FAILURE DIAGNOSIS · FROM €190 SAMPLE · FICTIONAL CASE

Packing line stops: a hot incoming terminal is tripping the 250 A breaker, not overload

Case VX-0001 (sample) · LV distribution & protection · Packing line, food producer, EU · Line-down priority · First answer same day, updated after the electrician's readings

Short answer. Keep the breaker; fix the connection. The electrician's readings rule out overload (phase currents 74–78 % of the setting) and point to the L2 incoming terminal, which runs 41 K hotter than L1 and L3. Isolate, clean and re-terminate L2 with a new lug, torque all terminals to the maker's value, and re-scan under load. Replace the breaker only if the L2 terminal or its housing is damaged.

01 Your question

“The main breaker for packing line 2 tripped three times this week and the line stops each time. Do we need a bigger breaker, or a new one?”

02 What you sent

Photos	Breaker front with settings, incoming terminals (discoloured insulation on L2), nameplate, panel overview
Equipment	250 A moulded-case circuit breaker (MCCB), thermal-magnetic trip unit, Ir set at 0.8 (200 A); installed 2014
Symptoms	Trips after 3–5 hours at full production; warm smell at the panel; no trip at night shift (lower load)
Load	Two conveyors with drives, heat-shrink tunnel 2 × 24 kW, palletiser

03 Checklist sent to your electrician, and the readings that came back

Sent through the case share link. Readings taken by your electrician under your site's safe-work procedure.

Reading	Typical	Measured	Read
Load current per phase at full production	Below Ir (200 A), balanced within ~10 %	152 / 148 / 155 A	**OK: 74–78 % of Ir**
Supply voltage L-L at the breaker	~400 V ±10 %	398 / 401 / 396 V	**OK**
Terminal temperatures under load (thermal image)	No connection >10 K above the others	L1 43 °C · **L2 84 °C** · L3 41 °C	**L2 +41 K**
Terminals checked against maker's torque	Yes	L2 turned ¼ turn; L1, L3 tight	**L2 loose**
Trip indication	—	Thermal (overload) flag	**Heat, not current**
Insulation resistance of outgoing circuit (isolated)	≥1 MΩ at 500 V DC	>200 MΩ all phases	**OK**

04 How the readings changed the answer

From the photos (first answer, same day)
Two possible causes, equally likely: overload from the added heat-shrink tunnel, or a poor connection heating the trip unit. Advice: run at reduced load, do not reset after a trip until checked, send the readings below.

After the readings (updated answer, included)
Overload ruled out: current is well under the setting. The L2 terminal is 41 K hotter and was loose. A thermal-magnetic trip unit senses heat, so a hot terminal next to it makes it trip early, as if overloaded.

05 Likely cause

1. **Loose L2 incoming connection — high confidence.** Hot spot of +41 K on one phase only, terminal found loose, discoloured insulation in the photo, trips only at high load.
2. **Lug or cable end damaged by heat — medium confidence.** Months of heating usually oxidise the contact surface; re-tightening alone often does not last.
3. **Undersized breaker — ruled out.** 152–155 A against a 200 A setting leaves margin; raising Ir or fitting a bigger breaker would hide the problem and risk the cable.

06 Is it safe to keep running?

Only at reduced load until the terminal is repaired, and not at all if the smell or discolouration gets worse. Do not raise the trip setting. The repair needs the board isolated, so plan a short stop.

07 What to do

1. Plan a stop of about 1–2 hours and have your electrician isolate and lock off the incoming supply to the breaker.
2. Remove the L2 cable, inspect the lug, cable end and breaker terminal. Cut back damaged conductor and fit a new lug of the right size and type.
3. Clean contact faces, re-terminate and torque all three phases to the breaker maker's value; mark the screws.
4. Inspect the breaker terminal and housing on L2. If cracked, melted or pitted, replace the breaker like-for-like (same frame and setting).
5. Re-energise, run at full production for at least an hour and repeat the thermal image. All three terminals should be within ~10 K of each other.
6. Add the board to your annual thermal scan; this pattern tends to return on other heavy terminals of the same age.

08 Parts list

Item	Qty	Note
Compression lug for the existing cable size, matching the breaker terminal	1–3	Confirm cable size from the marking; replace all three if L1/L3 lugs show oxidation
Spare: MCCB, same frame, rating and trip unit	0–1	Only if the L2 terminal or housing is damaged; check lead time before the stop

09 Brief for your electrician

250 A thermal-magnetic MCCB, Ir 0.8 (200 A), trips on the thermal flag after 3–5 h at full load. Measured 152/148/155 A, so not overload. Thermal image: L2 incoming 84 °C vs 43/41 °C; L2 terminal found loose. Please isolate and lock off, replace the L2 lug and cut back any heat-damaged conductor, clean and torque all phases to the maker's value, inspect the breaker terminal (replace like-for-like if damaged), then re-scan under full load and send the new image through the same link.

10 What it saved

Avoided

Bigger breaker + cable check

Raising the rating would have masked a heating fault and stressed the cable.

Downtime

1 planned stop

Instead of repeated unplanned trips during production.

Limits of this answer. Remote advice based on the photographs, information and readings provided; not an inspection, test or certificate. All work on the installation, and every decision to switch or re-energise equipment, stays with a qualified local professional under the rules that apply at your site. One follow-up on this case is included within 14 days of the answer; readings sent through the checklist count as that follow-up.
SAMPLE — fictional case for illustration. Equipment and figures are invented; customer details do not exist. info@voltampix.com