

casIO4

INSTALLATION + COMMISSIONING GUIDE

Four-channel Casambi dry-contact interface
Hardware reference: casIO4

Project:
Profile:
Contact:



PRODUCT ROLE casIO4 connects four low-voltage dry-contact points to a Casambi network. It does not generate DMX or 0-10 V, and it does not power field loads.

At a glance	Verified installation value
Power	12-24 VDC, Class 2; less than 30 mA input current
Channels	Four shared dry-contact input-sense / low-current sink terminals
Output capability	25 mA maximum sink per channel; not for relay coils or loads
Environment	Indoor, open-type device; avoid metal enclosures

1 Product overview

casIO4 is a Bluetooth Low Energy, Casambi-enabled four-channel interface for wired switches and equipment dry-contact inputs. Each field channel is one shared terminal that can sense a closure to Ground (-) and can also pull the terminal to Ground (-) under Casambi control. The selected fixture profile determines which input and output functions the app exposes.

DRY CONTACTS ONLY Never apply an external power source to an I/O terminal. Connect input switches only between an I/O terminal and Ground (-). Use an output only with equipment designed to accept a low-current, non-powered contact closure.

1.1 Technical data

Item	Rating / description
Supply	12-24 VDC Class 2, polarity sensitive
Input current	Less than 30 mA
I/O channels	4, sharing one Ground (-) terminal
Input connection	Unpowered switch/contact closure from channel to Ground (-)
Output connection	Low-side NFET sink to Ground (-), 25 mA maximum
Operating temperature	-25 to +45 C (-13 to +113 F)
Maximum case temperature	+75 C (+167 F), Tc point on bottom
Storage temperature	-25 to +75 C (-13 to +167 F)
Relative humidity	0-80%, non-condensing
Overall size	72.6 x 30.0 x 18.0 mm (2.86 x 1.18 x 0.71 in), including mounting ears
Weight	23 g (0.8 oz)
Radio	Fanstel BT840 family, 2.4 GHz Bluetooth Low Energy; exact production variant to verify

1.2 Intended applications

- Wall switches, pushbuttons, occupancy contacts, and other passive contact closures.
- Remote control of equipment that already provides a low-current dry-contact sense input.
- Multi-location switching using the same Gang setting on multiple compatible Casambi devices.
- Mixed installations where some channels are inputs and others are outputs.

NOT A LOAD DRIVER The 25 mA output is a signaling contact substitute. It is not rated to energize a relay coil, solenoid, lamp, motor, or other load.

2 Terminals and installation

casIO4 REV. B - FIELD TERMINALS



Each I/O terminal is a shared input-sense / low-current sink point. Use only with dry contacts.

2.1 Terminal mapping

Terminal	Label	Function
X1-1	+12-24 VDC	Class 2 supply positive
X1-2	Ground (-)	Supply return
X2-1	Dry Contact I/O 1	Channel 1 shared input/output point
X2-2	Dry Contact I/O 2	Channel 2 shared input/output point
X2-3	Dry Contact I/O 3	Channel 3 shared input/output point
X2-4	Dry Contact I/O 4	Channel 4 shared input/output point
X2-5	Ground (-)	Common for all four dry-contact channels

2.2 Typical connections

X2-1 through X2-4 are universal dry-contact points. The selected fixture profile assigns each physical terminal as an input or an output; it does not change the terminal numbering. All four channels share X2-5 Ground (-).

casIO4 X2

X2-1 I/O 1X2-2 I/O 2X2-3 I/O 3X2-4 I/O 4X2-5 GND (-)

INPUT

PASSIVE DRY-CONTACT SWITCH

I/O nX2-5 GND (-)

- Wire the switch between I/O n and X2-5
- Never apply an external voltage
- Input profile shows a PushButton -> Element

OUTPUT

LOW-CURRENT ELECTRONIC CONTACT

EQUIPMENT SENSE INPUTcasIO4 OPEN-DRAIN

- Connect only to a compatible contact-sense input
- Casambi fixture page shows an output toggle
- Closes to GND (-); 25 mA maximum sink

DO NOT USE AN I/O TERMINAL TO POWER A LOAD OR RELAY COIL

Terminal role	Field connection	Casambi app
Input	Passive switch between X2-n and X2-5 Ground (-)	PushButton mapped to a Casambi Element
Output	Equipment contact-sense input to X2-n; sense common to X2-5	Toggle on the Casambi fixture page

ONE COMMON - TWO VERY DIFFERENT USES As an input, the terminal senses a passive closure to X2-5. As an output, it electronically closes a compatible low-current sensing circuit to X2-5. It does not source voltage, power a load, or directly drive a relay coil.

DMX Engineering LLC

August 2026

Document Version 1.00

2.3 Installation procedure

1. **Select a mounting location.** Use an indoor location protected from contamination and physical damage. Avoid metal enclosures or provide an approved external-antenna arrangement.
2. **Leave power off.** Verify the Class 2 supply is de-energized and confirm polarity before landing conductors.
3. **Connect the dry-contact wiring.** For an input, wire the switch between the selected I/O terminal and X2-5 Ground (-). For an output, wire the equipment's contact-sense input and its sense common to the selected I/O terminal and X2-5.
4. **Connect 12-24 VDC power.** Connect positive to X1-1 and return to X1-2. Do not use a constant-current LED driver.
5. **Inspect and energize.** Check for loose strands, shorts, reversed polarity, or any external voltage on X2 before applying power.

Installer pre-power checklist

- Supply is 12-24 VDC Class 2 and polarity is correct.
- No I/O terminal is connected to a voltage source or load.
- Every input switch closes only between its I/O terminal and X2-5 Ground (-).
- Every output target is a compatible dry-contact sense input drawing no more than 25 mA.
- The intended Casambi profile and per-channel role are recorded.

3 Fixture profiles and channel roles

The hardware always contains both an input-sense path and an output-sink path for every channel. The fixture profile controls how casIO4 appears in the Casambi app and which channel functions are exposed. Choose the profile before naming controls or building scenes.

CASAMBI PROFILE -> APP CONTROLS -> PHYSICAL I/O

48686	casIO4 - 4 Out	TOGGLE I/O 1	TOGGLE I/O 2	TOGGLE I/O 3	TOGGLE I/O 4
48694	casIO4 - 3 Out, 1 In	TOGGLE I/O 1	TOGGLE I/O 2	TOGGLE I/O 3	PUSHBUTTON I/O 4 -> Element 1
48698	casIO4 - 2 Out, 2 In	TOGGLE I/O 1	TOGGLE I/O 2	PUSHBUTTON I/O 3 -> Element 1	PUSHBUTTON I/O 4 -> Element 2
48724	casIO4 - 1 Out, 3 In	TOGGLE I/O 1	PUSHBUTTON I/O 2 -> Element 1	PUSHBUTTON I/O 3 -> Element 2	PUSHBUTTON I/O 4 -> Element 3
48699	casIO4 - 4 In	PUSHBUTTON I/O 1 -> Element 1	PUSHBUTTON I/O 2 -> Element 2	PUSHBUTTON I/O 3 -> Element 3	PUSHBUTTON I/O 4 -> Element 4

Orange = output toggle shown on the fixture page. Blue = input PushButton mapped to an Element.

Each output is shown as a toggle button on the Casambi fixture page. Each input is shown as a PushButton that can be mapped to an Element. Output channels occupy the first physical I/O positions; input channels occupy the remaining positions.

Fixture ID	Profile	Fixture page	Element mapping
48686	casIO4 - 4 Out	I/O 1-4: four toggles	None
48694	casIO4 - 3 Out, 1 In	I/O 1-3: three toggles	I/O 4: PushButton -> Element 1
48698	casIO4 - 2 Out, 2 In	I/O 1-2: two toggles	I/O 3-4: PushButtons -> Elements 1-2
48724	casIO4 - 1 Out, 3 In	I/O 1: one toggle	I/O 2-4: PushButtons -> Elements 1-3
48699	casIO4 - 4 In	None	I/O 1-4: PushButtons -> Elements 1-4

PROFILE FIRST Changing the profile later can alter the controls exposed in the app and disturb names, scenes, automations, or switch assignments. Re-test every channel after a profile change.

4 Add caslO4 to the Casambi app



4.1 Pair and identify

1. **Power caslO4.** Confirm it appears in More > Nearby devices while the phone is within Bluetooth range.
2. **Choose the fixture profile.** Select the In/Out combination that matches the field wiring and intended channel roles.
3. **Add it to the project network.** Use the authorized network and credentials. A device can belong to only one Casambi network.
4. **Name each exposed control.** Use room, function, and channel identifiers that match the project schedule.
5. **Set vendor parameters.** Configure each channel deliberately using Section 5. Keep the device powered until the parameter-complete exchange has finished.
6. **Test and record.** Operate every wired switch and every output from the app, then test scenes and any gang behavior.

4.2 Radio placement

Bluetooth mesh range depends strongly on walls, metal, equipment, antenna orientation, and neighboring mesh nodes. Do not assume an open-air range will be available after installation. Test control from representative occupied locations and with the enclosure closed.

METAL ATTENUATES RADIO Do not mount the internal-antenna model inside a metal junction box. Use a nonmetallic enclosure or an approved external-antenna product variant.

5 Vendor parameters

casIO4 has 12 vendor parameters: three settings for each of four channels. The parameter index is part of the firmware interface and must not be reordered in the fixture definition. Labels may be made friendlier, but the numeric option values must remain exact.

GENTLE WORKFLOW Configure one channel at a time: choose its Input Action, choose its Input Mode, choose its Output Polarity, then test that channel before moving to the next. Settings for an input may remain present even when the selected profile exposes that channel only as an output, and vice versa.

5.1 Exact parameter index map

Index	Suggested label	Purpose	Default
0	Pin 1 - Input Action	Standalone / inversion / Gang 1-10	0
1	Pin 1 - Input Mode	Follow, toggle, hold, or double-tap behavior	0
2	Pin 1 - Output Polarity	Normal or inverted output sense	0
3	Pin 2 - Input Action	Standalone / inversion / Gang 1-10	0
4	Pin 2 - Input Mode	Follow, toggle, hold, or double-tap behavior	0
5	Pin 2 - Output Polarity	Normal or inverted output sense	0
6	Pin 3 - Input Action	Standalone / inversion / Gang 1-10	0
7	Pin 3 - Input Mode	Follow, toggle, hold, or double-tap behavior	0
8	Pin 3 - Output Polarity	Normal or inverted output sense	0
9	Pin 4 - Input Action	Standalone / inversion / Gang 1-10	0
10	Pin 4 - Input Mode	Follow, toggle, hold, or double-tap behavior	0
11	Pin 4 - Output Polarity	Normal or inverted output sense	0

5.2 Input Action - what this channel controls

Input Action first decides whether the wired contact controls only its own casIO4 element or participates in a numbered gang shared with other compatible Casambi devices.

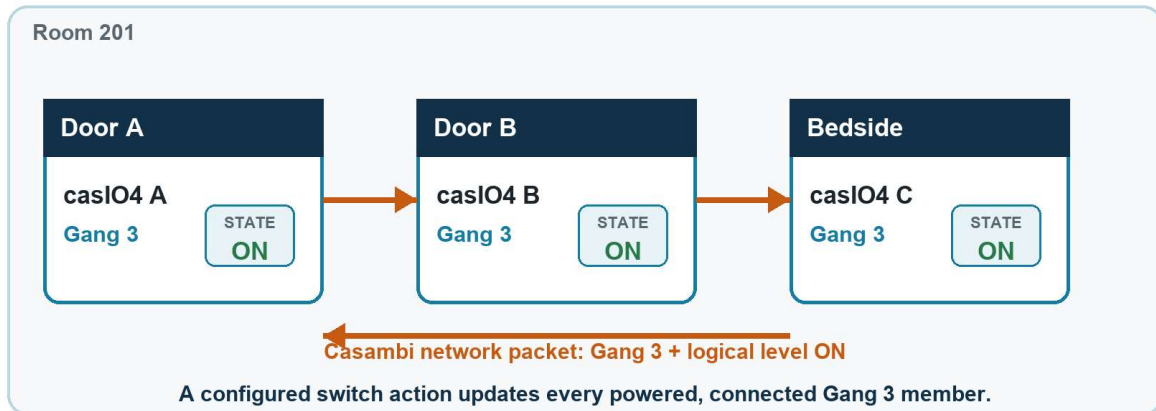
Value	Suggested label	User-facing behavior
0	Standalone - Normal	Closed contact reports ON; open contact reports OFF.
1	Standalone - Inverted	Closed contact reports OFF; open contact reports ON.
2	Gang 1	Shares state with every compatible channel set to Gang 1.
3	Gang 2	Shares state with every compatible channel set to Gang 2.
4	Gang 3	Shares state with every compatible channel set to Gang 3.
5	Gang 4	Shares state with every compatible channel set to Gang 4.
6	Gang 5	Shares state with every compatible channel set to Gang 5.
7	Gang 6	Shares state with every compatible channel set to Gang 6.
8	Gang 7	Shares state with every compatible channel set to Gang 7.
9	Gang 8	Shares state with every compatible channel set to Gang 8.
10	Gang 9	Shares state with every compatible channel set to Gang 9.
11	Gang 10	Shares state with every compatible channel set to Gang 10.

GANG NUMBERS Gang 1 through Gang 10 are identifiers, not physical channel numbers. Use the same gang value on every channel that must stay synchronized, and use a different value for each independent group.

5.3 Why Multiswitch Gangs exist

A Multiswitch Gang is normally used when two or more wall stations control the same room or lighting function but are physically separated. Every participating input is assigned the same Gang number. No traveler wire is required between switch locations; compatible NED devices exchange a vendor packet over the Casambi network so every member remembers the same logical level and dim direction.

ONE ROOM - SEPARATE SWITCHES - ONE SHARED LOGICAL STATE



THE PROBLEM IT SOLVES Without Gang synchronization, a remote switch may still remember OFF after another station turned the room ON. Its first operation then changes only its stale local memory from OFF to ON, so the user sees no lighting change and must operate it again. With Gang synchronization, every member already remembers ON; the next single operation at any member commands OFF as expected.

5.4 What happens when a Gang member is operated

1. **A user operates one switch.** The local casIO4 input calculates the new shared logical level and, for toggle-dim modes, the current dim direction.
2. **The casIO4 transmits a Gang packet.** The vendor message carries the Gang ID, level, direction, and source channel over the Casambi network.
3. **Every matching member updates its memory.** Powered compatible devices assigned to that Gang accept the level automatically. Toggle-dim members also update the direction used for the next operation.
4. **The operated input reports its local PushButton level.** The mapped Element, scene, or Casambi control performs the intended action while the Gang packet keeps the other wall stations logically aligned.
5. **The next station starts from the shared state.** A single operation at any separated Gang member now produces the expected opposite command; no catch-up operation is required.

5.5 Gang packet and switch behavior

Gang field	Behavior
Gang ID	Input Action values 2-11 correspond to Gang 1-10. Receivers synchronize by Gang ID, not by physical channel number.
Level	0-255 shared logical level. Static or pulsed edges toggle the endpoints; dim modes distribute intermediate levels.
Direction	Carries the up/down state for Hold to dim - alternating so separated stations continue in the expected direction.
Source channel	Identifies the originating input. The sender also reports its own PushButton level to the mapped Casambi function.
Receiver action	Every powered compatible input assigned to the same Gang updates its stored network level even though its local contact was not operated.

NOT A CASAMBI LUMINAIRE GROUP A Multiswitch Gang synchronizes the internal switch memory of compatible NED devices. It is separate from a normal Casambi luminaire group, scene, or Element mapping. The Gang keeps the wall stations in step; the mapped Casambi function determines what the lighting system controls.

5.6 Match the switch type

Switch type	Recommended Input Mode	Gang behavior
Maintained wall switch	On / Off (follow contact)	Either physical transition toggles the shared logical state. Lever positions at different locations do not need to match.
Momentary pushbutton	Toggle (each press)	The debounced closure toggles the shared state once; releasing the button does not create a second toggle.
Hold-to-dim button	Hold brighten / dim / alternating	Level changes are shared while the button is held. Alternating mode also keeps the next ramp direction coordinated.
Standalone input	Input Action 0 or 1	No gang synchronization packet is used; the input controls only its own mapped Casambi function.

COMMISSION THE WHOLE GANG A Gang is a distributed room behavior, not only a parameter on one device. Turn the room ON at station A, then operate station B once; the room must turn OFF on that first operation. Repeat among every pair of stations, then prove dim direction, network recovery, and any replacement or profile change.

5.7 Input Mode - how the contact is interpreted

Value	Suggested label	Best with	Behavior
0	On / Off (follow contact)	Maintained switch	Standalone follows contact. In a gang, each contact transition toggles the shared state.
1	Toggle (each press)	Momentary pushbutton	Each debounced closure toggles state; release does not toggle.
2	Hold to brighten	Momentary pushbutton	While held, level increases; release stops the ramp.
3	Hold to dim	Momentary pushbutton	While held, level decreases; release stops the ramp.
4	Hold to dim - alternating	Momentary pushbutton	Each new press reverses the ramp direction.
5	Double-tap to full	Momentary pushbutton	Hold brightens; a double-tap automatically ramps to maximum.
6	Double-tap to off	Momentary pushbutton	Hold dims; a double-tap automatically ramps to off.
7	Double-tap to ends	Momentary pushbutton	Hold alternates direction; a double-tap ramps to the selected endpoint.

SWITCH MATCHING For a maintained wall switch, start with On / Off. For a momentary pushbutton, start with Toggle. Use hold or double-tap modes only when that dimming behavior is intentional and the selected profile exposes a compatible pushbutton element.

5.8 Output Polarity - what ON means

Value	Suggested label	Electrical result
0	Normal (closed when on)	Casambi ON closes the electronic contact to Ground (-); OFF releases it.
1	Inverted (open when on)	Casambi ON releases the electronic contact; OFF closes it to Ground (-).

TEST THE RECEIVING EQUIPMENT The words normal and inverted describe the casIO4 contact state, not the final machine action. After changing polarity, confirm the connected equipment's safe state at Casambi ON, OFF, power-up, network loss, and casIO4 power loss.

5.9 Common configurations

Use case	Input Action	Input Mode	Output Polarity	Expected result
Maintained local switch	Standalone - Normal	On / Off	Normal	Closed = on; open = off
Momentary local pushbutton	Standalone - Normal	Toggle	Normal	Each press toggles
Maintained multi-location switches	Same Gang n on all	On / Off	As required	Every switch transition toggles gang
Momentary multi-location buttons	Same Gang n on all	Toggle	As required	Each button closure toggles gang
Press-and-hold dimmer	Standalone or same Gang n	Hold alternating	As required	Hold ramps; next press reverses
Equipment contact input	Input setting unused	Input setting unused	Normal	Casambi ON closes to ground

6 Startup, acceptance testing, and troubleshooting

Check	Acceptance requirement
Power	Unit remains powered and visible; no abnormal heating.
Profile	Profile role count and displayed channel order match the field schedule.
Inputs	Every switch reports the intended ON/OFF or dimming behavior without chatter.
Outputs	Every output reaches the intended receiving input and never exceeds the 25 mA interface limit.
Polarity	Normal/inverted behavior and all safe states are verified.
Gangs	Each gang operates only its intended members and remains synchronized.
Scenes	All assigned scenes and automations produce the intended state.
Mesh	Control succeeds from representative occupied locations with enclosure closed.
Record	Profile, channel roles, parameter values, and connected equipment are documented.

6.1 Troubleshooting

Symptom	Likely cause	Corrective action
Not visible nearby	No/incorrect power; out of range; already paired	Measure 12-24 VDC at X1. Move phone closer. Check network ownership.
Input never changes	No Ground (-) return; external voltage; wrong profile	Remove power source; wire contact to X2-5; confirm an input profile.
Input changes twice	Momentary button using follow-contact behavior	Select Toggle (each press) for a momentary button.
Output does not operate target	Wrong common/polarity; target is not compatible	Confirm target accepts a ≤ 25 mA low-side contact closure and shares sense common.
Gang behaves unexpectedly	Gang ID mismatch; wrong switch mode	Use the same Gang n. Use On/Off for maintained switches or Toggle for momentary buttons.
Short radio range	Metal enclosure or obstruction	Use a nonmetallic enclosure or approved external-antenna variant; re-test mesh.

6.2 Before leaving site

- Confirm no I/O channel is exposed to an external voltage source.
- Exercise every input, output, scene, automation, and gang from both local controls and the app.
- Record all 12 vendor-parameter values, even when a profile does not expose both roles on every channel.
- Label the supply, casIO4, field wires, and connected equipment consistently with the closeout schedule.

7 Closeout record

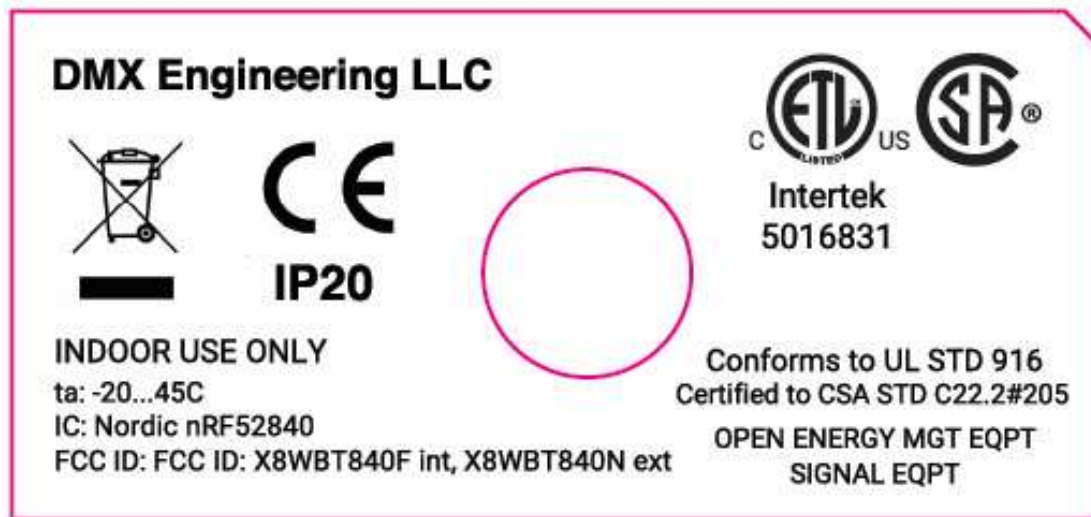
Field	Record
Project / area	
casIO4 identifier	
Casambi network	
Fixture profile	
Firmware version	
Supply voltage measured	
Commissioned by / date	

7.1 Per-channel parameter record

Ch	Role	Connected device	Input Action	Input Mode	Output Polarity
1					
2					
3					
4					

7.2 Product identification and certification label

The casIO4 back-label artwork uses the same controlled Fanstel label treatment as casTen. It includes the ETL mark and control number 5016831, CE and IP20 markings, WEEE symbol, indoor-use and ambient markings, nRF52840/BT840 radio identifiers, UL/CSA conformity wording, and the equipment-category statement.



LABEL CONTROL Use this back-label image as the controlled artwork reference. Confirm that the internal-antenna or external-antenna Fanstel variant installed in the shipped casIO4 matches the applicable FCC identifier before print release; do not redraw or substitute certification marks.

Appendix A Engineering pin mapping

The mapping below is for hardware/firmware review and service documentation. Field wiring uses X1 and X2 only.

Function	Field terminal	PSoC input path	PSoC output path
Channel 1	X2-1	P0.7 / DRY_IN1	P0.6 / DRY_OUT1
Channel 2	X2-2	P0.3 / DRY_IN2	P0.2 / DRY_OUT2
Channel 3	X2-3	P0.1 / DRY_IN3	P0.0 / DRY_OUT3
Channel 4	X2-4	P4.3 / DRY_IN4	P4.2 / DRY_OUT4
Common	X2-5	Ground (-)	Ground (-)
Internal function		PSoC pin	
Casambi UART RX		P4.0	
Casambi UART TX		P4.1	
Activity LED		P1.1	
Error LED		P1.0	
Supply sense		P2.6	