrink each conductor. Then seal the cut face separately — COB end cap in silicone or epoxy.

BEFORE THE DIFFUSER GOES ON

Every soldered run is powered up and tested before it is closed

- Keep the tip clean and tinned. A dirty tip transfers heat badly and forces a longer dwell.
- Rosin core only. Acid core corrodes the pad from underneath and the joint fails months later.
- Never solder a live strip. Disconnect the box before any work on the pads.
- **Soldered joint:** heat shrink each conductor. **Cut end / termination:** COB end cap in silicone or epoxy. Heat shrink alone does not restore the IP rating.