Standard substation element — control panel wiring

Twin-plate substation with twin-head distribution pump and pressurisation unit · one WAGO 750 node per element

Current-path schematic to IEC 61082 conventions: supply potentials as horizontal rails, one I/O channel per numbered path, device tags per IEC 81346, cross-references as /sheet.path.

Drawing list

1 Cover, drawing list and legend
2 Power distribution
3 Hard-wired safety circuit
4 Digital outputs 1–5
5 Digital inputs 1–8
6 Digital inputs 9–16
7 Digital inputs 17–21
8 Analogue inputs 4–20 mA
9 RTD inputs Pt1000
10 Control valves and pump speed: 0–10 V out, position feedback in
11 Communications: Modbus RTU, M-Bus, Ethernet
12 Terminal schedule (1)
13 Device schedule and panel parts

How the drawing grows

Every channel owns one path. A larger station adds sheets, not density: the 16-channel DI slice fills two sheets of eight, a second slice adds two more. Sheet and path numbers are the wire-location language used on the terminal schedule. The terminal schedule and device schedule at the back are produced from the same list as the paths, so they cannot disagree. The same list is what a Controls plugin would hold per element: device → I/O signature → path, terminal, relay, lamp.

Layers, top to bottom on every I/O sheet

Controller
WAGO 750 node: controller and I/O slices. Module box shows slice and channel.

Interposing and operator layer
Relays -K, Hand-Off-Auto selectors -S, lamps -H, the safety relay -K1. Works with the controller offline.

Field terminals
Numbered DIN rail terminals -X1 … -X6, one strip per signal family. Field cables land here and nowhere else.

Field
Dashed boxes: equipment outside the panel, with its own terminal names.

Tags

-K1 safety relay · -K11…K15 output interposing · -K21…K29 input interposing · -K31…K34 hand changeover (0–10 V feed)
-S11…S14 Hand-Off-Auto selectors (pole 1 power, pole 2 Hand to a DI and the changeover relay) · -R11 pump setter, -R12 valve setter (door potentiometers across the 10 V reference -G2) · -S2 door switch · -S31…S34 valve end switches
-H11…H15 green running / on (plates: secondary valve open) · -H21…H25 red fault / alarm · -H1 red safety trip · -H2 white 24 V healthy
-X1 power · -X2 digital inputs · -X3 digital outputs · -X4 analogue and RTD inputs · -X5 control valves and pump speed (out and feedback) · -X6 communications
-B field contacts and sensors · -PT, -DPT pressure and dP transmitters · -T Pt1000 · -Y valve actuators · -Q heat and water meters
Potentials: L1 N PE (230 V) · +24S 0VS controller system supply · +24F 0VF field supply, through the 750-602 power jumper
Cables C11… one per field device, cores numbered on the terminal schedule. Cross-reference /4.3 = sheet 4, path 3.

Symbols



Field device boxes are dashed. A junction dot means a connection; crossing lines without a dot do not connect.

Heatweb Solutions Ltd	Standard substation element — control panel wiring
Cover, drawing list and legend WAGO 750 node · interposing, safety, HOA and lamp layer · DIN field terminals Indicative. Generated from the element point list; confirm module pin-outs and ratings against the current data sheets before manufacture. Not for construction.	Sheet **1 / 13** · Rev **C** Date 8 November 2026 · Drawn generated · RH

230 V AC incomer, from the plant-room distribution board (6 A radial)

L1 · N · PE

-X1:1 · -X1:2 · -X1:3

-Q1
MCB 6 A C

-PE bar

-G1
PSU 230 V AC → 24 V DC
5 A, DIN rail
L N ≙ + −

+24 V from -G1

0 V from -G1

-F1
2 A · +24S controller

-F2
6 A · +24F field layer

+24S

0VS

+24F

0VF

controller system supply

→ /3.1 /4.1 /5.1 /6.1 /7.1 /10.1

→ /3.1 /4.1 /5.1 /6.1 /7.1 /10.1

750-8212 · slot 0
24 V / 0 V system

controller system supply and K-bus

750-8212 · slot 0
24 V / 0 V field (bus)

feeds slots 1–8 power jumper

750-602 · slot 8
24 V / 0 V field

new potential group: slots 9–11

-F3
2 A · actuator power

+24F-A → /10.1

-H2
24 V healthy

Notes

- Mains supplies to the pump and the pressurisation unit are separate from this panel and are not shown. This panel carries control power only.
- +24S feeds the controller's system supply and the internal bus. +24F feeds the field side through the 750-602 power jumper slice, the relays, selectors and lamps.
- Screens of analogue and bus cables are landed on the -X4/-X5/-X6 screen terminals and bonded to the PE bar at the panel end only.

Heatweb Solutions Ltd

Standard substation element — control panel wiring

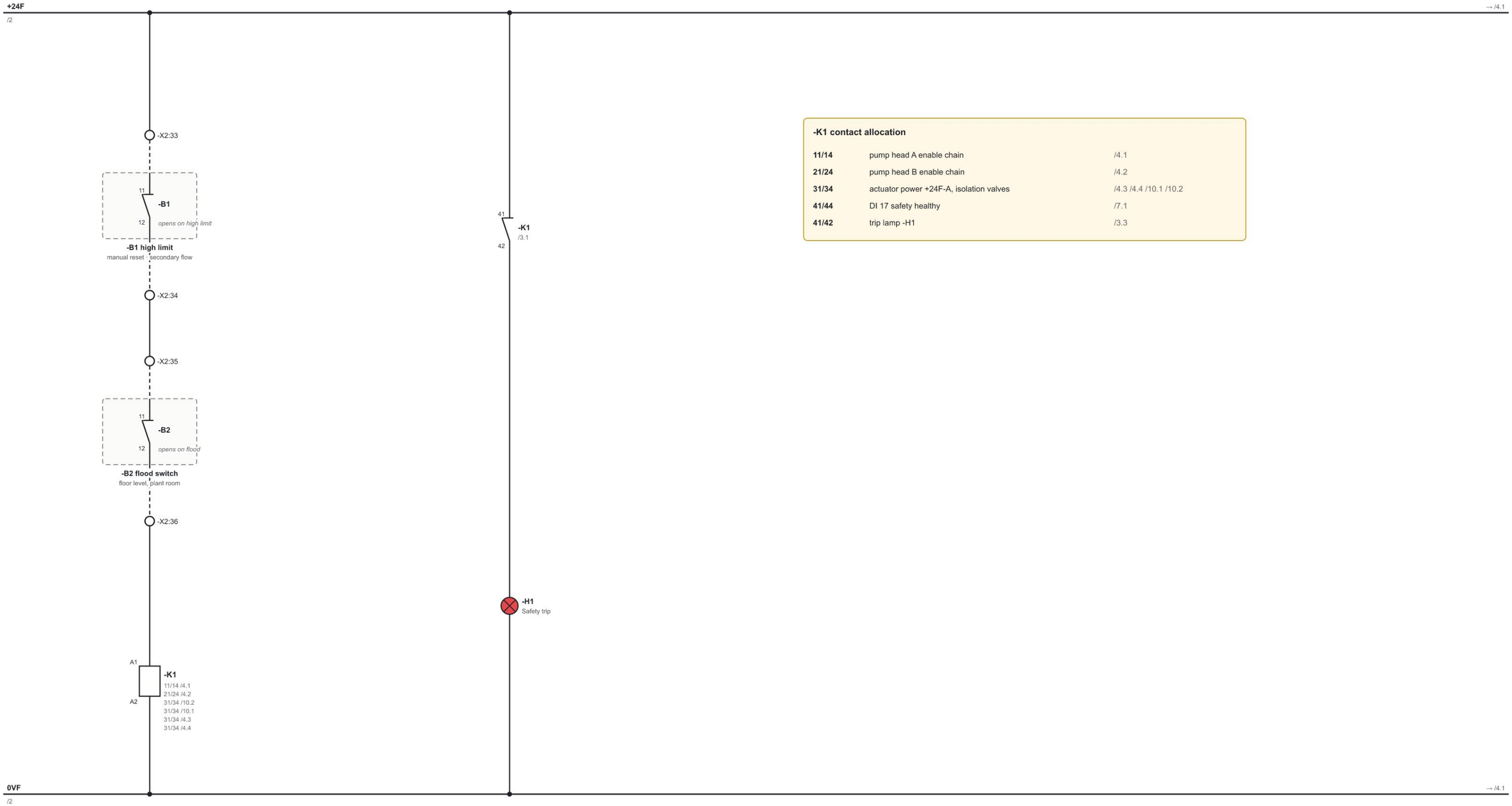
Power distribution

WAGO 750 node · interposing, safety, HOA and lamp layer · DIN field terminals

Indicative. Generated from the element point list; confirm module pin-outs and ratings against the current data sheets before manufacture. Not for construction.

Sheet	Rev
2 / 13	C

Date	Drawn
8 November 2026	generated · RH



-K1 contact allocation

11/14	pump head A enable chain	/4.1
21/24	pump head B enable chain	/4.2
31/34	actuator power +24F-A, isolation valves	/4.3 /4.4 /10.1 /10.2
41/44	DI 17 safety healthy	/7.1
41/42	trip lamp -H1	/3.3

Notes

- The safety chain is independent of the controller. -B1 is a manual-reset high-limit thermostat on the secondary flow header; -B2 opens on water at floor level.
- -K1 contacts drop the pump enables and the actuator power so spring-return valves close. The controller only sees the state on DI 16 and the trip lamp -H1 works with the controller offline.
- Each safety device has a second contact to its own DI (DI 8 and DI 9, sheets 5–6) so the alarm names the cause.
- Add an emergency stop or a gas interlock in series on this chain where the station has one; the drawing gains a path, nothing else changes.

Heatweb Solutions Ltd — Standard substation element — control panel wiring

Hard-wired safety circuit

WAGO 750 node · interposing, safety, HOA and lamp layer · DIN field terminals

Indicative. Generated from the element point list; confirm module pin-outs and ratings against the current data sheets before manufacture. Not for construction.

Sheet	Rev
3 / 13	C
Date	**Drawn**
8 November 2026	generated · RH

DO 1	DO 2	DO 3	DO 4	DO 5	DO 6	DO 7	DO 8
Pump head A enable	Pump head B enable	Plate 1 secondary isolation valve	Plate 2 secondary isolation valve	Common alarm	spare	spare	spare

750-1504 · slot 12 — DO 1 / DO 2 / DO 3 / DO 4 / DO 5

+24F /3 → /5.1

-S11 Hand – Off – Auto (H O A) — 13 -K11 /4.1 — 14
-S12 Hand – Off – Auto (H O A) — 13 -K12 /4.2 — 14
-S13 Hand – Off – Auto (H O A) — 13 -K13 /4.3 — 14
-S14 Hand – Off – Auto (H O A) — 13 -K14 /4.4 — 14
13 -K15 /4.5 — 14

11 -K1 /3.1 safety 14 — -X3:1 — C11 — EN 24 V in — -M1 Pump head A enable — -X3:2
21 -K1 /3.1 safety 24 — -X3:3 — C12 — EN 24 V in — -M2 Pump head B enable — -X3:4
31 -K1 /3.1 safety 34 — -X3:5 — C43 — EN 24 V in — -Y03 Plate 1 secondary isolation valve — -X3:6
31 -K1 /3.1 safety 34 — -X3:7 — C44 — EN 24 V in — -Y04 Plate 2 secondary isolation valve — -X3:8
-X3:9 — C19 — EN 24 V in — -A1 Common alarm — -X3:10

-H24 Common alarm

A1 -K11 13/14 /4.1 A2
A1 -K12 13/14 /4.2 A2
A1 -K13 13/14 /4.3 A2
A1 -K14 13/14 /4.4 A2
A1 -K15 13/14 /4.5 A2

0VF /3 → /5.1

Notes

• Each output drives an interposing relay; the field never sees the controller's transistor output. Enables are 24 V DC sourced from +24F; where the equipment needs a volt-free contact, use the relay's second contact (21/24) to the same -X3 pair and omit the 0VF link.

• Selector in Hand bypasses the interposing relay but not -K1: a pump cannot be hand-run through a high-limit trip, and a plate in Hand holds its secondary isolation valve open while its primary control valve follows the door setter (sheet 10). Off is not reported separately: the controller infers it from an enable with no run or open feedback.

• Pole 2 of each selector reports Hand to DI 13–16 (sheet 6) and energises the changeover relay -K31…K34. The secondary isolation valves are on/off spring-return two-ports: 24 V = open, through -K1 31/34 so a safety trip closes them; their end switches report to DI 18–21 (sheet 7). The pressurisation unit has no enable from this panel: it runs on its own controls and is monitored (DI 5–7). DO 6–16 spare.

Heatweb Solutions Ltd — Standard substation element — control panel wiring

Digital outputs 1–5

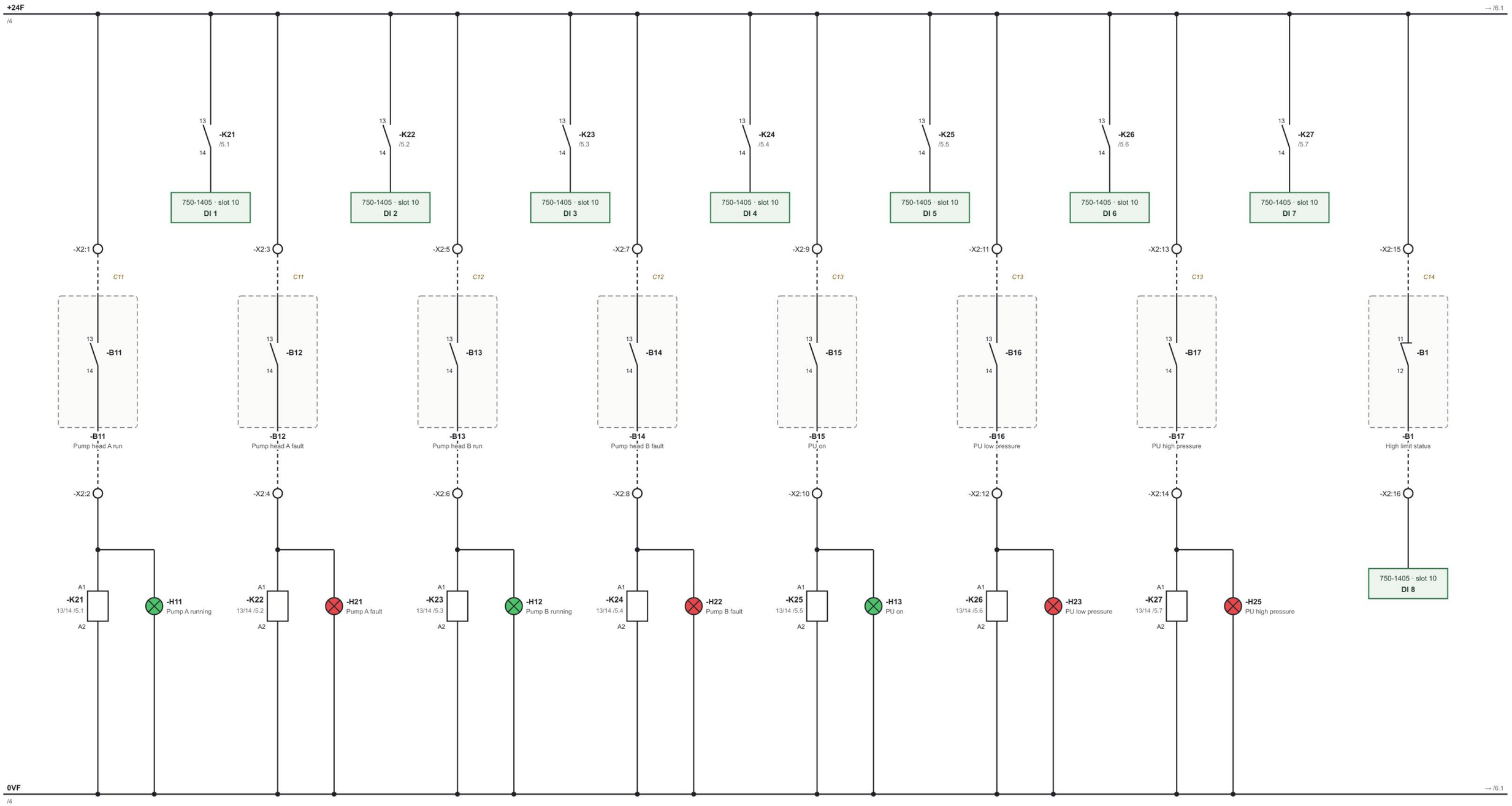
WAGO 750 node · interposing, safety, HOA and lamp layer · DIN field terminals

Indicative. Generated from the element point list; confirm module pin-outs and ratings against the current data sheets before manufacture. Not for construction.

Sheet	Rev
4 / 13	C
Date	**Drawn**
8 November 2026	generated · RH

Sheet 5	1	2	3	4	5	6	7	8	

DI 1 Pump head A run
DI 2 Pump head A fault
DI 3 Pump head B run
DI 4 Pump head B fault
DI 5 PU on
DI 6 PU low pressure
DI 7 PU high pressure
DI 8 High limit status (N/C)



Notes

- Inputs with a panel lamp go through a 2 c/o interposing relay: one contact to the controller, the lamp across the coil, so indication works with the controller offline. The pressurisation unit runs on its own controls and is monitored only: on, low pressure, high pressure. A plate's green running lamp is its secondary isolation valve open (DI 18, 20).
- Volt-free field contacts are wetted from +24F. The DI slice returns to 0VF through the 750-602 power jumper, so no 0 V core is run per channel.

Heatweb Solutions Ltd

Standard substation element — control panel wiring

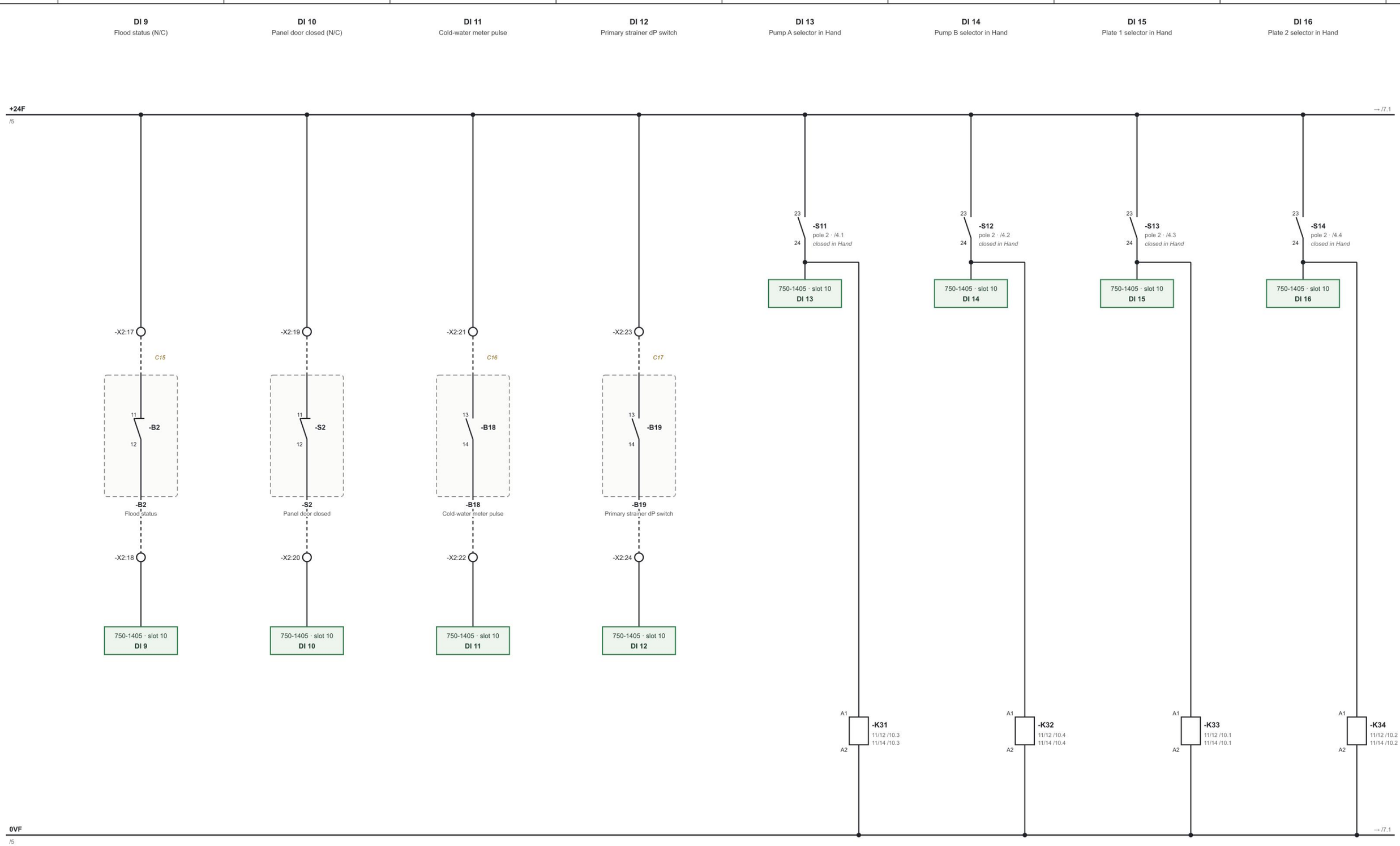
Digital inputs 1–8

WAGO 750 node · interposing, safety, HOA and lamp layer · DIN field terminals

Indicative. Generated from the element point list; confirm module pin-outs and ratings against the current data sheets before manufacture. Not for construction.

Sheet	Rev
5 / 13	C
Date	**Drawn**
8 November 2026	generated · RH

Sheet 6	1	2	3	4	5	6	7	8



Notes

• Volt-free field contacts are wetted from +24F. The DI slice returns to 0VF through the 750-602 power jumper, so no 0 V core is run per channel.

• Hand feedback (DI 13–16) is pole 2 of each selector. The same contact energises the changeover relay -K31…K34, which moves the pump or valve 0–10 V feed from the controller to the door setter (sheet 10); the controller sees Hand and suppresses its fault logic for that output.

Heatweb Solutions Ltd

Standard substation element — control panel wiring

Digital inputs 9–16

WAGO 750 node · interposing, safety, HOA and lamp layer · DIN field terminals

Indicative. Generated from the element point list; confirm module pin-outs and ratings against the current data sheets before manufacture. Not for construction.

Sheet	Rev
6 / 13	C
Date	**Drawn**
8 November 2026	generated · RH

DI 17
Safety circuit healthy

DI 18
Plate 1 secondary valve open

DI 19
Plate 1 secondary valve closed

DI 20
Plate 2 secondary valve open

DI 21
Plate 2 secondary valve closed

+24F
/6

→ /8.1

41 **-K1** /3.1 44 *closed when healthy*
750-1405 · slot 11 **DI 1**

13 **-K28** /7.2 14
750-1405 · slot 11 **DI 2**

13 **-K29** /7.4 14
750-1405 · slot 11 **DI 4**

-X2:25 *C43*
13 **-S31** 14
-S31
Plate 1 secondary valve open

-X2:27 *C43*
13 **-S32** 14
-S32
Plate 1 secondary valve closed

-X2:29 *C44*
13 **-S33** 14
-S33
Plate 2 secondary valve open

-X2:31 *C44*
13 **-S34** 14
-S34
Plate 2 secondary valve closed

-X2:26
A1 **-K28** 13/14 /7.2 A2
-H14 Plate 1 running

-X2:28
750-1405 · slot 11 **DI 3**

-X2:30
A1 **-K29** 13/14 /7.4 A2
-H15 Plate 2 running

-X2:32
750-1405 · slot 11 **DI 5**

0VF
/6

→ /8.1

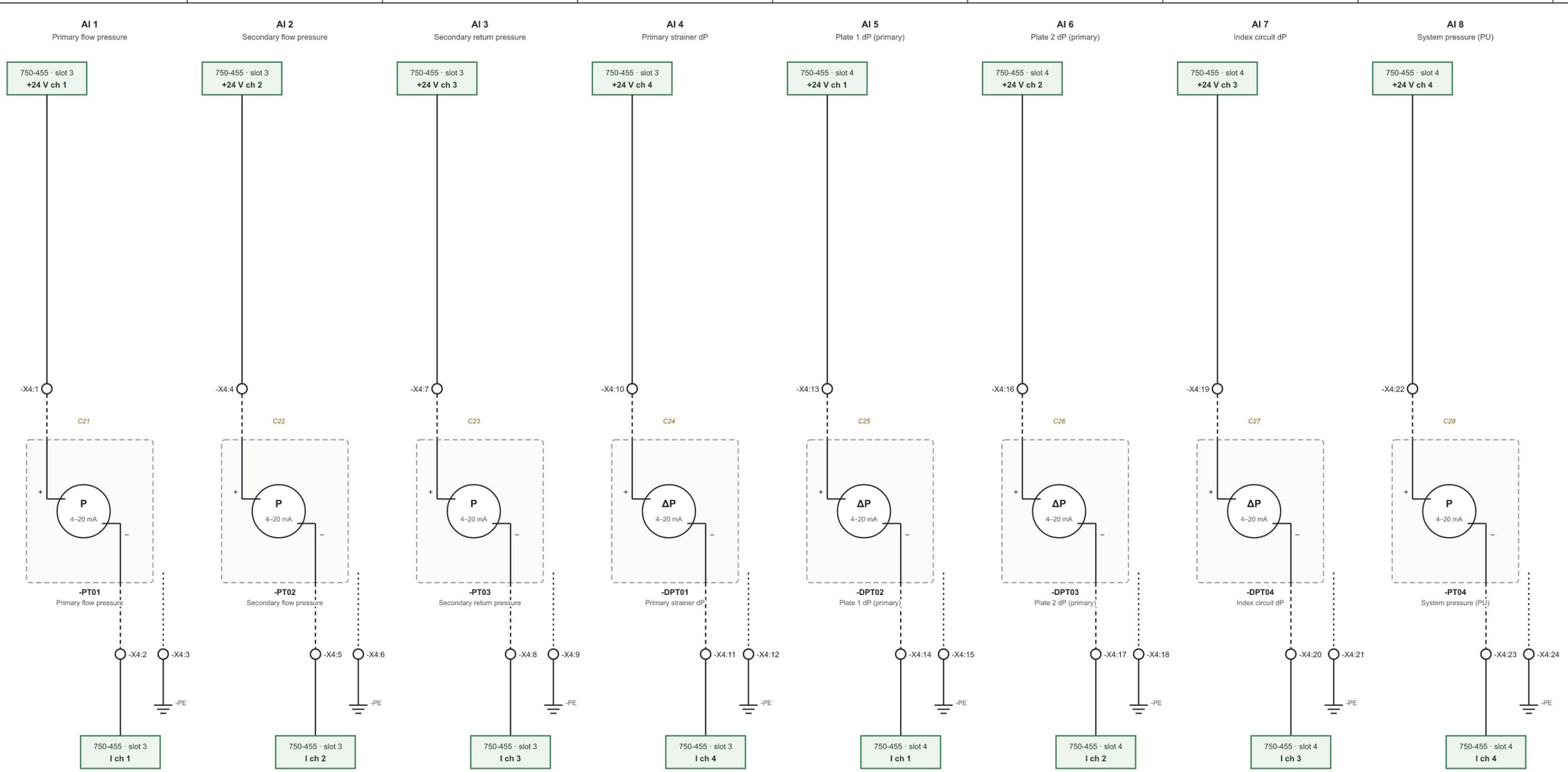
Notes
• Inputs with a panel lamp go through a 2 c/o interposing relay: one contact to the controller, the lamp across the coil, so indication works with the controller offline. The pressurisation unit runs on its own controls and is monitored only: on, low pressure, high pressure. A plate's green running lamp is its secondary isolation valve open (DI 18, 20).
• The first slice (slot 10) is full; safety healthy and the valve end switches are on the second 750-1405 in slot 11, channels 22–32 spare. A larger station adds sheets of this layout, not density.

Heatweb Solutions Ltd
Standard substation element — control panel wiring

Digital inputs 17–21
WAGO 750 node · interposing, safety, HOA and lamp layer · DIN field terminals

Indicative. Generated from the element point list; confirm module pin-outs and ratings against the current data sheets before manufacture. Not for construction.

Sheet **7 / 13** | Rev **C**
Date 8 November 2026 | Drawn generated · RH



Notes

- Two-wire loop-powered transmitters: the 750-455 supplies +24 V to the loop from the field potential group and measures the return current. Screens to -X4 screen terminals, bonded at the panel end only.
- Index dP (DPT04) is the remote sensor on the far circuit; its cable is the long one. Channels 9–12 of slot 5 spare.
- 0–10 V signals go to the 750-459 in slot 6: the primary control valve position feedbacks are drawn with their actuators on sheet 10; channels 3–4 of that slice are spare.

Heatweb Solutions Ltd

Standard substation element — control panel wiring

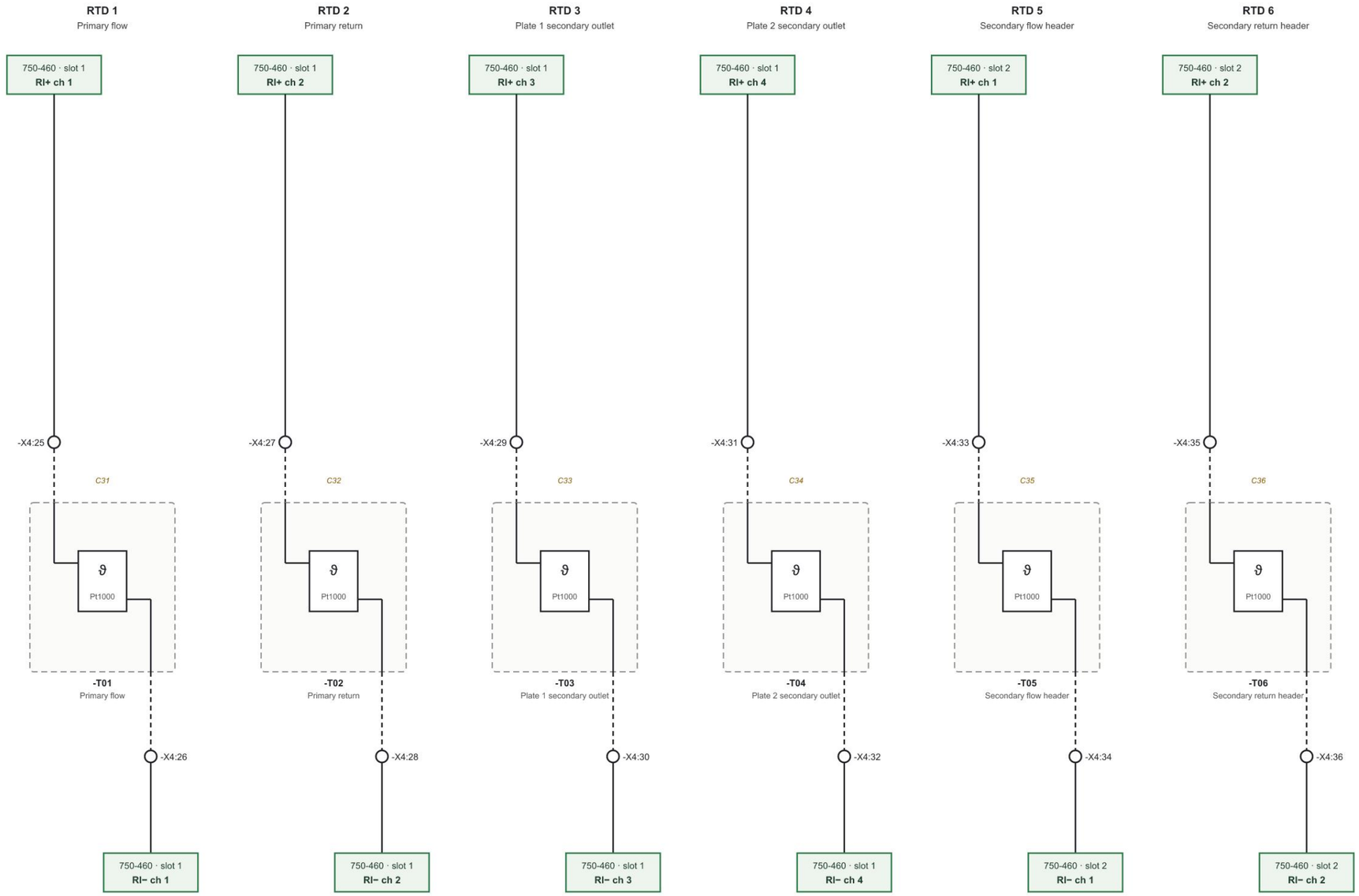
Analogue inputs 4–20 mA

WAGO 750 node · interposing, safety, HOA and lamp layer · DIN field terminals

Indicative. Generated from the element point list; confirm module pin-outs and ratings against the current data sheets before manufacture. Not for construction.

Sheet	Rev
8 / 13	C

Date	Drawn
8 November 2026	generated · RH



Notes

- Pt1000 two-wire on the 750-460 (Pt100/Pt1000 selectable, 2/3-wire). For three-wire sensors the third core lands on a third -X4 terminal and the module's RI− sense terminal; the path gains one line.
- The primary flow and return pairs are for control speed; the intake heat meter remains the fiscal measurement and is read over M-Bus (sheet 11). Channels 7–8 of slot 2 spare.

Heatweb Solutions Ltd

Standard substation element — control panel wiring

RTD inputs Pt1000

WAGO 750 node · interposing, safety, HOA and lamp layer · DIN field terminals

Indicative. Generated from the element point list; confirm module pin-outs and ratings against the current data sheets before manufacture. Not for construction.

Sheet	Rev
9 / 13	C
Date	**Drawn**
8 November 2026	generated · RH

AO 1 Plate 1 primary control valve
AO 2 Plate 2 primary control valve
AO 3 Pump head A speed
AO 4 Pump head B speed
-G2 10 V reference for the manual setters
-R11 pump setter Hand: both pump heads
-R12 valve setter Hand: both primary control valves

750-559 · slot 7 **AO 1 Y** | 750-559 · slot 7 **GND**
750-559 · slot 7 **AO 2 Y** | 750-559 · slot 7 **GND**
750-559 · slot 7 **AO 3 Y** | 750-559 · slot 7 **GND**
750-559 · slot 7 **AO 4 Y** | 750-559 · slot 7 **GND**

+24F-A — /2.7 via -F3

-R12 /10.7 — Auto 12 / 14 Hand — **-K33** /6.7 11 — 31 **-K1** /3.1 34 safety — -X5:1 -X5:2 -X5:3 — C41 — actuator 0–10 V (+, U, 0 V) — **-Y01** Plate 1 primary control valve

-R12 /10.7 — Auto 12 / 14 Hand — **-K34** /6.8 11 — 31 **-K1** /3.1 34 safety — -X5:6 -X5:7 -X5:8 — C42 — actuator 0–10 V (+, U, 0 V) — **-Y02** Plate 2 primary control valve

-R11 /10.6 — Auto 12 / 14 Hand — **-K31** /6.5 11 — -X5:11 -X5:12 — C11 — VSD analogue input — **-Y05** pump speed input

-R11 /10.6 — Auto 12 / 14 Hand — **-K32** /6.6 11 — -X5:13 -X5:14 — C12 — VSD analogue input — **-Y06** pump speed input

-X5:5 -X5:4 → 750-459 · slot 6 **U ch 1**

-X5:10 -X5:9 → 750-459 · slot 6 **U ch 2**

+24 → **-G2** 24 V DC in / 10 V DC reference out → 0 V

+10 V ref

-R11 10 kΩ lin — wiper → /10.3 /10.4 pin 14

-R12 10 kΩ lin — wiper → /10.1 /10.2 pin 14

0VF — /2

Notes

- The primary control valve actuators are powered from the panel on +24F-A (fuse -F3, sheet 2) through -K1 31/34, so a safety trip removes power and the spring return closes them.
- Each actuator cable has five cores: Y demand (1), signal 0 V ⊥ (2), +24 V (3), U position feedback (4), power 0 V (5). Signal 0 V and power 0 V meet only at the panel's 0VF, so the motor's return current does not shift the 0–10 V reference. Many actuators link them internally; wire them separately regardless.
- U is read on the 750-459 in slot 6 against 0VF: the controller compares position with demand and alarms a stuck or failed actuator. The secondary isolation valves and the primary dP valve have no 0–10 V (sheet 4). Pump speed references go to the pump's own analogue input with the signal 0 V on its own core; on Modbus RTU (sheet 11) AO 3–4 are not wired. AO 5–8 spare.
- Hand: the changeover relay -K31…K34 (coil on sheet 6, from pole 2 of the selector) moves the 0–10 V feed from the 750-559 output (pin 12, shown) to a door potentiometer (pin 14): -R11 for both pump heads, -R12 for both primary control valves. The pots sit across the 10 V reference -G2 (path 5); the pump and valve inputs are high impedance, so one wiper drives both.

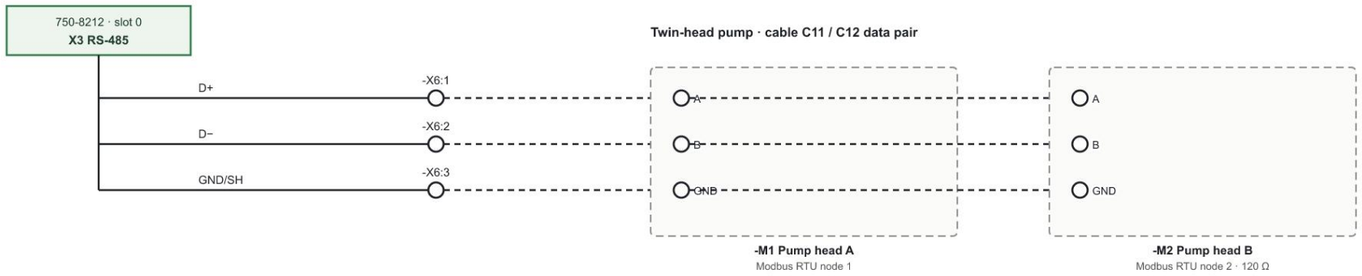
Heatweb Solutions Ltd — Standard substation element — control panel wiring

Control valves and pump speed: 0–10 V out, position feedback in

WAGO 750 node · interposing, safety, HOA and lamp layer · DIN field terminals

Indicative. Generated from the element point list; confirm module pin-outs and ratings against the current data sheets before manufacture. Not for construction.

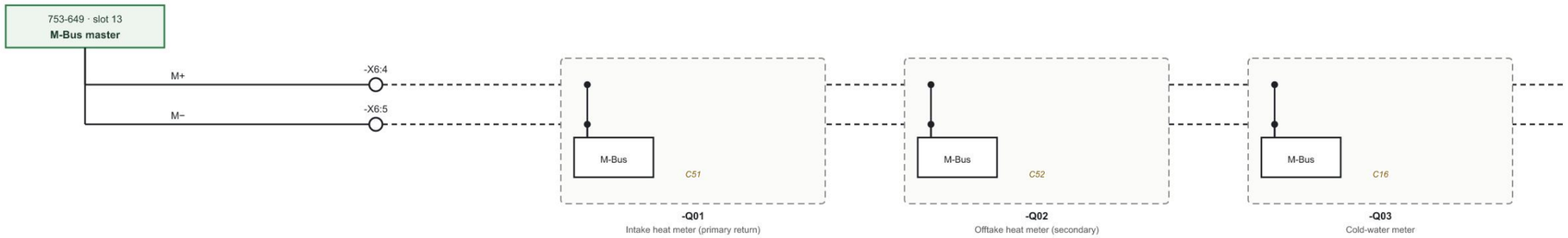
Sheet	Rev
10 / 13	C
Date	**Drawn**
8 November 2026	generated · RH

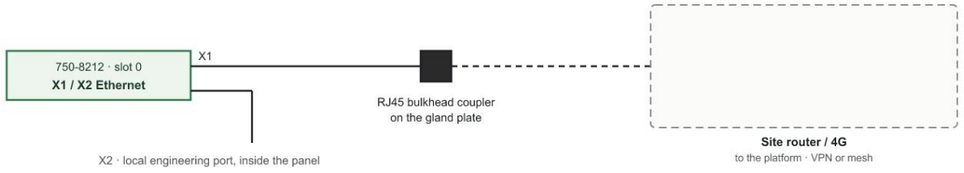


Screens

RS-485 and M-Bus screens on -X6 screen terminals, bonded to -PE at the panel end only.

Keep data cables 100 mm from 230 V, cross at right angles.





Notes

• RS-485: twisted pair with screen, 120 Ω termination at the last device, bias on the controller port. Pump heads A and B are two Modbus RTU nodes on one bus; speed, run, fault, power and flow then come over the bus and DI 1–4 / AO 3–4 become spare.

• M-Bus is polarity-free and parallel: three meters on one pair from the 753-649 master. The cold-water meter is read here if it has an M-Bus module, otherwise as a pulse on DI 11.

• Ethernet X1 to the site router (platform, VPN or mesh); X2 for the local engineering laptop. Switched off at the router if no remote access is wanted: the controller keeps running.

Heatweb Solutions Ltd — Standard substation element — control panel wiring

Communications: Modbus RTU, M-Bus, Ethernet

WAGO 750 node · interposing, safety, HOA and lamp layer · DIN field terminals

Indicative. Generated from the element point list; confirm module pin-outs and ratings against the current data sheets before manufacture. Not for construction.

Sheet	Rev
11 / 13	C
Date	**Drawn**
8 November 2026	generated · RH

Terminal	Function	Cable	Core	Field device / internal destination	Ref
-X1 Power					
-X1:1	230 V L	mains	L	Incomer	/2.1
-X1:2	230 V N	mains	N	Incomer	/2.1
-X1:3	PE	mains	PE	Incomer	/2.1
-X2 Digital inputs and safety chain					
-X2:1	+24F → Pump head A run	C11	1	Twin-head pump · head A run contact	/5.1
-X2:2	Pump head A run → -K21 coil	C11	2	Twin-head pump · head A run contact	/5.1
-X2:3	+24F → Pump head A fault	C11	3	Twin-head pump · head A fault contact	/5.2
-X2:4	Pump head A fault → -K22 coil	C11	4	Twin-head pump · head A fault contact	/5.2
-X2:5	+24F → Pump head B run	C12	1	Twin-head pump · head B run contact	/5.3
-X2:6	Pump head B run → -K23 coil	C12	2	Twin-head pump · head B run contact	/5.3
-X2:7	+24F → Pump head B fault	C12	3	Twin-head pump · head B fault contact	/5.4
-X2:8	Pump head B fault → -K24 coil	C12	4	Twin-head pump · head B fault contact	/5.4
-X2:9	+24F → PU on	C13	1	Pressurisation unit · on / running contact	/5.5
-X2:10	PU on → -K25 coil	C13	2	Pressurisation unit · on / running contact	/5.5
-X2:11	+24F → PU low pressure	C13	3	Pressurisation unit · low-pressure contact	/5.6
-X2:12	PU low pressure → -K26 coil	C13	4	Pressurisation unit · low-pressure contact	/5.6
-X2:13	+24F → PU high pressure	C13	5	Pressurisation unit · high-pressure contact	/5.7
-X2:14	PU high pressure → -K27 coil	C13	6	Pressurisation unit · high-pressure contact	/5.7
-X2:15	+24F → High limit status (N/C)	C14	1	High-limit thermostat · 2nd contact (indication)	/5.8
-X2:16	High limit status (N/C) → DI 8	C14	2	High-limit thermostat · 2nd contact (indication)	/5.8
-X2:17	+24F → Flood status (N/C)	C15	1	Flood switch · 2nd contact (indication)	/6.1
-X2:18	Flood status (N/C) → DI 9	C15	2	Flood switch · 2nd contact (indication)	/6.1
-X2:19	+24F → Panel door closed (N/C)	—		Door switch on the panel (internal)	/6.2
-X2:20	Panel door closed (N/C) → DI 10	—		Door switch on the panel (internal)	/6.2
-X2:21	+24F → Cold-water meter pulse	C16	1	Cold-water meter · pulse output	/6.3
-X2:22	Cold-water meter pulse → DI 11	C16	2	Cold-water meter · pulse output	/6.3
-X2:23	+24F → Primary strainer dP switch	C17	1	Strainer dP switch · primary	/6.4
-X2:24	Primary strainer dP switch → DI 12	C17	2	Strainer dP switch · primary	/6.4
-X2:25	+24F → Plate 1 secondary valve open	C43	3	Secondary isolation valve -Y03 · end switch, open	/7.2
-X2:26	Plate 1 secondary valve open → -K28 coil	C43	4	Secondary isolation valve -Y03 · end switch, open	/7.2
-X2:27	+24F → Plate 1 secondary valve closed	C43	5	Secondary isolation valve -Y03 · end switch, closed	/7.3
-X2:28	Plate 1 secondary valve closed → DI 3	C43	6	Secondary isolation valve -Y03 · end switch, closed	/7.3
-X2:29	+24F → Plate 2 secondary valve open	C44	3	Secondary isolation valve -Y04 · end switch, open	/7.4
-X2:30	Plate 2 secondary valve open → -K29 coil	C44	4	Secondary isolation valve -Y04 · end switch, open	/7.4
-X2:31	+24F → Plate 2 secondary valve closed	C44	5	Secondary isolation valve -Y04 · end switch, closed	/7.5
-X2:32	Plate 2 secondary valve closed → DI 5	C44	6	Secondary isolation valve -Y04 · end switch, closed	/7.5
-X2:33	Safety chain → high limit	C14	1	-B1 high-limit thermostat (safety pole)	/3.1
-X2:34	High limit → safety chain	C14	2	-B1 high-limit thermostat (safety pole)	/3.1
-X2:35	Safety chain → flood	C15	1	-B2 flood switch (safety pole)	/3.1
-X2:36	Flood → safety chain	C15	2	-B2 flood switch (safety pole)	/3.1
-X3 Digital outputs					
-X3:1	Pump head A enable · +24 V enable	C11	5	Twin-head pump · head A enable input	/4.1
-X3:2	Pump head A enable · 0 V return	C11	6	Twin-head pump · head A enable input	/4.1
-X3:3	Pump head B enable · +24 V enable	C12	5	Twin-head pump · head B enable input	/4.2
-X3:4	Pump head B enable · 0 V return	C12	6	Twin-head pump · head B enable input	/4.2
-X3:5	Plate 1 secondary isolation valve · +24 V enable	C43	1	Two-port isolation valve · spring return · 24 V = open	/4.3
-X3:6	Plate 1 secondary isolation valve · 0 V return	C43	2	Two-port isolation valve · spring return · 24 V = open	/4.3
-X3:7	Plate 2 secondary isolation valve · +24 V enable	C44	1	Two-port isolation valve · spring return · 24 V = open	/4.4
-X3:8	Plate 2 secondary isolation valve · 0 V return	C44	2	Two-port isolation valve · spring return · 24 V = open	/4.4
-X3:9	Common alarm · +24 V enable	C19	1	Remote alarm / beacon input	/4.5
-X3:10	Common alarm · 0 V return	C19	2	Remote alarm / beacon input	/4.5
-X4 Analogue and RTD inputs					
-X4:1	Primary flow pressure · loop +24 V	C21	1	-PT01 Primary flow pressure transmitter	/8.1
-X4:2	Primary flow pressure · 4–20 mA signal	C21	2	-PT01 Primary flow pressure transmitter	/8.1
-X4:3	Primary flow pressure · screen	C21	SH	-PT01 Primary flow pressure transmitter	/8.1
-X4:4	Secondary flow pressure · loop +24 V	C22	1	-PT02 Secondary flow pressure transmitter	/8.2
-X4:5	Secondary flow pressure · 4–20 mA signal	C22	2	-PT02 Secondary flow pressure transmitter	/8.2
-X4:6	Secondary flow pressure · screen	C22	SH	-PT02 Secondary flow pressure transmitter	/8.2
-X4:7	Secondary return pressure · loop +24 V	C23	1	-PT03 Secondary return pressure transmitter	/8.3
-X4:8	Secondary return pressure · 4–20 mA signal	C23	2	-PT03 Secondary return pressure transmitter	/8.3
-X4:9	Secondary return pressure · screen	C23	SH	-PT03 Secondary return pressure transmitter	/8.3
-X4:10	Primary strainer dP · loop +24 V	C24	1	-DPT01 Primary strainer dP transmitter	/8.4
-X4:11	Primary strainer dP · 4–20 mA signal	C24	2	-DPT01 Primary strainer dP transmitter	/8.4
-X4:12	Primary strainer dP · screen	C24	SH	-DPT01 Primary strainer dP transmitter	/8.4
-X4:13	Plate 1 dP (primary) · loop +24 V	C25	1	-DPT02 Plate 1 dP (primary) transmitter	/8.5
-X4:14	Plate 1 dP (primary) · 4–20 mA signal	C25	2	-DPT02 Plate 1 dP (primary) transmitter	/8.5
-X4:15	Plate 1 dP (primary) · screen	C25	SH	-DPT02 Plate 1 dP (primary) transmitter	/8.5
-X4:16	Plate 2 dP (primary) · loop +24 V	C26	1	-DPT03 Plate 2 dP (primary) transmitter	/8.6
-X4:17	Plate 2 dP (primary) · 4–20 mA signal	C26	2	-DPT03 Plate 2 dP (primary) transmitter	/8.6
-X4:18	Plate 2 dP (primary) · screen	C26	SH	-DPT03 Plate 2 dP (primary) transmitter	/8.6
-X4:19	Index circuit dP · loop +24 V	C27	1	-DPT04 Index circuit dP transmitter	/8.7
-X4:20	Index circuit dP · 4–20 mA signal	C27	2	-DPT04 Index circuit dP transmitter	/8.7
-X4:21	Index circuit dP · screen	C27	SH	-DPT04 Index circuit dP transmitter	/8.7
-X4:22	System pressure (PU) · loop +24 V	C28	1	-PT04 System pressure (PU) transmitter	/8.8
-X4:23	System pressure (PU) · 4–20 mA signal	C28	2	-PT04 System pressure (PU) transmitter	/8.8
-X4:24	System pressure (PU) · screen	C28	SH	-PT04 System pressure (PU) transmitter	/8.8
-X4:25	Primary flow · RI+	C31	1	-T01 Pt1000 Primary flow	/9.1
-X4:26	Primary flow · RI−	C31	2	-T01 Pt1000 Primary flow	/9.1
-X4:27	Primary return · RI+	C32	1	-T02 Pt1000 Primary return	/9.2
-X4:28	Primary return · RI−	C32	2	-T02 Pt1000 Primary return	/9.2
-X4:29	Plate 1 secondary outlet · RI+	C33	1	-T03 Pt1000 Plate 1 secondary outlet	/9.3
-X4:30	Plate 1 secondary outlet · RI−	C33	2	-T03 Pt1000 Plate 1 secondary outlet	/9.3
-X4:31	Plate 2 secondary outlet · RI+	C34	1	-T04 Pt1000 Plate 2 secondary outlet	/9.4
-X4:32	Plate 2 secondary outlet · RI−	C34	2	-T04 Pt1000 Plate 2 secondary outlet	/9.4
-X4:33	Secondary flow header · RI+	C35	1	-T05 Pt1000 Secondary flow header	/9.5
-X4:34	Secondary flow header · RI−	C35	2	-T05 Pt1000 Secondary flow header	/9.5
-X4:35	Secondary return header · RI+	C36	1	-T06 Pt1000 Secondary return header	/9.6
-X4:36	Secondary return header · RI−	C36	2	-T06 Pt1000 Secondary return header	/9.6
-X5 Control valves and pump speed (0–10 V out, feedback in)					
-X5:1	Plate 1 primary control valve · 0–10 V demand Y	C41	1	-Y01 Plate 1 primary control valve	/10.1
-X5:2	Plate 1 primary control valve · signal 0 V ⊥	C41	2	-Y01 Plate 1 primary control valve	/10.1
-X5:3	Plate 1 primary control valve · +24 V actuator power	C41	3	-Y01 Plate 1 primary control valve	/10.1
-X5:4	Plate 1 primary control valve · position feedback U 0–10 V	C41	4	-Y01 Plate 1 primary control valve	/10.1
-X5:5	Plate 1 primary control valve · actuator power 0 V	C41	5	-Y01 Plate 1 primary control valve	/10.1
-X5:6	Plate 2 primary control valve · 0–10 V demand Y	C42	1	-Y02 Plate 2 primary control valve	/10.2
-X5:7	Plate 2 primary control valve · signal 0 V ⊥	C42	2	-Y02 Plate 2 primary control valve	/10.2
-X5:8	Plate 2 primary control valve · +24 V actuator power	C42	3	-Y02 Plate 2 primary control valve	/10.2
-X5:9	Plate 2 primary control valve · position feedback U 0–10 V	C42	4	-Y02 Plate 2 primary control valve	/10.2
-X5:10	Plate 2 primary control valve · actuator power 0 V	C42	5	-Y02 Plate 2 primary control valve	/10.2
-X5:11	Pump head A speed · 0–10 V demand Y	C11	7	Twin-head pump · speed input	/10.3
-X5:12	Pump head A speed · signal 0 V ⊥	C11	8	Twin-head pump · speed input	/10.3
-X5:13	Pump head B speed · 0–10 V demand Y	C12	7	Twin-head pump · speed input	/10.4
-X5:14	Pump head B speed · signal 0 V ⊥	C12	8	Twin-head pump · speed input	/10.4
-X6 Communications					
-X6:1	RS-485 D+ (A)	C11/C12	9	Pump heads A, B · Modbus RTU	/11
-X6:2	RS-485 D− (B)	C11/C12	10	Pump heads A, B · Modbus RTU	/11
-X6:3	RS-485 screen / common	C11/C12	SH	Pump heads A, B · Modbus RTU	/11
-X6:4	M-Bus M+	C51/C52/C16	1	Heat and water meters · M-Bus	/11
-X6:5	M-Bus M−	C51/C52/C16	2	Heat and water meters · M-Bus	/11

Notes
• Cores: numbers are the field cable's core numbers; SH is the screen. Internal wires carry the potential name or the terminal number they land on.

Heatweb Solutions Ltd — Standard substation element — control panel wiring

Terminal schedule (1)

WAGO 750 node · interposing, safety, HOA and lamp layer · DIN field terminals

Indicative. Generated from the element point list; confirm module pin-outs and ratings against the current data sheets before manufacture. Not for construction.

Sheet	Rev
12 / 13	C
Date	**Drawn**
8 November 2026	generated · RH

Relays, selectors, lamps, protection

Tag	Description	Coil / location	Contacts used → where
-F1	2 A, +24S controller system supply	/2.3	
-F2	6 A, +24F field supply, relays, lamps	/2.5	
-F3	2 A, actuator power +24F-A	/2.7	
-G1	24 V DC 5 A power supply	/2.1	
-G2	10 V DC reference module for the manual setters, 24 V DC in, DIN rail	/10.5	
-H1	red, safety trip	/3.3	
-H2	white, 24 V healthy	/2.8	
-H11	green, Pump A running	/5.1	
-H12	green, Pump B running	/5.3	
-H13	green, PU on	/5.5	
-H14	green, Plate 1 running	/7.2	
-H15	green, Plate 2 running	/7.4	
-H21	red, Pump A fault	/5.2	
-H22	red, Pump B fault	/5.4	
-H23	red, PU low pressure	/5.6	
-H24	red, Common alarm	/4.5	
-H25	red, PU high pressure	/5.7	
-K1	Safety relay, 4 c/o contacts, 24 V DC coil, DIN plug-in base	/3.1	11/14 /4.1, 21/24 /4.2, 31/34 /10.2, 31/34 /10.1, 31/34 /4.3, 31/34 /4.4, 41/42 /3.3, 41/44 /7.1
-K11	Interposing relay 2 c/o 24 V DC · Pump head A enable	/4.1	13/14 /4.1
-K12	Interposing relay 2 c/o 24 V DC · Pump head B enable	/4.2	13/14 /4.2
-K13	Interposing relay 2 c/o 24 V DC · Plate 1 secondary isolation valve	/4.3	13/14 /4.3
-K14	Interposing relay 2 c/o 24 V DC · Plate 2 secondary isolation valve	/4.4	13/14 /4.4
-K15	Interposing relay 2 c/o 24 V DC · Common alarm	/4.5	13/14 /4.5
-K21	Interposing relay 2 c/o 24 V DC · Pump head A run	/5.1	13/14 /5.1
-K22	Interposing relay 2 c/o 24 V DC · Pump head A fault	/5.2	13/14 /5.2
-K23	Interposing relay 2 c/o 24 V DC · Pump head B run	/5.3	13/14 /5.3
-K24	Interposing relay 2 c/o 24 V DC · Pump head B fault	/5.4	13/14 /5.4
-K25	Interposing relay 2 c/o 24 V DC · PU on	/5.5	13/14 /5.5
-K26	Interposing relay 2 c/o 24 V DC · PU low pressure	/5.6	13/14 /5.6
-K27	Interposing relay 2 c/o 24 V DC · PU high pressure	/5.7	13/14 /5.7
-K28	Interposing relay 2 c/o 24 V DC · Plate 1 secondary valve open	/7.2	13/14 /7.2
-K29	Interposing relay 2 c/o 24 V DC · Plate 2 secondary valve open	/7.4	13/14 /7.4
-K31	Changeover relay 1 c/o 24 V DC · in Hand: pump speed from -R11	/6.5	11/12 /10.3, 11/14 /10.3
-K32	Changeover relay 1 c/o 24 V DC · in Hand: pump speed from -R11	/6.6	11/12 /10.4, 11/14 /10.4
-K33	Changeover relay 1 c/o 24 V DC · in Hand: control valve from -R12	/6.7	11/12 /10.1, 11/14 /10.1
-K34	Changeover relay 1 c/o 24 V DC · in Hand: control valve from -R12	/6.8	11/12 /10.2, 11/14 /10.2
-Q1	6 A type C incomer MCB	/2.1	
-R11	Potentiometer 10 kΩ linear, 22 mm door mounted, 0–10 V across -G2 · common to both pump heads	/10.6	
-R12	Potentiometer 10 kΩ linear, 22 mm door mounted, 0–10 V across -G2 · common to both primary con	/10.7	ılves
-S11	Hand-Off-Auto selector, 2 pole · Pump head A enable	/4.1	23/24 /6.5
-S12	Hand-Off-Auto selector, 2 pole · Pump head B enable	/4.2	23/24 /6.6
-S13	Hand-Off-Auto selector, 2 pole · Plate 1 secondary isolation valve	/4.3	23/24 /6.7
-S14	Hand-Off-Auto selector, 2 pole · Plate 2 secondary isolation valve	/4.4	23/24 /6.8

Field devices (supplied with the plant, wired by the installer)

Tag	Description	Sheet
-B1	High-limit thermostat, manual reset, 2 contacts	/3.1
-B2	Flood switch, 2 contacts	/3.1
-DPT01	Primary strainer dP transmitter, 4–20 mA two-wire	/8.4
-DPT02	Plate 1 dP (primary) transmitter, 4–20 mA two-wire	/8.5
-DPT03	Plate 2 dP (primary) transmitter, 4–20 mA two-wire	/8.6
-DPT04	Index circuit dP transmitter, 4–20 mA two-wire	/8.7
-PT01	Primary flow pressure transmitter, 4–20 mA two-wire	/8.1
-PT02	Secondary flow pressure transmitter, 4–20 mA two-wire	/8.2
-PT03	Secondary return pressure transmitter, 4–20 mA two-wire	/8.3
-PT04	System pressure (PU) transmitter, 4–20 mA two-wire	/8.8
-Q01	Intake heat meter (primary return), M-Bus slave	/11
-Q02	Offtake heat meter (secondary), M-Bus slave	/11
-Q03	Cold-water meter, M-Bus slave	/11
-T01	Pt1000 immersion sensor, Primary flow	/9.1
-T02	Pt1000 immersion sensor, Primary return	/9.2
-T03	Pt1000 immersion sensor, Plate 1 secondary outlet	/9.3
-T04	Pt1000 immersion sensor, Plate 2 secondary outlet	/9.4
-T05	Pt1000 immersion sensor, Secondary flow header	/9.5
-T06	Pt1000 immersion sensor, Secondary return header	/9.6
-Y01	Plate 1 primary control valve, 0–10 V actuator with 0–10 V position feedback, 24 V, separate signal and power 0 V, spring return	/10.1
-Y02	Plate 2 primary control valve, 0–10 V actuator with 0–10 V position feedback, 24 V, separate signal and power 0 V, spring return	/10.2
-Y03	Plate 1 secondary isolation valve, two-port spring return, 24 V on/off, end switches open / closed	/4.3
-Y04	Plate 2 secondary isolation valve, two-port spring return, 24 V on/off, end switches open / closed	/4.4

Panel parts list

Qty	Item	Description
1	**750-8212**	PFC200 G2 controller, 2 × ETH, RS-485
2	**750-460**	4-ch RTD input
3	**750-455**	4-ch 4–20 mA input
1	**750-459**	4-ch 0–10 V input
2	**750-559**	4-ch 0–10 V output
1	**750-602**	field supply, new potential group
2	**750-1405**	16-ch DI 24 V
1	**750-1504**	16-ch DO 24 V 0.5 A
1	**753-649**	M-Bus master
1	**750-600**	end module
1	**-G1**	PSU 230 V AC / 24 V DC 5 A
1	**-Q1**	MCB 6 A C-curve
3	**-F1…F3**	fuse terminals 2 / 6 / 2 A
1	**-K1**	safety relay 4 c/o, 24 V DC, plug-in base
18	**-K11…K34**	interposing / changeover relay 2 c/o, 24 V DC, 6.2 mm plug-in base
4	**-S11…S14**	3-position selector, 2 pole, door mounted
1	**-G2**	10 V DC reference module, 24 V DC in
2	**-R11, R12**	potentiometer 10 kΩ linear, 22 mm door mounted, 0–10 scale (pumps; control valves)
12	**-H1…H25**	22 mm LED pilot lamp 24 V DC
1	**-S2**	door switch
104	**-X1…X6**	DIN rail terminals 2.5 mm² push-in, plus end covers, separators, markers, screen terminals
1	**—**	RJ45 bulkhead coupler, gland plate, cable glands, PE bar, trunking, 35 mm rail

Notes
- Quantities for one standard substation panel. WAGO part numbers as the node front view; relay, selector and lamp makes to the panel builder's standard.

Heatweb Solutions Ltd — Standard substation element — control panel wiring

Device schedule and panel parts

WAGO 750 node · interposing, safety, HOA and lamp layer · DIN field terminals

Indicative. Generated from the element point list; confirm module pin-outs and ratings against the current data sheets before manufacture. Not for construction.

Sheet 13 / 13 — Rev C

Date 8 November 2026 — Drawn generated · RH