CENTRAL NODE · PARTS

Boat 1 · A3 · v10.5 · TICONN IP67, 17.7 x 13.8 x 7.9 in, near the battery and bus board

A



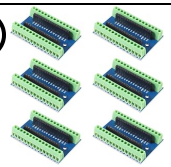
Box, TICONN IP67, 17.7 x 13.8 x 7.9 in, clear lid
Inside 16-7/8 x 12-7/8 x 7-1/2 in; plate 15-7/8 x 11-3/4 in. Amazon B0BZR3M8PK, $94.99

B



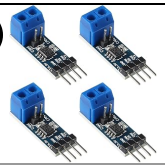
NUCLEO-G431KB
The node's brain. Solder links stay as shipped
1 · have

C



Nano screw carrier (AITRIP)
Nucleo plugs in; every pin on a screw
1 · have

D



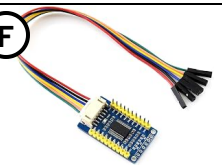
CAN board SN65HVD230
120 ohm snipped off. Header stays: 4-pin plug, 24 AWG, zip-tied
1 · have; plug: buy

E



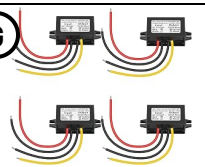
CAN surge part, Taidacent RS-12V/2S
Middle rail, left end. Ground to 0 V
1 · have

F



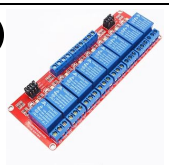
Expander, Waveshare MCP23017
Relay coils, cut relay, 4 inputs. Screw blocks on
1 · have

G



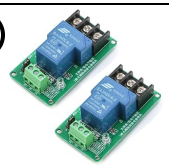
24 to 5 V converter, Klnuoxj
Potted. On the top wall, inside
1 · check shelf

H



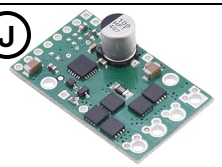
Relay boards, HiLetgo 24 V, 8 ch
Board 1: ch 1 to 8. Board 2: ch 9 to 16
2 · check shelf

I



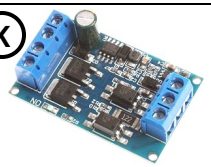
30 A relays, HiLetgo 24 V
Enable relay (coil D3), cut relay (coil PA4)
2 · have

J



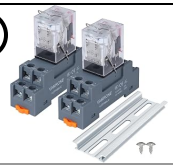
Steering drive, Pololu G2 24v13
Drives the Ewellix. On a G10 pad
1 · have

K



MOSFET modules, 600 W
One per release ch 1 to 6
6 · have

L



Reversing relays MY2NJ, DIN sockets
Pullers ch 3 to 6. On the right wall, upper part, short DIN rail. Coils on ch 11

N

red stud breaker

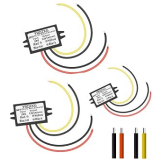
Puller breakers, GLOSO E512 6 A auto-reset
Stud type, covers on. Right wall, below the relays
4 · have (5-pack)

M



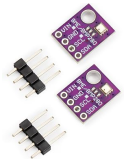
Opto board, Fafeicy 8 ch
Input 1: pump 1 running
1 · have

O



Light converters, YRDZXG 24 to 12 V
Bow lantern, whites. Top wall (open)
2 · have

P



BME280 barometer
Air pressure and the box's damp. On I2C
1 · have

Q



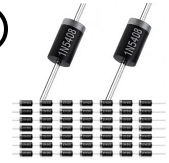
Horn inline fuse holder, 5 A
Sealed. After ch 13
1 · check: 9 on hand

R



DIN fuse holders and slow-blow fuses
5 x 20 mm: 5 A x2, 3 A, 2 A x3, 0.5 A
7 · count holders

S



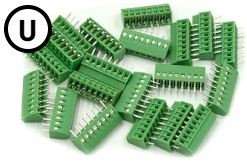
Diodes 1N5408 x4, 1.5KE33CA x1
1N5408 at each socket; 1.5KE33CA 32 to 39
5 · have

T



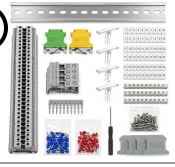
Resistors, 1/4 W
1k (steering position wire), 4.7k x2 (probe chains)
3 · have (kit)

U



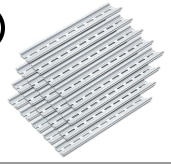
Screw blocks, 0.1 in, 8-way (Hxchen)
Soldered on the G2 and expander
5 · have (kit)

V



DIN screw blocks, UK2.5B type
65 blocks, bridges, partitions, end stops
65 · count the kits

W



DIN rail, 35 mm
Top, middle, bottom and socket rails
4 · check shelf

X



Glands PG9 x8, PG11 x3, PG11 or 13.5 x2
Plus Altelix split glands, 4-port (right) and 5-port (bottom), and the M12 vent

Y



Ferrites, mix 31
Outside, below glands 7, 17a, 17b, 18
4 · have

Z

wire, ferrules, G10

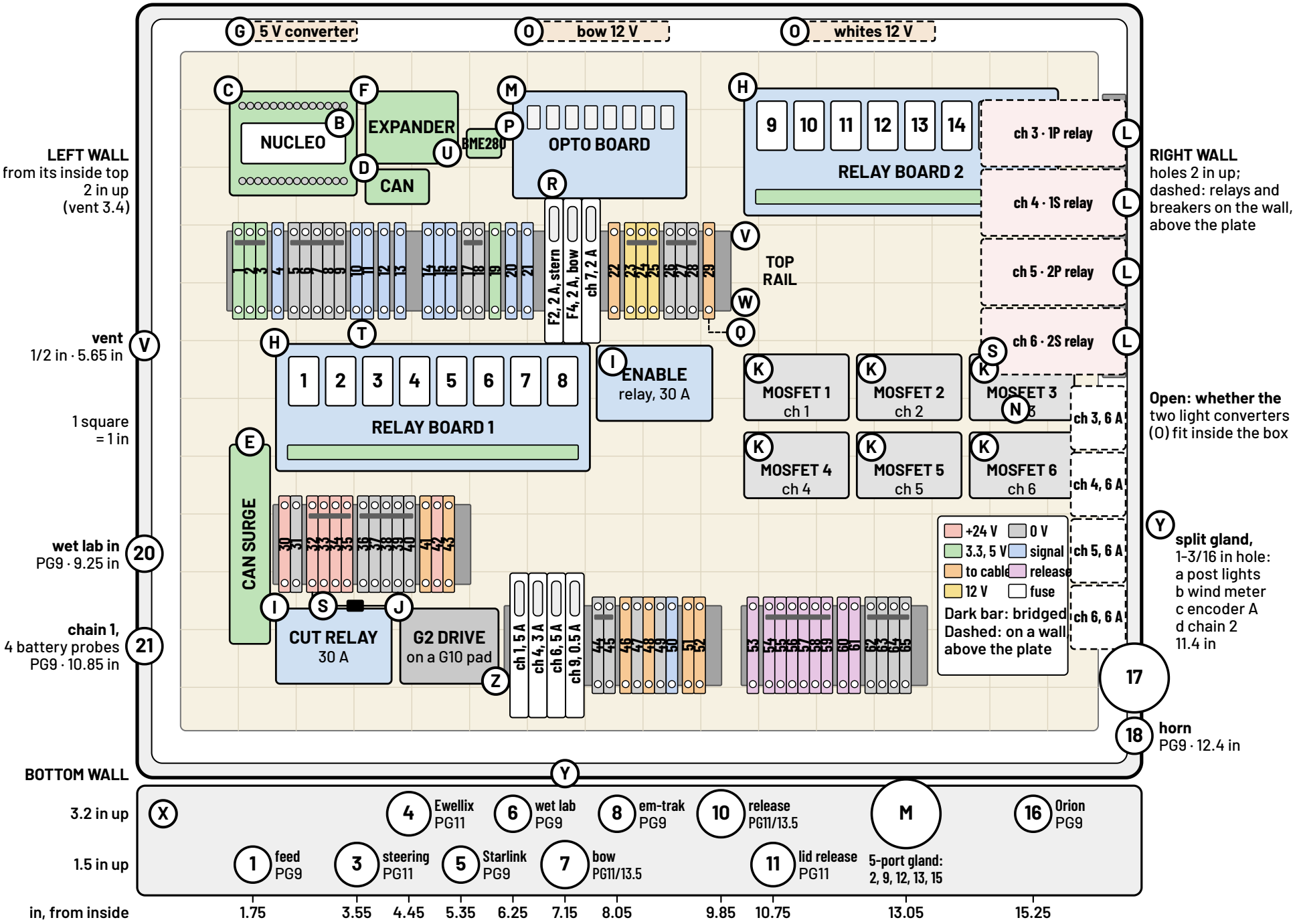
Wire, ferrules, labels; G10 pads; coat
22 AWG kit; 16 to 12 AWG offcuts. Coat not picked
1 · have; coat open

OPEN, NOT SETTLED YET

- Whether the two light converters (O) fit inside (here: top wall).
- Glands 7, 10: PG11 or PG13.5 (measure the 12/2 jacket).
- Puller fuse sizes: from the one-puller bench test.
- Release bus readback (expander PB6): no board carries it.
- Not drawn: surge diodes at glands 3, 10, 20.
- Ch 2: does podlink already switch the wet lab?
- Waiting on Mike: encoder and pot 3.3 V off the Nucleo; Ewellix feedback's own PG7; a Starlink ferrite; horn fuse on DIN; UV-C LM317 here; no humidity board.

CENTRAL NODE · LAYOUT

TICONN, inside 16-7/8 x 12-7/8 x 7-1/2 in · lid off · to scale · drill: PG7 1/2, PG9 5/8, PG11 3/4, PG13.5 13/16 in · top wall: no holes · letters: page 1



LEFT WALL
from its inside top
2 in up
(vent 3.4)

vent V
1/2 in · 5.65 in

1 square
= 1 in

wet lab in 20
PG9 · 9.25 in

chain 1, 21
4 battery probes
PG9 · 10.85 in

BOTTOM WALL

3.2 in up

1.5 in up

in, from inside

RIGHT WALL
holes 2 in up;
dashed: relays and breakers on the wall, above the plate

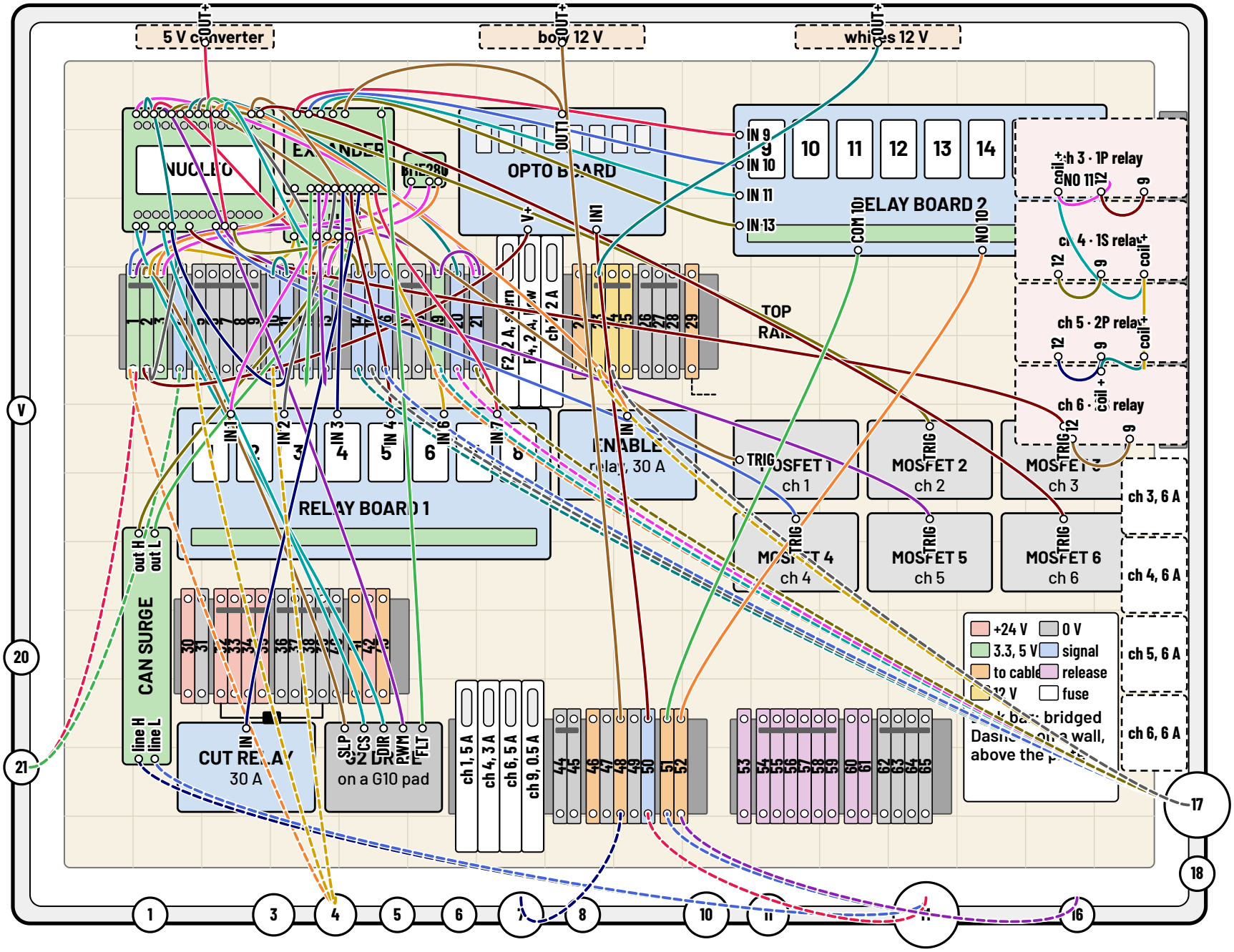
Open: whether the two light converters (O) fit inside the box

split gland, Y
1-3/16 in hole:
a post lights
b wind meter
c encoder A
d chain 2
11.4 in

horn 18
PG9 · 12.4 in

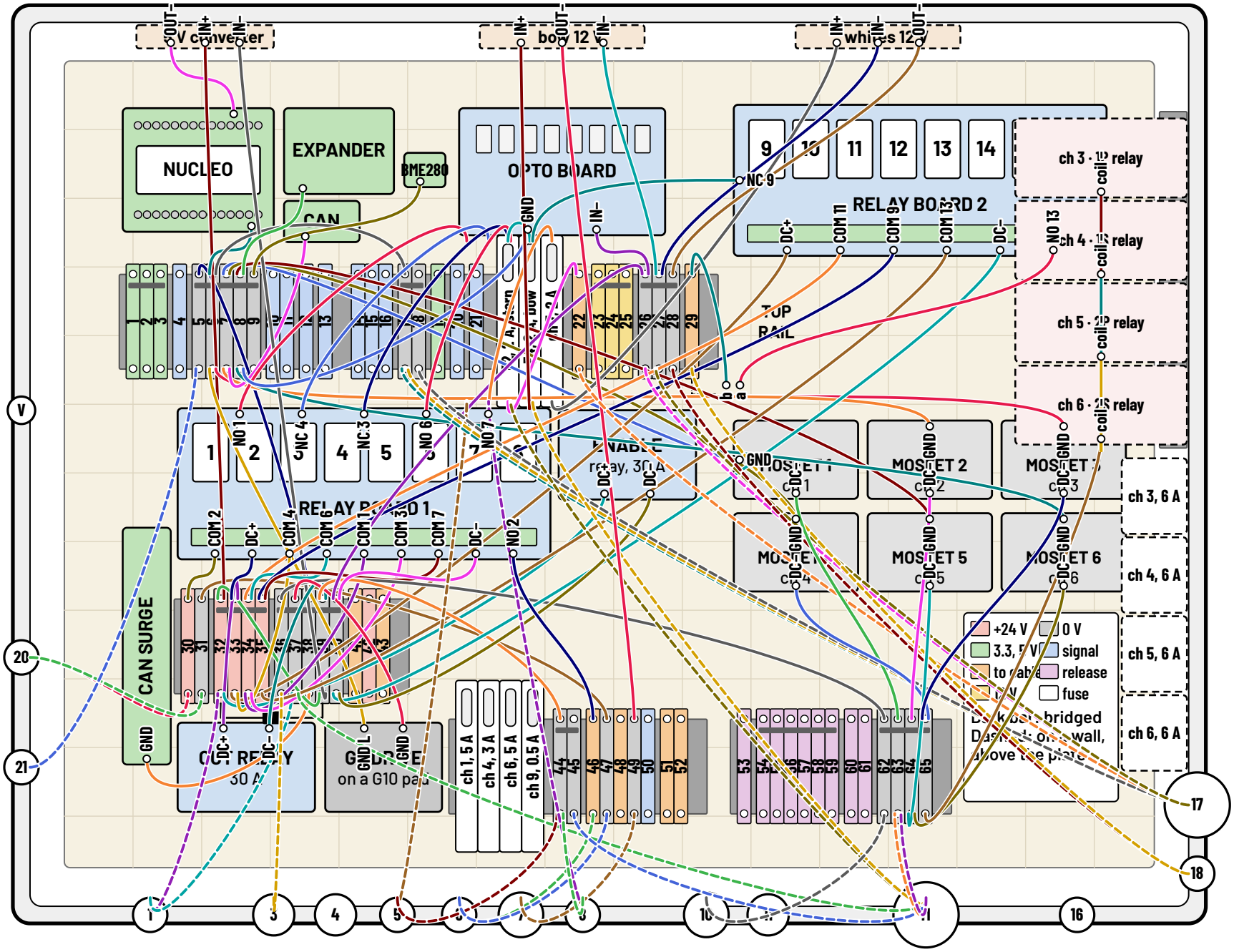
CENTRAL NODE · WIRES ON THE LAYOUT: CONTROL AND SENSORS

each wire its own color · dashed = to a hole · Nucleo corner pins: page 6



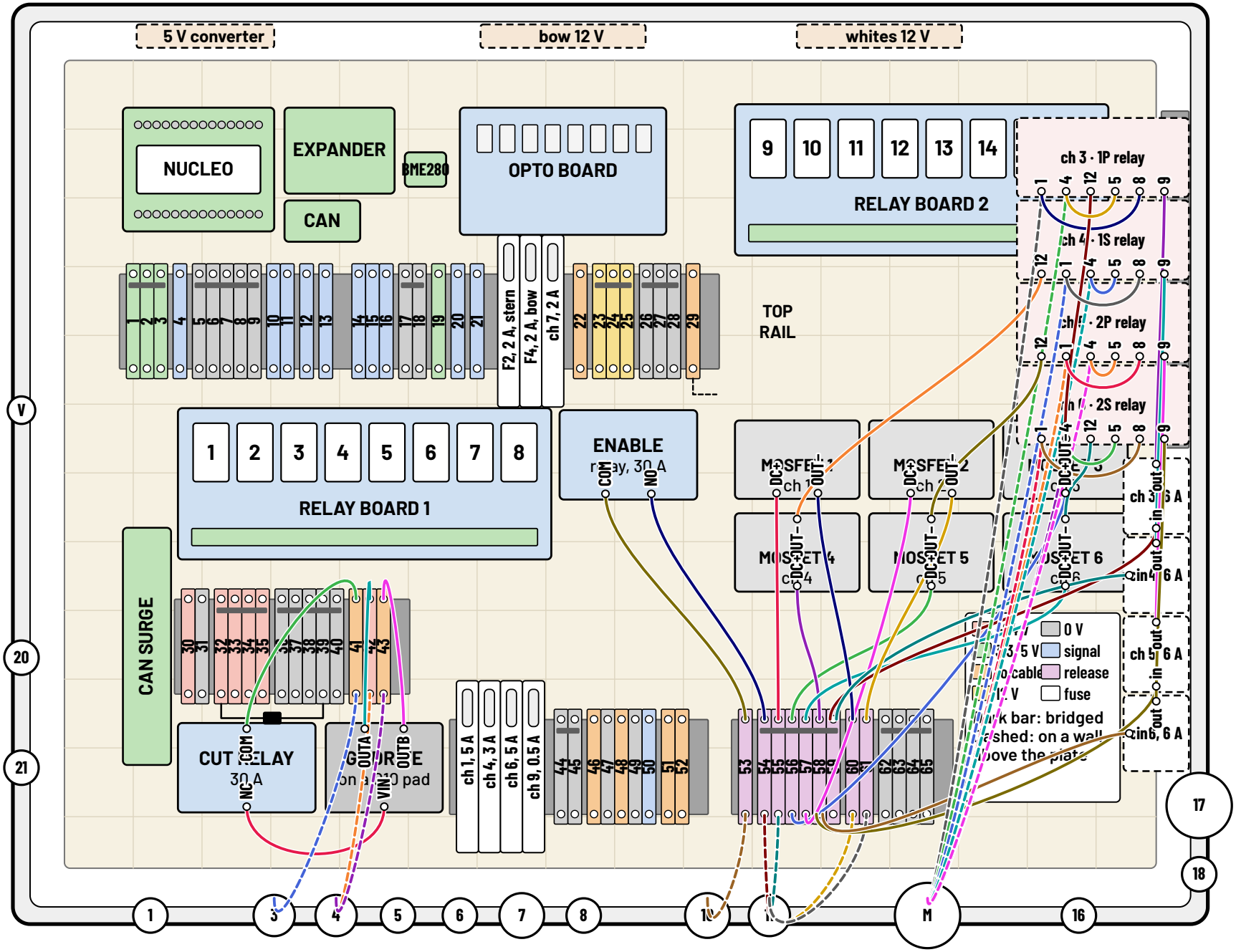
CENTRAL NODE · WIRES ON THE LAYOUT: POWER AND 0 V

each wire its own color · dashed = to a hole · Nucleo corner pins: page 6



CENTRAL NODE · WIRES ON THE LAYOUT: RELEASE AND STEERING MOTOR

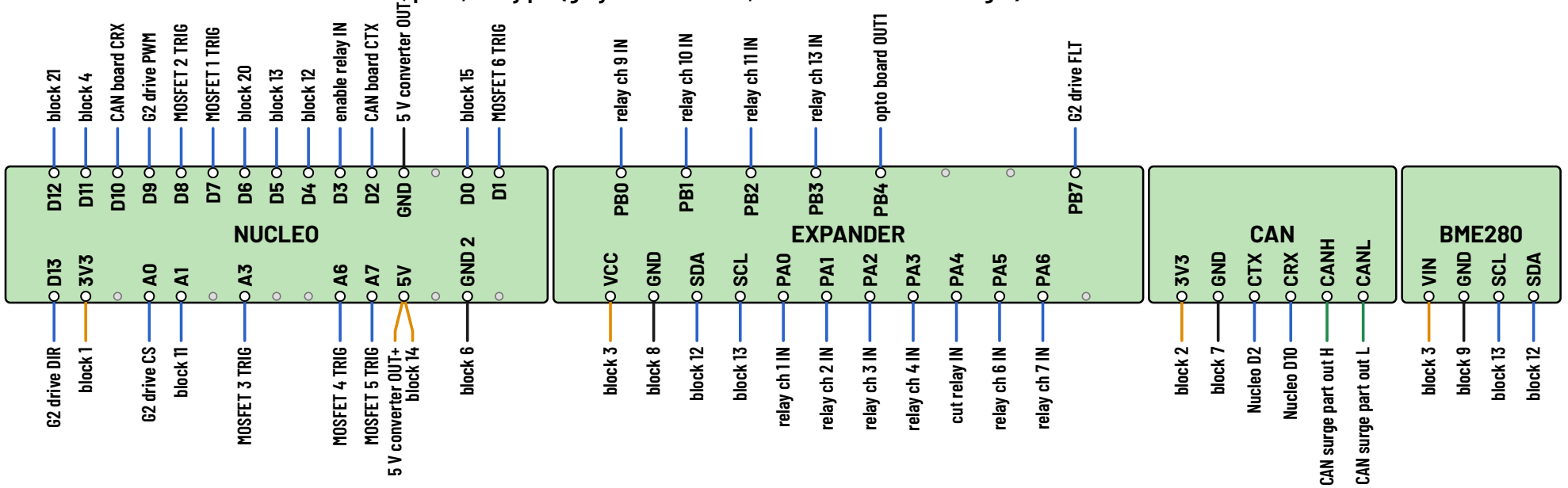
each wire its own color · dashed = to a hole · Nucleo corner pins: page 6



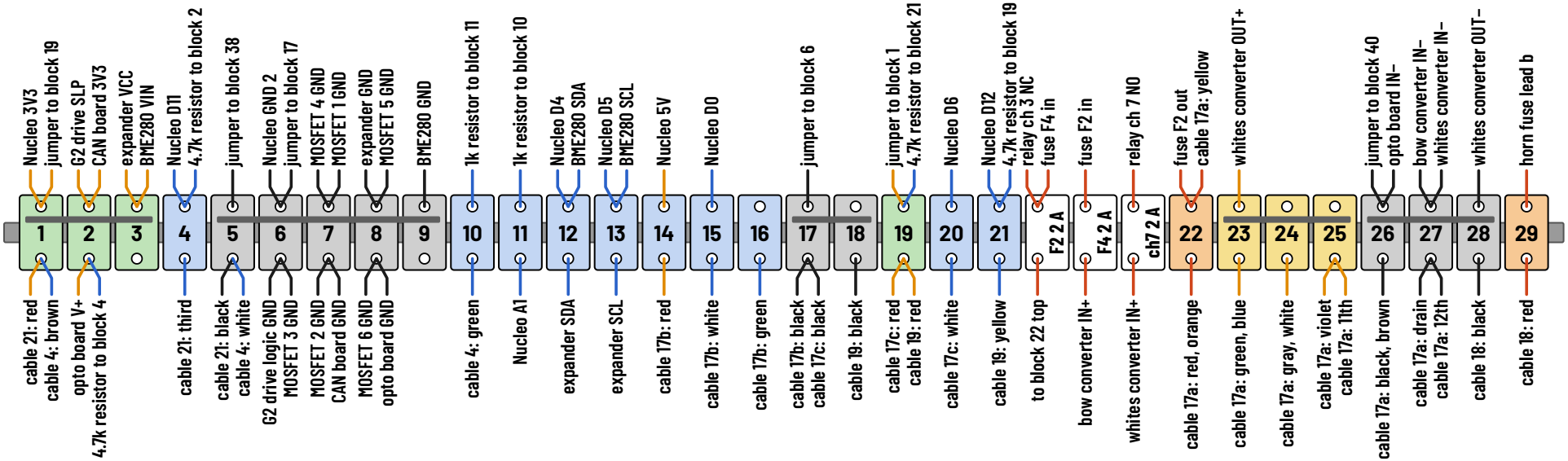
CENTRAL NODE · NUCLEO CORNER AND TOP RAIL

every pin and every screw, and what lands on it

NUCLEO CORNER: the small boards at the top left, every pin (gray dots: not used; Nucleo USB end to the right)



TOP RAIL: blocks 1 to 29 and the light fuses



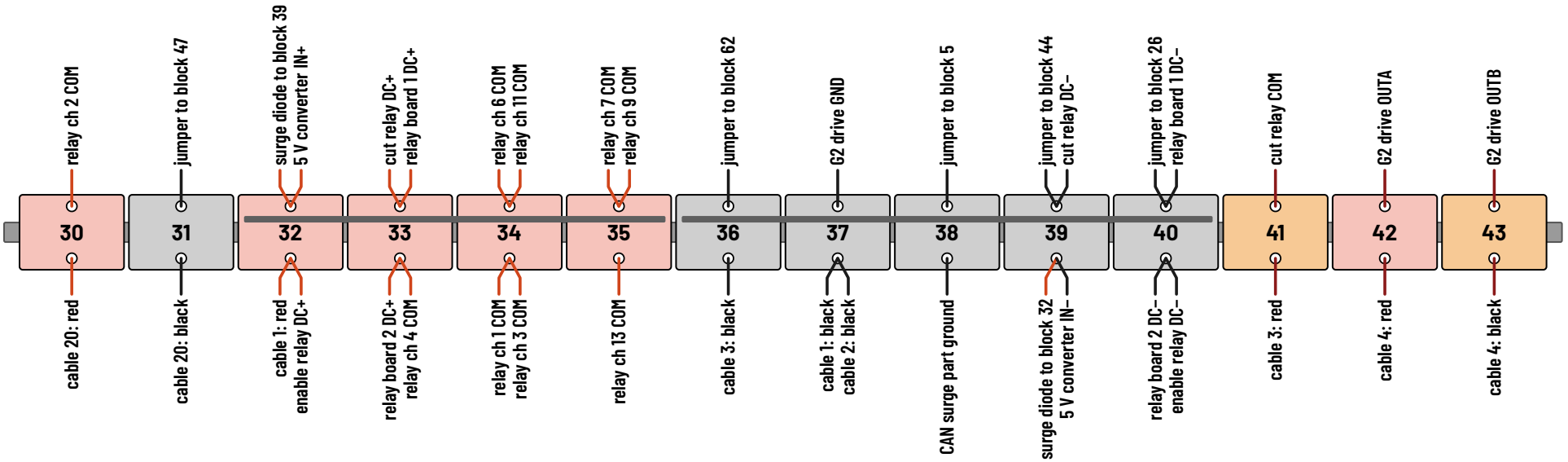
Each line is one wire; its label says where the other end goes. Top screw faces the boards, bottom screw the wall holes. Two lines on a screw share a twin ferrule. Dark bar = bridged. Fuses: in at the top, out at the bottom. Jumper = a short wire to another block. Cable 21: red = the red wire of cable 21 (page 2 shows its hole).

24 V · 0 V · 3.3, 5 V · release · steering motor · CAN · signal

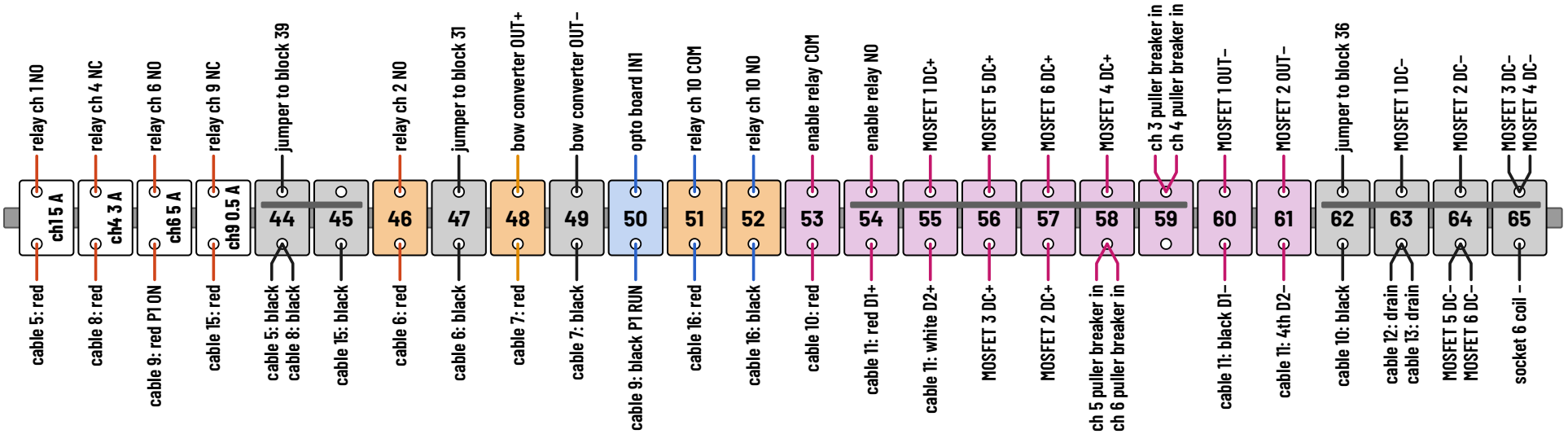
CENTRAL NODE · MIDDLE AND BOTTOM RAIL CLOSE-UP

every screw and what lands on it

MIDDLE RAIL: power and steering



BOTTOM RAILS: load fuses and loads (left), release (right)



Each line is one wire; its label says where the other end goes. Top screw faces the boards, bottom screw the wall holes. Two lines on a screw share a twin ferrule. Dark bar = bridged. Fuses: in at the top, out at the bottom. Jumper = a short wire to another block. Cable 21: red = the red wire of cable 21 (page 2 shows its hole).

24 V · 0 V · 3.3, 5 V · release · steering motor · CAN · signal

CENTRAL NODE · EVERY WIRE

b bottom screw, t top · (16) 16 AWG · (two 22) two 22 AWG, one ferrule · else 22 AWG · circled = cable number

TOP RAIL: BLOCK, JOB, WIRES

1-3 3.3 V, joined:

1 b: ㉑ red, ④ brown. t: Nucleo 3V3, to 19

2 b: opto V+, 4.7k to 4. t: G2 SLP, CAN board 3V3

3 t: expander VCC, BME280 VIN

4 chain 1 data. b: ㉑ third. t: Nucleo D11, 4.7k to 2

5-9 logic 0 V, joined:

5 b: ㉑ black, ④ white. t: join (two 22) to 38

6 b: G2 logic GND, MOSFET 3 GND. t: Nucleo GND 2, to 17

7 b: MOSFET 2 GND, CAN board GND. t: MOSFET 4, 1 GND

8 b: MOSFET 6 GND, opto GND. t: expander GND, MOSFET 5 GND

9 t: BME280 GND

10 wiper in. b: ④ green. t: 1k to 11

11 wiper out. b: Nucleo A1. t: 1k to 10

12 SDA. b: expander SDA. t: Nucleo D4, BME280 SDA

13 SCL. b: expander SCL. t: Nucleo D5, BME280 SCL

14 wind 5 V. b: ⑰b red. t: Nucleo 5V

15 wind data out. b: ⑰b white. t: Nucleo D0

16 wind green, parked. b: ⑰b green

17-18 0 V, joined:

17 b: ⑰b, ⑰c black. t: to 6

18 b: ⑲ black

19 3.3 V. b: ⑰c, ⑲ red. t: to 1, 4.7k to 21

20 encoder pulse. b: ⑰c white. t: Nucleo D6

21 chain 2 data. b: ⑲ yellow. t: Nucleo D12, 4.7k to 19

22 stern light +. b: ⑰a red, orange. t: F2 out (16), ⑰a yellow

23-25 whites 12 V +, joined:

23 b: ⑰a green, blue. t: whites converter OUT+

24 b: ⑰a gray, white

25 b: ⑰a violet, 11th

26-28 0 V, joined:

26 b: ⑰a black, brown. t: to 40 (16), opto IN–

27 b: ⑰a drain, 12th. t: bow, whites converter IN–

28 b: ⑱ black. t: whites converter OUT–

29 horn +. b: ⑱ red. t: horn fuse lead b

FUSES (LIGHT FUSES ON THE TOP RAIL, LOAD FUSES ON THE BOTTOM RAIL): IN AT T, OUT AT B

F2 (2 A) stern light. t: ch 3 NC (16), F4 in (16). b: to 22t (16)

F4 (2 A) bow lantern. t: F2 in (16). b: bow converter IN+

ch 1 (5 A) Starlink. t: ch 1 NO (16). b: ⑤ red

ch 4 (3 A) em-trak. t: ch 4 NC (16). b: ⑧ red

ch 6 (5 A) bilge 1 on. t: ch 6 NO (16). b: ⑨ red P1 ON

ch 7 (2 A) whites. t: ch 7 NO (16). b: whites converter IN+

ch 9 (0.5 A) UV-C. t: ch 9 NC. b: ⑮ red

MIDDLE RAIL: BLOCK, JOB, WIRES

30 wet lab +. b: ⑳ red. t: ch 2 COM (16)

31 wet lab –. b: ⑳ black. t: to 47 (16)

32-35 +24 V, joined:

32 b: ① red, enable relay DC+. t: surge diode to 39, KInuoxj IN+

33 b: relay board 2 DC+ (16), ch 4 COM (16). t: cut relay DC+, relay board 1 DC+ (16)

34 b: ch 1, 3 COM (16). t: ch 6, 11 COM (16)

35 b: ch 13 COM (16). t: ch 7, 9 COM (16)

36-40 0 V, joined:

36 b: ③ black. t: to 62 (12)

37 b: ①, ② black. t: G2 GND (14)

38 b: surge part ground (two 22). t: join (two 22) to 5

39 b: surge diode to 32, KInuoxj IN–. t: to 44 (16), cut relay DC–

40 b: relay board 2 DC– (16), enable relay DC–. t: to 26 (16), relay board 1 DC– (16)

41 steer +. b: ③ red. t: cut relay COM (14)

42 motor A. b: ④ red. t: G2 OUTA (14)

43 motor B. b: ④ black. t: G2 OUTB (14)

BOTTOM RAIL, LOADS: BLOCK, JOB, WIRES

44-45 0 V, loads, joined:

44 b: ⑤, ⑧ black. t: to 39 (16)

45 b: ⑮ black

46 wet lab out +. b: ⑥ red. t: ch 2 NO (16)

47 wet lab –. b: ⑥ black. t: to 31 (16)

48 bow 12 V +. b: ⑦ red. t: bow converter OUT+

49 bow 12 V –. b: ⑦ black. t: bow converter OUT–

50 P1 RUN. b: ⑨ black P1 RUN. t: opto IN1

51 Orion remote H. b: ⑯ red. t: ch 10 COM

52 Orion remote L. b: ⑯ black. t: ch 10 NO

BOTTOM RAIL, RELEASE: BLOCK, JOB, WIRES

53 release feed +. b: ⑩ red. t: enable relay COM (12)

54-59 release bus, joined:

54 b: ⑪ red D1+. t: enable relay NO (12)

55 b: ⑪ white D2+. t: MOSFET 1 DC+ (two 22)

56 b: MOSFET 3 DC+ (two 22). t: MOSFET 5 DC+ (two 22)

57 b: MOSFET 2 DC+ (two 22). t: MOSFET 6 DC+ (two 22)

58 b: ch 5, 6 puller breaker in (16). t: MOSFET 4 DC+ (two 22)

59 t: ch 3, 4 puller breaker in (16)

60 drogue 1 –. b: ⑪ black D1–. t: MOSFET 1 OUT– (14)

61 drogue 2 –. b: ⑪ 4th D2–. t: MOSFET 2 OUT– (14)

62-65 release 0 V, joined:

62 b: ⑩ black. t: to 36 (12)

63 b: ⑫, ⑬ drain. t: MOSFET 1 DC– (14)

64 b: MOSFET 5, 6 DC– (16). t: MOSFET 2 DC– (14)

65 b: socket 6 coil –. t: MOSFET 3, 4 DC– (16)

OFF THE RAIL: PART, PINS

Nucleo Pin map. 5V, GND ← KInuoxj. 3V3 1t. GND 2 6t. D0 15t (listen only). D1 MOSFET 6 TRIG. D2 CAN CTX. D3 enable relay IN. D4 12t. D5 13t. D6 20t. D7, D8 MOSFET 1, 2 TRIG. D9 G2 PWM. D10 CAN CRX. D11 4t. D12 21t. D13 G2 11b. A3, A6, A7 MOSFET 3, 4, 5 TRIG. A2, A4, A5 never used; solder links as shipped.

Expander Pin order: Claude's pick. VCC 3t. GND 8t. SDA 12b. SCL 13b. PA0-3 ch 1-4 IN, PA4 cut relay IN, PA5-6 ch 6-7 IN, PB0-2 ch 9-11 IN, PB3 ch 13 (horn) IN. PA7, PB5, PB6 open. PB4 ← opto OUT1. PB7 ← G2 FLT (pull-up set in firmware).

Relay bd 1 ch 1-8. DC+ 33t, DC– 40t. IN1-4, 6-8 ← PA0-3, 5-7. COM: ch 1 34b, 2 30t, 3 34b, 4 33b, 6 34t, 7 35t. 1 NO ch 1 fuse; 2 NO 46t; 3 NC F2; 4 NC ch 4 fuse; 6 NO ch 6 fuse; 7 NO ch 7 fuse. 5, 8 empty.

Relay bd 2 ch 9-16. DC+ 33b, DC– 40b. IN1-3 (ch 9-11) ← PB0-2, IN5 (ch 13) ← PB3. COM: ch 9 35t, 10 51t, 11 34t, 13 35b. 9 NC ch 9 fuse; 10 NO 52t; 11 NO socket 3 coil +; 13 NO horn fuse. 12, 14-16 empty.

30 A relays Enable: DC+ 32b, DC– 40b, IN ← D3, COM 53t, NO 54t. **Cut:** DC+ 33t, DC– 39t, IN ← PA4, COM 41t, NC → G2 VIN (14).

G2 drive VIN ← cut relay NC. GND 37t. OUTA 42t, OUTB 43t. PWM ← D9, DIR ← D13, CS → A0, FLT → PB7. SLP 2t. Logic GND 6b. VREF, 3V3 empty.

MOSFETs 1-6. DC+: 1, 2 55t; 3, 4 56b; 5, 6 56t. DC–: 1 63t; 2 64t; 3, 4 65t; 5, 6 64b. OUT–: 1 60t; 2 61t; 3-6 socket 3-6 pin 12 (16). TRIG ← D7, D8, A3, A6, A7, D1, each twisted with its GND: 1, 2 7t; 3, 4 6b; 5, 6 8t.

Sockets 3-6 Reversing relays; ch 3 1P, 4 1S, 5 2P, 6 2S (Claude's pick). Pin 9 ← its 6 A breaker (16), 1N5408 stripe; 12 ← its MOSFET OUT– (16), 1N5408; jumpers 1 to 8, 4 to 5 (16); 1 cable +, 4 cable –. Coils chained 3 to 6: + from ch 11 NO, – to 65b.

CAN Surge part (middle rail, left end): line H, L ← ② white, blue; out H, L → CAN board CANH, CANL (twisted); ground 38b. **CAN board:** 3V3 2t, GND 7b, CTX ← D2, CRX → D10.

I2C boards BME280: VIN 3t, GND 9t, SDA 12t, SCL 13t.

Puller breakers Four GLOSO E512 6 A auto-reset, stud type, on the right wall below the relays. Line stud ← release bus 59t (16, ring lug); load stud → its socket's pin 9 (16, ring lug). Covers on.

Opto board IN1 50t. IN– 26t. V+ 2b. GND 8b. OUT1 PB4.

Top wall KInuoxj: IN+ 32t, IN– 39b, OUT+, OUT– Nucleo 5V, GND. **Bow:** IN+ ← F4, IN– 27t, OUT+ 48t, OUT– 49t (leads lengthened in 16 AWG). **Whites:** IN+ ← ch 7 fuse, IN– 27t, OUT+ 23t, OUT– 28t.

Horn fuse Inline 5 A: lead a ← ch 13 NO, lead b 29t.

CABLES IN: CABLE, CORES (THE HOLE EACH COMES IN BY: PAGE 2)

① **node feed 16/2.** red 32b, black 37b

② **CAN drop.** white, blue surge part line H, L; black 37b; red, drain cut

③ **steering 14/2.** red 41b, black 36b

④ **Ewellix.** red 42b, black 43b, brown 1b, white 5b, green 10b

⑤ **Starlink 16/2.** red ch 1 fuse, black 44b

⑥ **wet lab out 16/2.** red 46b, black 47b

⑦ **bow lantern 12/2.** red 48b, black 49b

⑧ **em-trak 16/2.** red ch 4 fuse, black 44b

⑨ **bilge 18/4.** red P1 ON ch 6 fuse, black P1 RUN 50b; white, 4th, drain cut

⑩ **release feed 12/2.** red 53b, black 62b

⑪ **lid release 14/4.** red D1+ 54b, black D1– 60b, white D2+ 55b, 4th D2– 61b

⑫ **port pullers 18/4.** red 1P+, black 1P– socket 3 pins 1, 4; white 2P+, 4th 2P– socket 5 pins 1, 4; drain 63b

⑬ **stbd pullers 18/4.** red 1S+, black 1S– socket 4 pins 1, 4; white 2S+, 4th 2S– socket 6 pins 1, 4; drain 63b

⑮ **UV-C 22/12.** red ch 9 fuse, black 45b; 10 others, drain cut

⑯ **Orion 16/2.** red 51b, black 52b

⑰a **post lights 22/12.** red, orange 22b + yellow 22t; green, blue 23b + violet 25b; gray, white 24b + 11th 25b; black, brown 26b + 12th 27b; drain 27b

⑰b **wind meter 22/12.** red 14b, black 17b, white 15b, green 16b; 8 others, drain cut

⑰c **encoder A 6504FE.** red 19b, black 17b, white 20b; green, blue, brown, drain cut

⑱ **horn 16/2.** red 29b, black 28b

⑲ **chain 2 22/12, other probes.** red 19b, black 18b, yellow 21b; 9 others, drain cut

⑳ **wet lab line 16/2.** red 30b, black 31b

㉑ **chain 1 20/3, the 4 battery probes.** red 1b, black 5b, third 4b

Ⓥ **vent**, M12 membrane, left wall

BEFORE WIRING; WIRE AND ENDS

Nucleo: check it says G431KB; solder links stay as shipped. Screw blocks soldered on the G2 and the BME280. CAN board: snip its 120 ohm off with flush cutters; its header stays, a 4-pin plug (24 AWG) on it, zip-tied, a dab of silicone, a paint dot at pin 1 on plug and board. Burn-in, coat, stake: Compute Bay 10.2. Trigger jumper H on both 30 A relays (and any on the relay boards), glued. Read each MY2NJ's coil + and – off it. Measure the 12/2 jacket before drilling 7 and 10.

Wire and ends: At most two wires per screw, in a twin ferrule; a two-22 pair or a 12 or 14 AWG wire fills a screw. Ferrule on every end; label both ends (D1+, 1P+, P1 ON, P1 RUN). P1 RUN is 24 V while pump 1 runs: colored heat shrink, never on 0 V. Write the real 4th and 22/12 colors at first cut. Sealant in duplex glands. Work dead: line 3, 4, 5, 9 lugs lifted.