K&K DATA SERVICE INC.

Liquid Cooling Reference Design

Edition: Public Edition P1 (based on internal Rev P03)

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Design Development — Public Edition. Functional P&ID and coordination set, for study and evaluation, not for construction.

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LC-001 LEGEND, NUMBERING AND DESIGN BASIS

V8.5 design basis | Design coordination / Not for construction | Schematic layout; construction dimensions and routing are not defined | © 2026 K&K Data Service Inc.

Design requirements, assumptions and unconfirmed parameters

Design requirements, preliminary selections and assumptions are identified separately from confirmed equipment performance. Unconfirmed parameters require verification against the selected equipment and operating conditions. Design requirements do not constitute OEM performance certification.

Functional equipment and symbols

Equipment, connection points and coolant routes indicate process functions. Rectangular package and boundary symbols do not define OEM internal construction or a procurement bill of materials. Text, electrical links and control relations do not represent coolant pipes.

Numbering

Identifiers distinguish the group, unit, equipment and functional port. Equipment tags are unique within each tag family. N-1, N-2 and other nozzle tags apply to their associated equipment. The primary drawing and secondary view of a CDU refer to one physical CDU.

Project scope

Overall design scope: 90 racks = 5 groups of 18 = 15 units of 6. Current P03 set: 14 base drawings plus 5 supplementary coordination drawings. Additional rack-unit PDF details are views of the existing 301 drawings, not additional equipment. G01 group drawings and remaining group-specific/shared details are not issued. The intended 26-drawing base scope is incomplete. See LC-010 and LC-011.

Electrical and liquid load basis

V8.5 sizing assumes 155 kW sustained electrical load per rack and 95% heat rejection to liquid: 883.50 kW per 6 racks; 2,650.50 kW per 18 racks; 13.2525 MW liquid load and 13.95 MW IT electrical load overall. These values are design assumptions, not measured GB300 consumption or an OEM performance guarantee. The 15 MW entry limit does not establish actual PUE.

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Condensation design requirement: the coldest exposed or insulated surface target is >= local dew point +3 K. A margin <2 K for 10 s triggers a warning; a margin <=1 K for 3 s requests dehumidification or cooling adjustment. The maximum rack supply temperature remains binding. Sensor locations and implemented control logic remain to be confirmed.

PG inventory basis: ten primary buffers x15 m3 =150 m3 nominal buffer volume only. This is not the actual fill volume or total coolant mass; pipes, CDUs and racks add inventory. Total initial fill and recovery quantities remain to be confirmed. A 30-ton total fill quantity is not adopted.

Temperatures

Outdoor dry-bulb temperature <=29 °C: primary supply 37 °C and secondary supply 40 °C. From 29 to 37 °C, secondary supply rises 0.5 K per degree and primary supply remains 3 K lower. At >=37 °C: primary supply 41 °C and secondary supply 44 °C. The secondary supply hard limit is 45 °C; compatibility with the selected OEM configuration remains to be confirmed.

Permitted heat-rejection operation

Continuous duty is one dry, one dry plus one wet, or one wet. Same-type sources overlap only during an approved short transition. Primary A/B may not be connected in parallel; supply and return selectors must select the same circuit.

Media and boundary

Primary PG25 and secondary PG25 are closed fluid domains separated by each CDU heat exchanger. Wet-tower spray WTR is an independent open evaporative circuit. Hot/cold primary legs share their own buffer inventory; no WTR-to-PG process connection is permitted.

Flow, sizing and verification

Primary design flow: 330 m3/h per operating group and 110 m3/h per operating CDU. Calculated secondary flow: 49.19 to 68.37 m3/h per operating CDU. DN250 heat-rejection branches/group main, DN150 CDU primary connections, DN100 secondary main and DN50 rack branches are preliminary selections requiring hydraulic verification.

Verification requirements

Thermal capacity, hydraulic pressure, 90-second transfer and leak containment require engineering verification. Construction suitability is not established.

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LC-010 DRAWING SCOPE AND EQUIPMENT CROSS-REFERENCES

PROJECT CONFIGURATION - V8.5 DESIGN BASIS

90 racks = 5 groups x 18 racks = 15 units x 6 racks. Each six-rack unit has two CDUs and two independent secondary supply/return rings, one duty and one standby. Standby equipment is not counted as additional operating capacity.

Item	Per 18-rack group	Whole site	Operating relationship
CDUs	6	30	3 duty + 3 standby; one duty CDU per six-rack unit.
Primary rings	2	10	A/B, one duty + one standby; interconnection prohibited.
Secondary rings	6	30	Two per six-rack unit; standby confined to that unit.
Dry coolers	2	10	D1/D2 mutually standby; no continuous two-dry operation.
Wet closed-circuit coolers	2	10	W1/W2 mutually standby; one wet unit covers its group.
Stratified PG buffers	2 x 15 m3	10 x 15 m3	One independent buffer per primary ring.
Spray-water storage	2 x 40 m3	10 x 40 m3	Dedicated storage for each wet cooler.

CDU VIEW-REFERENCE RANGES

Group	Primary-interface sheet 202	Secondary-interface sheet 301
G02	E-013 to E-018	E-041 to E-046, marked (202).
G03	E-061 to E-066	E-085 to E-090, marked (202).
G04	E-117 to E-122	E-141 to E-146, marked (202).
G05	E-155 to E-160	E-179 to E-184, marked (202).

Each row refers to the same intended six physical CDUs, not twelve CDUs. Individual aliases shall be reconciled by six-rack unit, duty/standby role and primary/secondary interface ports. Range order alone is not an approved one-to-one equipment mapping.

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LC-010 DRAWING SCOPE AND EQUIPMENT CROSS-REFERENCES

Buffer references shall identify the physical A or B tank and its hot/cold ports. Primary A/B selection, secondary A/B selection and the CDU duty/standby pair are separate functions; identical letters do not establish a common hydraulic connection.

BASE DRAWING SET - 14 SHEETS

The base set contains LC-001; LC-G02-201/202/301; LC-G03-201/202/301; LC-G04-201/202/301; LC-G04-211; and LC-G05-201/202/301. It is not a completed 26-sheet drawing set. LC-010, LC-011, LC-020, LC-030 and LC-040 provide supplementary design information.

The represented G02-G05 group schematics cover four 18-rack groups. G01 remains within the 90-rack design scope but its group drawings have not been prepared. G02-211, G03-211, G05-211 and the remaining shared support details are not included in the base set.

201/202/301 references to an unissued detail require an explicit interface schedule. Schematic coordinates do not establish equipment clearances, foundation loads, elevations or pipe fabrication lengths.

G04-211 TYPICAL DETAIL - CONDITIONAL APPLICATION

G04-211 describes the G04 cold-source shared manifolds between buffer ports N-3/N-4 and four source trains. Application to another group requires matching group duty, independent A/B topology, tank ports, pump roles, valve interfaces and control conditions. The group-specific interface and isolation schedule shall be issued before the typical detail is treated as that group's completed design.

Tank-port and branch-root isolation boundaries remain to be defined. G04-211 does not establish that additional isolation valves are installed. LC-030 identifies the proposed boundaries for confirmation.

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LC-011 CDU PHYSICAL EQUIPMENT AND SECONDARY VIEW REFERENCES

K&K REFERENCE DESIGN | REV P03 | DESIGN COORDINATION | NOT FOR CONSTRUCTION

Group	6-rack unit	Normal role	Physical CDU / sheet 202	Reference record / sheet 301	Equipment quantity
G02	1	Duty	E-013 / LC-G02-202	E-041 / LC-G02-301	1 physical CDU; 2 interface views
G02	1	Standby	E-014 / LC-G02-202	E-042 / LC-G02-301	1 physical CDU; 2 interface views
G02	2	Duty	E-015 / LC-G02-202	E-043 / LC-G02-301	1 physical CDU; 2 interface views
G02	2	Standby	E-016 / LC-G02-202	E-044 / LC-G02-301	1 physical CDU; 2 interface views
G02	3	Duty	E-017 / LC-G02-202	E-045 / LC-G02-301	1 physical CDU; 2 interface views
G02	3	Standby	E-018 / LC-G02-202	E-046 / LC-G02-301	1 physical CDU; 2 interface views
G03	1	Duty	E-061 / LC-G03-202	E-085 / LC-G03-301	1 physical CDU; 2 interface views
G03	1	Standby	E-062 / LC-G03-202	E-086 / LC-G03-301	1 physical CDU; 2 interface views
G03	2	Duty	E-063 / LC-G03-202	E-087 / LC-G03-301	1 physical CDU; 2 interface views
G03	2	Standby	E-064 / LC-G03-202	E-088 / LC-G03-301	1 physical CDU; 2 interface views
G03	3	Duty	E-065 / LC-G03-202	E-089 / LC-G03-301	1 physical CDU; 2 interface views
G03	3	Standby	E-066 / LC-G03-202	E-090 / LC-G03-301	1 physical CDU; 2 interface views
G04	1	Duty	E-117 / LC-G04-202	E-141 / LC-G04-301	1 physical CDU; 2 interface views
G04	1	Standby	E-118 / LC-G04-202	E-142 / LC-G04-301	1 physical CDU; 2 interface views
G04	2	Duty	E-119 / LC-G04-202	E-143 / LC-G04-301	1 physical CDU; 2 interface views
G04	2	Standby	E-120 / LC-G04-202	E-144 / LC-G04-301	1 physical CDU; 2 interface views
G04	3	Duty	E-121 / LC-G04-202	E-145 / LC-G04-301	1 physical CDU; 2 interface views
G04	3	Standby	E-122 / LC-G04-202	E-146 / LC-G04-301	1 physical CDU; 2 interface views
G05	1	Duty	E-155 / LC-G05-202	E-179 / LC-G05-301	1 physical CDU; 2 interface views
G05	1	Standby	E-156 / LC-G05-202	E-180 / LC-G05-301	1 physical CDU; 2 interface views
G05	2	Duty	E-157 / LC-G05-202	E-181 / LC-G05-301	1 physical CDU; 2 interface views
G05	2	Standby	E-158 / LC-G05-202	E-182 / LC-G05-301	1 physical CDU; 2 interface views
G05	3	Duty	E-159 / LC-G05-202	E-183 / LC-G05-301	1 physical CDU; 2 interface views
G05	3	Standby	E-160 / LC-G05-202	E-184 / LC-G05-301	1 physical CDU; 2 interface views

Canonical physical identification follows sheet 202. Sheet 301 retains its original native reference-record tag and shows the corresponding physical CDU explicitly. Reference records are not additional equipment.

Pairing is based on group, six-rack unit, duty/standby role and interface definition. All native record tags remain intact; this schedule resolves drawing interpretation and does not merge or duplicate database equipment records.

G01 has six physical CDUs within the 30-CDU site design; its group-specific interface drawings are not included in this set. The table covers the 24 represented physical CDUs in G02-G05.

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LC-020 OPERATING STATES, TRANSFER CONDITIONS AND BUFFER RECOVERY

K&K REFERENCE DESIGN | REV P03 | DESIGN COORDINATION | NOT FOR CONSTRUCTION

NORMAL OPERATING STATE

Function	Duty state	Standby state
Primary group ring	Selected supply and return open; 330 m3/h to three duty CDUs	Other ring isolated; cold reserve and availability monitored.
CDU pair in each six-rack unit	One CDU supplies its unit; internal secondary pump one duty + one standby	Other CDU and its secondary ring isolated and monitored.
Cold source	One dry, one dry plus one wet, or one wet	Same-type spare available; overlap only during transfer.

Primary source and load flows are separate circuits through the stratified buffer. Source-branch flows sum to 330 m3/h; each duty CDU receives 110 m3/h primary flow. Neither standby pumps nor parallel source branches add another 330 m3/h to the rack-side duty.

Normal valve position and loss-of-power position shall be scheduled separately. Valve-position feedback does not prove seat tightness. The drawing set does not assign unconfirmed actuator fail positions.

COLD-SOURCE SEQUENCE AND THERMAL RESERVE

Prove standby source power, valve positions, available liquid and cooling capability; maintain load circulation; establish qualified cold liquid in the duty ring; verify CDU inlet temperature and flow; isolate the failed source. Stop or isolate a failed source path that would recirculate hot liquid into the cold reserve.

Cold-source establishment: <=60 s, including fault detection. Displacement: <=30 s. Complete event: <=90 s. Same-type overlap during transfer: <=30 s. These are design requirements, not measured transfer results.

At 330 m3/h, 90 s requires 8.25 m3 of deliverable cold liquid. A 15 m3 stratified tank at 70% effective volume provides 10.50 m3, equivalent to 114.55 s by volume. Required outlet-temperature rise is <=0.5 K for 90 s at actual PG properties and maximum return temperature. A fully mixed 15 m3 tank is not an equivalent replacement.

TRANSFER AND PROTECTION MATRIX

Event	Required response	Continuity condition
Cold-source failure	Keep the load pump and CDU secondary pumps supplying; establish an available source in the same duty ring	Buffer covers loss of cooling capacity, not loss of circulation.
Primary load-pump failure	Transfer to the available load pump	Restore primary flow within the demonstrated transfer time; the tank does not provide pump pressure.

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LC-020 OPERATING STATES, TRANSFER CONDITIONS AND BUFFER RECOVERY

Event	Required response	Continuity condition
CDU whole-unit trip	Isolate the faulty path and transfer the affected six-rack unit to its ready standby CDU/ring	Rack flow-interruption tolerance and actual valve/pump response shall be demonstrated.
Primary header or tank failure	Isolate the failed primary boundary and assess transfer to the other ring	Prove retained inventory, available cold reserve and a continuous supply path for each unit; no simultaneous group-wide interruption is permitted.
Rack common-interface leak	Isolate the affected rack supply and return	Do not transfer another CDU into the same leak.

Primary A/B transfer requires isolation before connection; primary rings shall never be connected in parallel. The 90 s cold-source recovery budget does not establish a permissible whole-ring transfer duration.

Secondary temporary overlap is conditional: temperature difference <=2 K and pressure difference <=5 kPa for 5 s; overlap <=30 s; one pressure master for the pair. These interface targets require verification and are not a universal break-before-make sequence.

STANDBY READINESS AND RECHARGE CONDITIONS

CDU standby readiness shall define liquid temperature, pressure, pump availability, valve travel, pressure-master transfer and permitted rack interruption. Primary thermal reserve cannot sustain rack flow after the secondary pump stops.

After a transfer, restore the buffer cold reserve before another planned transfer. Define recovery from measured tank temperature distribution, deliverable cold volume and source/load energy balance. Equal source and load flow alone neither proves nor disproves recharge; recovery time and completion criteria remain to be established. Define standby-ring cooling and readiness independently: source selection shall not cross-connect A/B, and permissible standby tank temperature and recharge triggers remain to be established.

44 degC is the high-temperature continuous secondary target. 44.5 degC initiates forced standby cooling takeover and the highest-priority alarm. 45 degC is the rack supply hard limit, not the start of regulation. Sensor uncertainty, buffer rise and transfer response share the same 1 K margin.

Each 18-rack group has two independent 500 kVA/400 kW UPS paths, each with a 10 min design backup. Continuous critical-load budget: 231 kW; permitted single-pair transfer overlap: 331 kW. Ten minutes of electrical backup is not ten minutes of thermal storage. IT load reduction is not a compliant substitute for the specified full-load transfer. Budget components: 3 x63 +37 +5 kW continuous; 4 x63 +2 x37 +5 kW during permitted overlap. Cold-source pumps and tower fans are outside this UPS budget; source recovery requires independent available power.

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LC-030 LEAK ISOLATION INTERFACES AND PROCESS-FLUID BOUNDARIES

EXISTING REQUIREMENTS AND PROPOSED ISOLATION BOUNDARIES

V8.5 requires zoned leak detection, supply/return isolation, restricted make-up during a leak and controlled handling of shared-interface failures. Check valves do not replace maintenance isolation. The following boundary schedule is a design proposal for confirmation; it is not an additional approved valve quantity or selected valve specification.

Leak location	Boundary to define	Retained-service condition
Cooler body or dedicated branch	Isolate the affected source supply and return; stop the associated failed pump	Another source may serve the same ring only if the leak is outside the retained liquid boundary.
Branch root between header and source selector	Establish isolation at the reachable header/branch-root boundary	Tower-end selectors alone may leave a tank-to-leak path open.
Primary supply/return header	Define sector boundaries and every tank/source/CDU backfeed path	The opposite ring can be retained only if its hydraulic and common-interface boundaries remain intact.
Buffer tank or tank port	Define isolation at hot and cold tank connections, including connected pump paths	That ring's thermal reserve is unavailable; establish the other ring's independent cold reserve and transfer capability.
Rack shared short connection	Isolate the affected rack supply and return at the common interface	Do not open the alternate CDU feed into the leak; adjacent racks remain available only if their boundaries are intact.

For each case, identify actual shutoff points, reachable trapped volume, likely drain-down inventory, affected racks and the surviving flow path. A primary leak initially concerns its 18-rack group; it does not establish either site-wide failure or successful standby-ring takeover.

PG25 AND WTR INTERFACE SCHEDULE

Circuit	Fluid/function	Separation boundary
Primary process loop	PG25 through cooler coils, stratified buffers and CDU primary passages	A/B remain separate; the CDU plate exchanger separates primary from secondary.
Secondary process loop	PG25 through CDU secondary passages and rack cooling circuits	Each six-rack unit has its own duty/standby pair; shared rack connections require local isolation.
WTR spray make-up	Treated water for the wet cooler's external evaporative/spray circuit	Cooler coil wall separates spray water from the closed PG25 process circuit.

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LC-030 LEAK ISOLATION INTERFACES AND PROCESS-FLUID BOUNDARIES

WTR storage does not replace PG inventory or PG thermal reserve. There is no authorized direct WTR make-up connection into the process PG loops. Heat transfer across a coil or plate exchanger is not a fluid cross-connection.

Each wet cooler has its own 40 m3 nominal spray-water tank and two 100% booster pumps, one duty and one standby. Storage must contain water meeting the spray-water quality requirement; treatment and discharge arrangements depend on the actual water analysis.

ISOLATION AND RECOVERY CONDITIONS TO CONFIRM

Confirm tank-root and branch-root valve positions, isolation of both supply and return, power-loss positions, closure time and independent local command authority. Commanded closed position is not proof of hydraulic tightness; verification shall include the remaining pressure/flow or leak indication.

Confirm pressure relief for isolated liquid volumes, drain and vent locations, closed PG recovery, safe recovery capacity and refill permissions. Automatic make-up shall not continue feeding an unisolated leak. No valve type, actuator fail position, relief setting or additional device count is selected by this sheet.

Leak detection shall distinguish CDU, header, branch and rack zones. Critical protection and transfer measurements use independent measurement chains; disagreement alarms and uses the adverse valid value. BMS communication loss shall not disable local protection.

Return to service requires repaired containment, demonstrated isolation integrity, compatible fluid quality, air removal, restored inventory and cold reserve. The detailed permissive sequence and affected-zone limits shall be assigned to the actual pipe and control interfaces.

DRAINING, FREEZE AND COMMON-CAUSE BOUNDARIES

PG25 product concentration, additives, temperature-dependent properties and freezing curve shall be confirmed. The designation PG25 alone does not demonstrate protection at the recorded -17.2 degC outdoor minimum.

Provide circulation or heat tracing for charged, ready standby and operating exposed sections. Recover and isolate drainable out-of-service branches; retain protected power and relief for non-drainable trapped sections. A drained branch is unavailable as a ready standby until refilled and proved ready. Spray-water tanks/pipes require >=5 degC protected space or separately backed heat tracing.

Assess shared source water, electrical supply, controller, valve manifold and physical interface failures independently of installed spare counts. Extra isolation proposals require coordinated hydraulic, control and maintenance review before incorporation.

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LC-040 OPERATING DUTIES, COOLANT INVENTORY AND WATER-USE BASIS

LOAD AND FLOW BASIS - FULL DESIGN LOAD

Basis	Value	Condition
IT electrical load	155 kW/rack; 13.95 MW/site	90 racks at full design load.
Heat entering liquid	147.25 kW/rack; 883.50 kW/6 racks; 13.2525 MW/site	Design assumption: 95% of IT electrical load.
CDU exchanger duty	888.42 kW normal; 895.25 kW hot	Per duty CDU, including secondary pump heat.
Cold-source heat rejection	2700.63 kW normal; 2721.11 kW hot	Per 18-rack group, including operating pump heat.
Primary flow	330 m3/h/group; 110 m3/h/duty CDU	Three operating CDUs; standby flow is not added.
PG25 calculation properties	Density 1009 kg/m3; specific heat 4.0 kJ/(kg K)	Preliminary uniform properties; actual product values vary with temperature.

Dry bulb degC	Primary/secondary supply degC	Secondary flow m3/h per duty CDU	Secondary operating pressure drop kPa
<=29	37 / 40	49.19	234.30
35	40 / 43	63.57	357.75
>=37	41 / 44	68.37	402.15

Primary supply targets apply at operating CDU inlets; secondary targets apply at rack supply. The primary buffer/cooler cold-end target is approximately 0.0535 K lower to compensate load-pump heat. The tabulated primary return temperature in the design basis is the cold-source inlet, not the CDU primary exchanger outlet.

PG INVENTORY AND STORAGE VOLUMES

Inventory item	Per 18-rack group	Whole site	Basis
Primary PG buffer vessels	2 x 15 = 30 m3	10 x 15 = 150 m3	Nominal vessel volume, duty and standby included.
Spray-water vessels	2 x 40 = 80 m3	10 x 40 = 400 m3	Nominal WTR storage; excluded from PG inventory.

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LC-040 OPERATING DUTIES, COOLANT INVENTORY AND WATER-USE BASIS

Total PG fill = actual buffer fill + cooler-coil and primary-pipe volumes + CDU primary/secondary volumes + secondary-pipe and rack volumes, including charged standby circuits. Nominal vessel volume is not actual initial fill. The complete PG inventory and recovery capacity remain to be calculated from the final equipment and pipe volumes.

A whole-system PG fill quantity requires the complete operating and charged-standby inventory. PG concentration and product density are required before specifying concentrate purchase quantity. Tank footprint, operating weight, foundation loads and recovery access shall be included in the site arrangement.

EQUIPMENT PERFORMANCE CONDITIONS TO CONFIRM

CDU preliminary capacity is 1100 kW per unit. At the 895.25 kW hot duty, confirm both-side temperatures, flows, pressure drops, heat-exchanger UA and fouling allowance; a 3 K cold-end approach alone is not a heat-exchanger performance guarantee.

Pump duty	Operating pressure drop	Preliminary inquiry point
Primary source	118.90 kPa at 330 m3/h	>=142.68 kPa; 30 kW motor budget.
Primary load	151.10 kPa at 330 m3/h	>=181.32 kPa; 37 kW motor budget.
CDU secondary	Up to 402.15 kPa at 68.37 m3/h	70 m3/h at >=500 kPa; 22 kW motor budget.

These are operating pressure differences and selection targets, not absolute interface gauge pressures or measured capacities. Confirm actual pump curves, minimum flow, NPSH, shutoff pressure and the lowest component MAWP.

45 degC rack supply would require approximately 73.16 m3/h per CDU under the same preliminary interpolation/scaling method. The 70 m3/h inquiry point is not a proven maximum pump flow, and the 44 degC calculation does not establish continuous full-load capability at 45 degC.

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LC-040 OPERATING DUTIES, COOLANT INVENTORY AND WATER-USE BASIS

Dry cooler reference: 3200 kW at 29 degC dry bulb, 37 degC outlet and 330 m3/h PG25. Wet cooler requirement: 3300 kW at 30 degC wet bulb, 35 degC outlet, 43.92 degC inlet and 330 m3/h PG25. Partial-flow performance, including the 66 m3/h wet branch budget, requires confirmation. The 46 degC dry-bulb/30 degC wet-bulb pair is a stress condition, not an observed coincident extreme. The preliminary thermal model applies a 10% UA reduction to the dry-cooler reference; this is a calculation allowance, not a supplier-certified degraded capacity.

SPRAY-WATER STORAGE AND ANNUAL CONSUMPTION

Quantity	Value	Calculation condition
Wet-mode operation	1027.81 h/year per group	Standard-year theoretical model; normally one wet cooler operates.
Normal spray make-up	11032.32 m3/year, whole 90-rack site	V8.5 full-load standard-year model; not measured consumption or a final total-water forecast.
Per wet cooler make-up maximum	14.85 m3/h	3300 kW, 100% evaporation heat, latent heat 2400 kJ/kg and concentration cycles 1.5.
Per tank required usable water	32.67 m3	14.85 m3/h x 2 h x 1.10 margin.
Per tank design usable water	34 m3	40 m3 nominal x 85% usable; each tank independently meets the 2 h basis.

Current control permits one dry, one dry plus one wet, or one wet; dry coolers exit above the defined threshold, corresponding to dry bulb >35 degC on the current curve. A wet cooler may also start earlier if one dry cooler lacks capacity. Normal modeled water use is therefore not restricted to emergencies.

The annual model uses 2016-2025 dry-bulb bins normalized to 8760 h; wet bulb is approximated as the lesser of 30 degC and bin dry bulb. Annual evaporation uses an 85% heat fraction, concentration cycles 1.5 and drift at 0.2% of evaporation. The 2 h storage calculation separately uses 100% evaporation heat.

Initial filling of all spray-water vessels is up to 400 m3 and is counted in the year it occurs, not every year. First fills, drain/refill, cleaning, testing and fault-related water are excluded from 11032.32 m3/year and shall be added to the utility-water allowance.

This policy includes normal seasonal wet cooling. An emergency-only water-use basis would require a different control policy and a separate thermal and water balance; it is not the basis of this drawing set. A continuous two-dry strategy requires a separate design decision and recalculation.

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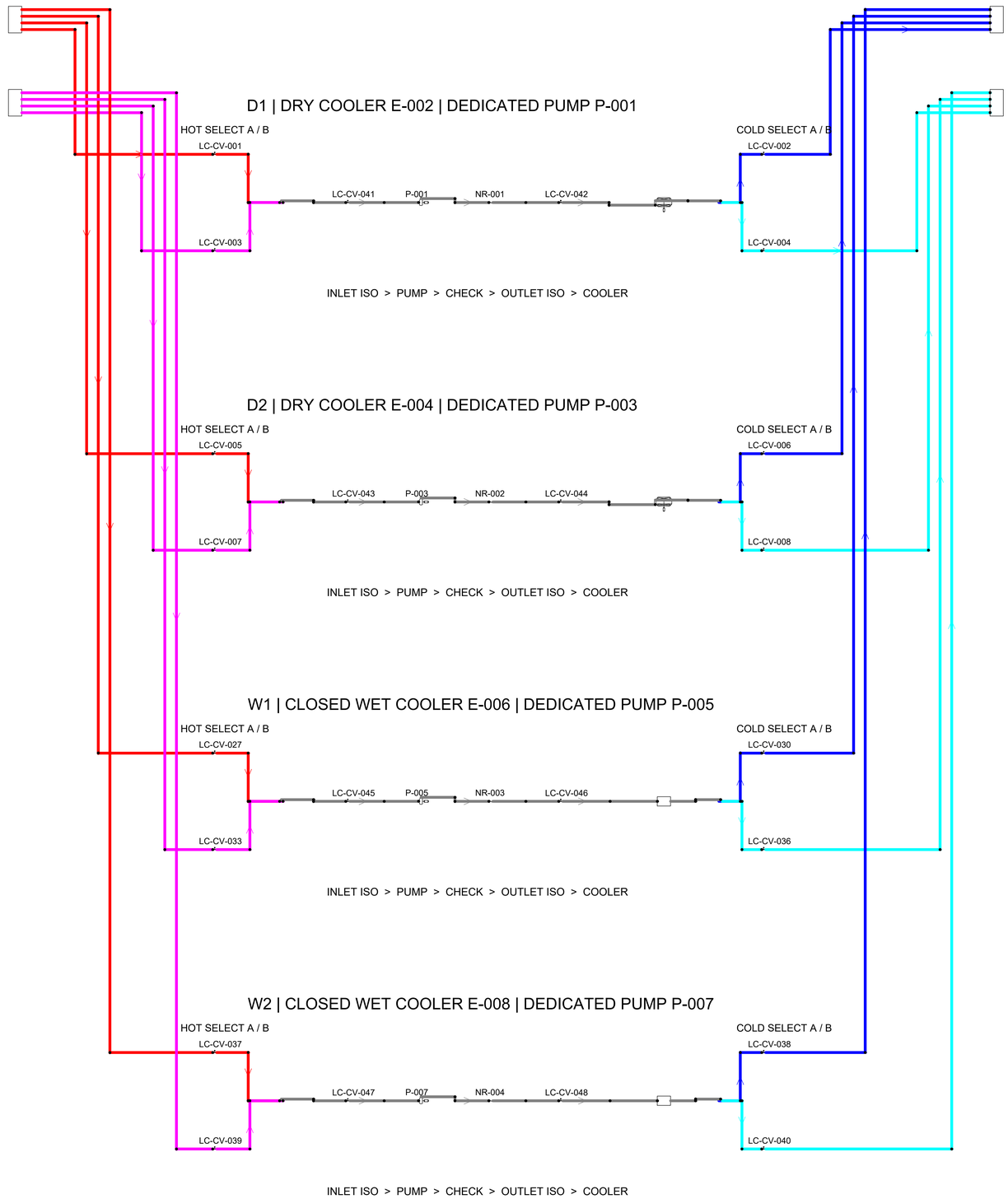
PRIMARY A | REF LC-G02-202
BUFFER V-001 | SOURCE_HOT_OUT
Reference symbol E-010; same physical tank.
Physical tank port N-3 (hot); four functional source branches, not four physical tank nozzles.

PRIMARY B | REF LC-G02-202
BUFFER V-002 | SOURCE_HOT_OUT
Reference symbol E-012; same physical tank.
Physical tank port N-3 (hot); four functional source branches, not four physical tank nozzles.

PRIMARY A | REF LC-G02-202
BUFFER V-001 | SOURCE_COLD_IN
Reference symbol E-009; same physical tank.
Physical tank port N-4 (cold); four functional source branches, not four physical tank nozzles.

PRIMARY B | REF LC-G02-202
BUFFER V-002 | SOURCE_COLD_IN
Reference symbol E-011; same physical tank.
Physical tank port N-4 (cold); four functional source branches, not four physical tank nozzles.

SOURCE FLOW DIRECTION
Hot: tank N-3 > matched hot selector > inlet isolation > dedicated pump > check > outlet isolation > cooler. Cold: cooler > matched cold selector > tank N-4. Both sides select the same A or B ring. See presentation arrows; crossings without a junction do not connect.



LC-G02-201 | COLD-SOURCE SELECTION
18-rack group / Four dedicated source trains / NTS

NORMAL REFERENCE STATE
Primary ring A selected. D1 pump running; D1 HA + CA open, HB + CB closed. D2, W1 and W2 pumps ready; their four source selectors closed. Maintenance isolators in service position. Normal state is not the loss-of-power valve position.

MATCHED RING SELECTION
Each running train selects HA + CA for primary A, or HB + CB for primary B. Supply and return must select the same ring. Do not open both A and B pairs as a normal duty state; do not connect primary A to primary B through a cooler train.

PERMITTED SOURCE MODES
One dry cooler; one dry plus one wet cooler when required; or one wet cooler. The two dry coolers are mutual standby, not continuous parallel duty. A same-type changeover overlap is short and controlled, with hydraulic and control limits to be confirmed.

WET DUTY BOUNDARY
Wet operation above 35 degC outdoor dry bulb, or earlier when dry capacity is insufficient, is an intended operating mode. Spray water is a separate service. Tank, spray-pump and water-treatment detail is outside this source-train schematic.

FLOW AND HEAT BASIS
Primary group flow 330 m3/h. Source-pump selection must satisfy the selected train and combined-mode flow; standby pump ratings are not added. Group heat rejection including pump heat: 2700.63 kW normal / 2721.11 kW high-temperature basis. Individual cooler capacities and hydraulic duty remain to be confirmed.

TEMPERATURE AND BUFFER
Primary / secondary supply: 37 / 40 degC normal; 41 / 44 degC high-temperature mode. 45 degC is a hard limit, not a continuous rating. 15 m3 nominal buffer per ring; 90 s source transfer and outlet rise <=0.5 K are design requirements, subject to usable volume, stratification and control validation.

FAILURE AND LEAK RESPONSE
Stop a failed source pump and isolate the affected train as permitted by the verified sequence. Healthy load and secondary pumps need not stop for a source-only fault. Stopping a pump does not isolate a leak. Header/branch isolation, retained pressure, transfer timing and common failure cut sets remain to be confirmed; no guaranteed whole-ring transfer is stated. Valve feedback does not prove seat isolation. Maintenance-valve actuation and actuator quantities remain to be confirmed.

INTERFACES AND DRAWING SCOPE
Primary tanks, load pumps and CDU selection: LC-G02-202. Rack distribution: LC-G02-301. LC-G04-211 is the G04 SOURCE SHARED-MANIFOLD typical (tank N-3/N-4 to four source trains), not a CDU package or pump detail. Use in other groups only after the group port, A/B topology, controls and isolation schedule are confirmed. LC-020 / LC-030 are issued coordination supplements; selected isolation hardware and detailed control schematics remain to be confirmed.

GRAPHIC CONVENTION
Primary A hot red / cold blue; primary B hot magenta / cold cyan. Neutral grey is the common train after matched selectors. Crossings without a junction symbol do not connect. Branch nozzles and reference symbols indicate functional interfaces, not physical nozzle schedules.

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Rev P03 | Design coordination / Not for construction
A0 / NTS | Equipment arrangement, pipe sizes, fail positions and OEM ratings remain to be confirmed.

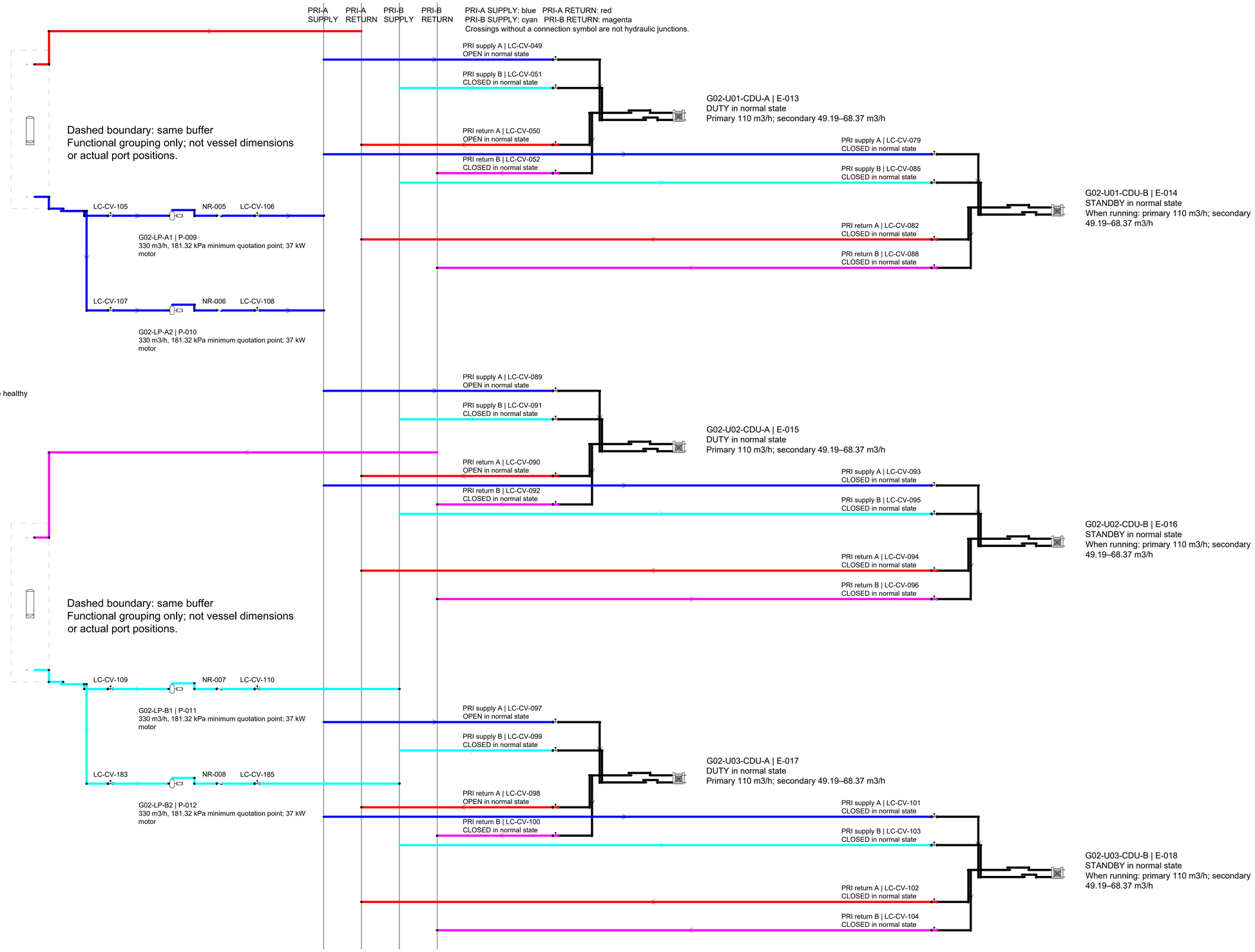
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LC-G02-202 PRIMARY DISTRIBUTION — 18-RACK STANDARD GROUP

P03 | 3 x 6 racks | 6 CDUs: 3 duty + 3 standby | Primary A/B: one duty, one standby | NTS

V8.5 basis: 155 kW/rack; 95% liquid. Group heat rejection incl. pump heat: 2,700.63 / 2,721.11 kW.
Primary: 330 m3/h per operating group; 110 m3/h per operating CDU. Standby flows are not added.

CDU selection: 1,100 kW/physical unit; actual duty 888.42 / 895.25 kW.
37/40 C normal; 41/44 C high-temperature primary/secondary supply. 45 C is the secondary hard limit, not a rated operating guarantee.



Primary selectors: supply and return select the SAME primary circuit. A/B parallel connection is prohibited.
Valve fail position and seat leakage performance require the actual actuator/valve specification.

Buffer cold inventory does not maintain rack flow after a CDU secondary-pump trip.
Whole-ring transfer, standby readiness and recharge completion criteria: LC-020. Isolation proposals: LC-030.

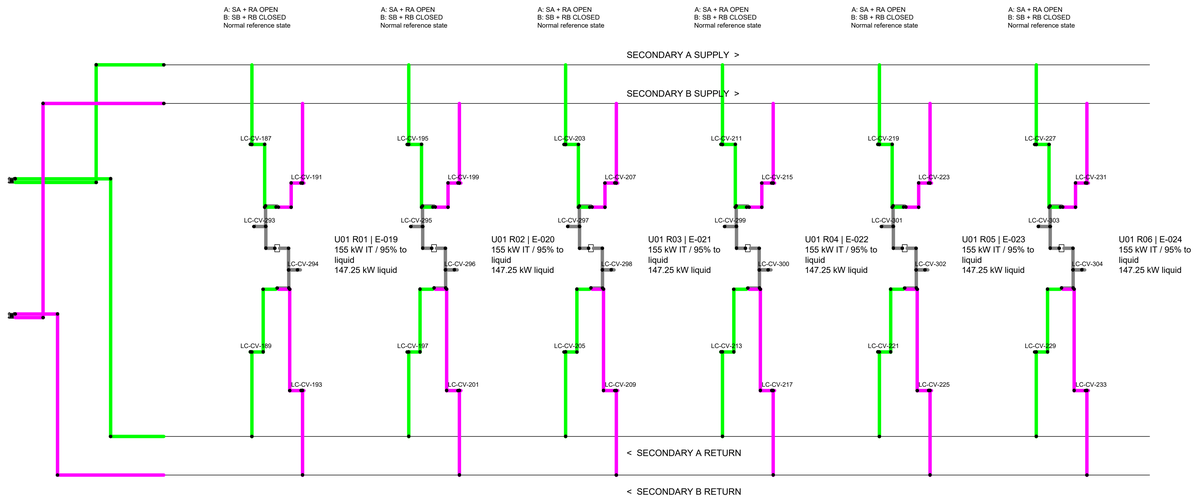
FUNCTIONAL TOP / HOT AND BOTTOM / COLD ZONES ONLY. Vessel nozzle geometry is not established by this layout; verify actual native attachments and OEM port schedule. Crossings without a junction symbol are not connections.

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LC-G02-301 | SECONDARY DISTRIBUTION
Three independent six-rack units / NTS

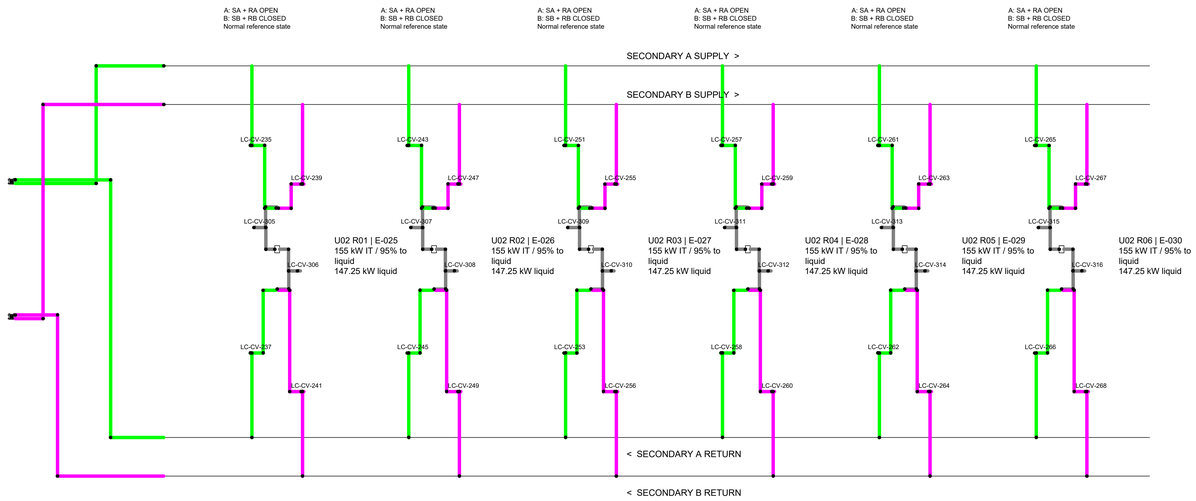
UNIT U01 | SIX RACKS | TWO CDU REFERENCES | SECONDARY A/B



U01 CDU A
PHYSICAL E-013 | REF LC-G02-202
This secondary symbol E-041 represents the same CDU, not additional equipment.

U01 CDU B
PHYSICAL E-014 | REF LC-G02-202
This secondary symbol E-042 represents the same CDU, not additional equipment.

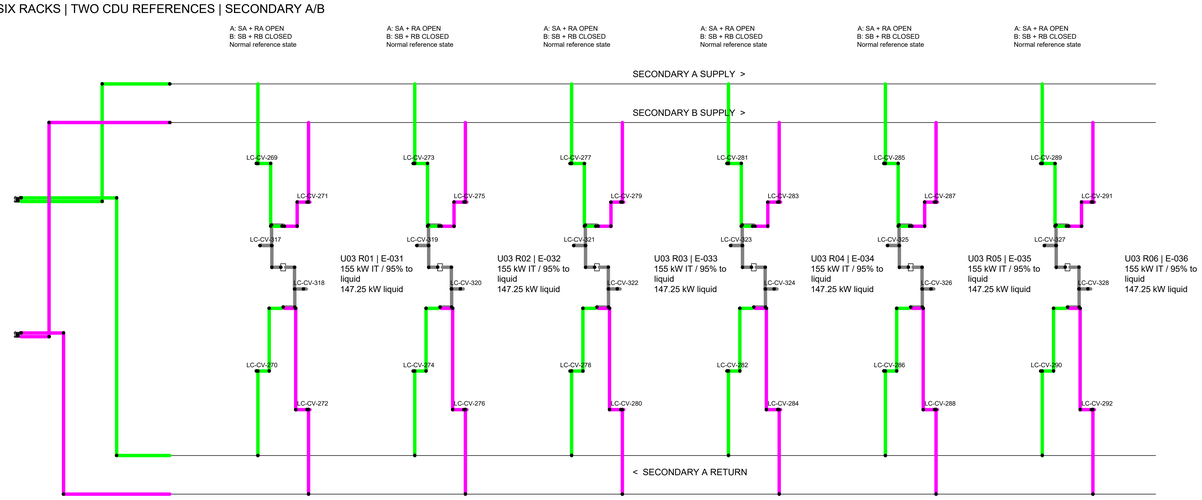
UNIT U02 | SIX RACKS | TWO CDU REFERENCES | SECONDARY A/B



U02 CDU A
PHYSICAL E-015 | REF LC-G02-202
This secondary symbol E-043 represents the same CDU, not additional equipment.

U02 CDU B
PHYSICAL E-016 | REF LC-G02-202
This secondary symbol E-044 represents the same CDU, not additional equipment.

UNIT U03 | SIX RACKS | TWO CDU REFERENCES | SECONDARY A/B



U03 CDU A
PHYSICAL E-017 | REF LC-G02-202
This secondary symbol E-045 represents the same CDU, not additional equipment.

U03 CDU B
PHYSICAL E-018 | REF LC-G02-202
This secondary symbol E-046 represents the same CDU, not additional equipment.

PHYSICAL EQUIPMENT IDENTITY
CDU symbols on this page are secondary-side references to the same physical CDUs on the 202 sheet. Use the PHYSICAL tag as the canonical equipment reference; the original secondary symbol tag is retained in the mapping. There are six physical CDUs per 18-rack group, not twelve.

NORMAL DUTY / STANDBY
For each unit, CDU A supplies secondary A; rack SA + RA are open and SB + RB closed. CDU B / secondary B is standby. Rack common supply and return maintenance isolators remain open in service. Valve loss-of-power positions are separate design requirements and remain to be confirmed.

SECONDARY TRANSFER
Transfer both supply and return selectors to the healthy secondary pair. A conditional, controlled transient parallel interval may be used after pressure, temperature, check-valve and control compatibility are confirmed. Proposed permissives: DeltaT <=2 K; DeltaP <=5 kPa stable >=5 s; overlap <=30 s; one pressure master. Actual timing, valve stroke, sensor response and acknowledgement require validation. This does not require primary A-to-B transfer; primary circuits remain isolated.

HEAT AND FLOW BASIS
Each rack: 155 kW IT, 95% liquid =147.25 kW; remaining 7.75 kW is room heat. Six-rack liquid load 883.5 kW before pump heat. Per operating CDU including pump heat: 888.42 kW normal /895.25 kW high-temperature basis. 1100 kW is the initial CDU rating requirement, subject to OEM duty validation.

SECONDARY OPERATING LIMITS
40 degC supply normal /44 degC high-temperature mode. Flow at 44 degC: 68.37 m3/h per CDU; 70 m3/h is the quoted selection basis. Derived 45 degC flow 73.16 m3/h is not an established pump maximum. 45 degC is a hard limit, not a continuous rated operating point.

FAILURE / LOSS OF FLOW
On a CDU or secondary-pump fault, isolate the affected path and transfer only under a confirmed sequence. The primary buffer does not sustain secondary rack flow when a CDU secondary pump stops. Permitted no-flow duration, restart transient, minimum standby circulation and interruption limits remain to be confirmed. Package function: return > VSD pump pair (1+1) > heat exchanger > supply; OEM internal routing is not an external-pipe layout.

RACK LEAK / SHARED INTERFACE
A rack leak in the common interface can require isolation of that rack on both secondary paths. Do not assume automatic transfer bypasses a common leak. Short secondary parallel transfer couples the entire six-rack inventory. Stopping a pump does not isolate a leak. Shared manifold, valve, control, power and maintenance common causes, actuator selection and valve-seat containment remain to be confirmed.

INTERFACES / GRAPHIC CONVENTION
Primary selection and buffer: LC-G02-202. LC-G04-211 is the G04 SOURCE SHARED-MANIFOLD typical, not a CDU package or pump detail; applicability to another group requires an issued port and isolation schedule. See LC-030 for leak-boundary proposals. Green =secondary A, magenta =secondary B; grey =common rack interface. A junction exists only at its explicit connection symbol. SA/SB =supply selection; RA/RB =return selection; IS/IR =common rack isolation. Primary and secondary PG25 domains remain separated by the CDU heat exchanger. Functional header nozzles are not an OEM nozzle schedule.

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Rev P03 | Design coordination / Not for construction
A0 / NTS | Pipe sizes, valve fail positions and control timing remain to be confirmed.

PG PRESSURISATION / MAKE-UP INTERFACE - TO BE CONFIRMED
Premixed PG service only; no direct WTR connection. Define each secondary ring pressure reference, connection point and leak-inhibit function with the CDU supplier. This is a functional coordination note, not an added device, valve quantity or selected package.

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LC-G02-301 / U01 SIX-RACK UNIT DETAIL | REV P03 | NTS

UNIT U01 | SIX RACKS | TWO CDU REFERENCES | SECONDARY A/B

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

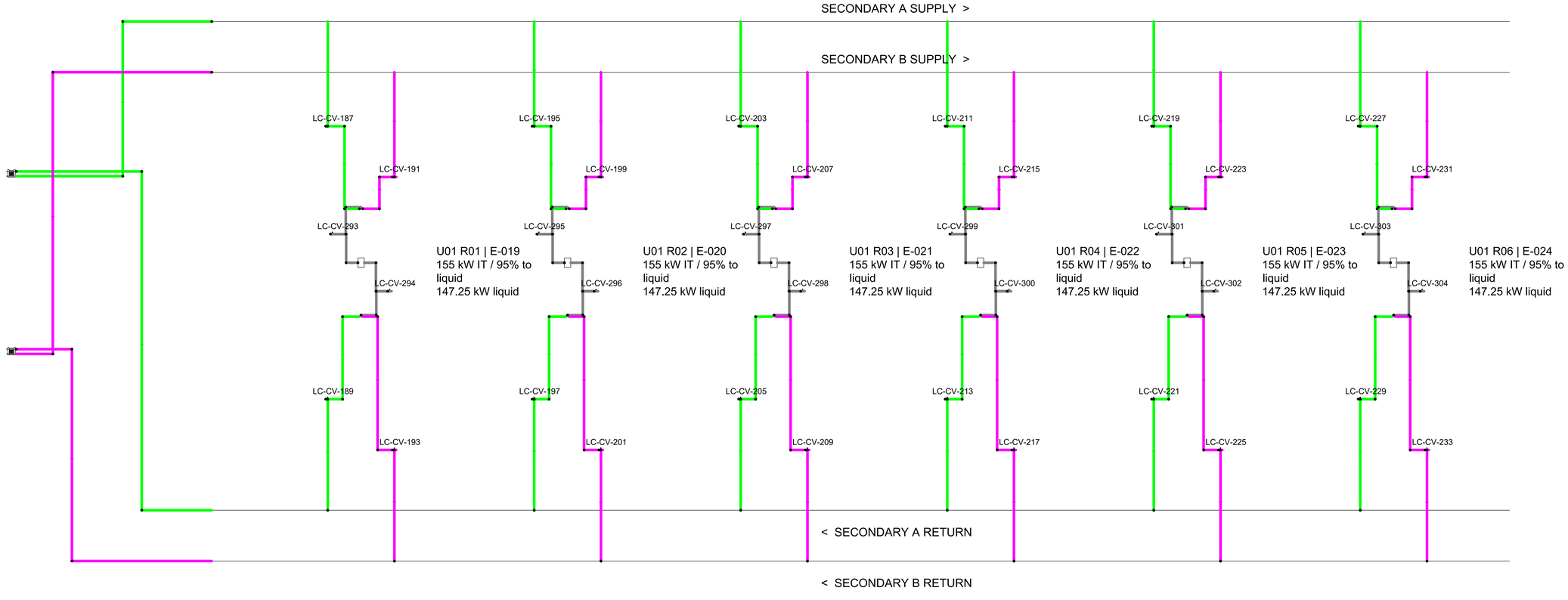
A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

U01 CDU A
PHYSICAL E-013 | REF LC-G02-202
This secondary symbol E-041 represents the same CDU, not additional equipment.

U01 CDU B
PHYSICAL E-014 | REF LC-G02-202
This secondary symbol E-042 represents the same CDU, not additional equipment.



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LC-G02-301 / U02 SIX-RACK UNIT DETAIL | REV P03 | NTS

UNIT U02 | SIX RACKS | TWO CDU REFERENCES | SECONDARY A/B

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

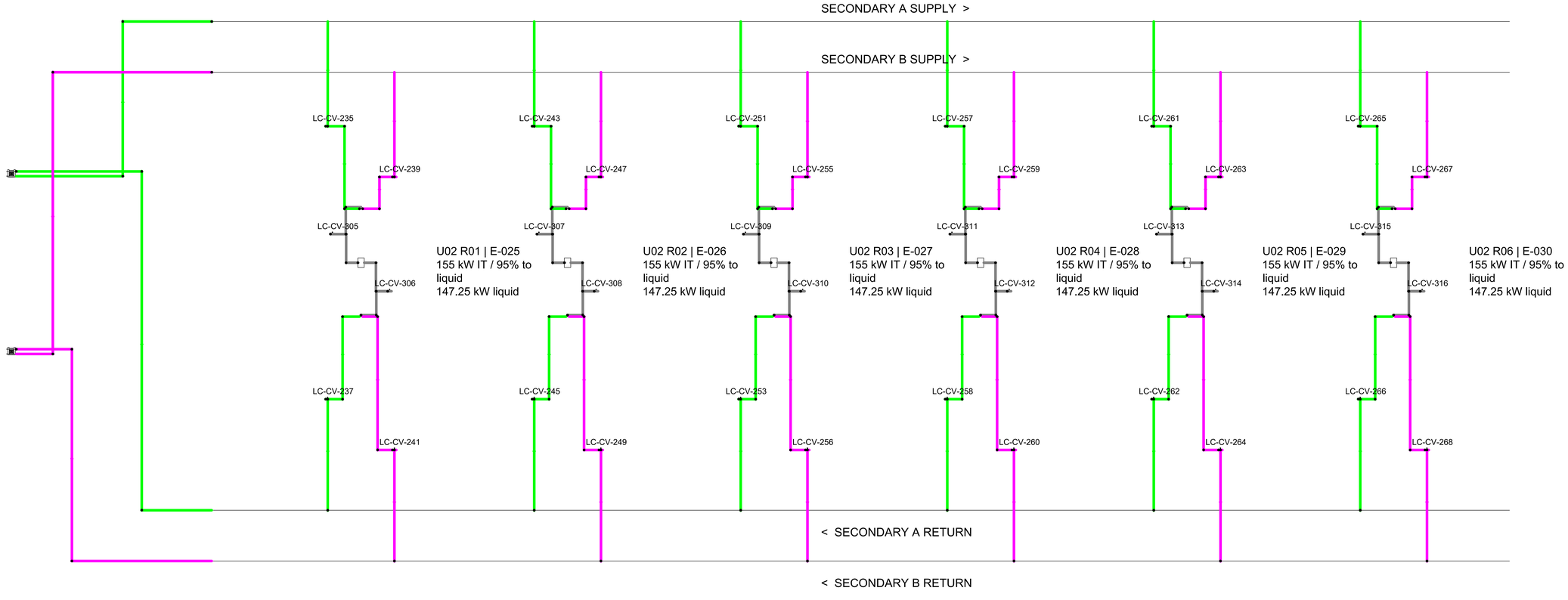
A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

U02 CDU A
PHYSICAL E-015 | REF LC-G02-202
This secondary symbol E-043 represents the same CDU, not additional equipment.

U02 CDU B
PHYSICAL E-016 | REF LC-G02-202
This secondary symbol E-044 represents the same CDU, not additional equipment.



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LC-G02-301 / U03 SIX-RACK UNIT DETAIL | REV P03 | NTS

UNIT U03 | SIX RACKS | TWO CDU REFERENCES | SECONDARY A/B

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

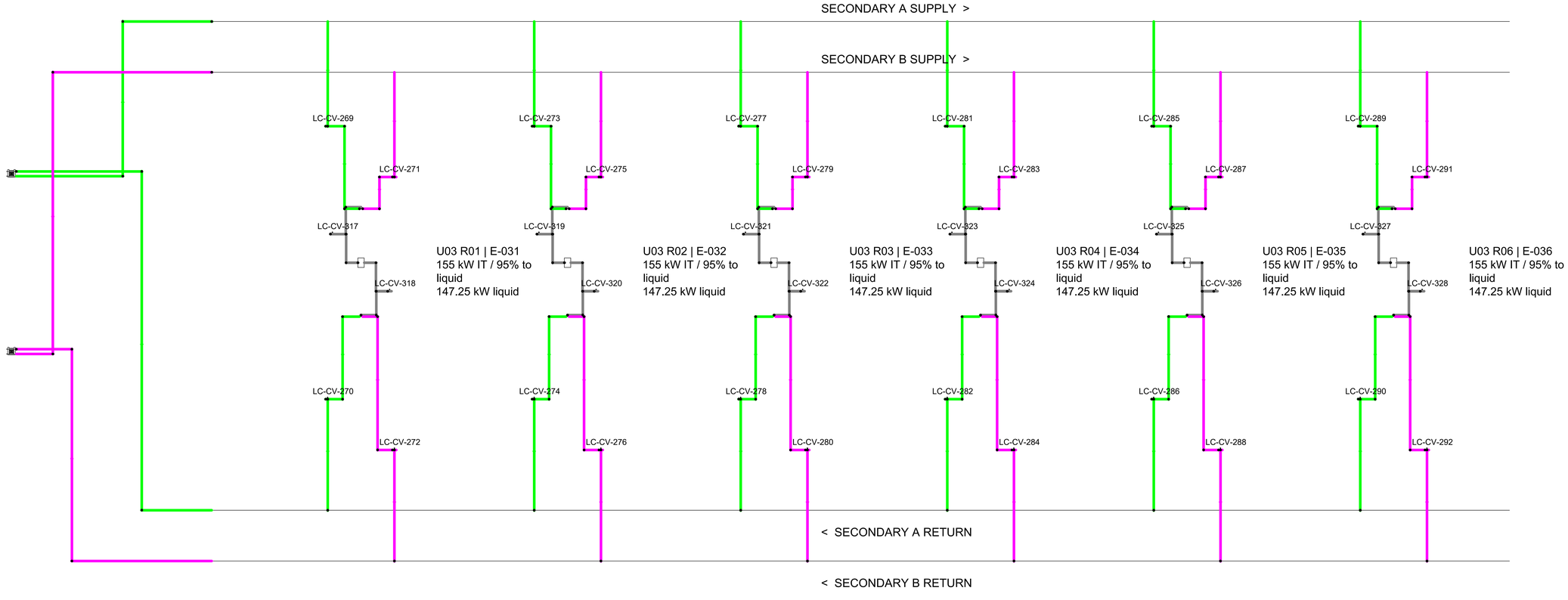
A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

U03 CDU A
PHYSICAL E-017 | REF LC-G02-202
This secondary symbol E-045 represents the same CDU, not additional equipment.

U03 CDU B
PHYSICAL E-018 | REF LC-G02-202
This secondary symbol E-046 represents the same CDU, not additional equipment.



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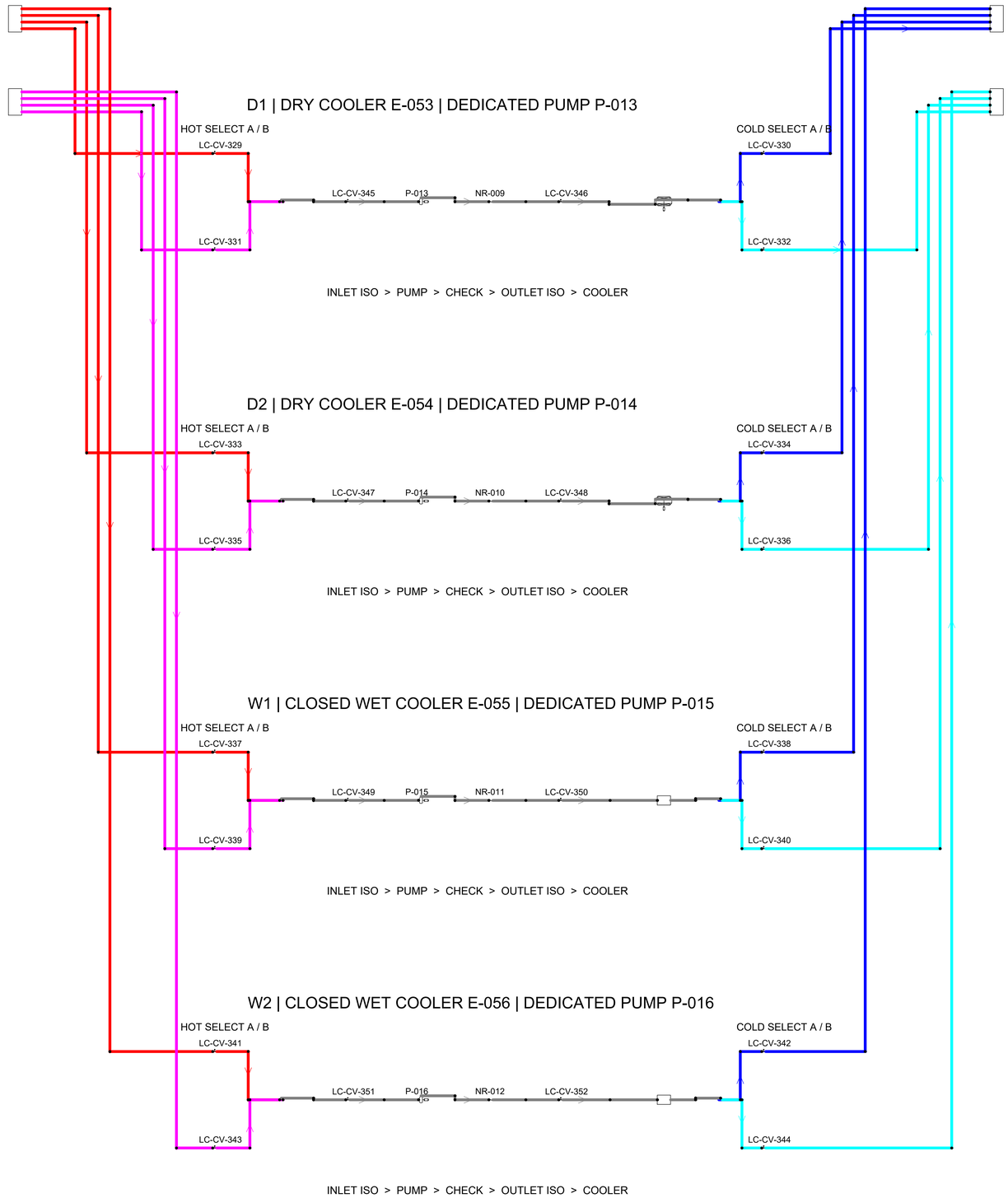
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PRIMARY A | REF LC-G03-202
BUFFER V-003 | SOURCE_HOT_OUT
Reference symbol E-058; same physical tank.
Physical tank port N-3 (hot); four functional source branches, not four physical tank nozzles.

PRIMARY B | REF LC-G03-202
BUFFER V-004 | SOURCE_HOT_OUT
Reference symbol E-060; same physical tank.
Physical tank port N-3 (hot); four functional source branches, not four physical tank nozzles.

PRIMARY A | REF LC-G03-202
BUFFER V-003 | SOURCE_COLD_IN
Reference symbol E-057; same physical tank.
Physical tank port N-4 (cold); four functional source branches, not four physical tank nozzles.

PRIMARY B | REF LC-G03-202
BUFFER V-004 | SOURCE_COLD_IN
Reference symbol E-059; same physical tank.
Physical tank port N-4 (cold); four functional source branches, not four physical tank nozzles.



SOURCE FLOW DIRECTION
Hot: tank N-3 > matched hot selector > inlet isolation > dedicated pump > check > outlet isolation > cooler. Cold: cooler > matched cold selector > tank N-4. Both sides select the same A or B ring. See presentation arrows; crossings without a junction do not connect.

LC-G03-201 | COLD-SOURCE SELECTION
18-rack group / Four dedicated source trains / NTS

NORMAL REFERENCE STATE
Primary ring A selected. D1 pump running; D1 HA + CA open, HB + CB closed. D2, W1 and W2 pumps ready; their four source selectors closed. Maintenance isolators in service position. Normal state is not the loss-of-power valve position.

MATCHED RING SELECTION
Each running train selects HA + CA for primary A, or HB + CB for primary B. Supply and return must select the same ring. Do not open both A and B pairs as a normal duty state; do not connect primary A to primary B through a cooler train.

PERMITTED SOURCE MODES
One dry cooler; one dry plus one wet cooler when required; or one wet cooler. The two dry coolers are mutual standby, not continuous parallel duty. A same-type changeover overlap is short and controlled, with hydraulic and control limits to be confirmed.

WET DUTY BOUNDARY
Wet operation above 35 degC outdoor dry bulb, or earlier when dry capacity is insufficient, is an intended operating mode. Spray water is a separate service. Tank, spray-pump and water-treatment detail is outside this source-train schematic.

FLOW AND HEAT BASIS
Primary group flow 330 m3/h. Source-pump selection must satisfy the selected train and combined-mode flow; standby pump ratings are not added. Group heat rejection including pump heat: 2700.63 kW normal / 2721.11 kW high-temperature basis. Individual cooler capacities and hydraulic duty remain to be confirmed.

TEMPERATURE AND BUFFER
Primary / secondary supply: 37 / 40 degC normal; 41 / 44 degC high-temperature mode. 45 degC is a hard limit, not a continuous rating. 15 m3 nominal buffer per ring; 90 s source transfer and outlet rise <=0.5 K are design requirements, subject to usable volume, stratification and control validation.

FAILURE AND LEAK RESPONSE
Stop a failed source pump and isolate the affected train as permitted by the verified sequence. Healthy load and secondary pumps need not stop for a source-only fault. Stopping a pump does not isolate a leak. Header/branch isolation, retained pressure, transfer timing and common failure cut sets remain to be confirmed; no guaranteed whole-ring transfer is stated. Valve feedback does not prove seat isolation. Maintenance-valve actuation and actuator quantities remain to be confirmed.

INTERFACES AND DRAWING SCOPE
Primary tanks, load pumps and CDU selection: LC-G03-202. Rack distribution: LC-G03-301. LC-G04-211 is the G04 SOURCE SHARED-MANIFOLD typical (tank N-3/N-4 to four source trains), not a CDU package or pump detail. Use in other groups only after the group port, A/B topology, controls and isolation schedule are confirmed. LC-020 / LC-030 are issued coordination supplements; selected isolation hardware and detailed control schematics remain to be confirmed.

GRAPHIC CONVENTION
Primary A hot red / cold blue; primary B hot magenta / cold cyan. Neutral grey is the common train after matched selectors. Crossings without a junction symbol do not connect. Branch nozzles and reference symbols indicate functional interfaces, not physical nozzle schedules.

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Rev P03 | Design coordination / Not for construction
A0 / NTS | Equipment arrangement, pipe sizes, fail positions and OEM ratings remain to be confirmed.

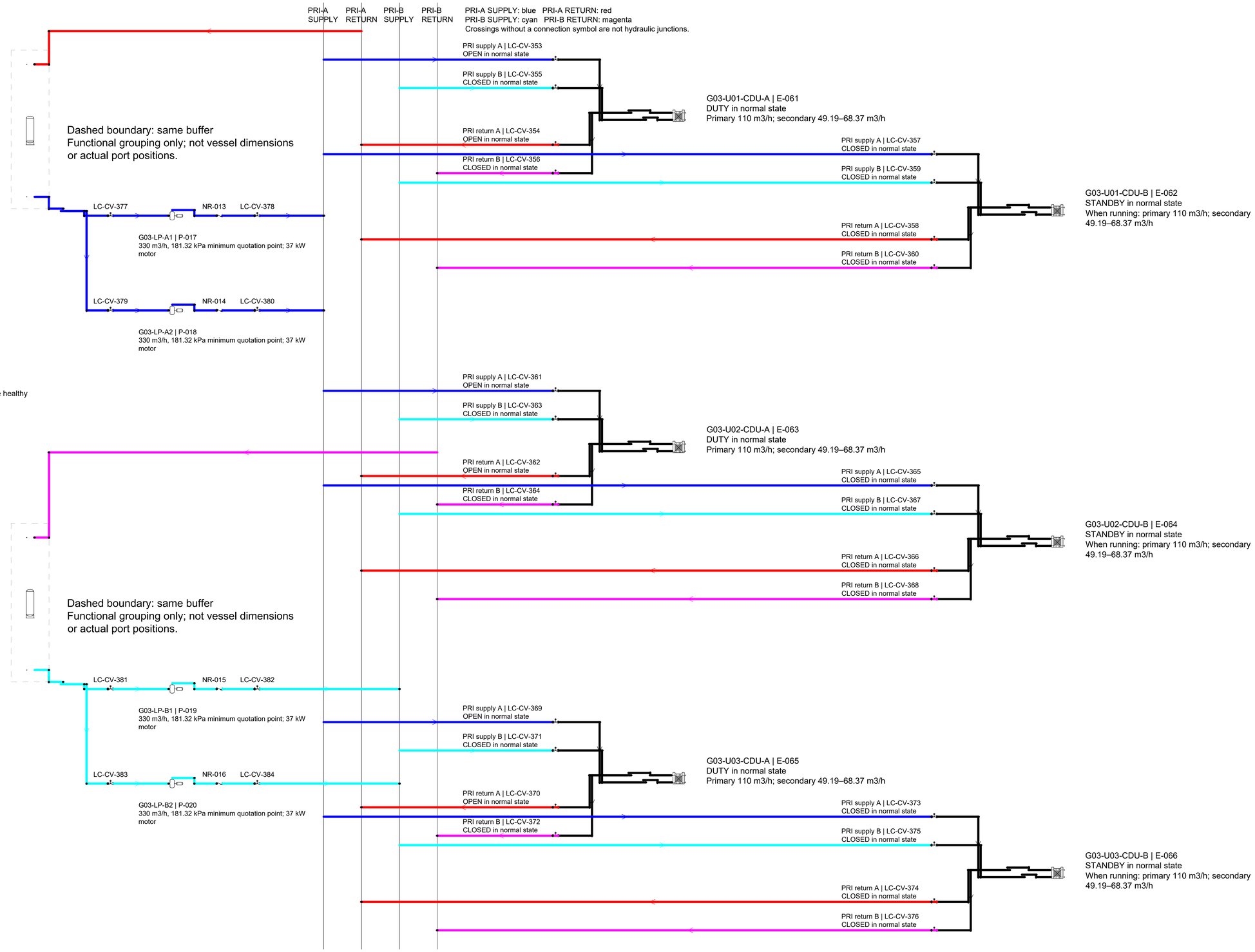
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LC-G03-202 PRIMARY DISTRIBUTION — 18-RACK STANDARD GROUP

P03 | 3 x 6 racks | 6 CDUs: 3 duty + 3 standby | Primary A/B: one duty, one standby | NTS

V8.5 basis: 155 kW/rack; 95% liquid. Group heat rejection incl. pump heat: 2,700.63 / 2,721.11 kW.
Primary: 330 m3/h per operating group; 110 m3/h per operating CDU. Standby flows are not added.

CDU selection: 1,100 kW/physical unit; actual duty 888.42 / 895.25 kW.
37/40 C normal; 41/44 C high-temperature primary/secondary supply. 45 C is the secondary hard limit, not a rated operating guarantee.



Primary selectors: supply and return select the SAME primary circuit. A/B parallel connection is prohibited.
Valve fail position and seat leakage performance require the actual actuator/valve specification.

Buffer cold inventory does not maintain rack flow after a CDU secondary-pump trip.
Whole-ring transfer, standby readiness and recharge completion criteria: LC-020. Isolation proposals: LC-030.

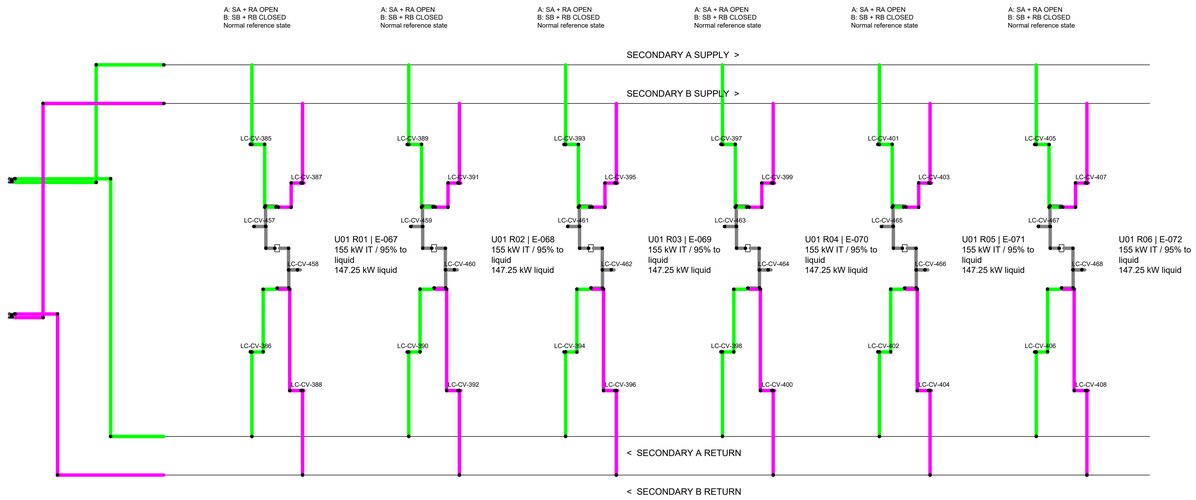
FUNCTIONAL TOP / HOT AND BOTTOM / COLD ZONES ONLY. Vessel nozzle geometry is not established by this layout; verify actual native attachments and OEM port schedule. Crossings without a junction symbol are not connections.

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LC-G03-301 | SECONDARY DISTRIBUTION
Three independent six-rack units / NTS

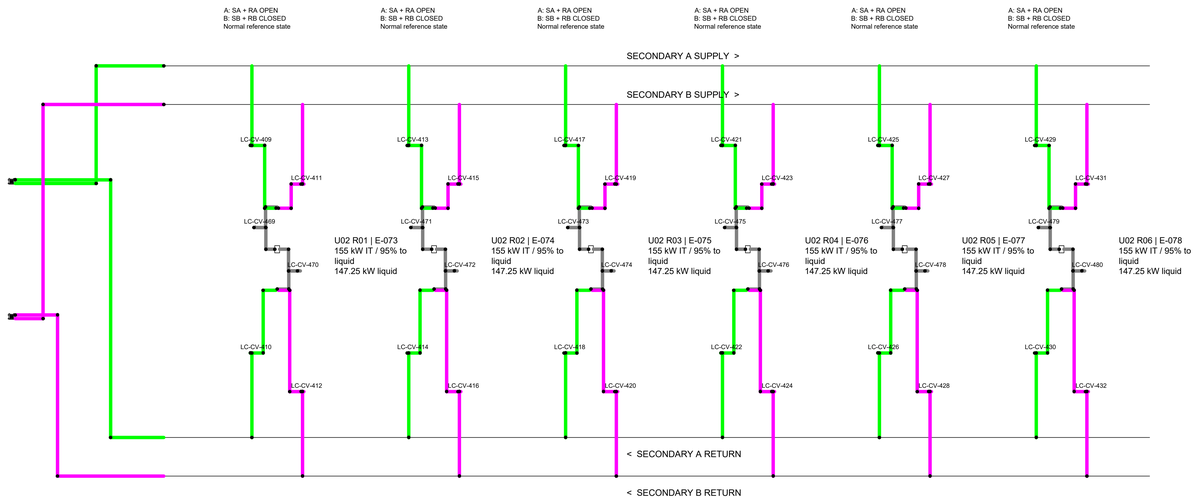
UNIT U01 | SIX RACKS | TWO CDU REFERENCES | SECONDARY A/B



U01 CDU A
PHYSICAL E-061 | REF LC-G03-202
This secondary symbol E-085 represents the same CDU, not additional equipment.

U01 CDU B
PHYSICAL E-062 | REF LC-G03-202
This secondary symbol E-086 represents the same CDU, not additional equipment.

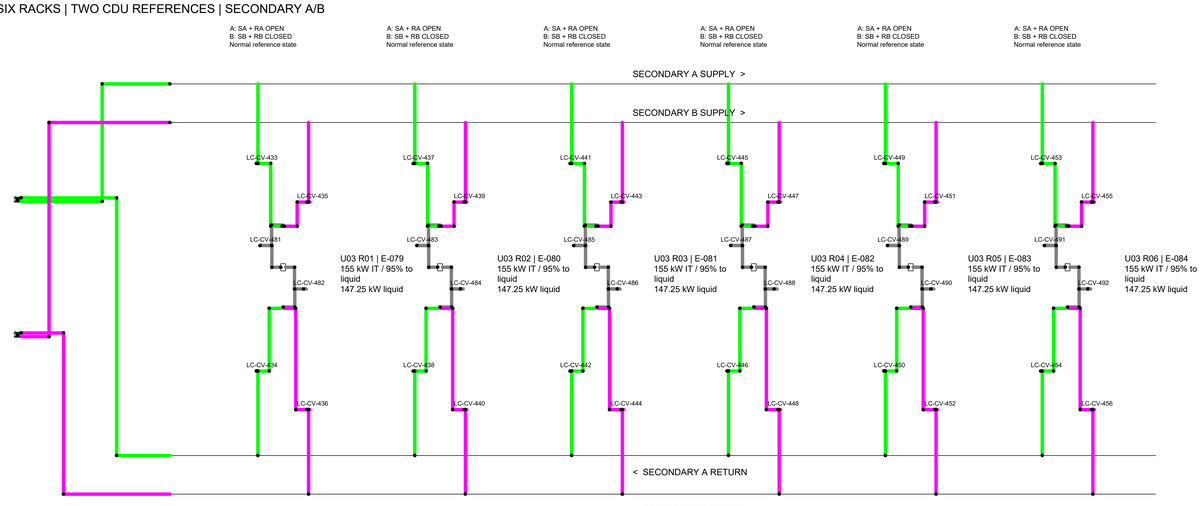
UNIT U02 | SIX RACKS | TWO CDU REFERENCES | SECONDARY A/B



U02 CDU A
PHYSICAL E-063 | REF LC-G03-202
This secondary symbol E-087 represents the same CDU, not additional equipment.

U02 CDU B
PHYSICAL E-064 | REF LC-G03-202
This secondary symbol E-088 represents the same CDU, not additional equipment.

UNIT U03 | SIX RACKS | TWO CDU REFERENCES | SECONDARY A/B



U03 CDU A
PHYSICAL E-065 | REF LC-G03-202
This secondary symbol E-089 represents the same CDU, not additional equipment.

U03 CDU B
PHYSICAL E-066 | REF LC-G03-202
This secondary symbol E-090 represents the same CDU, not additional equipment.

PHYSICAL EQUIPMENT IDENTITY
CDU symbols on this page are secondary-side references to the same physical CDUs on the 202 sheet. Use the PHYSICAL tag as the canonical equipment reference; the original secondary symbol tag is retained in the mapping. There are six physical CDUs per 18-rack group, not twelve.

NORMAL DUTY / STANDBY
For each unit, CDU A supplies secondary A; rack SA + RA are open and SB + RB closed. CDU B / secondary B is standby. Rack common supply and return maintenance isolators remain open in service. Valve loss-of-power positions are separate design requirements and remain to be confirmed.

SECONDARY TRANSFER
Transfer both supply and return selectors to the healthy secondary pair. A conditional, controlled transient parallel interval may be used after pressure, temperature, check-valve and control compatibility are confirmed. Proposed permissives: DeltaT <=2 K; DeltaP <=5 kPa stable >=5 s; overlap <=30 s; one pressure master. Actual timing, valve stroke, sensor response and acknowledgement require validation. This does not require primary A-to-B transfer; primary circuits remain isolated.

HEAT AND FLOW BASIS
Each rack: 155 kW IT, 95% liquid =147.25 kW; remaining 7.75 kW is room heat. Six-rack liquid load 883.5 kW before pump heat. Per operating CDU including pump heat: 888.42 kW normal /895.25 kW high-temperature basis. 1100 kW is the initial CDU rating requirement, subject to OEM duty validation.

SECONDARY OPERATING LIMITS
40 degC supply normal /44 degC high-temperature mode. Flow at 44 degC: 68.37 m3/h per CDU; 70 m3/h is the quoted selection basis. Derived 45 degC flow 73.16 m3/h is not an established pump maximum. 45 degC is a hard limit, not a continuous rated operating point.

FAILURE / LOSS OF FLOW
On a CDU or secondary-pump fault, isolate the affected path and transfer only under a confirmed sequence. The primary buffer does not sustain secondary rack flow when a CDU secondary pump stops. Permitted no-flow duration, restart transient, minimum standby circulation and interruption limits remain to be confirmed. Package function: return > VSD pump pair (1+1) > heat exchanger > supply; OEM internal routing is not an external-pipe layout.

RACK LEAK / SHARED INTERFACE
A rack leak in the common interface can require isolation of that rack on both secondary paths. Do not assume automatic transfer bypasses a common leak. Short secondary parallel transfer couples the entire six-rack inventory. Stopping a pump does not isolate a leak. Shared manifold, valve, control, power and maintenance common causes, actuator selection and valve-seat containment remain to be confirmed.

INTERFACES / GRAPHIC CONVENTION
Primary selection and buffer: LC-G03-202. LC-G04-211 is the G04 SOURCE SHARED-MANIFOLD typical, not a CDU package or pump detail; applicability to another group requires an issued port and isolation schedule. See LC-030 for leak-boundary proposals. Green =secondary A, magenta =secondary B; grey =common rack interface. A junction exists only at its explicit connection symbol. SA/SB =supply selection; RA/RB =return selection; IS/IR =common rack isolation. Primary and secondary PG25 domains remain separated by the CDU heat exchanger. Functional header nozzles are not an OEM nozzle schedule.

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Rev P03 | Design coordination / Not for construction
A0 / NTS | Pipe sizes, valve fail positions and control timing remain to be confirmed.

PG PRESSURISATION / MAKE-UP INTERFACE - TO BE CONFIRMED
Premixed PG service only; no direct WTR connection. Define each secondary ring pressure reference, connection point and leak-inhibit function with the CDU supplier. This is a functional coordination note, not an added device, valve quantity or selected package.

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LC-G03-301 / U01 SIX-RACK UNIT DETAIL | REV P03 | NTS

UNIT U01 | SIX RACKS | TWO CDU REFERENCES | SECONDARY A/B

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

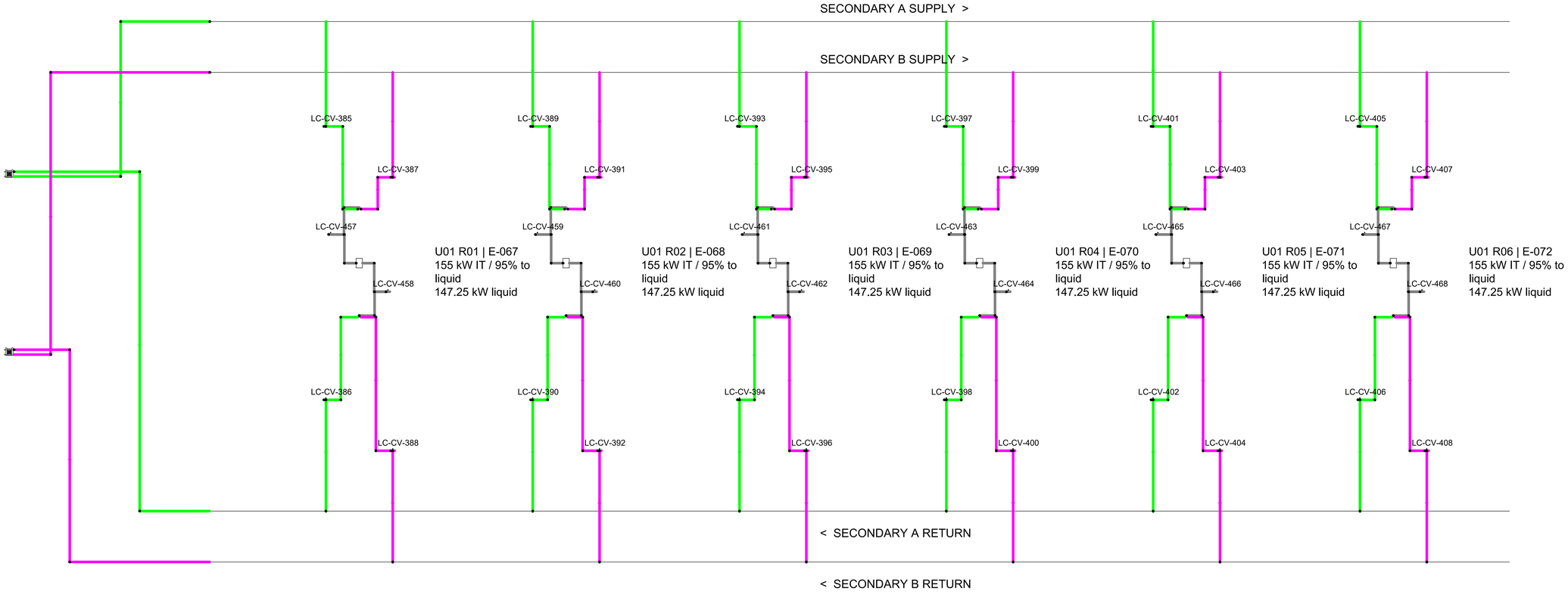
A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

U01 CDU A
PHYSICAL E-061 | REF LC-G03-202
This secondary symbol E-085 represents the same CDU, not additional equipment.

U01 CDU B
PHYSICAL E-062 | REF LC-G03-202
This secondary symbol E-086 represents the same CDU, not additional equipment.



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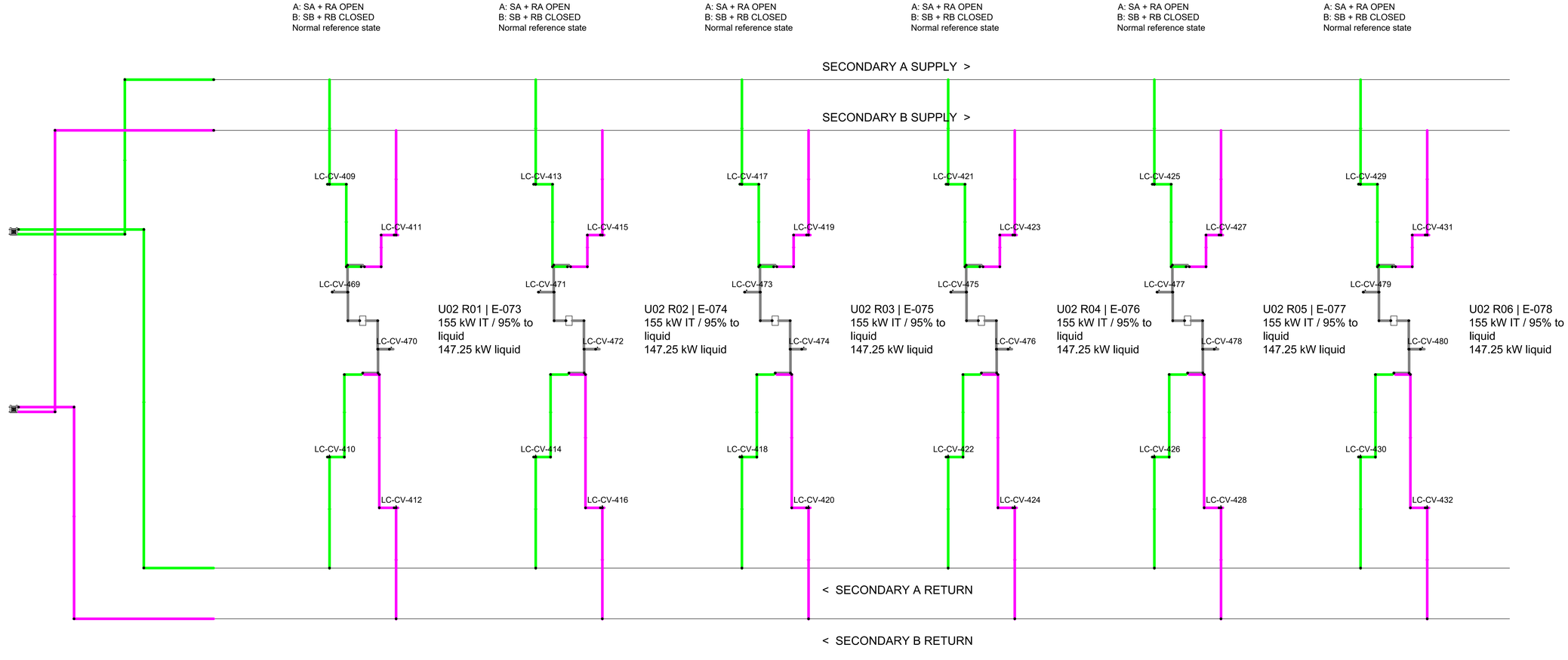
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LC-G03-301 / U02 SIX-RACK UNIT DETAIL | REV P03 | NTS

UNIT U02 | SIX RACKS | TWO CDU REFERENCES | SECONDARY A/B

U02 CDU A
PHYSICAL E-063 | REF LC-G03-202
This secondary symbol E-087 represents the same CDU, not additional equipment.

U02 CDU B
PHYSICAL E-064 | REF LC-G03-202
This secondary symbol E-088 represents the same CDU, not additional equipment.



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LC-G03-301 / U03 SIX-RACK UNIT DETAIL | REV P03 | NTS

UNIT U03 | SIX RACKS | TWO CDU REFERENCES | SECONDARY A/B

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

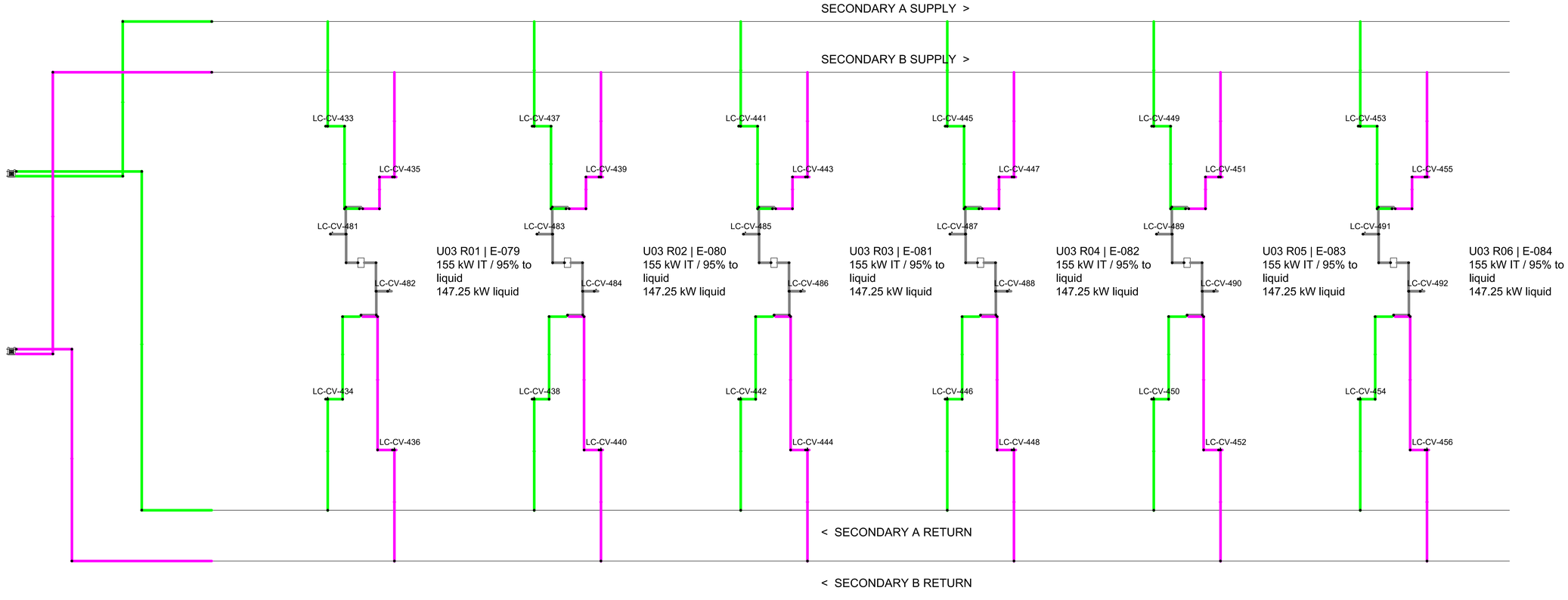
A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

U03 CDU A
PHYSICAL E-065 | REF LC-G03-202
This secondary symbol E-089 represents the same CDU, not additional equipment.

U03 CDU B
PHYSICAL E-066 | REF LC-G03-202
This secondary symbol E-090 represents the same CDU, not additional equipment.



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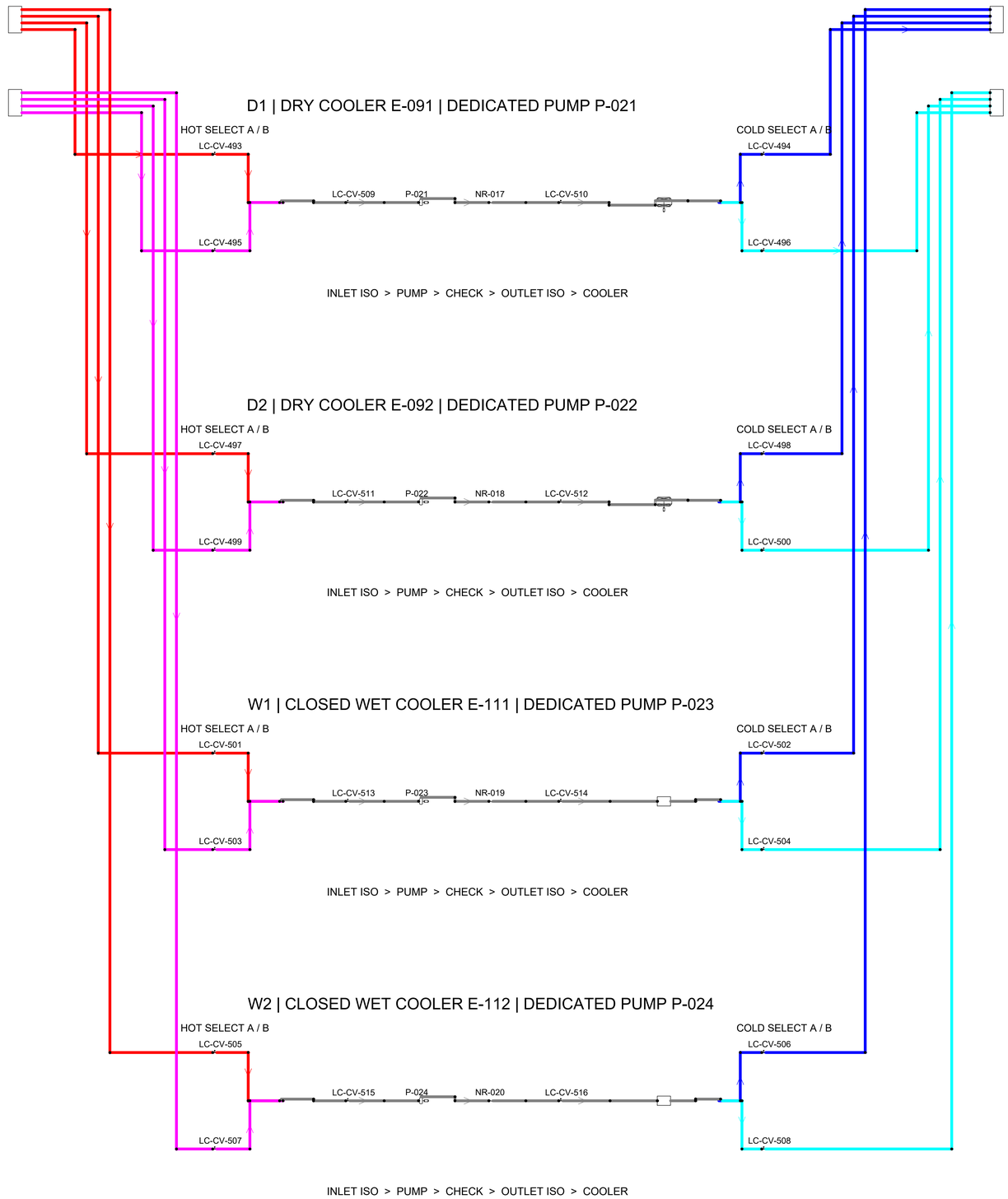
PRIMARY A | REF LC-G04-202
BUFFER V-005 | SOURCE_HOT_OUT
Reference symbol E-114; same physical tank.
Physical tank port N-3 (hot); four functional source branches, not four physical tank nozzles.

PRIMARY B | REF LC-G04-202
BUFFER V-006 | SOURCE_HOT_OUT
Reference symbol E-116; same physical tank.
Physical tank port N-3 (hot); four functional source branches, not four physical tank nozzles.

PRIMARY A | REF LC-G04-202
BUFFER V-005 | SOURCE_COLD_IN
Reference symbol E-113; same physical tank.
Physical tank port N-4 (cold); four functional source branches, not four physical tank nozzles.

PRIMARY B | REF LC-G04-202
BUFFER V-006 | SOURCE_COLD_IN
Reference symbol E-115; same physical tank.
Physical tank port N-4 (cold); four functional source branches, not four physical tank nozzles.

SOURCE FLOW DIRECTION
Hot: tank N-3 > matched hot selector > inlet isolation > dedicated pump > check > outlet isolation > cooler. Cold: cooler > matched cold selector > tank N-4. Both sides select the same A or B ring. See presentation arrows; crossings without a junction do not connect.



LC-G04-201 | COLD-SOURCE SELECTION
18-rack group / Four dedicated source trains / NTS

NORMAL REFERENCE STATE
Primary ring A selected. D1 pump running; D1 HA + CA open, HB + CB closed. D2, W1 and W2 pumps ready; their four source selectors closed. Maintenance isolators in service position. Normal state is not the loss-of-power valve position.

MATCHED RING SELECTION
Each running train selects HA + CA for primary A, or HB + CB for primary B. Supply and return must select the same ring. Do not open both A and B pairs as a normal duty state; do not connect primary A to primary B through a cooler train.

PERMITTED SOURCE MODES
One dry cooler; one dry plus one wet cooler when required; or one wet cooler. The two dry coolers are mutual standby, not continuous parallel duty. A same-type changeover overlap is short and controlled, with hydraulic and control limits to be confirmed.

WET DUTY BOUNDARY
Wet operation above 35 degC outdoor dry bulb, or earlier when dry capacity is insufficient, is an intended operating mode. Spray water is a separate service. Tank, spray-pump and water-treatment detail is outside this source-train schematic.

FLOW AND HEAT BASIS
Primary group flow 330 m3/h. Source-pump selection must satisfy the selected train and combined-mode flow; standby pump ratings are not added. Group heat rejection including pump heat: 2700.63 kW normal / 2721.11 kW high-temperature basis. Individual cooler capacities and hydraulic duty remain to be confirmed.

TEMPERATURE AND BUFFER
Primary / secondary supply: 37 / 40 degC normal; 41 / 44 degC high-temperature mode. 45 degC is a hard limit, not a continuous rating. 15 m3 nominal buffer per ring; 90 s source transfer and outlet rise <=0.5 K are design requirements, subject to usable volume, stratification and control validation.

FAILURE AND LEAK RESPONSE
Stop a failed source pump and isolate the affected train as permitted by the verified sequence. Healthy load and secondary pumps need not stop for a source-only fault. Stopping a pump does not isolate a leak. Header/branch isolation, retained pressure, transfer timing and common failure cut sets remain to be confirmed; no guaranteed whole-ring transfer is stated. Valve feedback does not prove seat isolation. Maintenance-valve actuation and actuator quantities remain to be confirmed.

INTERFACES AND DRAWING SCOPE
Primary tanks, load pumps and CDU selection: LC-G04-202. Rack distribution: LC-G04-301. LC-G04-211 is the G04 SOURCE SHARED-MANIFOLD typical (tank N-3/N-4 to four source trains), not a CDU package or pump detail. Use in other groups only after the group port, A/B topology, controls and isolation schedule are confirmed. LC-020 / LC-030 are issued coordination supplements; selected isolation hardware and detailed control schematics remain to be confirmed.

GRAPHIC CONVENTION
Primary A hot red / cold blue; primary B hot magenta / cold cyan. Neutral grey is the common train after matched selectors. Crossings without a junction symbol do not connect. Branch nozzles and reference symbols indicate functional interfaces, not physical nozzle schedules.

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Rev P03 | Design coordination / Not for construction
A0 / NTS | Equipment arrangement, pipe sizes, fail positions and OEM ratings remain to be confirmed.

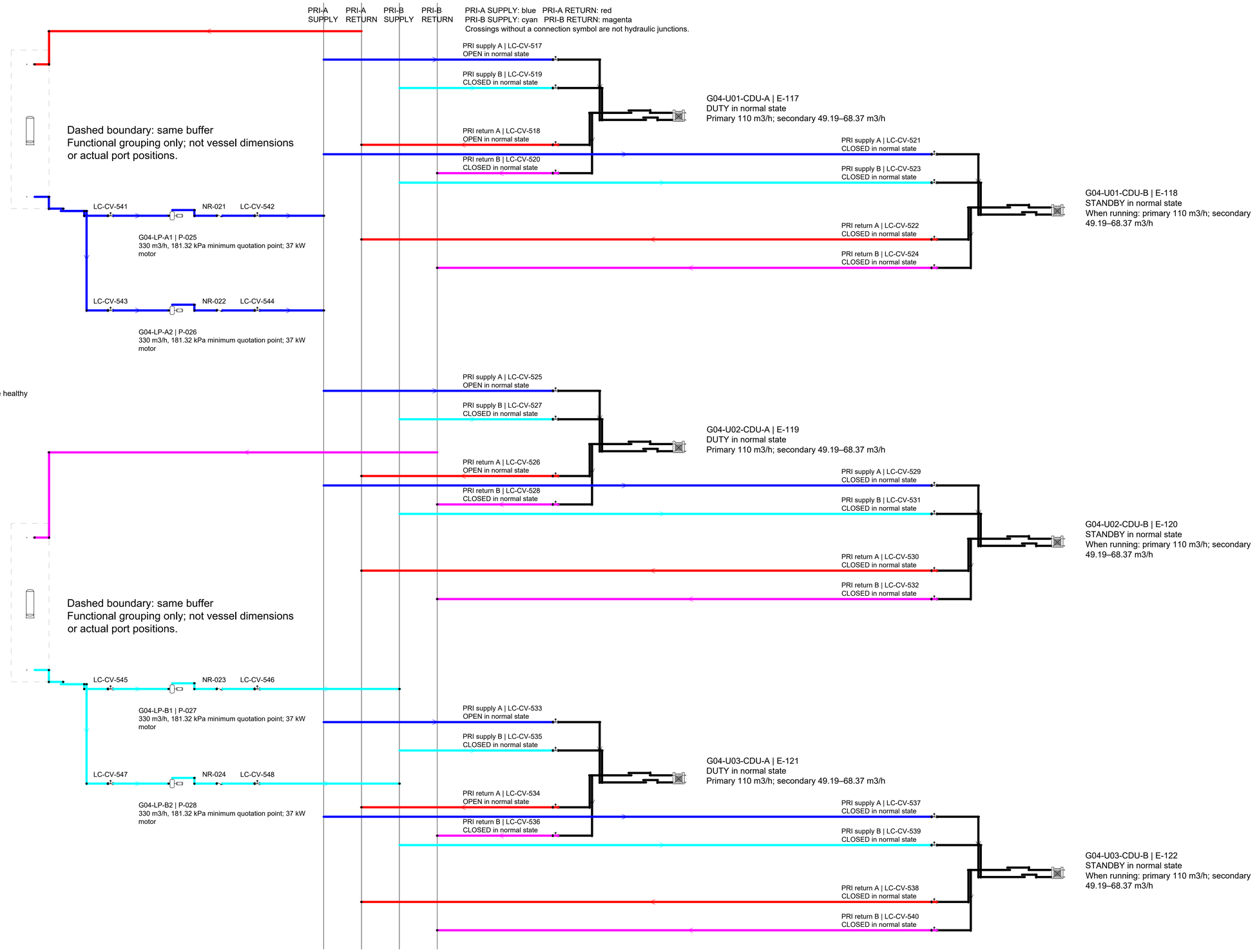
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LC-G04-202 PRIMARY DISTRIBUTION — 18-RACK STANDARD GROUP

P03 | 3 x 6 racks | 6 CDUs: 3 duty + 3 standby | Primary A/B: one duty, one standby | NTS

V8.5 basis: 155 kW/rack; 95% liquid. Group heat rejection incl. pump heat: 2,700.63 / 2,721.11 kW.
Primary: 330 m3/h per operating group; 110 m3/h per operating CDU. Standby flows are not added.

CDU selection: 1,100 kW/physical unit; actual duty 888.42 / 895.25 kW.
37/40 C normal; 41/44 C high-temperature primary/secondary supply. 45 C is the secondary hard limit, not a rated operating guarantee.



Primary selectors: supply and return select the SAME primary circuit. A/B parallel connection is prohibited.
Valve fail position and seat leakage performance require the actual actuator/valve specification.

Buffer cold inventory does not maintain rack flow after a CDU secondary-pump trip.
Whole-ring transfer, standby readiness and recharge completion criteria: LC-020. Isolation proposals: LC-030.

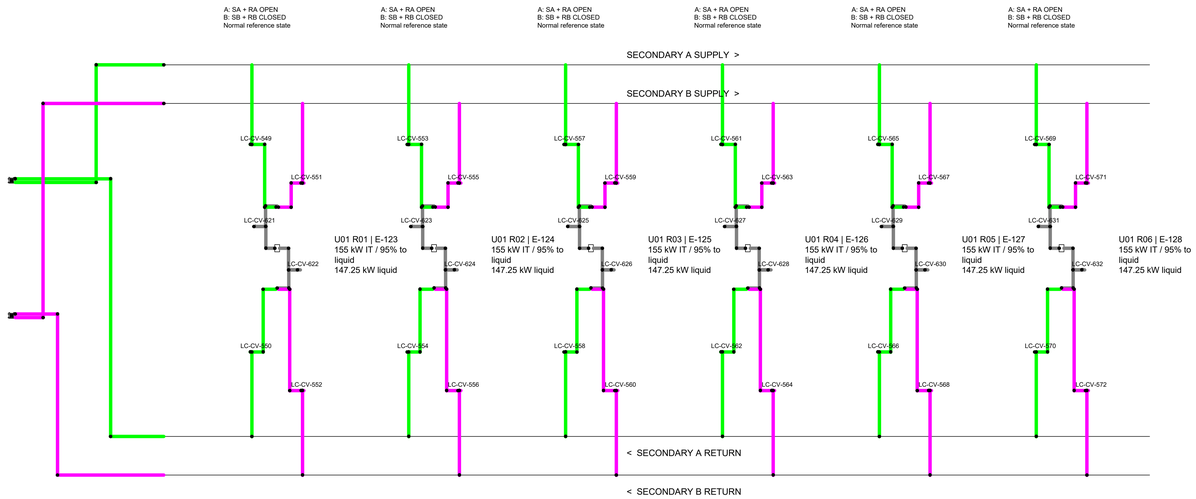
FUNCTIONAL TOP / HOT AND BOTTOM / COLD ZONES ONLY. Vessel nozzle geometry is not established by this layout; verify actual native attachments and OEM port schedule. Crossings without a junction symbol are not connections.

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LC-G04-301 | SECONDARY DISTRIBUTION
Three independent six-rack units / NTS

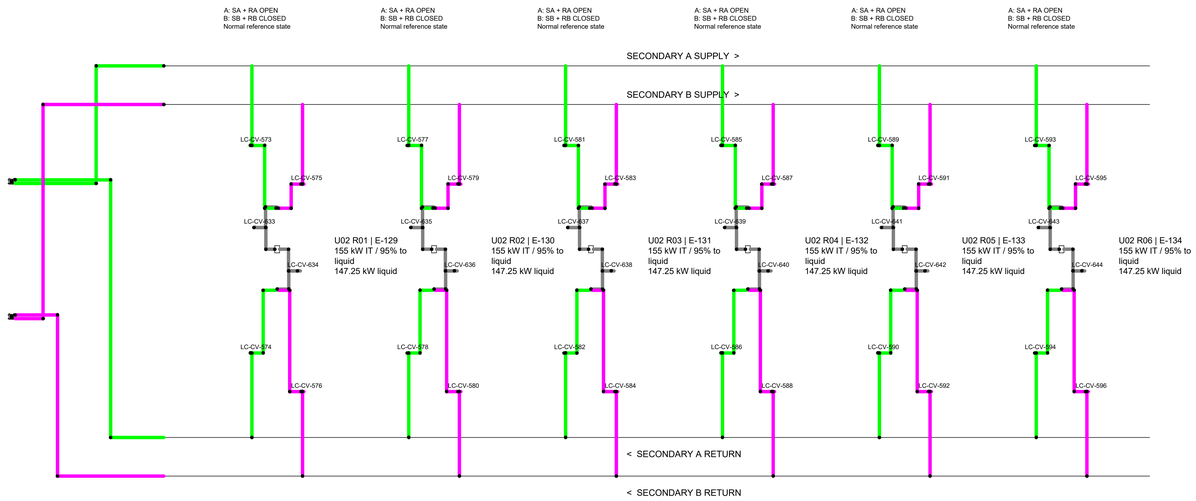
UNIT U01 | SIX RACKS | TWO CDU REFERENCES | SECONDARY A/B



U01 CDU A
PHYSICAL E-117 | REF LC-G04-202
This secondary symbol E-141 represents the same CDU, not additional equipment.

U01 CDU B
PHYSICAL E-118 | REF LC-G04-202
This secondary symbol E-142 represents the same CDU, not additional equipment.

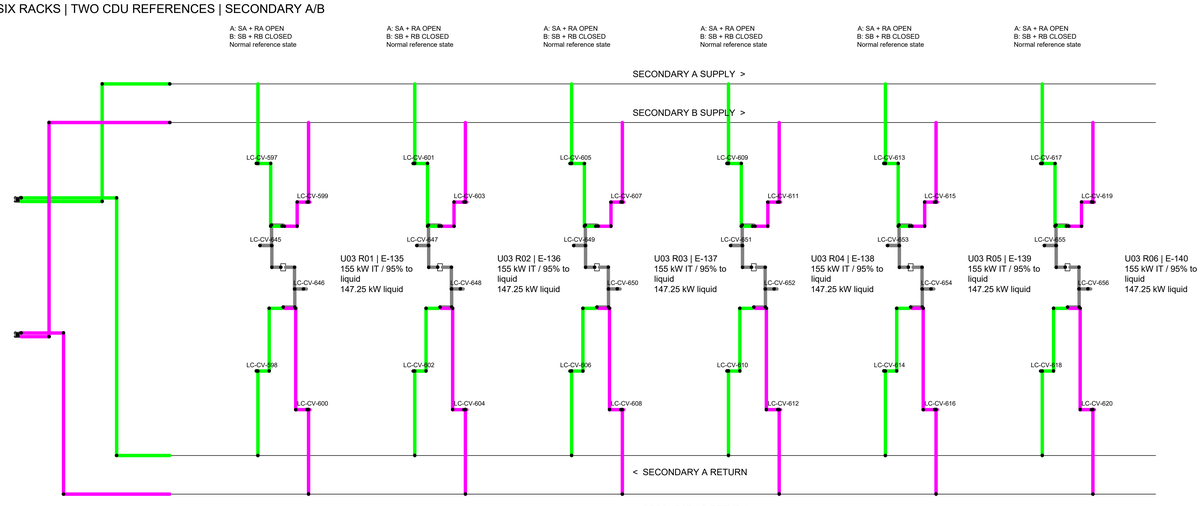
UNIT U02 | SIX RACKS | TWO CDU REFERENCES | SECONDARY A/B



U02 CDU A
PHYSICAL E-119 | REF LC-G04-202
This secondary symbol E-143 represents the same CDU, not additional equipment.

U02 CDU B
PHYSICAL E-120 | REF LC-G04-202
This secondary symbol E-144 represents the same CDU, not additional equipment.

UNIT U03 | SIX RACKS | TWO CDU REFERENCES | SECONDARY A/B



U03 CDU A
PHYSICAL E-121 | REF LC-G04-202
This secondary symbol E-145 represents the same CDU, not additional equipment.

U03 CDU B
PHYSICAL E-122 | REF LC-G04-202
This secondary symbol E-146 represents the same CDU, not additional equipment.

PHYSICAL EQUIPMENT IDENTITY
CDU symbols on this page are secondary-side references to the same physical CDUs on the 202 sheet. Use the PHYSICAL tag as the canonical equipment reference; the original secondary symbol tag is retained in the mapping. There are six physical CDUs per 18-rack group, not twelve.

NORMAL DUTY / STANDBY
For each unit, CDU A supplies secondary A; rack SA + RA are open and SB + RB closed. CDU B / secondary B is standby. Rack common supply and return maintenance isolators remain open in service. Valve loss-of-power positions are separate design requirements and remain to be confirmed.

SECONDARY TRANSFER
Transfer both supply and return selectors to the healthy secondary pair. A conditional, controlled transient parallel interval may be used after pressure, temperature, check-valve and control compatibility are confirmed. Proposed permissives: DeltaT <=2 K; DeltaP <=5 kPa stable >=5 s; overlap <=30 s; one pressure master. Actual timing, valve stroke, sensor response and acknowledgement require validation. This does not require primary A-to-B transfer; primary circuits remain isolated.

HEAT AND FLOW BASIS
Each rack: 155 kW IT, 95% liquid =147.25 kW; remaining 7.75 kW is room heat. Six-rack liquid load 883.5 kW before pump heat. Per operating CDU including pump heat: 888.42 kW normal /895.25 kW high-temperature basis. 1100 kW is the initial CDU rating requirement, subject to OEM duty validation.

SECONDARY OPERATING LIMITS
40 degC supply normal /44 degC high-temperature mode. Flow at 44 degC: 68.37 m3/h per CDU; 70 m3/h is the quoted selection basis. Derived 45 degC flow 73.16 m3/h is not an established pump maximum. 45 degC is a hard limit, not a continuous rated operating point.

FAILURE / LOSS OF FLOW
On a CDU or secondary-pump fault, isolate the affected path and transfer only under a confirmed sequence. The primary buffer does not sustain secondary rack flow when a CDU secondary pump stops. Permitted no-flow duration, restart transient, minimum standby circulation and interruption limits remain to be confirmed. Package function: return > VSD pump pair (1+1) > heat exchanger > supply; OEM internal routing is not an external-pipe layout.

RACK LEAK / SHARED INTERFACE
A rack leak in the common interface can require isolation of that rack on both secondary paths. Do not assume automatic transfer bypasses a common leak. Short secondary parallel transfer couples the entire six-rack inventory. Stopping a pump does not isolate a leak. Shared manifold, valve, control, power and maintenance common causes, actuator selection and valve-seat containment remain to be confirmed.

INTERFACES / GRAPHIC CONVENTION
Primary selection and buffer: LC-G04-202. LC-G04-211 is the G04 SOURCE SHARED-MANIFOLD typical, not a CDU package or pump detail; applicability to another group requires an issued port and isolation schedule. See LC-030 for leak-boundary proposals. Green =secondary A, magenta =secondary B; grey =common rack interface. A junction exists only at its explicit connection symbol. SA/SB =supply selection; RA/RB =return selection; IS/IR =common rack isolation. Primary and secondary PG25 domains remain separated by the CDU heat exchanger. Functional header nozzles are not an OEM nozzle schedule.

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Rev P03 | Design coordination / Not for construction
A0 / NTS | Pipe sizes, valve fail positions and control timing remain to be confirmed.

PG PRESSURISATION / MAKE-UP INTERFACE - TO BE CONFIRMED
Premixed PG service only; no direct WTR connection. Define each secondary ring pressure reference, connection point and leak-inhibit function with the CDU supplier. This is a functional coordination note, not an added device, valve quantity or selected package.

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Within G04: 201 = LC-G04-201; 202 = LC-G04-202; 211 = LC-G04-211; 301 = LC-G04-301.

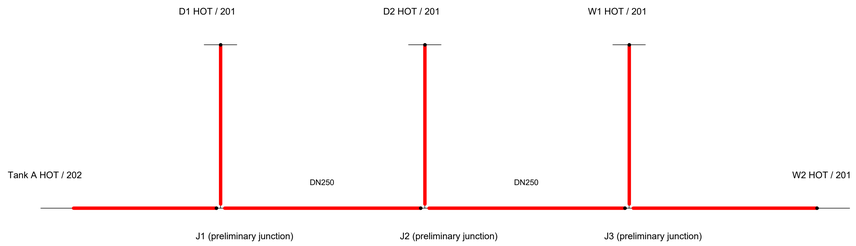
LC-G04-211 G04 SOURCE SHARED-MANIFOLD DETAIL

Design coordination / Not for construction | Not for equipment procurement | © 2026 K&K Data Service Inc.

Design coordination / Not for construction | 03 Oct 2026. Within G04: 201 = 201, 202 = 202. Short references identify the existing source branches and single tank ports.

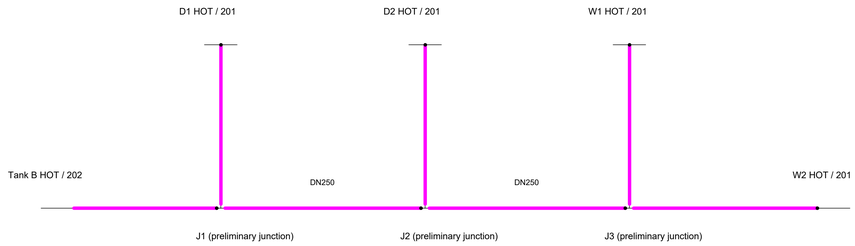
A HOT: tank source outlet to four cooler-in branches

DN250 preliminary heat-rejection selection. Three junctions and all detail spools are preliminary design provisions; final sizing and supply scope remain to be confirmed.



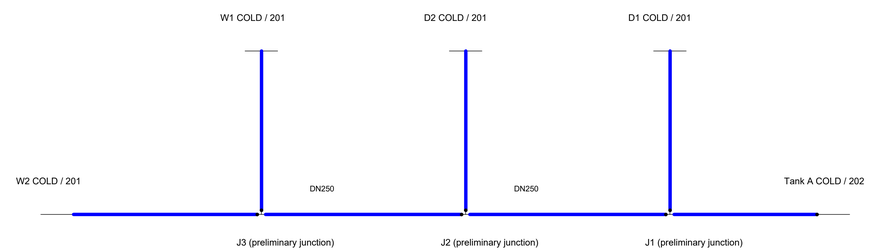
B HOT: tank source outlet to four cooler-in branches

DN250 preliminary heat-rejection selection. Three junctions and all detail spools are preliminary design provisions; final sizing and supply scope remain to be confirmed.



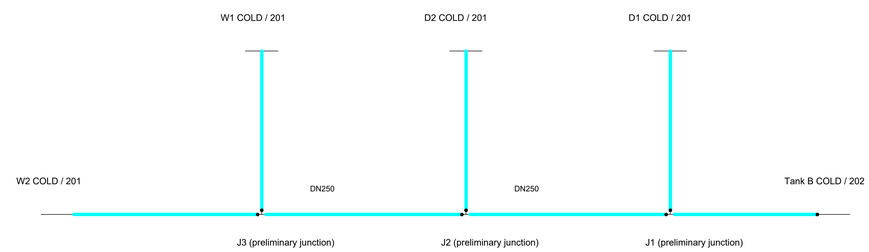
A COLD: four cooler-out branches to tank source inlet

DN250 preliminary heat-rejection selection. Three junctions and all detail spools are preliminary design provisions; final sizing and supply scope remain to be confirmed.



B COLD: four cooler-out branches to tank source inlet

DN250 preliminary heat-rejection selection. Three junctions and all detail spools are preliminary design provisions; final sizing and supply scope remain to be confirmed.



Each leg has four separate branch interfaces, three preliminary tees, two intertee spools and one common tank spool. No tank-internal pipe is drawn.

A shared header, branch-root tee or common-spool leak can expose the affected ring inventory. Tower selectors alone do not prove containment of a root leak.

Tank-side and branch-root isolation boundaries remain to be confirmed. No additional isolation valve is assumed or included in this detail.

A and B are not joined in this detail. Check valves do not replace physical isolation. Commissioning must verify fault containment, valve positions and the independent remaining circuit.

A hot and cold manifolds share BT-A inventory; B hot and cold share BT-B inventory. Four panels do not mean four independent coolant inventories.

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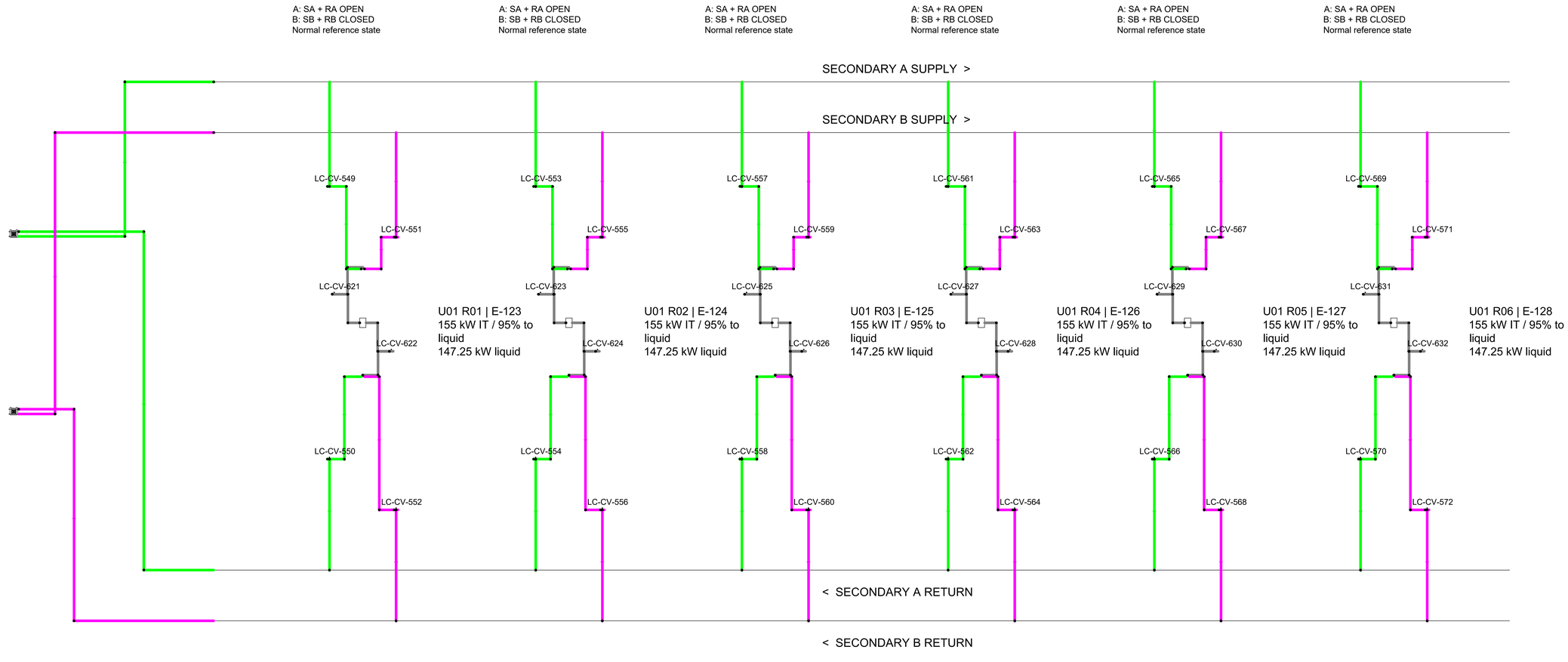
Typical G04 buffer interface: application to another group requires matching ports, duty, topology and controls. Tank-root and branch-root isolation are not selected or added by this detail; proposed boundaries are defined in LC-030. P03 | Design coordination / Not for construction.

LC-G04-301 / U01 SIX-RACK UNIT DETAIL | REV P03 | NTS

UNIT U01 | SIX RACKS | TWO CDU REFERENCES | SECONDARY A/B

U01 CDU A
PHYSICAL E-117 | REF LC-G04-202
This secondary symbol E-141 represents the same CDU, not additional equipment.

U01 CDU B
PHYSICAL E-118 | REF LC-G04-202
This secondary symbol E-142 represents the same CDU, not additional equipment.



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LC-G04-301 / U02 SIX-RACK UNIT DETAIL | REV P03 | NTS

UNIT U02 | SIX RACKS | TWO CDU REFERENCES | SECONDARY A/B

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

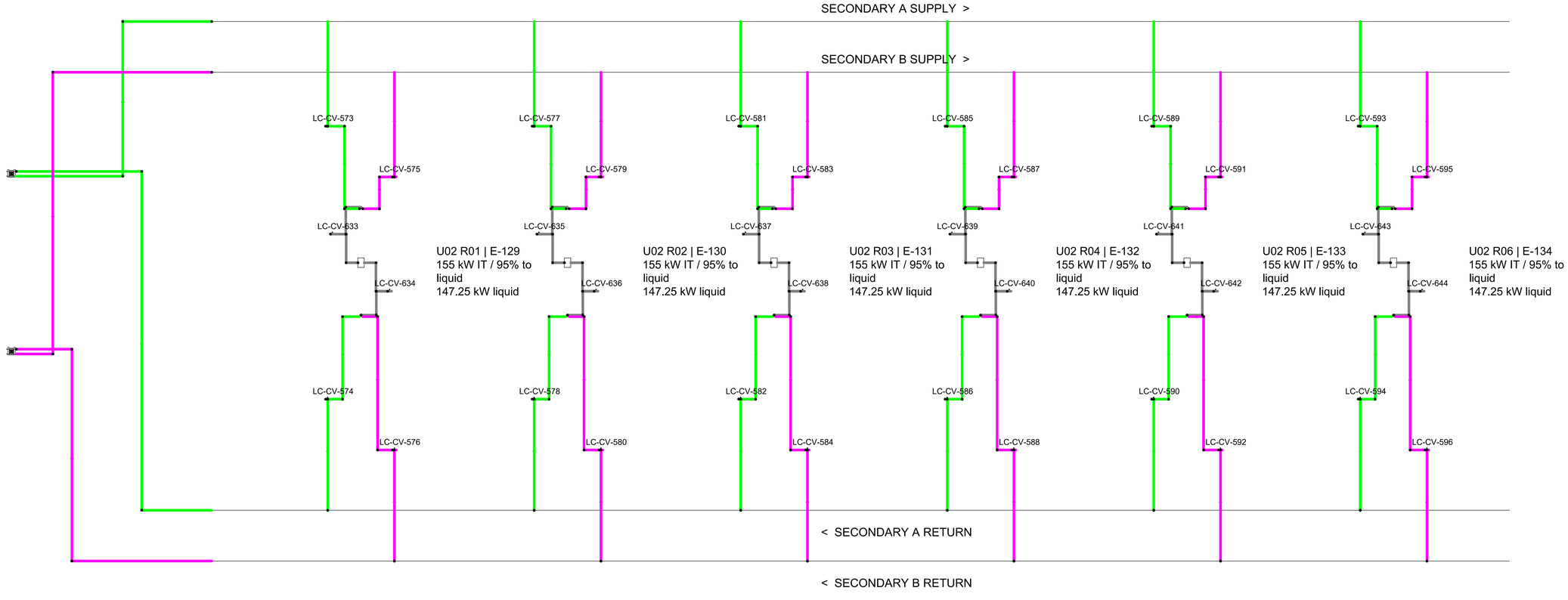
A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

U02 CDU A
PHYSICAL E-119 | REF LC-G04-202
This secondary symbol E-143 represents the same CDU, not additional equipment.

U02 CDU B
PHYSICAL E-120 | REF LC-G04-202
This secondary symbol E-144 represents the same CDU, not additional equipment.



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LC-G04-301 / U03 SIX-RACK UNIT DETAIL | REV P03 | NTS

UNIT U03 | SIX RACKS | TWO CDU REFERENCES | SECONDARY A/B

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

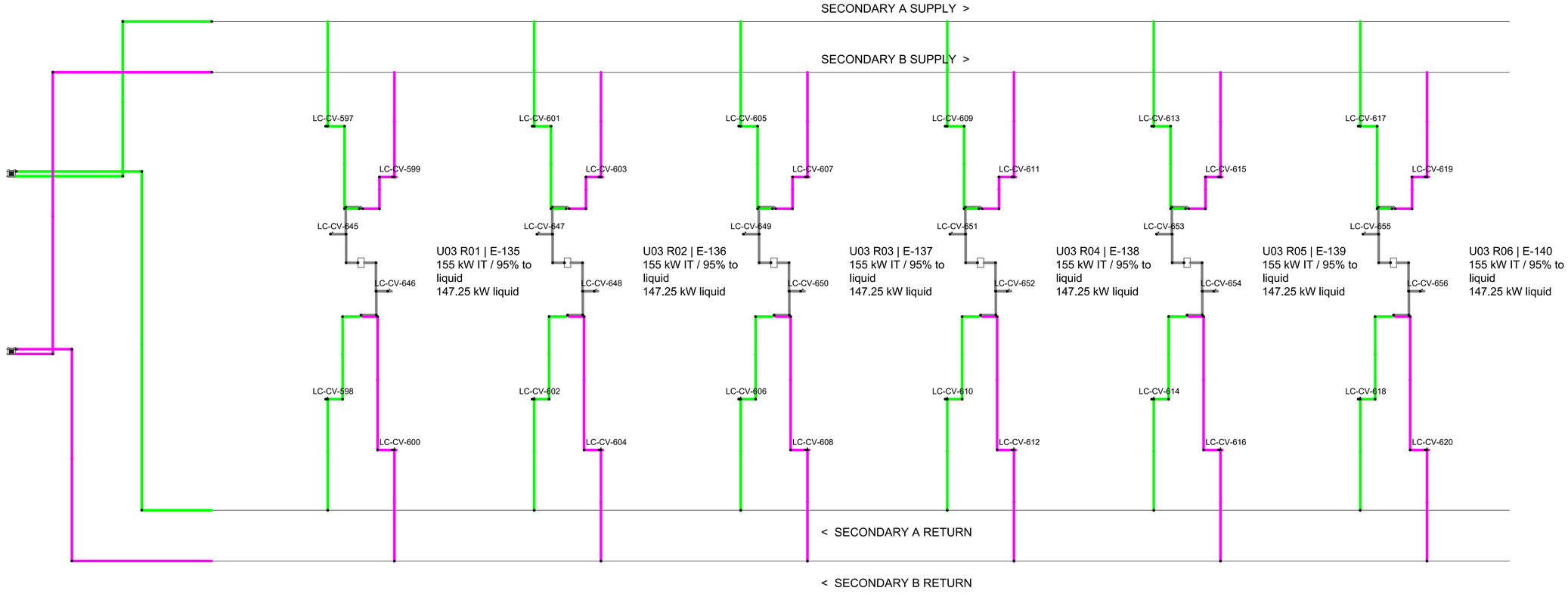
A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

U03 CDU A
PHYSICAL E-121 | REF LC-G04-202
This secondary symbol E-145 represents the same CDU, not additional equipment.

U03 CDU B
PHYSICAL E-122 | REF LC-G04-202
This secondary symbol E-146 represents the same CDU, not additional equipment.



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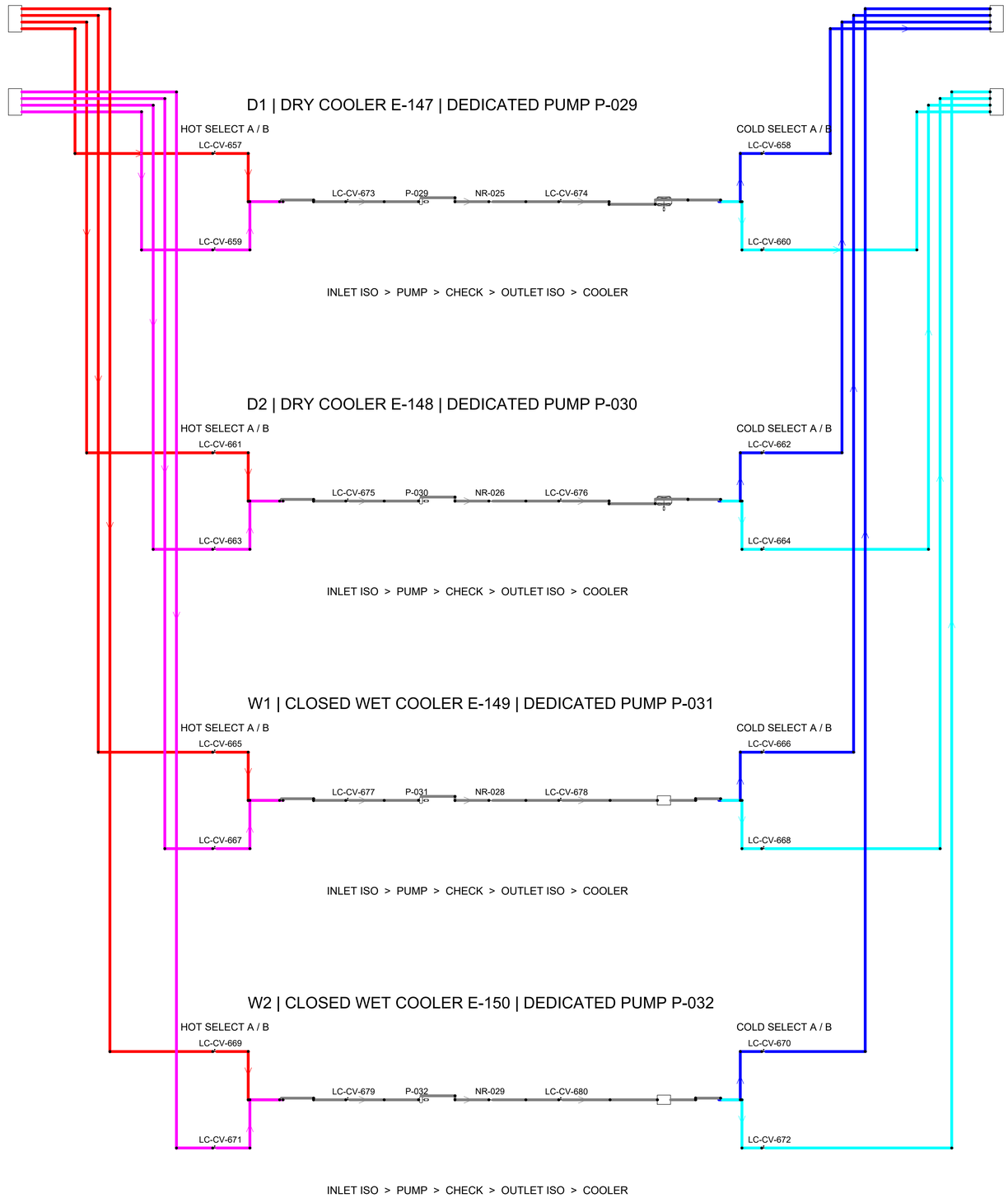
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PRIMARY A | REF LC-G05-202
BUFFER V-007 | SOURCE_HOT_OUT
Reference symbol E-152; same physical tank.
Physical tank port N-3 (hot); four functional source branches, not four physical tank nozzles.

PRIMARY B | REF LC-G05-202
BUFFER V-008 | SOURCE_HOT_OUT
Reference symbol E-154; same physical tank.
Physical tank port N-3 (hot); four functional source branches, not four physical tank nozzles.

PRIMARY A | REF LC-G05-202
BUFFER V-007 | SOURCE_COLD_IN
Reference symbol E-151; same physical tank.
Physical tank port N-4 (cold); four functional source branches, not four physical tank nozzles.

PRIMARY B | REF LC-G05-202
BUFFER V-008 | SOURCE_COLD_IN
Reference symbol E-153; same physical tank.
Physical tank port N-4 (cold); four functional source branches, not four physical tank nozzles.



SOURCE FLOW DIRECTION
Hot: tank N-3 > matched hot selector > inlet isolation > dedicated pump > check > outlet isolation > cooler. Cold: cooler > matched cold selector > tank N-4. Both sides select the same A or B ring. See presentation arrows; crossings without a junction do not connect.

LC-G05-201 | COLD-SOURCE SELECTION
18-rack group / Four dedicated source trains / NTS

NORMAL REFERENCE STATE
Primary ring A selected. D1 pump running; D1 HA + CA open, HB + CB closed. D2, W1 and W2 pumps ready; their four source selectors closed. Maintenance isolators in service position. Normal state is not the loss-of-power valve position.

MATCHED RING SELECTION
Each running train selects HA + CA for primary A, or HB + CB for primary B. Supply and return must select the same ring. Do not open both A and B pairs as a normal duty state; do not connect primary A to primary B through a cooler train.

PERMITTED SOURCE MODES
One dry cooler; one dry plus one wet cooler when required; or one wet cooler. The two dry coolers are mutual standby, not continuous parallel duty. A same-type changeover overlap is short and controlled, with hydraulic and control limits to be confirmed.

WET DUTY BOUNDARY
Wet operation above 35 degC outdoor dry bulb, or earlier when dry capacity is insufficient, is an intended operating mode. Spray water is a separate service. Tank, spray-pump and water-treatment detail is outside this source-train schematic.

FLOW AND HEAT BASIS
Primary group flow 330 m3/h. Source-pump selection must satisfy the selected train and combined-mode flow; standby pump ratings are not added. Group heat rejection including pump heat: 2700.63 kW normal / 2721.11 kW high-temperature basis. Individual cooler capacities and hydraulic duty remain to be confirmed.

TEMPERATURE AND BUFFER
Primary / secondary supply: 37 / 40 degC normal; 41 / 44 degC high-temperature mode. 45 degC is a hard limit, not a continuous rating. 15 m3 nominal buffer per ring; 90 s source transfer and outlet rise <=0.5 K are design requirements, subject to usable volume, stratification and control validation.

FAILURE AND LEAK RESPONSE
Stop a failed source pump and isolate the affected train as permitted by the verified sequence. Healthy load and secondary pumps need not stop for a source-only fault. Stopping a pump does not isolate a leak. Header/branch isolation, retained pressure, transfer timing and common failure cut sets remain to be confirmed; no guaranteed whole-ring transfer is stated. Valve feedback does not prove seat isolation. Maintenance-valve actuation and actuator quantities remain to be confirmed.

INTERFACES AND DRAWING SCOPE
Primary tanks, load pumps and CDU selection: LC-G05-202. Rack distribution: LC-G05-301. LC-G04-211 is the G04 SOURCE SHARED-MANIFOLD typical (tank N-3/N-4 to four source trains), not a CDU package or pump detail. Use in other groups only after the group port, A/B topology, controls and isolation schedule are confirmed. LC-020 / LC-030 are issued coordination supplements; selected isolation hardware and detailed control schematics remain to be confirmed.

GRAPHIC CONVENTION
Primary A hot red / cold blue; primary B hot magenta / cold cyan. Neutral grey is the common train after matched selectors. Crossings without a junction symbol do not connect. Branch nozzles and reference symbols indicate functional interfaces, not physical nozzle schedules.

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Rev P03 | Design coordination / Not for construction
A0 / NTS | Equipment arrangement, pipe sizes, fail positions and OEM ratings remain to be confirmed.

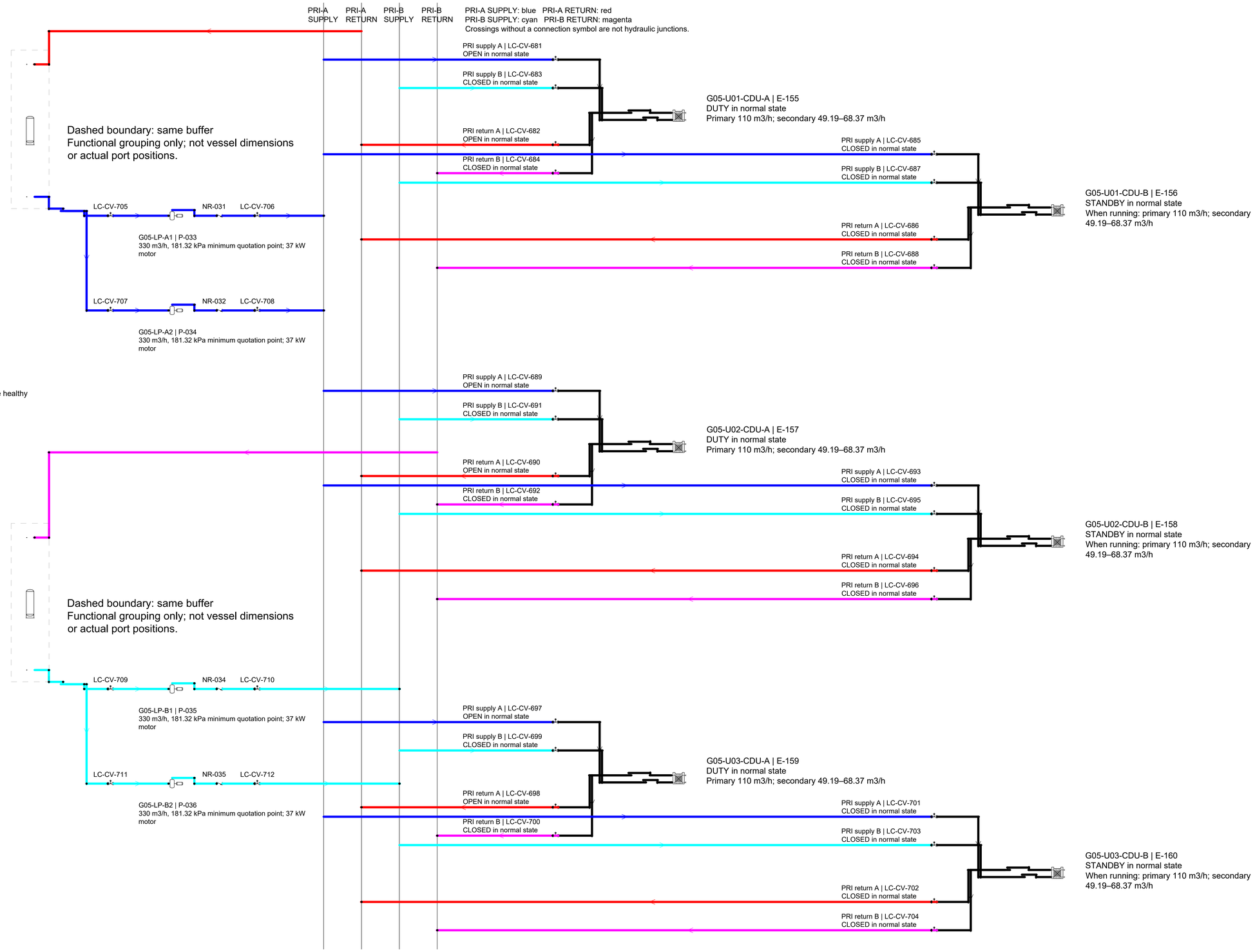
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LC-G05-202 PRIMARY DISTRIBUTION — 18-RACK STANDARD GROUP

P03 | 3 x 6 racks | 6 CDUs: 3 duty + 3 standby | Primary A/B: one duty, one standby | NTS

V8.5 basis: 155 kW/rack; 95% liquid. Group heat rejection incl. pump heat: 2,700.63 / 2,721.11 kW.
Primary: 330 m3/h per operating group; 110 m3/h per operating CDU. Standby flows are not added.

CDU selection: 1,100 kW/physical unit; actual duty 888.42 / 895.25 kW.
37/40 C normal; 41/44 C high-temperature primary/secondary supply. 45 C is the secondary hard limit, not a rated operating guarantee.



Primary selectors: supply and return select the SAME primary circuit. A/B parallel connection is prohibited.
Valve fail position and seat leakage performance require the actual actuator/valve specification.

Buffer cold inventory does not maintain rack flow after a CDU secondary-pump trip.
Whole-ring transfer, standby readiness and recharge completion criteria: LC-020. Isolation proposals: LC-030.

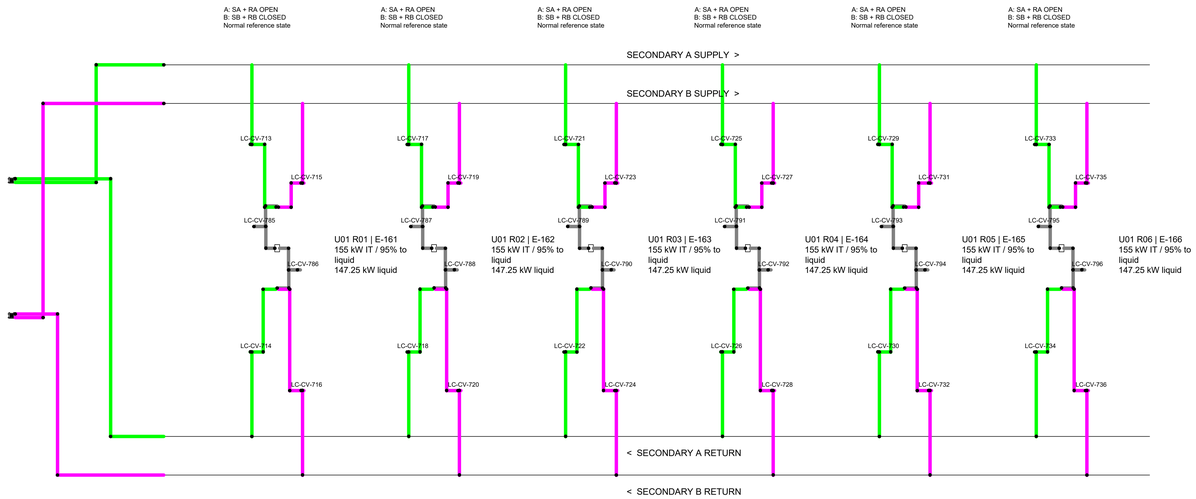
FUNCTIONAL TOP / HOT AND BOTTOM / COLD ZONES ONLY. Vessel nozzle geometry is not established by this layout; verify actual native attachments and OEM port schedule. Crossings without a junction symbol are not connections.

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LC-G05-301 | SECONDARY DISTRIBUTION
Three independent six-rack units / NTS

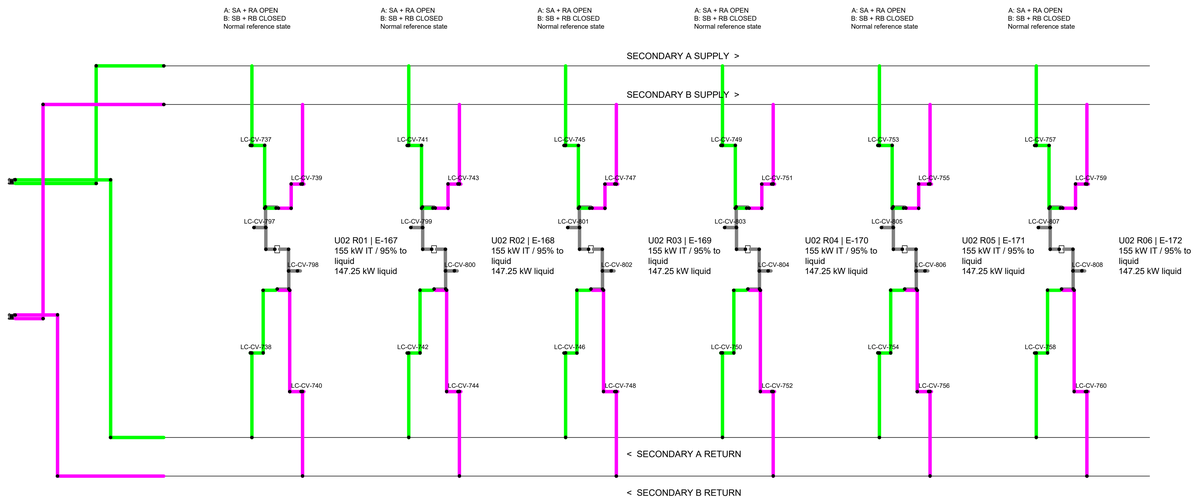
UNIT U01 | SIX RACKS | TWO CDU REFERENCES | SECONDARY A/B



U01 CDU A
PHYSICAL E-155 | REF LC-G05-202
This secondary symbol E-179 represents the same CDU, not additional equipment.

U01 CDU B
PHYSICAL E-156 | REF LC-G05-202
This secondary symbol E-180 represents the same CDU, not additional equipment.

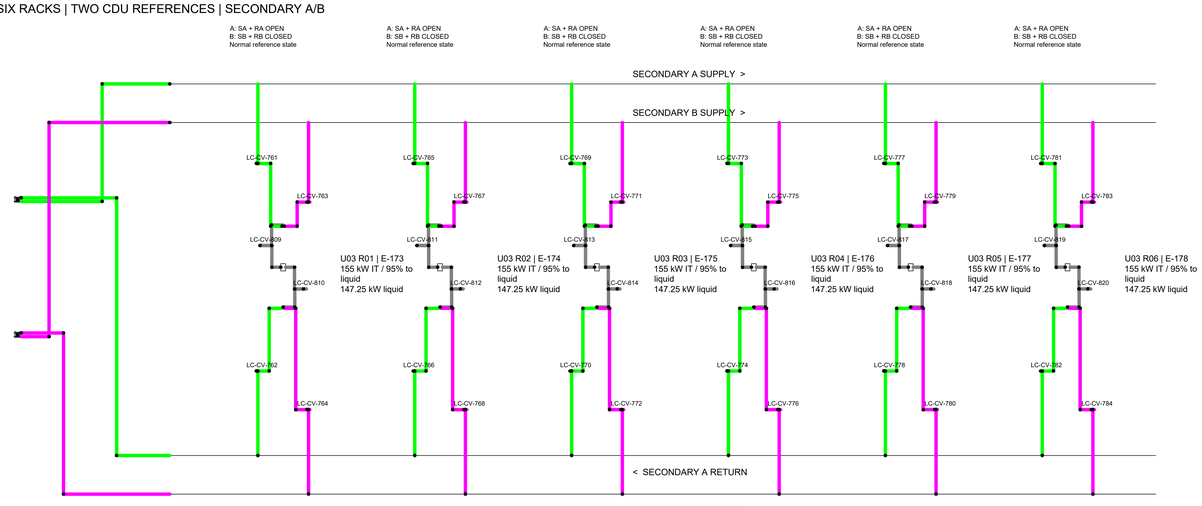
UNIT U02 | SIX RACKS | TWO CDU REFERENCES | SECONDARY A/B



U02 CDU A
PHYSICAL E-157 | REF LC-G05-202
This secondary symbol E-181 represents the same CDU, not additional equipment.

U02 CDU B
PHYSICAL E-158 | REF LC-G05-202
This secondary symbol E-182 represents the same CDU, not additional equipment.

UNIT U03 | SIX RACKS | TWO CDU REFERENCES | SECONDARY A/B



U03 CDU A
PHYSICAL E-159 | REF LC-G05-202
This secondary symbol E-183 represents the same CDU, not additional equipment.

U03 CDU B
PHYSICAL E-160 | REF LC-G05-202
This secondary symbol E-184 represents the same CDU, not additional equipment.

PHYSICAL EQUIPMENT IDENTITY
CDU symbols on this page are secondary-side references to the same physical CDUs on the 202 sheet. Use the PHYSICAL tag as the canonical equipment reference; the original secondary symbol tag is retained in the mapping. There are six physical CDUs per 18-rack group, not twelve.

NORMAL DUTY / STANDBY
For each unit, CDU A supplies secondary A; rack SA + RA are open and SB + RB closed. CDU B / secondary B is standby. Rack common supply and return maintenance isolators remain open in service. Valve loss-of-power positions are separate design requirements and remain to be confirmed.

SECONDARY TRANSFER
Transfer both supply and return selectors to the healthy secondary pair. A conditional, controlled transient parallel interval may be used after pressure, temperature, check-valve and control compatibility are confirmed. Proposed permissives: DeltaT <=2 K; DeltaP <=5 kPa stable >=5 s; overlap <=30 s; one pressure master. Actual timing, valve stroke, sensor response and acknowledgement require validation. This does not require primary A-to-B transfer; primary circuits remain isolated.

HEAT AND FLOW BASIS
Each rack: 155 kW IT, 95% liquid =147.25 kW; remaining 7.75 kW is room heat. Six-rack liquid load 883.5 kW before pump heat. Per operating CDU including pump heat: 888.42 kW normal /895.25 kW high-temperature basis. 1100 kW is the initial CDU rating requirement, subject to OEM duty validation.

SECONDARY OPERATING LIMITS
40 degC supply normal /44 degC high-temperature mode. Flow at 44 degC: 68.37 m3/h per CDU; 70 m3/h is the quoted selection basis. Derived 45 degC flow 73.16 m3/h is not an established pump maximum. 45 degC is a hard limit, not a continuous rated operating point.

FAILURE / LOSS OF FLOW
On a CDU or secondary-pump fault, isolate the affected path and transfer only under a confirmed sequence. The primary buffer does not sustain secondary rack flow when a CDU secondary pump stops. Permitted no-flow duration, restart transient, minimum standby circulation and interruption limits remain to be confirmed. Package function: return > VSD pump pair (1+1) > heat exchanger > supply; OEM internal routing is not an external-pipe layout.

RACK LEAK / SHARED INTERFACE
A rack leak in the common interface can require isolation of that rack on both secondary paths. Do not assume automatic transfer bypasses a common leak. Short secondary parallel transfer couples the entire six-rack inventory. Stopping a pump does not isolate a leak. Shared manifold, valve, control, power and maintenance common causes, actuator selection and valve-seat containment remain to be confirmed.

INTERFACES / GRAPHIC CONVENTION
Primary selection and buffer: LC-G05-202. LC-G04-211 is the G04 SOURCE SHARED-MANIFOLD typical, not a CDU package or pump detail; applicability to another group requires an issued port and isolation schedule. See LC-030 for leak-boundary proposals. Green =secondary A, magenta =secondary B; grey =common rack interface. A junction exists only at its explicit connection symbol. SA/SB =supply selection; RA/RB =return selection; IS/IR =common rack isolation. Primary and secondary PG25 domains remain separated by the CDU heat exchanger. Functional header nozzles are not an OEM nozzle schedule.

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A0 / NTS | Pipe sizes, valve fail positions and control timing remain to be confirmed.

PG PRESSURISATION / MAKE-UP INTERFACE - TO BE CONFIRMED
Premixed PG service only; no direct WTR connection. Define each secondary ring pressure reference, connection point and leak-inhibit function with the CDU supplier. This is a functional coordination note, not an added device, valve quantity or selected package.

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LC-G05-301 / U01 SIX-RACK UNIT DETAIL | REV P03 | NTS

UNIT U01 | SIX RACKS | TWO CDU REFERENCES | SECONDARY A/B

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

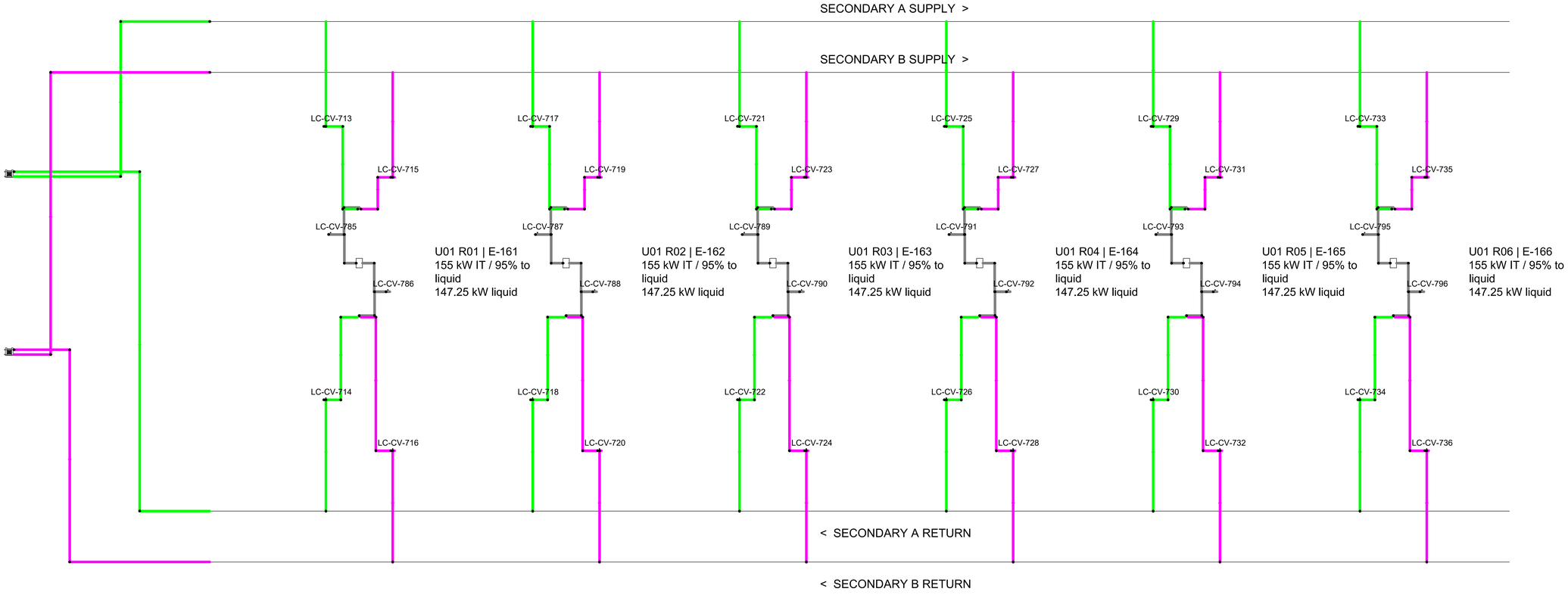
A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

U01 CDU A
PHYSICAL E-155 | REF LC-G05-202
This secondary symbol E-179 represents the same CDU, not additional equipment.

U01 CDU B
PHYSICAL E-156 | REF LC-G05-202
This secondary symbol E-180 represents the same CDU, not additional equipment.



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LC-G05-301 / U02 SIX-RACK UNIT DETAIL | REV P03 | NTS

UNIT U02 | SIX RACKS | TWO CDU REFERENCES | SECONDARY A/B

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

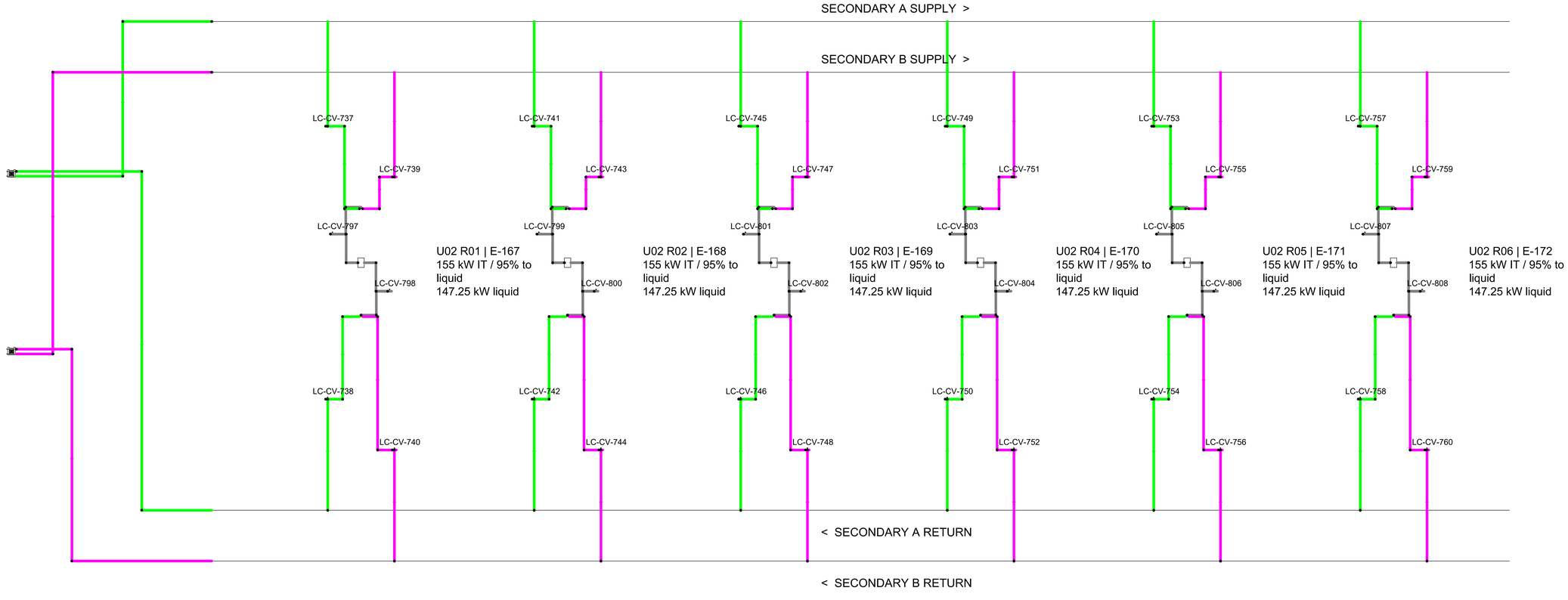
A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

A: SA + RA OPEN
B: SB + RB CLOSED
Normal reference state

U02 CDU A
PHYSICAL E-157 | REF LC-G05-202
This secondary symbol E-181 represents the same CDU, not additional equipment.

U02 CDU B
PHYSICAL E-158 | REF LC-G05-202
This secondary symbol E-182 represents the same CDU, not additional equipment.



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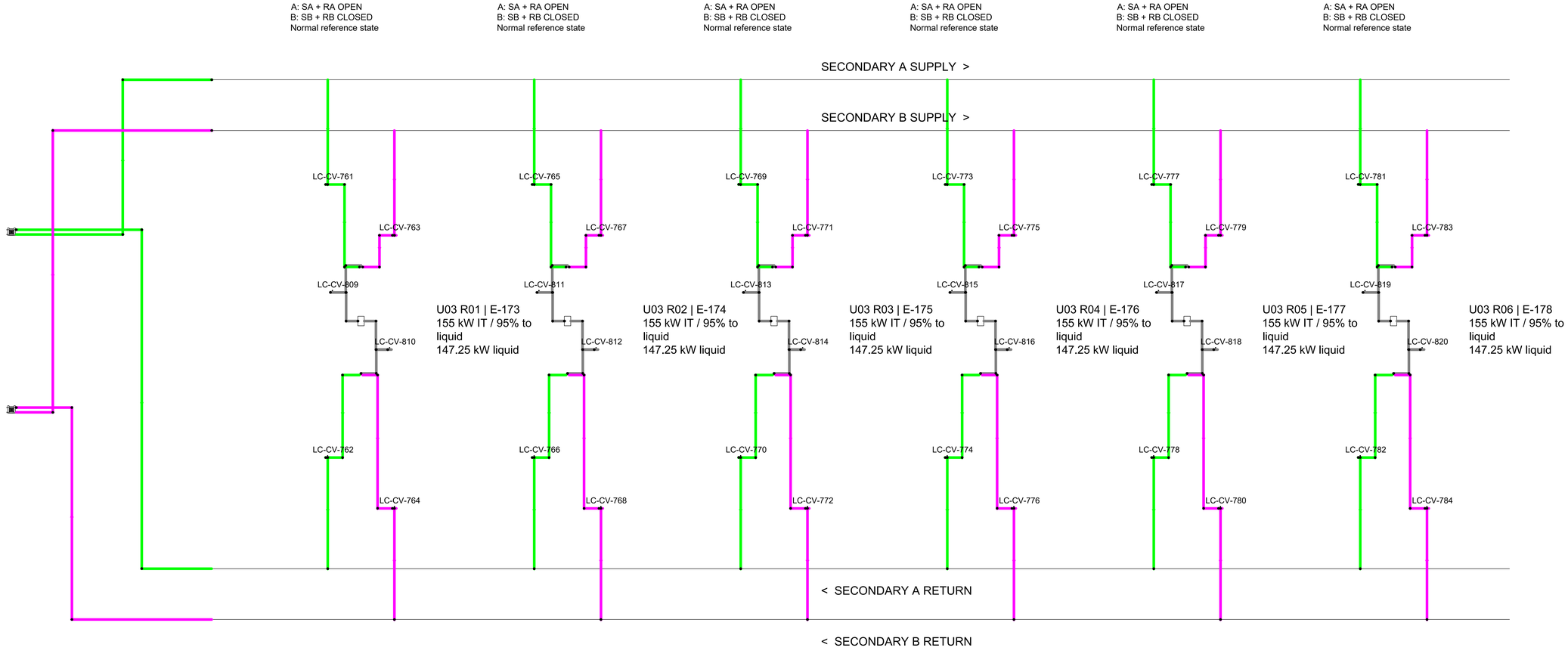
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LC-G05-301 / U03 SIX-RACK UNIT DETAIL | REV P03 | NTS

UNIT U03 | SIX RACKS | TWO CDU REFERENCES | SECONDARY A/B

U03 CDU A
PHYSICAL E-159 | REF LC-G05-202
This secondary symbol E-183 represents the same CDU, not additional equipment.

U03 CDU B
PHYSICAL E-160 | REF LC-G05-202
This secondary symbol E-184 represents the same CDU, not additional equipment.



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