Ballard Power Systems Europe A/S
Majsmarken 1
9500 Hobro
Denmark

Revision history		
Rev.	**Date.**	**Description**
001	27/01/2023	First Issue
002	03/03/2023	Modified according to comments
003	17/05/2023	Updated according to comments
004	08/03/2024	Updated according to comments
005	16/10/2024	Updated according to comments and with changed water separator
006	20/11/2024	Updated according to comments

Document Title:	**BLPH Project - P&IDs**
Document Number:	K559-2254-CWIWP4202202-C03-001
Revision:	Rev006
Sequence Number:	001
File Name:	K559-2254-CWIWP4202202-C03-001Rev006
Purchaser Job:	K559-2254
Purchase Order:	CWIWP4202202
Code:	C03
Requsition Number:	n/a
Customer:	CrossWind C.V., Rotterdam, The Netherlands

Process And Instrumentation Diagrams

Crosswind/Shell Baseload Power Hub, Fuel Cell Container 1MW, no BESS

Table of Contents

Higher-Level Function	Mounting Location	Page	Page Description	Last Modified Date
		1	P&ID Introduction	20-Nov-24
		2	Structure Identifier Overview	20-Nov-24
		3	Symbol List	15-Oct-24
		4	Hydrogen Supply System	20-Nov-24
		5	Hydrogen Supply System - BOM	20-Nov-24
		6	Process Exhaust and Drain	20-Nov-24
		7	HT1 Coolant System - Fuel Cells	20-Nov-24
		8	HT2 Coolant System - Fuel Cells	20-Nov-24
		9	LT Coolant System - Overview	20-Nov-24
		10	LT Coolant System - Fuel Cells	20-Nov-24
		11	LT Coolant System - Power Converters 1/2	20-Nov-24
		12	LT Coolant System - Power Converters 2/2	20-Nov-24
		13	LT Coolant System - BOM	20-Nov-24
		13.a	LT Coolant System - BOM	16-Oct-24
		14	Ventilation Air System - 40ft Container	20-Nov-24
		15	Ventilation Air System - 10ft Container	20-Nov-24

THIS DOCUMENT, SUBMITTED IN CONFIDENCE, CONTAINS PROPRIETARY INFORMATION WHICH SHALL NOT BE REPRODUCED OR TRANSFERRED TO OTHER DOCUMENTS OR DISCLOSED TO OTHERS OR USED FOR MANUFACTURING OR ANY OTHER PURPOSE WITHOUT PRIOR WRITTEN PERMISSION OF BALLARD POWER SYSTEMS INC. OR A RELATED WHOLLY-OWNED SUBSIDIARY OR AFFILIATE.

BALLARD™ CONFIDENTIAL

THIS DOCUMENT'S APPROVAL IS MANAGED BY E-SIGNATURE ON FILE IN BALLARD POWER SYSTEMS' PLM SYSTEM

Structure Identifier Overview

Functional Designation

Which function is associated with the components?

Structure identifier overview

Full designation	Labeling	Structure description
=AA01	Function designation	Container Interconnection
=BA01	Function designation	Power Conversion Block 1
=BA02	Function designation	Power Conversion Block 2
=BA20	Function designation	Power Conversion BOP
=BA30	Function designation	Power Conversion Output
=HA01	Function designation	Hydrogen Supply System
=HE01	Function designation	High Temperature Cooling Circuit #1
=HE02	Function designation	High Temperature Cooling System #2
=HE03	Function designation	Low Temperature Cooling Circuit
=JA01	Function designation	Container Ventilation System
=JA02	Function designation	Process Exhaust System
=JA03	Function designation	H2 Enclosure Ventilation
=JB01	Function designation	Condensate Drainage System
=LA01	Function designation	Container Control System
=LB02	Function designation	Container Safety System
=RE01	Function designation	Fuel Cell System 1
=RE02	Function designation	Fuel Cell System 2
=HKN70	Function designation	Baseload Power Hub
=EXT	Function designation	External Connection
=JB02	Function designation	Condensate Drainage System
=LA01.LA01	Function designation	

Location Designation

Where is the component located?

Structure identifier overview

Full designation	Labeling	Structure description
+DA01	Location designation	Container #1 Inside
+DA02	Location designation	Container #1 Outside
+DA03	Location designation	Container #2 Inside
+DA04	Location designation	Container #2 Outside
+GB01	Location designation	FCwave Module #1
+GB02	Location designation	FCwave Module #2
+GB03	Location designation	FCwave Module #3
+GB04	Location designation	FCwave Module #4
+GB05	Location designation	FCwave Module #5
+GB06	Location designation	FCwave Module #6
+UC01	Location designation	DCDC Cabinet #1
+UC02	Location designation	DCDC Cabinet #2
+UC03	Location designation	DCDC Cabinet #3
+UC04	Location designation	DCDC Cabinet #4
+UC05	Location designation	DCDC Cabinet #5
+UC06	Location designation	DCDC Cabinet #6
+UC07	Location designation	Ventilation Cabinet
+UC10	Location designation	DCAC Cabinet Output
+UC20	Location designation	Control Cabinet (40ft)
+UC30	Location designation	Coolant Skid Control Cabinet
+UC31	Location designation	Control Cabinet (10ft)
+UC40	Location designation	Coolant Power Distribution
+UC41	Location designation	HT+LT VFD Cabinet
+UC42	Location designation	EX Barrier Box
+UC50	Location designation	AC Power Distribution
+WZ10	Location designation	Container Interconnect Frame
+H2SS	Location designation	Hydrogen Supply (Ext)
+UC30.UC20	Location designation	

THIS DOCUMENT, SUBMITTED IN CONFIDENCE, CONTAINS PROPRIETARY INFORMATION WHICH SHALL NOT BE REPRODUCED OR TRANSFERRED TO OTHER DOCUMENTS OR DISCLOSED TO OTHERS OR USED FOR MANUFACTURING OR ANY OTHER PURPOSE WITHOUT PRIOR WRITTEN PERMISSION OF BALLARD POWER SYSTEMS INC. OR A RELATED WHOLLY-OWNED SUBSIDIARY OR AFFILIATE.

BALLARD™ CONFIDENTIAL

THIS DOCUMENT'S APPROVAL IS MANAGED BY E-SIGNATURE ON FILE IN BALLARD POWER SYSTEMS' PLM SYSTEM

Symbol List

Process Engineering

Threaded Connection
Dissimilar male and female part
=+-XM00

Valve, Hand-actuated
Typically quarter-turn, lockable in both positions
=+-QM00

Wall-passthough
Penetration through enclosure or container
-XT01

Valve, solenoid-actuated
Electromagnetic shutoff valve, normally closed type
-QM00

Pipe fixed point
Eg pipe end or welding connection
-XM00

Valve, check
One-way flow control valve for gas for fluid
-RM00

Liquid cooling element
Cooling path of liquid cooled power electronics
-TA00

Cooling Tower, with fans
Suction type
=+-EG00

Pump, centrifugal, with motor
Suction type
-GP00

Hose, Flexible
-WP00

Exhaust, to free air
With weather shield
-WM00

Valve, Shut-off, Motorized, Modulating
Motorized Control Valve, gradual between 0-100%
-QN00

Vessel or tank
With volume indicated
=+-CL00
Volume XL

Flow restrictor or orifice
For limiting gas or fluid flow rate
-QN00

Reducer, concentric
With indication of size
-XM00

Ventilation and Heating

Heater, with fans
Space heating element, electric
-EB00

Damper, lamellar
For ventilation purposes
-QM00

Actuator, motor, modulating
For dampers or valves
=+-QM00.MA00

Fan, axial flow
With motor
-GQ00

Fan, radial flow
With motor
-GQ00

Sensor, Room
Sensor for sensing conditions in open space
-BT00

Sensor, Process
Sensor with process connection
-BT00

Filter, for air
Cooling path of liquid cooled power electronics
-FS00

Reference Item Number	Ballard Part # TBD
EPLAN Project Name	601456B - Shell Baseload Power Hub
EPLAN Revision	03.P18
EPLAN Project Pages	623
= | ++	+ | & B02

REVISION INFORMATION	
DESCRIPTION	
DATE	
15-Oct-24	

THIS DOCUMENT, SUBMITTED IN CONFIDENCE, CONTAINS PROPRIETARY INFORMATION WHICH SHALL NOT BE REPRODUCED OR TRANSFERRED TO OTHER DOCUMENTS OR DISCLOSED TO OTHERS OR USED FOR MANUFACTURING OR ANY OTHER PURPOSE WITHOUT PRIOR WRITTEN PERMISSION OF BALLARD POWER SYSTEMS INC. OR A RELATED WHOLLY-OWNED SUBSIDIARY OR AFFILIATE.

BALLARD™
CONFIDENTIAL

THIS DOCUMENT'S APPROVAL IS MANAGED BY E-SIGNATURE ON FILE IN BALLARD POWER SYSTEMS PLM SYSTEM

DRAWING	601456B C03 Process and Instrumentation Diagram	REVISION	03.P18
DRAWING TITLE	Crosswind/Shell Baseload Power Hub, Fuel Cell Container 1MW, no BESS		
SHEET TYPE/DESC	Symbol List		
ALL SHEETS ARE THE SAME REVISION STATUS	SIZE A1	LANGUAGE EN	SHEET/TOTAL 3 / 16

FRMS103653/08

Hydrogen Supply System - Fuel Cells 1-6

=RE01
Fuel Cell System 1

+GB01
FCwave 1

-XM01
20mm
H2 Supply Inlet

-WP_H2927
Hydrogen
3,5-6,5 barg
12 - 80°C
<4,9 g/s

+GB02
FCwave 2

-XM01
20mm
H2 Supply Inlet

-WP_H2926
Hydrogen
3,5-6,5 barg
12 - 80°C
<4,9 g/s

+GB03
FCwave 3

-XM01
20mm
H2 Supply Inlet

-WP_H2925
Hydrogen
3,5-6,5 barg
12 - 80°C
<4,9 g/s

=RE02
Fuel Cell System 2

+GB04
FCwave 4

-XM01
20mm
H2 Supply Inlet

-WP_H2924
Hydrogen
3,5-6,5 barg
12 - 80°C
<4,9 g/s

+GB05
FCwave 5

-XM01
20mm
H2 Supply Inlet

-WP_H2923
Hydrogen
3,5-6,5 barg
12 - 80°C
<4,9 g/s

+GB06
FCwave 6

-XM01
20mm
H2 Supply Inlet

-WP_H2922
Hydrogen
3,5-6,5 barg
12 - 80°C
<4,9 g/s

=HA01+DA02
Hydorgen Supply System, Container #1 Outside

-XT01
Wall pass-through

-WP_H2917
Hydrogen
3,5-6,5 barg
12 - 80°C
<4,9 g/s

Y V
QM2.1

=HA01+DA02-QM2.1
DN20
Shut-off Valve

-WP_H2907
Hydrogen
3,5-6,5 barg
12 - 80°C
<4,9 g/s

Y V
QM1.1

=HA01+DA02-QM1.1
DN20
Shut-off Valve

-XT02
Wall pass-through

-WP_H2916
Hydrogen
3,5-6,5 barg
12 - 80°C
<4,9 g/s

Y V
QM2.2

=HA01+DA02-QM2.2
DN20
Shut-off Valve

-WP_H2906
Hydrogen
3,5-6,5 barg
12 - 80°C
<4,9 g/s

Y V
QM1.2

=HA01+DA02-QM1.2
DN20
Shut-off Valve

-XT03
Wall pass-through

-WP_H2915
Hydrogen
3,5-6,5 barg
12 - 80°C
<4,9 g/s

Y V
QM2.3

=HA01+DA02-QM2.3
DN20
Shut-off Valve

-WP_H2905
Hydrogen
3,5-6,5 barg
12 - 80°C
<4,9 g/s

Y V
QM1.3

=HA01+DA02-QM1.3
DN20
Shut-off Valve

-XT04
Wall pass-through

-WP_H2914
Hydrogen
3,5-6,5 barg
12 - 80°C
<4,9 g/s

Y V
QM2.4

=HA01+DA02-QM2.4
DN20
Shut-off Valve

-WP_H2904
Hydrogen
3,5-6,5 barg
12 - 80°C
<4,9 g/s

Y V
QM1.4

=HA01+DA02-QM1.4
DN20
Shut-off Valve

-XT05
Wall pass-through

-WP_H2913
Hydrogen
3,5-6,5 barg
12 - 80°C
<4,9 g/s

Y V
QM2.5

=HA01+DA02-QM2.5
DN20
Shut-off Valve

-WP_H2903
Hydrogen
3,5-6,5 barg
12 - 80°C
<4,9 g/s

Y V
QM1.5

=HA01+DA02-QM1.5
DN20
Shut-off Valve

-XT06
Wall pass-through

-WP_H2912
Hydrogen
3,5-6,5 barg
12 - 80°C
<4,9 g/s

Y V
QM2.6

=HA01+DA02-QM2.6
DN20
Shut-off Valve

-WP_H2902
Hydrogen
3,5-6,5 barg
-6,4 - 80°C
<4,9 g/s

Y V
QM1.6

=HA01+DA02-QM1.6
DN20
Shut-off Valve

-BL01
SI = 11 mm
Ex Point Liquid Detection

BT01
PT1000 -40...150 °C
Liquid Temperature Sensor

-CM01
SS316, Volume 146L
Hydrogen Heater Vessel

-EA01
3x400V, 9kW, Ex
Heating Element 1

-EA02
3x400V, 9kW, Ex
Heating Element 2

-WP01
DN25, 3000m
Tube Coil

-WP02
DN25, 3000m
Tube Coil

-WP03
DN25, 3000m
Tube Coil

-WP04
DN25, 3000m
Tube Coil

-WP05
DN25, 3000m
Tube Coil

-WP06
DN25, 3000m
Tube Coil

-WP_H2947
Hydrogen
3,5-6,5 barg
12 - 80°C
<4,9 g/s

=HA01+DA02-QM01
DN25
Isolation Valve, Lockable

-WP_H2946
Hydrogen
3,5-6,5 barg
12 - 80°C
<4,9 g/s

=HA01+DA02-QM02
DN25
Isolation Valve, Lockable

-WP_H2945
Hydrogen
3,5-6,5 barg
12 - 80°C
<4,9 g/s

=HA01+DA02-QM03
DN25
Isolation Valve, Lockable

-WP_H2944
Hydrogen
3,5-6,5 barg
12 - 80°C
<4,9 g/s

=HA01+DA02-QM04
DN25
Isolation Valve, Lockable

-WP_H2943
Hydrogen
3,5-6,5 barg
12 - 80°C
<4,9 g/s

=HA01+DA02-QM05
DN25
Isolation Valve, Lockable

-WP_H2942
Hydrogen
3,5-6,5 barg
12 - 80°C
<4,9 g/s

=HA01+DA02-QM06
DN25
Isolation Valve, Lockable

=HKN70
Baseload Power Hub, Hydrogen Supply

0,9 - 29,4 g/s
-6,4 - 25°C
4,5 - 6,5 barg
Hydrogen

-XM01
DN32, EN1759-1, RF face
H2 Supply Connection
Flange Fitting

P T
BT01

=HA01+DA02-BP01
0...10 barg
Hydrogen Inlet
Pressure Transmitter

-WP_H2900
Hydrogen
3,5 - 6,5 barg
-6,4 - 80°C
0,9 - 29,4 g/s

=HA01+DA02-QM00
DN32
Manual shutoff valve
Lockable

-WP_H2901
Hydrogen
3,5 - 6,5 barg
-6,4 - 80°C
0,9 - 29,4 g/s

Reference Item Number	Ballard Part # TBD
EPLAN Project Name	6014568 - Shell Baseload Power Hub
EPLAN Revision	03.P18
EPLAN Project Pages	623
= | +	+ & B02

REVISION INFORMATION	
DESCRIPTION	
DATE	
20-Nov-24	

THIS DOCUMENT, SUBMITTED IN CONFIDENCE, CONTAINS PROPRIETARY INFORMATION WHICH SHALL NOT BE REPRODUCED OR TRANSFERRED TO OTHER DOCUMENTS OR DISCLOSED TO OTHERS OR USED FOR MANUFACTURING OR ANY OTHER PURPOSE WITHOUT PRIOR WRITTEN PERMISSION OF BALLARD POWER SYSTEMS INC. OR A RELATED WHOLLY-OWNED SUBSIDIARY OR AFFILIATE.

BALLARD
CONFIDENTIAL

THIS DOCUMENT'S APPROVAL IS MANAGED BY E-SIGNATURE ON FILE IN BALLARD POWER SYSTEMS PLM SYSTEM

DRAWING	6014568 C03 Process and Instrumentation Diagram
REVISION	03.P18
DRAWING TITLE	Crosswind/Shell Baseload Power Hub, Fuel Cell Container 1MW, no BESS
SHEET TYPE/DESC	Hydrogen Supply System
ALL SHEETS ARE THE SAME REVISION STATUS	SIZE A1 | LANGUAGE EN | SHEET/TOTAL 4 / 16

FRMS103653/08

Hydrogen Supply System - Fuel Cells 1-6

Bill of Materials / Parts List

Device tag	Qty	Unit	Description	Manufacturer			
				Name	Type Number	Order Number	
-AC01-WG01	2	meter	ÖLFLEX CLASSIC 110 CH 18G0,75	Lapp Group	ÖLFLEX® CLASSIC 110 CH	10035051	
-BL01	1	Piece	Electronic level sensor; Operating voltage 18...30 DC V; ATEX; M12 Connector; Gold-plated contacts	IFM Electronic AS	LMACE-A12E-QSKG-I/US/3D/3G	LMT01A	
-BL01-WG01	1	piece	Connecting cable with socket Cable: 25 m, PUR, Halogen-free, black, Ø 4.9 mm; 4 x 0.34 mm² (42 x Ø 0.1 mm) Connector: 1 x M12, angled; coding: IP Electronic AS	IFM Electronic AS	[illegible]	EVC14A	Tightening torque: 1.2...1.5 Nm
-BL01-XG01	0						
-BP01	1	Piece	Pressure Transducer, 0-10 barg, 4-20mA, ATEX, -25 to 85°C Ta, M12 Connector, 10..30 VDC, 2-wire, G1/2 Process Connection, FPM Seal	HUBA Controls AG	Pressure Transducer 520 Series	520930S04M801	
-BP01-WG01	1	piece	Connecting cable with socket Cable: 10 m, PUR, Halogen-free, blue, Ø 4.9 mm; 4 x 0.34 mm² (42 x Ø 0.1 mm) Connector: 1 x M12, straight; coding: IP Electronic AS	IFM Electronic AS	[illegible]	EVC03A	Tightening torque: 1.2...1.5 Nm
-BP01-XG01	0						
-BT01	1	Piece	PT1000 Sensor Element, Ø10mm x 160mm, 4 wire connection, EN60751 Class A	IFM Electronic AS	TT-100KBBD10-...../US/	TT1050	
-BT01-WG01	1	piece	Connecting cable with socket Cable: 10 m, PUR, Halogen-free, blue, Ø 4.9 mm; 4 x 0.34 mm² (42 x Ø 0.1 mm) Connector: 1 x M12, straight; coding: IP Electronic AS	IFM Electronic AS	[illegible]	EVC03A	Tightening torque: 1.2...1.5 Nm
-BT01-XG01	0						
-CM01	1	piece	Hydrogen Heater System, Water bath heat exchanger, SS316L, Volume 146L	Ballard Power Systems Europe			
-CM01-EA01	1	piece	Immersion Heater, 3x400V, 9kW, ATEX, IP66, Screw plug 2", ASTM A182 F316, Element Length 600m	JEVI Heating Elements AS	D-8640	340386	
-CM01-EA01	1	piece	Cable gland, ATEX Group II, grounding ring for amour, tightening guide, Resin/compound barrier with transparant inspection chamber, Unplated brass, M20	Hawke International	ICG 653 UNIV Os M20	653UOsM20	
-CM01-EA02	1	piece	Immersion Heater, 3x400V, 9kW, ATEX, IP66, Screw plug 2", ASTM A182 F316, Element Length 600m	JEVI Heating Elements AS	D-8640	340386	
-CM01-EA02	1	Piece	Cable gland, ATEX Group II, grounding ring for amour, tightening guide, Resin/compound barrier with transparant inspection chamber, Unplated brass, M20	Hawke International	ICG 653 UNIV Os M20	653UOsM20	
-CM01-WP01	1		Pipe coil, for H2 heater system. DN25 seamless pipe, 2mm wall, Stainless Steel 316L	Ballard Power Systems Europe			
-CM01-WP02	1		Pipe coil, for H2 heater system. DN25 seamless pipe, 2mm wall, Stainless Steel 316L	Ballard Power Systems Europe			
-CM01-WP03	1		Pipe coil, for H2 heater system. DN25 seamless pipe, 2mm wall, Stainless Steel 316L	Ballard Power Systems Europe			
-CM01-WP04	1		Pipe coil, for H2 heater system. DN25 seamless pipe, 2mm wall, Stainless Steel 316L	Ballard Power Systems Europe			
-CM01-WP05	1		Pipe coil, for H2 heater system. DN25 seamless pipe, 2mm wall, Stainless Steel 316L	Ballard Power Systems Europe			
-CM01-WP06	1		Pipe coil, for H2 heater system. DN25 seamless pipe, 2mm wall, Stainless Steel 316L	Ballard Power Systems Europe			
-EA01-WD01	1	meter	Screened control cable, 4G2.5mm2, LSZH	Lapp Group	ÖLFLEX® CLASSIC 135 CH	1123342	
-EA02-WD01	1	meter	Screened control cable, 4G2.5mm2, LSZH	Lapp Group	ÖLFLEX® CLASSIC 135 CH	1123342	
-QM00	1	Piece	3-piece premium quater-turn ball valve, full bore, Stainless steel, DN32, CF8M, ATEX, Weld-ends, lockable	Armatec DVCAS	1311 Full Bore	131150032	
-QM1.1	1	Piece	Solenoid Valve, Normally Closed, 3/4" Bore, ATEX for Hydrogen, Material: Body SS316, Seal, Diaphragm NBR, Pressure 0 to 16 barg	Emerson ASCO	NF X E210D488E 24/DC	NF X E210D488E 24/DC	
-QM1.1	1	Piece	Eaton's Crouse-Hinds series Redapt AD-U adaptor End1 size: 1/2", NPT, Male End2 size: M20, Metric, Female	Eaton	AD-U	ADU102904	
-QM1.1	1	Piece	501/421 Cable gland, ATEX Group II, M20, Unplated brass	Hawke International	501/421/O M20	421OM20	
-QM1.1-WG01	1	meter	ÖLFLEX CLASSIC 110 CH 3G1	Lapp Group	ÖLFLEX® CLASSIC 110 CH	10035056	
-QM1.2	1	Piece	Solenoid Valve, Normally Closed, 3/4" Bore, ATEX for Hydrogen, Material: Body SS316, Seal, Diaphragm NBR, Pressure 0 to 16 barg	Emerson ASCO	NF X E210D488E 24/DC	NF X E210D488E 24/DC	
-QM1.2	1	Piece	Eaton's Crouse-Hinds series Redapt AD-U adaptor End1 size: 1/2", NPT, Male End2 size: M20, Metric, Female	Eaton	AD-U	ADU102904	
-QM1.2	1	Piece	501/421 Cable gland, ATEX Group II, M20, Unplated brass	Hawke International	501/421/O M20	421OM20	
-QM1.2-WG01	1	meter	ÖLFLEX CLASSIC 110 CH 3G1	Lapp Group	ÖLFLEX® CLASSIC 110 CH	10035056	
-QM1.3	1	Piece	Solenoid Valve, Normally Closed, 3/4" Bore, ATEX for Hydrogen, Material: Body SS316, Seal, Diaphragm NBR, Pressure 0 to 16 barg	Emerson ASCO	NF X E210D488E 24/DC	NF X E210D488E 24/DC	
-QM1.3	1	Piece	Eaton's Crouse-Hinds series Redapt AD-U adaptor End1 size: 1/2", NPT, Male End2 size: M20, Metric, Female	Eaton	AD-U	ADU102904	
-QM1.3	1	Piece	501/421 Cable gland, ATEX Group II, M20, Unplated brass	Hawke International	501/421/O M20	421OM20	
-QM1.3-WG01	1	meter	ÖLFLEX CLASSIC 110 CH 3G1	Lapp Group	ÖLFLEX® CLASSIC 110 CH	10035056	
-QM1.4	1	Piece	Solenoid Valve, Normally Closed, 3/4" Bore, ATEX for Hydrogen, Material: Body SS316, Seal, Diaphragm NBR, Pressure 0 to 16 barg	Emerson ASCO	NF X E210D488E 24/DC	NF X E210D488E 24/DC	
-QM1.4	1	Piece	Eaton's Crouse-Hinds series Redapt AD-U adaptor End1 size: 1/2", NPT, Male End2 size: M20, Metric, Female	Eaton	AD-U	ADU102904	
-QM1.4	1	Piece	501/421 Cable gland, ATEX Group II, M20, Unplated brass	Hawke International	501/421/O M20	421OM20	
-QM1.4-WG01	1	meter	ÖLFLEX CLASSIC 110 CH 3G1	Lapp Group	ÖLFLEX® CLASSIC 110 CH	10035056	
-QM1.5	1	Piece	Solenoid Valve, Normally Closed, 3/4" Bore, ATEX for Hydrogen, Material: Body SS316, Seal, Diaphragm NBR, Pressure 0 to 16 barg	Emerson ASCO	NF X E210D488E 24/DC	NF X E210D488E 24/DC	
-QM1.5	1	Piece	Eaton's Crouse-Hinds series Redapt AD-U adaptor End1 size: 1/2", NPT, Male End2 size: M20, Metric, Female	Eaton	AD-U	ADU102904	
-QM1.5	1	Piece	501/421 Cable gland, ATEX Group II, M20, Unplated brass	Hawke International	501/421/O M20	421OM20	
-QM1.5-WG01	1	meter	ÖLFLEX CLASSIC 110 CH 3G1	Lapp Group	ÖLFLEX® CLASSIC 110 CH	10035056	
-QM1.6	1	Piece	Solenoid Valve, Normally Closed, 3/4" Bore, ATEX for Hydrogen, Material: Body SS316, Seal, Diaphragm NBR, Pressure 0 to 16 barg	Emerson ASCO	NF X E210D488E 24/DC	NF X E210D488E 24/DC	
-QM1.6	1	Piece	Eaton's Crouse-Hinds series Redapt AD-U adaptor End1 size: 1/2", NPT, Male End2 size: M20, Metric, Female	Eaton	AD-U	ADU102904	
-QM1.6	1	Piece	501/421 Cable gland, ATEX Group II, M20, Unplated brass	Hawke International	501/421/O M20	421OM20	
-QM1.6-WG01	1	meter	ÖLFLEX CLASSIC 110 CH 3G1	Lapp Group	ÖLFLEX® CLASSIC 110 CH	10035056	
-QM01	1	Piece	Quater-turn ball valve, lockable, size 25mm, 25mm Hy-Lok Tube Fitting ends	Hy-Lok Corporation	110 Series Ball Valves	BVH-25M	
-QM2.1	1	Piece	Solenoid Valve, Normally Closed, 3/4" Bore, ATEX for Hydrogen, Material: Body SS316, Seal, Diaphragm NBR, Pressure 0 to 16 barg	Emerson ASCO	NF X E210D488E 24/DC	NF X E210D488E 24/DC	
-QM2.1	1	Piece	Eaton's Crouse-Hinds series Redapt AD-U adaptor End1 size: 1/2", NPT, Male End2 size: M20, Metric, Female	Eaton	AD-U	ADU102904	
-QM2.1	1	Piece	501/421 Cable gland, ATEX Group II, M20, Unplated brass	Hawke International	501/421/O M20	421OM20	
-QM2.1-WG01	1	meter	ÖLFLEX CLASSIC 110 CH 3G1	Lapp Group	ÖLFLEX® CLASSIC 110 CH	10035056	
-QM2.2	1	Piece	Solenoid Valve, Normally Closed, 3/4" Bore, ATEX for Hydrogen, Material: Body SS316, Seal, Diaphragm NBR, Pressure 0 to 16 barg	Emerson ASCO	NF X E210D488E 24/DC	NF X E210D488E 24/DC	
-QM2.2	1	Piece	Eaton's Crouse-Hinds series Redapt AD-U adaptor End1 size: 1/2", NPT, Male End2 size: M20, Metric, Female	Eaton	AD-U	ADU102904	
-QM2.2	1	Piece	501/421 Cable gland, ATEX Group II, M20, Unplated brass	Hawke International	501/421/O M20	421OM20	

Reference Item Number	Ballard Part # TBD
EPLAN Project Name	601456B - Shell Baseload Power Hub
EPLAN Revision	03.P18
EPLAN Project Pages	623
=	++ | + | & B02

FRM5103653/08

REVISION INFORMATION	
DESCRIPTION	
DATE	20-Nov-24

THIS DOCUMENT, SUBMITTED IN CONFIDENCE, CONTAINS PROPRIETARY INFORMATION WHICH SHALL NOT BE REPRODUCED OR TRANSFERRED TO OTHER DOCUMENTS OR DISCLOSED TO OTHERS OR USED FOR MANUFACTURING OR ANY OTHER PURPOSE WITHOUT PRIOR WRITTEN PERMISSION OF BALLARD POWER SYSTEMS INC. OR A RELATED WHOLLY-OWNED SUBSIDIARY OR AFFILIATE.

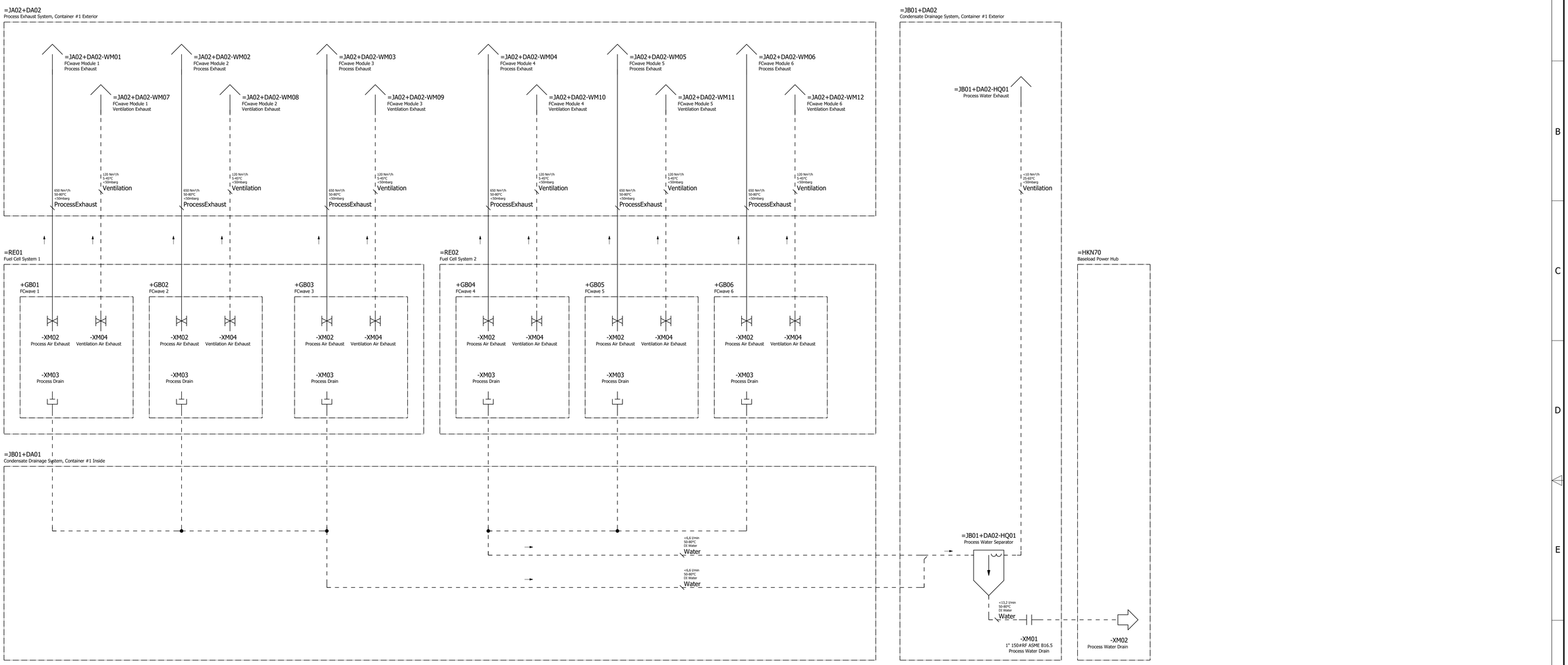
BALLARD®

CONFIDENTIAL

THIS DOCUMENT'S APPROVAL IS MANAGED BY E-SIGNATURE ON FILE IN BALLARD POWER SYSTEMS' PLM SYSTEM

DRAWING	601456B C03 Process and Instrumentation Diagram	REVISION	03.P18
DRAWING TITLE	Crosswind/Shell Baseload Power Hub, Fuel Cell Container 1MW, no BESS		
SHEET TYPE/DESC	Hydrogen Supply System - BOM		
ALL SHEETS ARE THE SAME REVISION STATUS	SIZE A1	LANGUAGE EN	SHEET/TOTAL 5 / 16

Process Exhaust, Ventilation Exhaust, Process Water Drain - Fuel Cells 1-6



Parts List

Device tag	Qty	Unit	Description	Manufacturer		
				Name	Type Number	Order Number
=JB01+DA02-HQ01	0					
=JB01+DA02-HQ01	1		Ventilation Exhaust, Megablock, 2", Stainless 316	Ballard Power Systems Europe		7001554
=JA02+DA02-WM01	1		Process Exhaust for FCwave, Megablock, 3" Stainless 316	Ballard Power Systems Europe		7001553
=JA02+DA02-WM02	1		Process Exhaust for FCwave, Megablock, 3" Stainless 316	Ballard Power Systems Europe		7001553
=JA02+DA02-WM03	1		Process Exhaust for FCwave, Megablock, 3" Stainless 316	Ballard Power Systems Europe		7001553
=JA02+DA02-WM04	1		Process Exhaust for FCwave, Megablock, 3" Stainless 316	Ballard Power Systems Europe		7001553
=JA02+DA02-WM05	1		Process Exhaust for FCwave, Megablock, 3" Stainless 316	Ballard Power Systems Europe		7001553
=JA02+DA02-WM06	1		Process Exhaust for FCwave, Megablock, 3" Stainless 316	Ballard Power Systems Europe		7001553
=JA02+DA02-WM07	1		Ventilation Exhaust, Megablock, 2", Stainless 316	Ballard Power Systems Europe		7001554
=JA02+DA02-WM08	1		Ventilation Exhaust, Megablock, 2", Stainless 316	Ballard Power Systems Europe		7001554
=JA02+DA02-WM09	1		Ventilation Exhaust, Megablock, 2", Stainless 316	Ballard Power Systems Europe		7001554
=JA02+DA02-WM10	1		Ventilation Exhaust, Megablock, 2", Stainless 316	Ballard Power Systems Europe		7001554
=JA02+DA02-WM11	1		Ventilation Exhaust, Megablock, 2", Stainless 316	Ballard Power Systems Europe		7001554
=JA02+DA02-WM12	1		Ventilation Exhaust, Megablock, 2", Stainless 316	Ballard Power Systems Europe		7001554
=JB01+DA02-XM01	1		Pipe End, Ø60.3mm, Material 1.4301	Ballard Power Systems Europe		5500231B-2891

Reference Item Number	Ballard Part # TBD
EPLAN Project Name	601456B - Shell Baseload Power Hub
EPLAN Revision	03.P18
EPLAN Project Pages	623
- ++	+ & B02

FRMS10365J/08

REVISION INFORMATION
DESCRIPTION
DATE
20-Nov-24

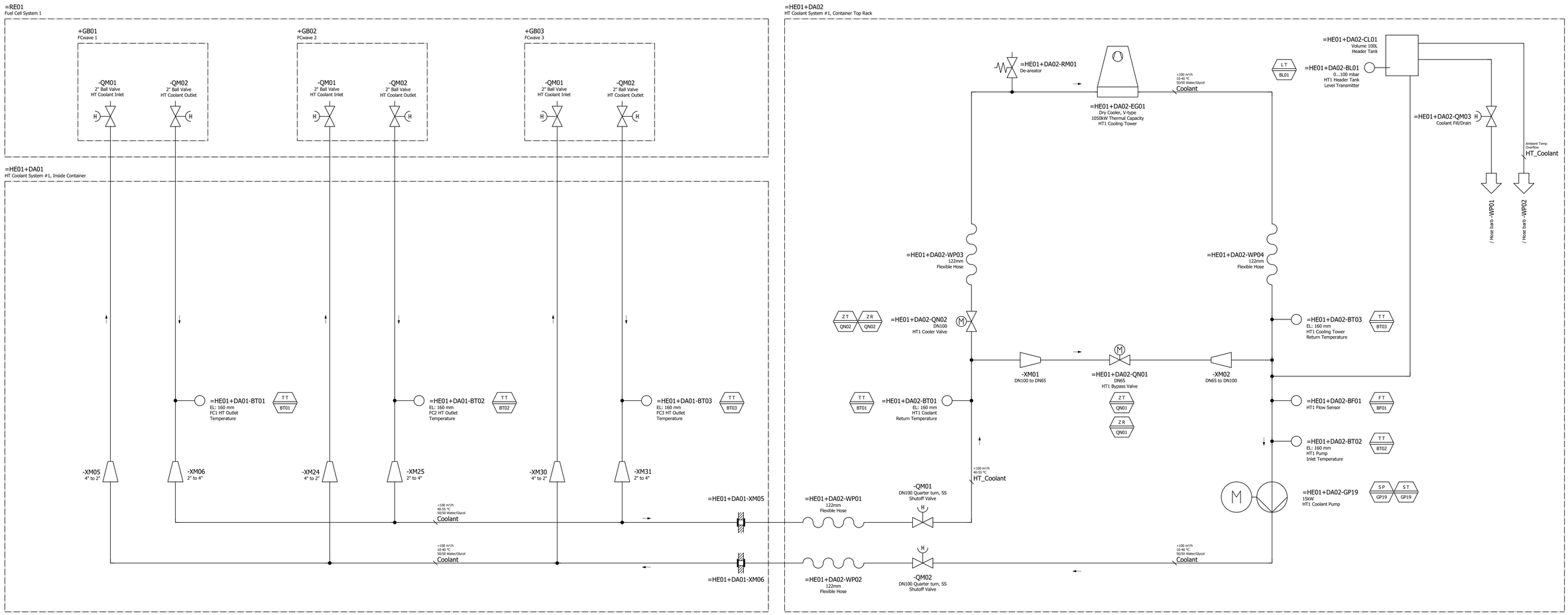
THIS DOCUMENT, SUBMITTED IN CONFIDENCE, CONTAINS PROPRIETARY INFORMATION WHICH SHALL NOT BE REPRODUCED OR TRANSFERRED TO OTHER DOCUMENTS OR DISCLOSED TO OTHERS OR USED FOR MANUFACTURING OR ANY OTHER PURPOSE WITHOUT PRIOR WRITTEN PERMISSION OF BALLARD POWER SYSTEMS INC. OR A RELATED WHOLLY-OWNED SUBSIDIARY OR AFFILIATE.

BALLARD
CONFIDENTIAL

THIS DOCUMENT'S APPROVAL IS MANAGED BY E-SIGNATURE ON FILE IN BALLARD POWER SYSTEMS' PLM SYSTEM

DRAWING	601456B C03 Process and Instrumentation Diagram
REVISION	03.P18
DRAWING TITLE	Crosswind/Shell Baseload Power Hub, Fuel Cell Container 1MW, no BESS
SHEET TYPE/DESC	Process Exhaust and Drain
ALL SHEETS ARE THE SAME REVISION STATUS	SIZE A1 | LANGUAGE EN | SHEET/TOTAL 6 / 16

High Temperature Cooling System - Fuel Cells 1-3



Parts List

Device tag	Qty	Unit	Description	Manufacturer		
				Name	Type Number	Order Number
=HE01+DA02-BF01	1	Piece	Flow sensor	IFM Electronic AS	SAEXXXXB50KG/US-100	SA4104
=HE01+DA02-BL01	1	Piece	Pressure transmitter with ceramic measuring cell, DC, analogue signal	IFM Electronic AS	PA-,10BRBG14-A-ZVG/US/ /V	PA3589
=HE01+DA01-BT01	1		Temperature sensor for connection to a control monitor	IFM Electronic AS	TT-100KBBD06- /US/ /V	TT1250
=HE01+DA01-BT02	1		Temperature sensor for connection to a control monitor	IFM Electronic AS	TT-100KBBD06- /US/ /V	TT1250
=HE01+DA01-BT03	1		Temperature sensor for connection to a control monitor	IFM Electronic AS	TT-100KBBD06- /US/ /V	TT1250
=HE01+DA02-BT01	1		Temperature sensor for connection to a control monitor	IFM Electronic AS	TT-100KBBD06- /US/ /V	TT1250
=HE01+DA02-BT02	1		Temperature sensor for connection to a control monitor	IFM Electronic AS	TT-100KBBD06- /US/ /V	TT1250
=HE01+DA02-BT03	1		Temperature sensor for connection to a control monitor	IFM Electronic AS	TT-100KBBD06- /US/ /V	TT1250
=HE01+DA02-CL01	1		Header Tank, Volume 100L, AISI 304	Ballard Power Systems Europe	5500231B-3002	5500231B-3002
=HE01+DA02-EG01	1		Dry Cooler, 1050kW, With Ventilators (Offshore)	EVAPCO Europe A/S	VA091 Series Drycooler	VA091EWHHD-682-IHD-120-2,3-Sp
=HE01+DA02-GP19	1		Centrifugal pump, with electric motor, single-stage close coupled in line.	Grundfos AS	TP 100-310/2 X-F-A-BQQE-OW1	92886729
=HE01+DA02-QM01	1		Ball Valve, Stainless Steel, DN100, Weld Flange	Armatec DVCAS	DVC Type 1311	1311510100
=HE01+DA02-QM02	1		Ball Valve, Stainless Steel, DN100, Weld Flange	Armatec DVCAS	DVC Type 1311	1311510100
=HE01+DA02-QM03	0					
=HE01+DA02-QN01	1	piece	Valve act. 24...230V, 160 Nm, bus, IP66	Belimo Holding AG	PRCA-BAC-S2-T	PRCA-BAC-S2-T
=HE01+DA02-QN02	1	piece	Valve act. 24...230V, 160 Nm, bus, IP66	Belimo Holding AG	PRCA-BAC-S2-T	PRCA-BAC-S2-T
=HE01+DA02-RM01	1		De-aerator, For coolant containing 50% glycol, 21.3mm BSPT thread external	Sanistål	Flexvent 1/2"	
=HE01+DA02-WP01	1		Coolant Hose, 110x122mm, EPDM, 4barg	Radiacord	5.002.000.01604	NW110-122
=HE01+DA02-WP02	1		Coolant Hose, 110x122mm, EPDM, 4barg	Radiacord	5.002.000.01604	NW110-122
=HE01+DA02-WP03	1		Coolant Hose, 110x122mm, EPDM, 4barg	Radiacord	5.002.000.01604	NW110-122
=HE01+DA02-WP04	1		Coolant Hose, 110x122mm, EPDM, 4barg	Radiacord	5.002.000.01604	NW110-122

Reference Item Number	Ballard Part # TBD
EPLAN Project Name	601456B - Shell Baseload Power Hub
EPLAN Revision	03.P18
EPLAN Project Pages	623
=	++ + & B02

REVISION INFORMATION	
DESCRIPTION	
DATE	20-Nov-24

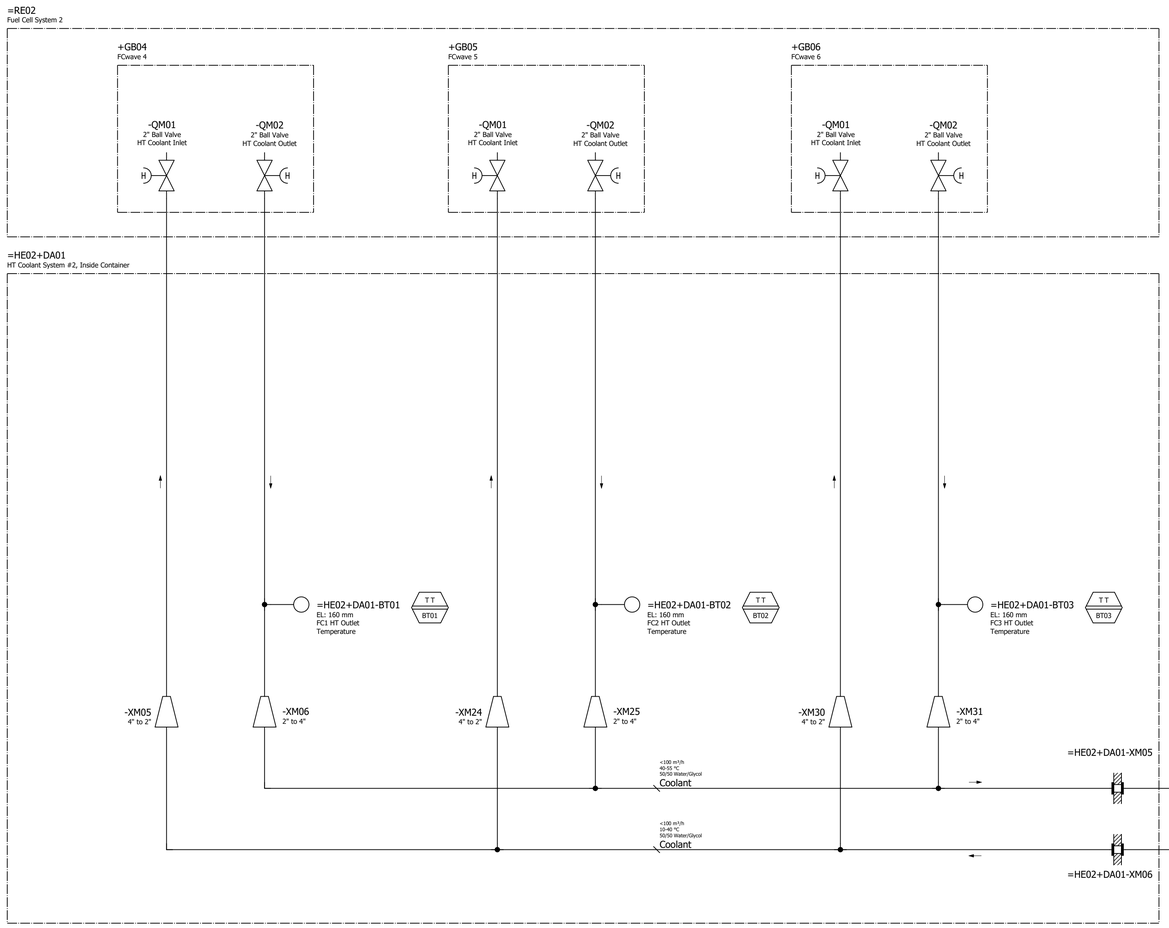
THIS DOCUMENT, SUBMITTED IN CONFIDENCE, CONTAINS PROPRIETARY INFORMATION WHICH SHALL NOT BE REPRODUCED OR TRANSFERRED TO OTHER DOCUMENTS OR DISCLOSED TO OTHERS OR USED FOR MANUFACTURING OR ANY OTHER PURPOSE WITHOUT PRIOR WRITTEN PERMISSION OF BALLARD POWER SYSTEMS INC. OR A RELATED WHOLLY-OWNED SUBSIDIARY OR AFFILIATE.

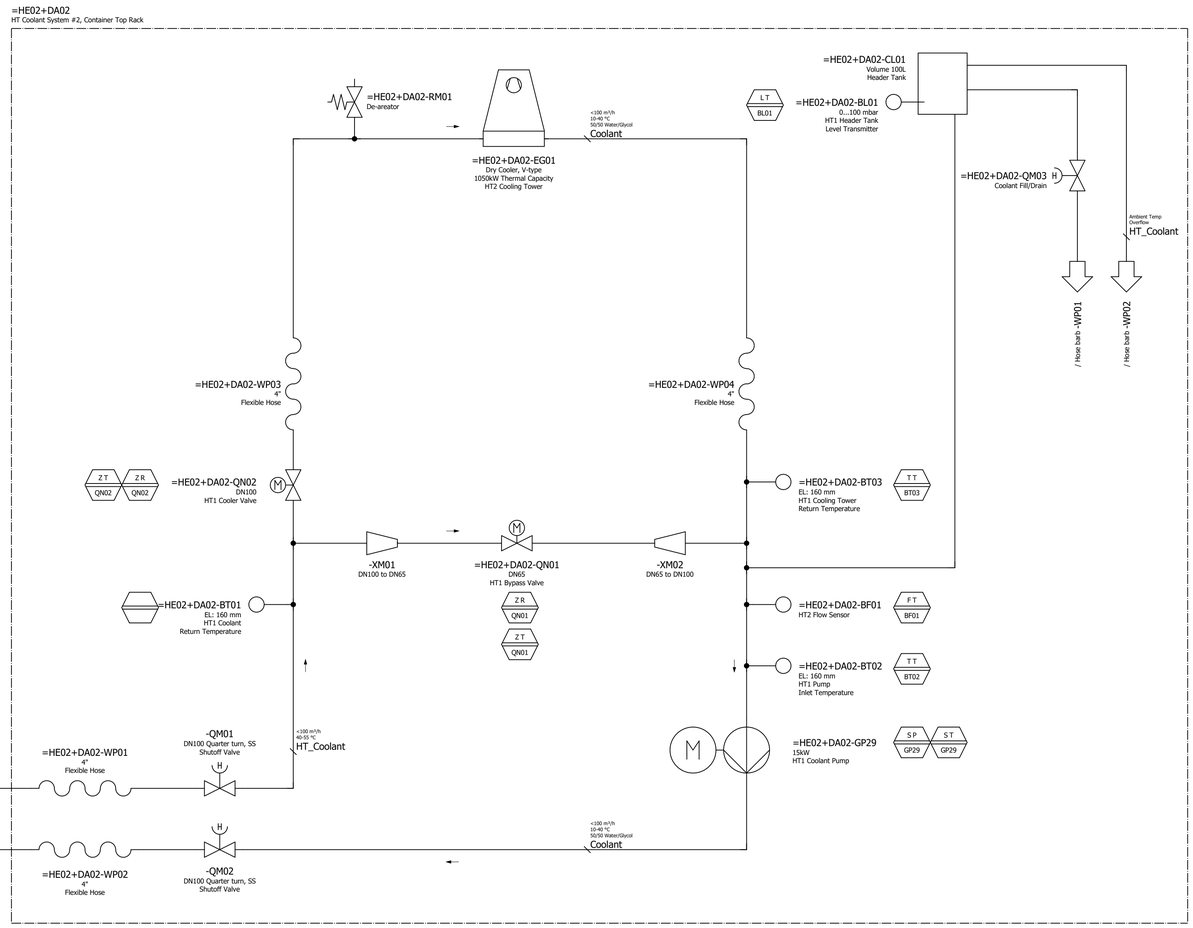
BALLARD
CONFIDENTIAL

THIS DOCUMENT'S APPROVAL IS MANAGED BY E-SIGNATURE ON FILE IN BALLARD POWER SYSTEMS' PLM SYSTEM

DRAWING	601456B C03 Process and Instrumentation Diagram
REVISION	03.P18
DRAWING TITLE	Crosswind/Shell Baseload Power Hub, Fuel Cell Container 1MW, no BESS
SHEET TYPE/DESC	HT1 Coolant System - Fuel Cells
ALL SHEETS ARE THE SAME REVISION STATUS	SIZE A1 · LANGUAGE EN · SHEET/TOTAL 7 / 16

High Temperature Cooling System - Fuel Cells 4-6





Parts List

Device tag	Qty	Unit	Description	Manufacturer		
				Name	Type Number	Order Number
=HE02+DA02-BF01	1	Piece	Flow sensor	IFM Electronic AS	SAEXXXXB50KG/US-100	SA4104
=HE02+DA02-BL01	1	Piece	Pressure transmitter with ceramic measuring cell, DC, analogue signal	IFM Electronic AS	PA-,10BRBG14-A-ZVG/US/ /V	PA3589
=HE02+DA01-BT01	1		Temperature sensor for connection to a control monitor	IFM Electronic AS	TT-100KBBD06- /US/ /V	TT1250
=HE02+DA01-BT02	1		Temperature sensor for connection to a control monitor	IFM Electronic AS	TT-100KBBD06- /US/ /V	TT1250
=HE02+DA01-BT03	1		Temperature sensor for connection to a control monitor	IFM Electronic AS	TT-100KBBD06- /US/ /V	TT1250
=HE02+DA02-BT01	1		Temperature sensor for connection to a control monitor	IFM Electronic AS	TT-100KBBD06- /US/ /V	TT1250
=HE02+DA02-BT02	1		Temperature sensor for connection to a control monitor	IFM Electronic AS	TT-100KBBD06- /US/ /V	TT1250
=HE02+DA02-BT03	1		Temperature sensor for connection to a control monitor	IFM Electronic AS	TT-100KBBD06- /US/ /V	TT1250
=HE02+DA02-CL01	1		Header Tank, Volume 100L, AISI 304	Ballard Power Systems Europe	5500231B-3002	5500231B-3002
=HE02+DA02-EG01	1		Dry Cooler, 1050kW, With Ventilators (Offshore)	EVAPCO Europe A/S	VA091 Series Drycooler	VA091EWHHD-682-IHD-120-2,3-Sp
=HE02+DA02-GP29	1		Centrifugal pump, with electric motor, single-stage close coupled in line.	Grundfos AS	TP 100-310/2 X-F-A-BQQE-OW1	92886729
=HE02+DA02-QM01	1		Ball Valve, Stainless Steel, DN100, Weld Flange	Armatec DVCAS	DVC Type 1311	1311510100
=HE02+DA02-QM02	1		Ball Valve, Stainless Steel, DN100, Weld Flange	Armatec DVCAS	DVC Type 1311	1311510100
=HE02+DA02-QM03	0					
=HE02+DA02-QN01	1	piece	Valve act. 24...230V, 160 Nm, bus, IP66	Belimo Holding AG	PRCA-BAC-S2-T	PRCA-BAC-S2-T
=HE02+DA02-QN02	1	piece	Valve act. 24...230V, 160 Nm, bus, IP66	Belimo Holding AG	PRCA-BAC-S2-T	PRCA-BAC-S2-T
=HE02+DA02-RM01	1		De-aerator, For coolant containing 50% glycol, 21.3mm BSPT thread external	Sanistål	Flexvent 1/2"	
=HE02+DA02-WP01	1		Coolant Hose, 110x122mm, EPDM, 4barg	Radiacord	5.002.000.01604	NW110-122
=HE02+DA02-WP02	1		Coolant Hose, 110x122mm, EPDM, 4barg	Radiacord	5.002.000.01604	NW110-122
=HE02+DA02-WP03	1		Coolant Hose, 110x122mm, EPDM, 4barg	Radiacord	5.002.000.01604	NW110-122
=HE02+DA02-WP04	1		Coolant Hose, 110x122mm, EPDM, 4barg	Radiacord	5.002.000.01604	NW110-122

Reference Item Number	Ballard Part # TBD
EPLAN Project Name	601456B - Shell Baseload Power Hub
EPLAN Revision	03.P18
EPLAN Project Pages	623
=	++ + & B02

REVISION INFORMATION	
DESCRIPTION	
DATE	20-Nov-24

THIS DOCUMENT, SUBMITTED IN CONFIDENCE, CONTAINS PROPRIETARY INFORMATION WHICH SHALL NOT BE REPRODUCED OR TRANSFERRED TO OTHER DOCUMENTS OR DISCLOSED TO OTHERS OR USED FOR MANUFACTURING OR ANY OTHER PURPOSE WITHOUT PRIOR WRITTEN PERMISSION OF BALLARD POWER SYSTEMS INC. OR A RELATED WHOLLY-OWNED SUBSIDIARY OR AFFILIATE.

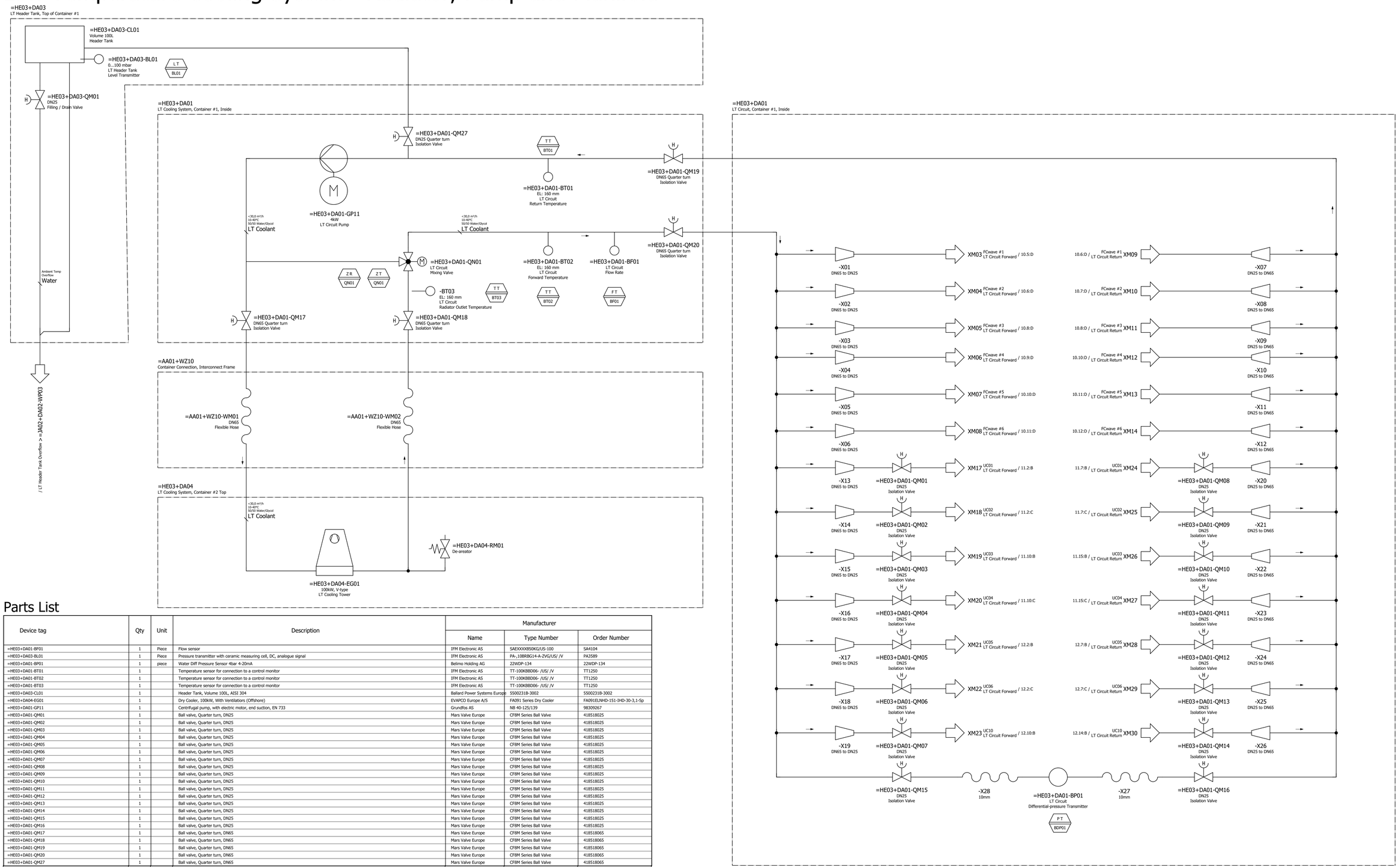
BALLARD
CONFIDENTIAL

THIS DOCUMENT'S APPROVAL IS MANAGED BY E-SIGNATURE ON FILE IN BALLARD POWER SYSTEMS' PLM SYSTEM

DRAWING	601456B C03 Process and Instrumentation Diagram
REVISION	03.P18
DRAWING TITLE	Crosswind/Shell Baseload Power Hub, Fuel Cell Container 1MW, no BESS
SHEET TYPE/DESC	HT2 Coolant System - Fuel Cells
ALL SHEETS ARE THE SAME REVISION STATUS	SIZE A1 · LANGUAGE EN · SHEET/TOTAL 8 / 16

FRMS103653/0B

Low Temperature Cooling System - Radiator, Pump and Manifold



Parts List

Device tag	Qty	Unit	Description	Manufacturer		
				Name	Type Number	Order Number
=HE03+DA01-BF01	1	Piece	Flow sensor	IFM Electronic AS	SAEXXXXB50KG/US-100	SA4104
=HE03+DA03-BL01	1	Piece	Pressure transmitter with ceramic measuring cell, DC, analogue signal	IFM Electronic AS	PA-,108RBG14-A-ZVG/US/ /V	PA3589
=HE03+DA01-BP01	1	piece	Water Diff Pressure Sensor 4bar 4-20mA	Belimo Holding AG	22WDP-134	22WDP-134
=HE03+DA01-BT01	1		Temperature sensor for connection to a control monitor	IFM Electronic AS	TT-100KBBD06- /US/ /V	TT1250
=HE03+DA01-BT02	1		Temperature sensor for connection to a control monitor	IFM Electronic AS	TT-100KBBD06- /US/ /V	TT1250
=HE03+DA01-BT03	1		Temperature sensor for connection to a control monitor	IFM Electronic AS	TT-100KBBD06- /US/ /V	TT1250
=HE03+DA03-CL01	1		Header Tank, Volume 100L, AISI 304	Ballard Power Systems Europe	S500231B-3002	S500231B-3002
=HE03+DA04-EG01	1		Dry Cooler, 100kW, With Ventilators (Offshore)	EVAPCO Europe A/S	FA091 Series Dry Cooler	FA091ELNHD-151-IHD-30-3,1-Sp
=HE03+DA01-GP11	1		Centrifugal pump, with electric motor, end suction, EN 733	Grundfos AS	NB 40-125/139	98309267
=HE03+DA01-QM01	1		Ball valve, Quarter turn, DN25	Mars Valve Europe	CF8M Series Ball Valve	418S18025
=HE03+DA01-QM02	1		Ball valve, Quarter turn, DN25	Mars Valve Europe	CF8M Series Ball Valve	418S18025
=HE03+DA01-QM03	1		Ball valve, Quarter turn, DN25	Mars Valve Europe	CF8M Series Ball Valve	418S18025
=HE03+DA01-QM04	1		Ball valve, Quarter turn, DN25	Mars Valve Europe	CF8M Series Ball Valve	418S18025
=HE03+DA01-QM05	1		Ball valve, Quarter turn, DN25	Mars Valve Europe	CF8M Series Ball Valve	418S18025
=HE03+DA01-QM06	1		Ball valve, Quarter turn, DN25	Mars Valve Europe	CF8M Series Ball Valve	418S18025
=HE03+DA01-QM07	1		Ball valve, Quarter turn, DN25	Mars Valve Europe	CF8M Series Ball Valve	418S18025
=HE03+DA01-QM08	1		Ball valve, Quarter turn, DN25	Mars Valve Europe	CF8M Series Ball Valve	418S18025
=HE03+DA01-QM09	1		Ball valve, Quarter turn, DN25	Mars Valve Europe	CF8M Series Ball Valve	418S18025
=HE03+DA01-QM10	1		Ball valve, Quarter turn, DN25	Mars Valve Europe	CF8M Series Ball Valve	418S18025
=HE03+DA01-QM11	1		Ball valve, Quarter turn, DN25	Mars Valve Europe	CF8M Series Ball Valve	418S18025
=HE03+DA01-QM12	1		Ball valve, Quarter turn, DN25	Mars Valve Europe	CF8M Series Ball Valve	418S18025
=HE03+DA01-QM13	1		Ball valve, Quarter turn, DN25	Mars Valve Europe	CF8M Series Ball Valve	418S18025
=HE03+DA01-QM14	1		Ball valve, Quarter turn, DN25	Mars Valve Europe	CF8M Series Ball Valve	418S18025
=HE03+DA01-QM15	1		Ball valve, Quarter turn, DN25	Mars Valve Europe	CF8M Series Ball Valve	418S18025
=HE03+DA01-QM16	1		Ball valve, Quarter turn, DN25	Mars Valve Europe	CF8M Series Ball Valve	418S18025
=HE03+DA01-QM17	1		Ball valve, Quarter turn, DN65	Mars Valve Europe	CF8M Series Ball Valve	418S18065
=HE03+DA01-QM18	1		Ball valve, Quarter turn, DN65	Mars Valve Europe	CF8M Series Ball Valve	418S18065
=HE03+DA01-QM19	1		Ball valve, Quarter turn, DN65	Mars Valve Europe	CF8M Series Ball Valve	418S18065
=HE03+DA01-QM20	1		Ball valve, Quarter turn, DN65	Mars Valve Europe	CF8M Series Ball Valve	418S18065
=HE03+DA01-QM27	1		Ball valve, Quarter turn, DN65	Mars Valve Europe	CF8M Series Ball Valve	418S18065
=HE03+DA03-QM01	1		Ball valve, Quarter turn, DN25	Mars Valve Europe	CF8M Series Ball Valve	418S18025
=HE03+DA01-QN01	1		3-way flow control valve, Stainless steel, Internal thread, DN50, PN25	Belimo Holding AG	H3S Series Globe Valve	H350S-P
=HE03+DA01-QN01.MA01	1		Actuator, for globe valves, modulating, 1500N force	Belimo Holding AG	SVC Series Modulaing Actuators	SVC24A-SR-TPC
=HE03+DA04-RM01	1		De-aerator, Stainless, For coolant containing 50% glycol, 3/8"	Brdr AO Johansen	Aeromat Series	
=HE03+DA01-X27	1		Polyamide Flexible Tubing, Ø10x8,0	Parker Hannifin		100P1000
=HE03+DA01-X28	1		Polyamide Flexible Tubing, Ø10x8,0	Parker Hannifin		100P1000

Reference Item Number	Ballard Part # TBD
EPLAN Project Name	6014568 - Shell Baseload Power Hub
EPLAN Revision	03.P18
EPLAN Project Pages	623
=	++ | + | & B02

REVISION INFORMATION	
DESCRIPTION	
DATE	20-Nov-24

THIS DOCUMENT, SUBMITTED IN CONFIDENCE, CONTAINS PROPRIETARY INFORMATION WHICH SHALL NOT BE REPRODUCED OR TRANSFERRED TO OTHER DOCUMENTS OR DISCLOSED TO OTHERS OR USED FOR MANUFACTURING OR ANY OTHER PURPOSE WITHOUT PRIOR WRITTEN PERMISSION OF BALLARD POWER SYSTEMS INC. OR A RELATED WHOLLY-OWNED SUBSIDIARY OR AFFILIATE.

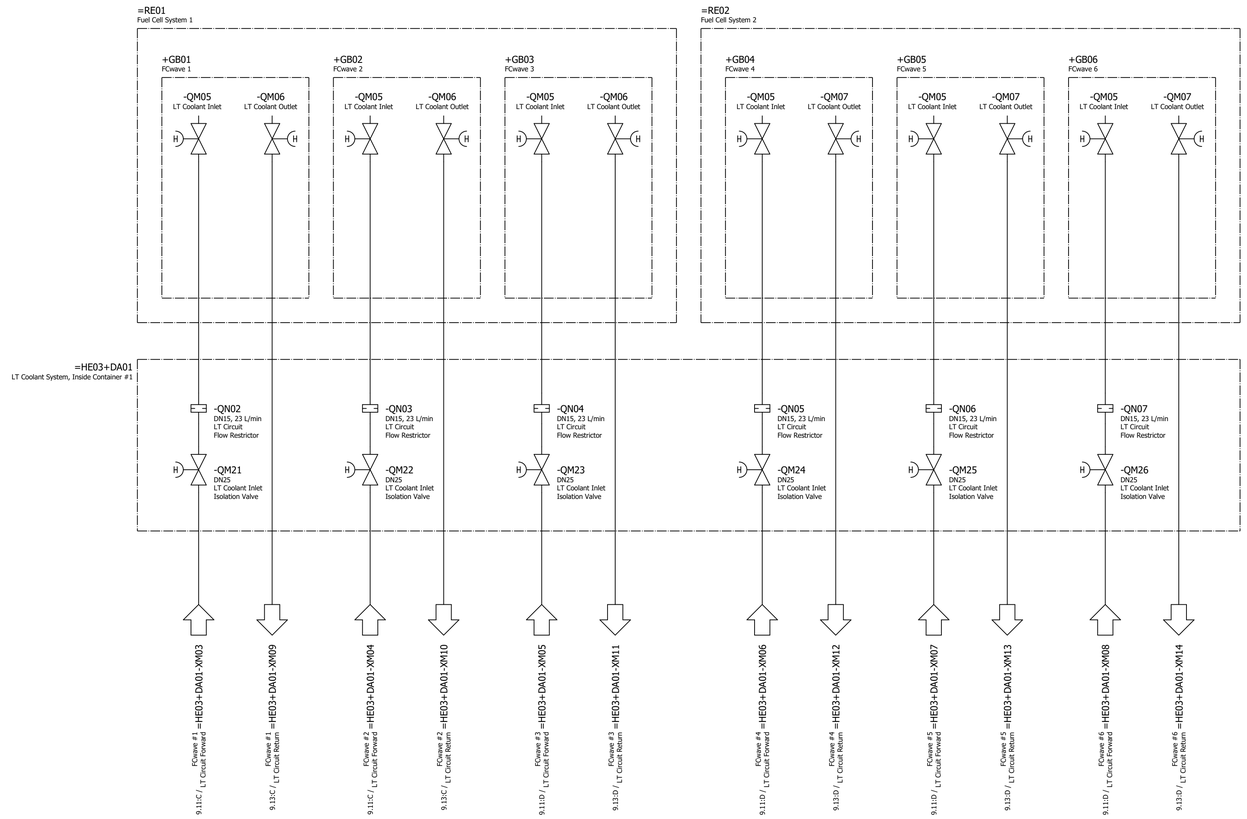
BALLARD CONFIDENTIAL

THIS DOCUMENT'S APPROVAL IS MANAGED BY E-SIGNATURE ON FILE IN BALLARD POWER SYSTEMS' PLM SYSTEM

DRAWING	6014568 C03 Process and Instrumentation Diagram
REVISION	03.P18
DRAWING TITLE	Crosswind/Shell Baseload Power Hub, Fuel Cell Container 1MW, no BESS
SHEET TYPE/DESC	LT Coolant System - Overview
ALL SHEETS ARE THE SAME REVISION STATUS	SIZE A1 | LANGUAGE EN | SHEET/TOTAL 9 / 16

FRMS103653/08

Low Temperature Cooling System - Fuel Cell Connections



Parts List

Device tag	Qty	Unit	Description	Manufacturer		
				Name	Type Number	Order Number
=HE03+DA01-QM21	1		Ball valve, Quarter turn, DN25	Mars Valve Europe	CF8M Series Ball Valve	418S1802S
=HE03+DA01-QM22	1		Ball valve, Quarter turn, DN25	Mars Valve Europe	CF8M Series Ball Valve	418S1802S
=HE03+DA01-QM23	1		Ball valve, Quarter turn, DN25	Mars Valve Europe	CF8M Series Ball Valve	418S1802S
=HE03+DA01-QM24	1		Ball valve, Quarter turn, DN25	Mars Valve Europe	CF8M Series Ball Valve	418S1802S
=HE03+DA01-QM25	1		Ball valve, Quarter turn, DN25	Mars Valve Europe	CF8M Series Ball Valve	418S1802S
=HE03+DA01-QM26	1		Ball valve, Quarter turn, DN25	Mars Valve Europe	CF8M Series Ball Valve	418S1802S
=HE03+DA01-QN02	1		Valve, Constant Flow, DN15, 23 L/min	Bertfeld Teknik AB		117115P230LP
=HE03+DA01-QN03	1		Valve, Constant Flow, DN15, 23 L/min	Bertfeld Teknik AB		117115P230LP
=HE03+DA01-QN04	1		Valve, Constant Flow, DN15, 23 L/min	Bertfeld Teknik AB		117115P230LP
=HE03+DA01-QN05	1		Valve, Constant Flow, DN15, 23 L/min	Bertfeld Teknik AB		117115P230LP
=HE03+DA01-QN06	1		Valve, Constant Flow, DN15, 23 L/min	Bertfeld Teknik AB		117115P230LP
=HE03+DA01-QN07	1		Valve, Constant Flow, DN15, 23 L/min	Bertfeld Teknik AB		117115P230LP

Reference Item Number	Ballard Part # TBD
EPLAN Project Name	601456B - Shell Baseload Power Hub
EPLAN Revision	03.P18
EPLAN Project Pages	623
=	++ + & B02

FRM510365 3/08

REVISION INFORMATION	
DESCRIPTION	
DATE	20-Nov-24

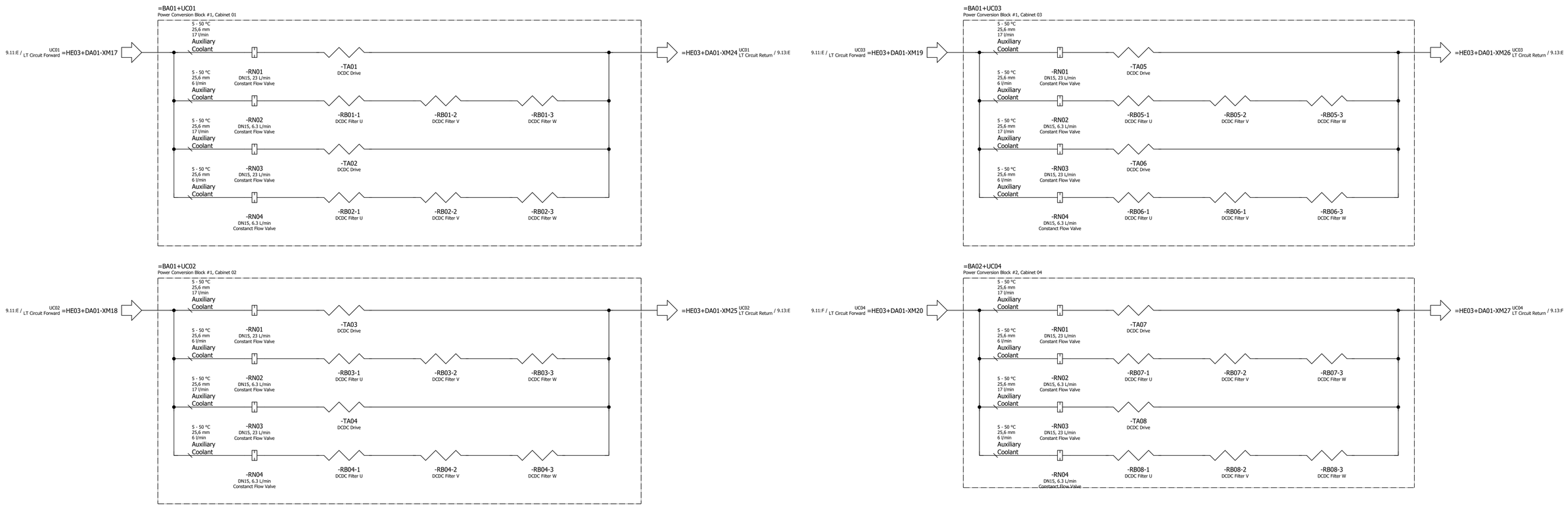
THIS DOCUMENT, SUBMITTED IN CONFIDENCE, CONTAINS PROPRIETARY INFORMATION WHICH SHALL NOT BE REPRODUCED OR TRANSFERRED TO OTHER DOCUMENTS OR DISCLOSED TO OTHERS OR USED FOR MANUFACTURING OR ANY OTHER PURPOSE WITHOUT PRIOR WRITTEN PERMISSION OF BALLARD POWER SYSTEMS INC. OR A RELATED WHOLLY-OWNED SUBSIDIARY OR AFFILIATE.

BALLARD
CONFIDENTIAL

THIS DOCUMENT'S APPROVAL IS MANAGED BY E-SIGNATURE ON FILE IN BALLARD POWER SYSTEMS' PLM SYSTEM

DRAWING	601456B C03 Process and Instrumentation Diagram
REVISION	03.P18
DRAWING TITLE	Crosswind/Shell Baseload Power Hub, Fuel Cell Container 1MW, no BESS
SHEET TYPE/DESC	LT Coolant System - Fuel Cells
ALL SHEETS ARE THE SAME REVISION STATUS	SIZE A1
LANGUAGE	EN
SHEET/TOTAL	10 / 16

Low Temperature Cooling System - Power Converter Connections 1/2



Parts List

Device tag	Qty	Unit	Description	Manufacturer		
				Name	Type Number	Order Number
=BA01+UC01-RB01-1	1		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA01+UC01-RB01-2	1		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA01+UC01-RB01-3	1		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA01+UC01-RB02-1	1		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA01+UC01-RB02-2	1		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA01+UC01-RB02-3	1		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA01+UC02-RB03-1	1		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA01+UC02-RB03-2	1		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA01+UC02-RB03-3	1		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA01+UC02-RB04-1	1		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA01+UC02-RB04-2	1		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA01+UC02-RB04-3	1		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA01+UC03-RB05-1	1		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA01+UC03-RB05-2	1		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA01+UC03-RB05-3	1		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA01+UC03-RB06-1	2		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA01+UC03-RB06-3	1		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA01+UC01-RN01	1		Valve, Constant Flow, DN15, 23 L/min	Bertfeld Teknik AB		117115P230LP
=BA01+UC01-RN02	1		Valve, Constant Flow, DN15, 6.3 L/min	Bertfeld Teknik AB		117115P63LP
=BA01+UC01-RN03	1		Valve, Constant Flow, DN15, 23 L/min	Bertfeld Teknik AB		117115P230LP
=BA01+UC01-RN04	1		Valve, Constant Flow, DN15, 6.3 L/min	Bertfeld Teknik AB		117115P63LP
=BA01+UC02-RN01	1		Valve, Constant Flow, DN15, 23 L/min	Bertfeld Teknik AB		117115P230LP
=BA01+UC02-RN02	1		Valve, Constant Flow, DN15, 6.3 L/min	Bertfeld Teknik AB		117115P63LP
=BA01+UC02-RN03	1		Valve, Constant Flow, DN15, 23 L/min	Bertfeld Teknik AB		117115P230LP
=BA01+UC02-RN04	1		Valve, Constant Flow, DN15, 6.3 L/min	Bertfeld Teknik AB		117115P63LP
=BA01+UC03-RN01	1		Valve, Constant Flow, DN15, 23 L/min	Bertfeld Teknik AB		117115P230LP
=BA01+UC03-RN02	1		Valve, Constant Flow, DN15, 6.3 L/min	Bertfeld Teknik AB		117115P63LP
=BA01+UC03-RN03	1		Valve, Constant Flow, DN15, 23 L/min	Bertfeld Teknik AB		117115P230LP
=BA01+UC03-RN04	1		Valve, Constant Flow, DN15, 6.3 L/min	Bertfeld Teknik AB		117115P63LP
=BA01+UC01-TA01	1		Heat exchanger, Frame FR8 for NXP series	Danfoss	FR8 Chassis Heat Exhanger	FR08901
=BA01+UC01-TA02	1		Heat exchanger, Frame FR8 for NXP series	Danfoss	FR8 Chassis Heat Exhanger	FR08901
=BA01+UC02-TA03	1		Heat exchanger, Frame FR8 for NXP series	Danfoss	FR8 Chassis Heat Exhanger	FR08901
=BA01+UC02-TA04	1		Heat exchanger, Frame FR8 for NXP series	Danfoss	FR8 Chassis Heat Exhanger	FR08901
=BA01+UC03-TA05	1		Heat exchanger, Frame FR8 for NXP series	Danfoss	FR8 Chassis Heat Exhanger	FR08901

Reference Item Number	Ballard Part # TBD
EPLAN Project Name	6014568 - Shell Baseload Power Hub
EPLAN Revision	03.P18
EPLAN Project Pages	623
=	++ | + | & B02

REVISION INFORMATION	
DESCRIPTION	
DATE	
20-Nov-24	

THIS DOCUMENT, SUBMITTED IN CONFIDENCE, CONTAINS PROPRIETARY INFORMATION WHICH SHALL NOT BE REPRODUCED OR TRANSFERRED TO OTHER DOCUMENTS OR DISCLOSED TO OTHERS OR USED FOR MANUFACTURING OR ANY OTHER PURPOSE WITHOUT PRIOR WRITTEN PERMISSION OF BALLARD POWER SYSTEMS INC. OR A RELATED WHOLLY-OWNED SUBSIDIARY OR AFFILIATE.

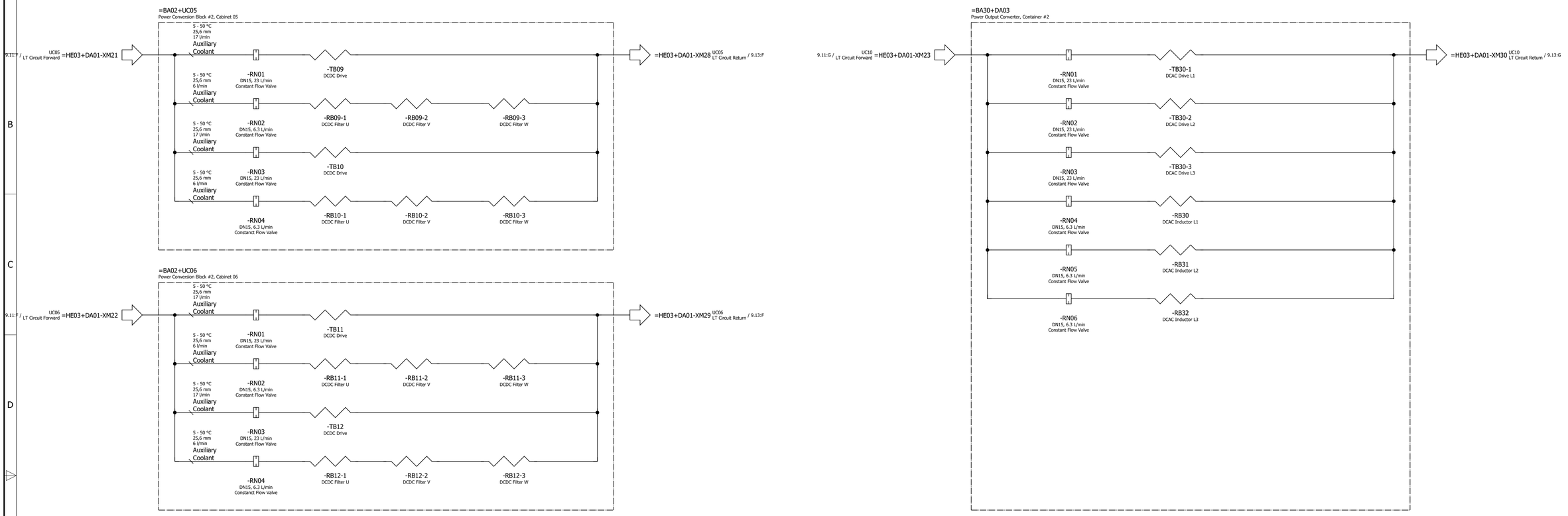
BALLARD
CONFIDENTIAL

THIS DOCUMENT'S APPROVAL IS MANAGED BY E-SIGNATURE ON FILE IN BALLARD POWER SYSTEMS' PLM SYSTEM

DRAWING	6014568 C03 Process and Instrumentation Diagram
REVISION	03.P18
DRAWING TITLE	Crosswind/Shell Baseload Power Hub, Fuel Cell Container 1MW, no BESS
SHEET TYPE/DESC	LT Coolant System - Power Converters 1/2
ALL SHEETS ARE THE SAME REVISION STATUS	SIZE A1 | LANGUAGE EN | SHEET/TOTAL 11 / 16

FRMS103653/08

Low Temperature Cooling System - Power Converter Connections 2/2



Parts List

Device tag	Qty	Unit	Description	Manufacturer		
				Name	Type Number	Order Number
=BA02+UC05-RB09-1	1		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA02+UC05-RB09-2	1		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA02+UC05-RB09-3	1		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA02+UC05-RB10-1	1		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA02+UC05-RB10-2	1		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA02+UC05-RB10-3	1		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA02+UC06-RB11-1	1		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA02+UC06-RB11-2	1		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA02+UC06-RB11-3	1		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA02+UC06-RB12-1	1		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA02+UC06-RB12-2	1		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA02+UC06-RB12-3	1		Heat Exchanger, for liquid cooled DC inductors, 168A, 1050V	QA Trafotek Oy	181B5969	
=BA30+DA03-RB30	1		Heat exchanger, Frame CH64 for NXP series	Danfoss	FR8 Chassis Heat Exhanger	FW64905
=BA30+DA03-RB31	1		Heat exchanger, Frame CH64 for NXP series	Danfoss	FR8 Chassis Heat Exhanger	FW64905
=BA30+DA03-RB32	1		Heat exchanger, Frame CH64 for NXP series	Danfoss	FR8 Chassis Heat Exhanger	FW64905
=BA02+UC05-RN01	1		Valve, Constant Flow, DN15, 23 L/min	Bertfeld Teknik AB		117115P230LP
=BA02+UC05-RN02	1		Valve, Constant Flow, DN15, 6.3 L/min	Bertfeld Teknik AB		117115P63LP
=BA02+UC05-RN03	1		Valve, Constant Flow, DN15, 23 L/min	Bertfeld Teknik AB		117115P230LP
=BA02+UC05-RN04	1		Valve, Constant Flow, DN15, 6.3 L/min	Bertfeld Teknik AB		117115P63LP
=BA02+UC06-RN01	1		Valve, Constant Flow, DN15, 23 L/min	Bertfeld Teknik AB		117115P230LP
=BA02+UC06-RN02	1		Valve, Constant Flow, DN15, 6.3 L/min	Bertfeld Teknik AB		117115P63LP
=BA02+UC06-RN03	1		Valve, Constant Flow, DN15, 23 L/min	Bertfeld Teknik AB		117115P230LP
=BA02+UC06-RN04	1		Valve, Constant Flow, DN15, 6.3 L/min	Bertfeld Teknik AB		117115P63LP
=BA30+DA03-RN01	1		Valve, Constant Flow, DN15, 23 L/min	Bertfeld Teknik AB		117115P230LP
=BA30+DA03-RN02	1		Valve, Constant Flow, DN15, 6.3 L/min	Bertfeld Teknik AB		117115P63LP
=BA30+DA03-RN03	1		Valve, Constant Flow, DN15, 6.3 L/min	Bertfeld Teknik AB		117115P63LP
=BA30+DA03-RN04	1		Valve, Constant Flow, DN15, 6.3 L/min	Bertfeld Teknik AB		117115P63LP
=BA30+DA03-RN05	1		Valve, Constant Flow, DN15, 6.3 L/min	Bertfeld Teknik AB		117115P63LP
=BA30+DA03-RN06	1		Valve, Constant Flow, DN15, 6.3 L/min	Bertfeld Teknik AB		117115P63LP
=BA02+UC05-TB09	1		Heat exchanger, Frame FR8 for NXP series	Danfoss	FR8 Chassis Heat Exhanger	FR08901
=BA02+UC05-TB10	1		Heat exchanger, Frame FR8 for NXP series	Danfoss	FR8 Chassis Heat Exhanger	FR08901
=BA02+UC06-TB11	1		Heat exchanger, Frame FR8 for NXP series	Danfoss	FR8 Chassis Heat Exhanger	FR08901
=BA02+UC06-TB12	1		Heat exchanger, Frame FR8 for NXP series	Danfoss	FR8 Chassis Heat Exhanger	FR08901
=BA30+DA03-TB30-1	1		Heat exchanger, Frame CH64 for NXP series	Danfoss	FR8 Chassis Heat Exhanger	FW64905
=BA30+DA03-TB30-2	1		Heat exchanger, Frame CH64 for NXP series	Danfoss	FR8 Chassis Heat Exhanger	FW64905
=BA30+DA03-TB30-3	1		Heat exchanger, Frame CH64 for NXP series	Danfoss	FR8 Chassis Heat Exhanger	FW64905

Reference Item Number	Ballard Part # TBD
EPLAN Project Name	6014568 - Shell Baseload Power Hub
EPLAN Revision	03.P18
EPLAN Project Pages	623
=	++ | + | & B02

FRM5103653/0B

REVISION INFORMATION	
DESCRIPTION	
DATE	
20-Nov-24	

THIS DOCUMENT, SUBMITTED IN CONFIDENCE, CONTAINS PROPRIETARY INFORMATION WHICH SHALL NOT BE REPRODUCED OR TRANSFERRED TO OTHER DOCUMENTS OR DISCLOSED TO OTHERS OR USED FOR MANUFACTURING OR ANY OTHER PURPOSE WITHOUT PRIOR WRITTEN PERMISSION OF BALLARD POWER SYSTEMS INC. OR A RELATED WHOLLY-OWNED SUBSIDIARY OR AFFILIATE.

BALLARD CONFIDENTIAL

THIS DOCUMENT'S APPROVAL IS MANAGED BY E-SIGNATURE ON FILE IN BALLARD POWER SYSTEMS' PLM SYSTEM

DRAWING	6014568 C03 Process and Instrumentation Diagram
REVISION	03.P18
DRAWING TITLE	Crosswind/Shell Baseload Power Hub, Fuel Cell Container 1MW, no BESS
SHEET TYPE/DESC	LT Coolant System - Power Converters 2/2
ALL SHEETS ARE THE SAME REVISION STATUS	SIZE A1 | LANGUAGE EN | SHEET/TOTAL 12 / 16

0	1	2	3	4	5	6	7	8

Bill of Materials / Parts List

Device tag	Qty	Unit	Description	Manufacturer			
				Name	Type Number	Order Number	
-BF01	1	Piece	Flow sensor, Connector: 1 x M12; coding: A; Contacts: gold-plated	IFM Electronic AS	SAEXXXXB50KG/US-100	SA4104	
-BF01-WG01	1	Piece	Connecting cable with socket; 4x0.34mm2, AC/DC < 50 V; 10 m M12 to open end; LSZH	IFM Electronic AS	ADOGH040VAT0025H04/3G/2D	EVC540	
-BF01-XD01	0						
-BF01-WG01	1	Piece	Connecting cable with socket; 4x0.34mm2, AC/DC < 50 V; 10 m M12 to open end; LSZH	IFM Electronic AS	ADOGH040VAT0025H04/3G/2D	EVC540	
-BF01-XG01	0						
-BL01-WG01	1	Piece	Connecting cable with socket; 4x0.34mm2, AC/DC < 50 V; 10 m M12 to open end; LSZH	IFM Electronic AS	ADOGH040VAT0025H04/3G/2D	EVC540	
-BL01-XG01	0						
-BL01	1	Piece	Pressure transmitter with ceramic measuring cell, DC, analogue signal	IFM Electronic AS	PA-,10BRBG14-A-ZVG/US/ /V	PA3589	
-BP01	1	piece	Differential Pressure Sensor Water 0...4 bar AC/DC 24 V, Output signal 0...10 V	Belimo Holding AG	22WDP-134	22WDP-134	
-BP01-WG01	1	meter	ÖLFLEX CLASSIC 110 CH 3G1	Lapp Group	ÖLFLEX® CLASSIC 110 CH	10035056	
-BP01-XD01	0						
-BP02	0						
-BP02-WG01	1	Piece	Connecting cable with socket; 4x0.34mm2, AC/DC < 50 V; 10 m M12 to open end; LSZH	IFM Electronic AS	ADOGH040VAT0025H04/3G/2D	EVC540	
-BP02-XG01	0						
-BP03-WG01	1	Piece	Connecting cable with socket; 4x0.34mm2, AC/DC < 50 V; 10 m M12 to open end; LSZH	IFM Electronic AS	ADOGH040VAT0025H04/3G/2D	EVC540	
-BP03-XG01	0						
-BP04	0						
-BP04-WG01	1	Piece	Connecting cable with socket; 4x0.34mm2, AC/DC < 50 V; 10 m M12 to open end; LSZH	IFM Electronic AS	ADOGH040VAT0025H04/3G/2D	EVC540	
-BP04-XG01	0						
-BP05	0						
-BP05-WG01	1	Piece	Connecting cable with socket; 4x0.34mm2, AC/DC < 50 V; 10 m M12 to open end; LSZH	IFM Electronic AS	ADOGH040VAT0025H04/3G/2D	EVC540	
-BP05-XG01	0						
-BP06	0						
-BP06-WG01	1	Piece	Connecting cable with socket; 4x0.34mm2, AC/DC < 50 V; 10 m M12 to open end; LSZH	IFM Electronic AS	ADOGH040VAT0025H04/3G/2D	EVC540	
-BP06-XG01	0						
-BP07	0						
-BP07-WG01	1	Piece	Connecting cable with socket; 4x0.34mm2, AC/DC < 50 V; 10 m M12 to open end; LSZH	IFM Electronic AS	ADOGH040VAT0025H04/3G/2D	EVC540	
-BP07-XG01	0						
-BT01	1		PT1000 Sensor Element, Length 160mm to M12, A code connector. 3/4 wire measurement	IFM Electronic AS	TT-100KBBD06- /US/ /V	TT1250	
-BT02	1		PT1000 Sensor Element, Length 160mm to M12, A code connector. 3/4 wire measurement	IFM Electronic AS	TT-100KBBD06- /US/ /V	TT1250	
-BT03	1		PT1000 Sensor Element, Length 160mm to M12, A code connector. 3/4 wire measurement	IFM Electronic AS	TT-100KBBD06- /US/ /V	TT1250	
-BT04-XG01	0						
-BT05-XG01	0						
-BT05-WG01	1	Piece	Connecting cable with socket; 4x0.34mm2, AC/DC < 50 V; 10 m M12 to open end; LSZH	IFM Electronic AS	ADOGH040VAT0025H04/3G/2D	EVC540	
-BT05-XG01	0						
-CL01	1		Header Tank, Volume 100L, AISI 304	Ballard Power Systems Europe	5500231B-3002	5500231B-3002	
-EG01	1		Dry Cooler, 100kW, With Ventilatiors (Offshore), Tube 316, Fins AlMg/316, Frame 316	EVAPCO Europe A/S	FA091 Series Dry Cooler	FA091ELNHD-151-IHD-30-3,1-Sp	
-GP11	1		Centrifugal pump, with electric motor, end suction, EN 733, Motor: 4kW, 3x380-415D, 50Hz, 7.9A	Grundfos AS	NB 40-125/139	98309267	
-GP11-WG01	1	m	ÖLFLEX CLASSIC 110 Control Line, 3G1.0 Min Bending Radius 90mm, Numbered Conductors	Lapp Group	ÖLFLEX CLASSIC 110	1119 203	
-GP11-WG01	0						
-GP11.WD01	1	meter	Screened control cable, 4G2.5mm2, LSZH	Lapp Group	ÖLFLEX® CLASSIC 135 CH	1123342	
-GP11.WD02	1	meter	Screened control cable, 4G2.5mm2, LSZH	Lapp Group	ÖLFLEX® CLASSIC 135 CH	1123342	
-GP11.WG02	1	meter		Lapp Group	ÖLFLEX® CLASSIC 110 CH	10035059	
-GQ31	1		Three-phase asynchronous motor, 4 pole pairs, 4,0kW	Fabrika A/S	Fabrika CX B14 TEAO	CXB14-4	
-GQ31-WD01	1	meter	ÖLFLEX CLASSIC 135 CH BK 0,6/1 kV 4G2,5	Lapp Group	ÖLFLEX® CLASSIC 135 CH BK 0,6/1 kV	1123478	
-QM01	1		Ball valve, Quarter turn, DN25, Material body, valve AISI304, gasket and sealing ring PTFE	Mars Valve Europe	CF8M Series Ball Valve	418518025	
-QM02	1		Ball valve, Quarter turn, DN25, Material body, valve AISI304, gasket and sealing ring PTFE	Mars Valve Europe	CF8M Series Ball Valve	418518025	
-QM03	1		Ball valve, Quarter turn, DN25, Material body, valve AISI304, gasket and sealing ring PTFE	Mars Valve Europe	CF8M Series Ball Valve	418518025	
-QM04	1		Ball valve, Quarter turn, DN25, Material body, valve AISI304, gasket and sealing ring PTFE	Mars Valve Europe	CF8M Series Ball Valve	418518025	
-QM05	1		Ball valve, Quarter turn, DN25, Material body, valve AISI304, gasket and sealing ring PTFE	Mars Valve Europe	CF8M Series Ball Valve	418518025	
-QM06	1		Ball valve, Quarter turn, DN25, Material body, valve AISI304, gasket and sealing ring PTFE	Mars Valve Europe	CF8M Series Ball Valve	418518025	
-QM07	1		Ball valve, Quarter turn, DN25, Material body, valve AISI304, gasket and sealing ring PTFE	Mars Valve Europe	CF8M Series Ball Valve	418518025	
-QM08	1		Ball valve, Quarter turn, DN25, Material body, valve AISI304, gasket and sealing ring PTFE	Mars Valve Europe	CF8M Series Ball Valve	418518025	
-QM09	1		Ball valve, Quarter turn, DN25, Material body, valve AISI304, gasket and sealing ring PTFE	Mars Valve Europe	CF8M Series Ball Valve	418518025	
-QM10	1		Ball valve, Quarter turn, DN25, Material body, valve AISI304, gasket and sealing ring PTFE	Mars Valve Europe	CF8M Series Ball Valve	418518025	
-QM11	1		Ball valve, Quarter turn, DN25, Material body, valve AISI304, gasket and sealing ring PTFE	Mars Valve Europe	CF8M Series Ball Valve	418518025	

Reference Item Number	Ballard Part # TBD
EPLAN Project Name	601456B - Shell Baseload Power Hub
EPLAN Revision	03.P18
EPLAN Project Pages	623
=	++ | + | & B02

REVISION INFORMATION
DESCRIPTION
DATE
20-Nov-24

THIS DOCUMENT, SUBMITTED IN CONFIDENCE, CONTAINS PROPRIETARY INFORMATION WHICH SHALL NOT BE REPRODUCED OR TRANSFERRED TO OTHER DOCUMENTS OR DISCLOSED TO OTHERS OR USED FOR MANUFACTURING OR ANY OTHER PURPOSE WITHOUT PRIOR WRITTEN PERMISSION OF BALLARD POWER SYSTEMS INC. OR A RELATED WHOLLY-OWNED SUBSIDIARY OR AFFILIATE.

BALLARD™
CONFIDENTIAL

THIS DOCUMENT'S APPROVAL IS MANAGED BY E-SIGNATURE ON FILE IN BALLARD POWER SYSTEMS' PLM SYSTEM

DRAWING		REVISION	03.P18
DRAWING TITLE			
SHEET TYPE/DESC	LT Coolant System - BOM		
ALL SHEETS ARE THE SAME REVISION STATUS	SIZE A3	LANGUAGE EN	SHEET/TOTAL 13 /

0	1	2	3	4	5	6	7	8

Bill of Materials / Parts List

Device tag	Qty	Unit	Description	Manufacturer			
				Name	Type Number	Order Number	
-QM12	1		Ball valve, Quarter turn, DN25, Material body, valve AISI304, gasket and sealing ring PTFE	Mars Valve Europe	CF8M Series Ball Valve	418518025	
-QM13	1		Ball valve, Quarter turn, DN25, Material body, valve AISI304, gasket and sealing ring PTFE	Mars Valve Europe	CF8M Series Ball Valve	418518025	
-QM14	1		Ball valve, Quarter turn, DN25, Material body, valve AISI304, gasket and sealing ring PTFE	Mars Valve Europe	CF8M Series Ball Valve	418518025	
-QM15	1		Ball valve, Quarter turn, DN25, Material body, valve AISI304, gasket and sealing ring PTFE	Mars Valve Europe	CF8M Series Ball Valve	418518025	
-QM16	1		Ball valve, Quarter turn, DN25, Material body, valve AISI304, gasket and sealing ring PTFE	Mars Valve Europe	CF8M Series Ball Valve	418518025	
-QM17	1		Ball valve, Quarter turn, DN65, Material body, valve AISI304, gasket and sealing ring PTFE	Mars Valve Europe	CF8M Series Ball Valve	418518065	
-QM18	1		Ball valve, Quarter turn, DN65, Material body, valve AISI304, gasket and sealing ring PTFE	Mars Valve Europe	CF8M Series Ball Valve	418518065	
-QM19	1		Ball valve, Quarter turn, DN65, Material body, valve AISI304, gasket and sealing ring PTFE	Mars Valve Europe	CF8M Series Ball Valve	418518065	
-QM20	1		Ball valve, Quarter turn, DN65, Material body, valve AISI304, gasket and sealing ring PTFE	Mars Valve Europe	CF8M Series Ball Valve	418518065	
-QM21	1		Ball valve, Quarter turn, DN25, Material body, valve AISI304, gasket and sealing ring PTFE	Mars Valve Europe	CF8M Series Ball Valve	418518025	
-QM22	1		Ball valve, Quarter turn, DN25, Material body, valve AISI304, gasket and sealing ring PTFE	Mars Valve Europe	CF8M Series Ball Valve	418518025	
-QM23	1		Ball valve, Quarter turn, DN25, Material body, valve AISI304, gasket and sealing ring PTFE	Mars Valve Europe	CF8M Series Ball Valve	418518025	
-QM24	1		Ball valve, Quarter turn, DN25, Material body, valve AISI304, gasket and sealing ring PTFE	Mars Valve Europe	CF8M Series Ball Valve	418518025	
-QM25	1		Ball valve, Quarter turn, DN25, Material body, valve AISI304, gasket and sealing ring PTFE	Mars Valve Europe	CF8M Series Ball Valve	418518025	
-QM26	1		Ball valve, Quarter turn, DN25, Material body, valve AISI304, gasket and sealing ring PTFE	Mars Valve Europe	CF8M Series Ball Valve	418518025	
-QM27	1		Ball valve, Quarter turn, DN65, Material body, valve AISI304, gasket and sealing ring PTFE	Mars Valve Europe	CF8M Series Ball Valve	418518065	
-QM01	1		Ball valve, Quarter turn, DN25, Material body, valve AISI304, gasket and sealing ring PTFE	Mars Valve Europe	CF8M Series Ball Valve	418518025	
-QN01	1		3-way flow control valve, Stainless steel, Internal thread, DN50, PN25	Belimo Holding AG	H3S Series Globe Valve	H350S-P	
-QN01.MA01	1		Actuator, for globe valves, modulating, 1500N force	Belimo Holding AG	SVC Series Modulaing Actuators	SVC24A-SR-TPC	
-QN01.WG01	1	meter		Lapp Group	ÖLFLEX® CLASSIC 110 CH	10035059	
-QN01.WG02	1	meter		Lapp Group	ÖLFLEX® CLASSIC 110 CH	10035059	
-QN02	1		Valve, Constant Flow, DN15, 23 L/min	Bertfeld Teknik AB		117115P230LP	
-QN03	1		Valve, Constant Flow, DN15, 23 L/min	Bertfeld Teknik AB		117115P230LP	
-QN04	1		Valve, Constant Flow, DN15, 23 L/min	Bertfeld Teknik AB		117115P230LP	
-QN05	1		Valve, Constant Flow, DN15, 23 L/min	Bertfeld Teknik AB		117115P230LP	
-QN06	1		Valve, Constant Flow, DN15, 23 L/min	Bertfeld Teknik AB		117115P230LP	
-QN07	1		Valve, Constant Flow, DN15, 23 L/min	Bertfeld Teknik AB		117115P230LP	
-RM01	1		De-aerator, Stainless, For coolant containing 50% glycol, 3/8"	Brdr AO Johansen	Aeromat Series		
-TA11	2	PIECES	Safe Torque off & ATEX board for VACON® NXP 2DI,1RO(NO/NC), 1RO(NO), 1TI Slot B	Danfoss	OPT-AF	OPT-AF-V	
-TA11	2	pieces	VFD , Input voltage: 3x 380-500 VAC, Output Power: 4 kW	Danfoss	NXP00095-A5H1SSV	NXP00095-A5H1SSV	
-TA11	0						
-TA11	2	pieces	Vacon NX, Ethernet option board with two RJ-45 connectors SLOT: D, E	Danfoss	OPT-E9	OPT-E9-V	
-TF01	1		Signal Converter Voltage/Current, Input 0-10V or (0)4-20mA, Output (0)4-20mA	Belimo Holding AG	Z-UIC	Z-UIC	
-X27	1		Polyamide Flexible Tubing, Ø10x8,0 - OD 10mm, ID 8mm, 50bar, -40 to 100°C	Parker Hannifin		100P1000	
-X28	1		Polyamide Flexible Tubing, Ø10x8,0 - OD 10mm, ID 8mm, 50bar, -40 to 100°C	Parker Hannifin		100P1000	

Reference Item Number	Ballard Part # TBD		
EPLAN Project Name	601456B - Shell Baseload Power Hub		
EPLAN Revision	03.P18		
EPLAN Project Pages	623		
=	++	+	& B02

REVISION INFORMATION
DESCRIPTION
DATE
16-Oct-24

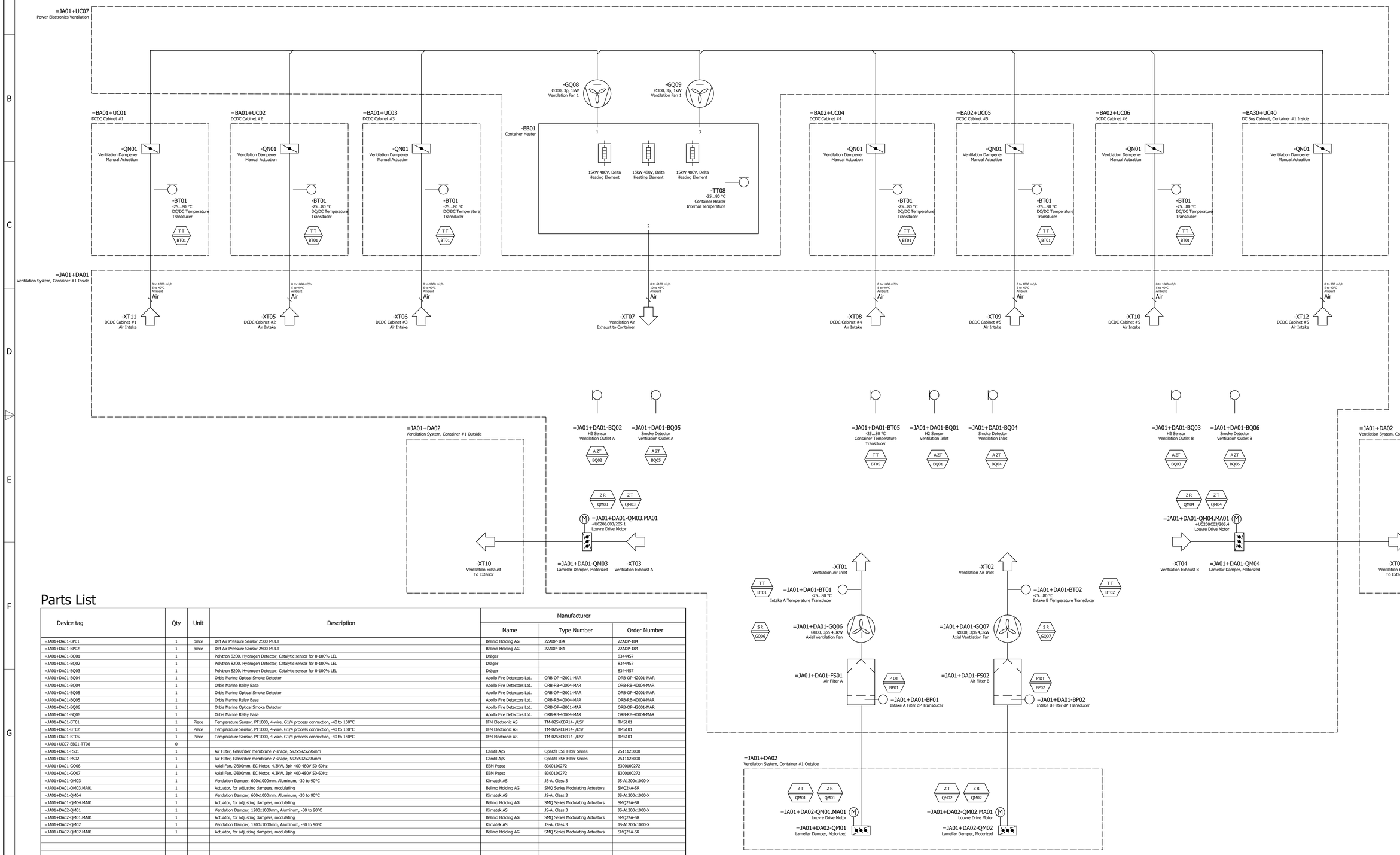
THIS DOCUMENT, SUBMITTED IN CONFIDENCE, CONTAINS PROPRIETARY INFORMATION WHICH SHALL NOT BE REPRODUCED OR TRANSFERRED TO OTHER DOCUMENTS OR DISCLOSED TO OTHERS OR USED FOR MANUFACTURING OR ANY OTHER PURPOSE WITHOUT PRIOR WRITTEN PERMISSION OF BALLARD POWER SYSTEMS INC. OR A RELATED WHOLLY-OWNED SUBSIDIARY OR AFFILIATE.

BALLARD™
CONFIDENTIAL

THIS DOCUMENT'S APPROVAL IS MANAGED BY E-SIGNATURE ON FILE IN BALLARD POWER SYSTEMS' PLM SYSTEM

DRAWING		REVISION	03.P18
DRAWING TITLE			
SHEET TYPE/DESC	LT Coolant System - BOM		
ALL SHEETS ARE THE SAME REVISION STATUS	SIZE A3	LANGUAGE EN	SHEET/TOTAL 13.a /

Ventilation Air System - 40ft Container



Parts List

Device tag	Qty	Unit	Description	Manufacturer		
				Name	Type Number	Order Number
=JA01+DA01-BP01	1	piece	Diff Air Pressure Sensor 2500 MULT	Belimo Holding AG	22ADP-184	22ADP-184
=JA01+DA01-BP02	1	piece	Diff Air Pressure Sensor 2500 MULT	Belimo Holding AG	22ADP-184	22ADP-184
=JA01+DA01-BQ01	1		Polytron 8200, Hydrogen Detector, Catalytic sensor for 0-100% LEL	Dräger		8344457
=JA01+DA01-BQ02	1		Polytron 8200, Hydrogen Detector, Catalytic sensor for 0-100% LEL	Dräger		8344457
=JA01+DA01-BQ03	1		Polytron 8200, Hydrogen Detector, Catalytic sensor for 0-100% LEL	Dräger		8344457
=JA01+DA01-BQ04	1		Orbis Marine Optical Smoke Detector	Apollo Fire Detectors Ltd.	ORB-OP-42001-MAR	ORB-OP-42001-MAR
=JA01+DA01-BQ04	1		Orbis Marine Relay Base	Apollo Fire Detectors Ltd.	ORB-RB-40004-MAR	ORB-RB-40004-MAR
=JA01+DA01-BQ05	1		Orbis Marine Optical Smoke Detector	Apollo Fire Detectors Ltd.	ORB-OP-42001-MAR	ORB-OP-42001-MAR
=JA01+DA01-BQ05	1		Orbis Marine Relay Base	Apollo Fire Detectors Ltd.	ORB-RB-40004-MAR	ORB-RB-40004-MAR
=JA01+DA01-BQ06	1		Orbis Marine Optical Smoke Detector	Apollo Fire Detectors Ltd.	ORB-OP-42001-MAR	ORB-OP-42001-MAR
=JA01+DA01-BQ06	1		Orbis Marine Relay Base	Apollo Fire Detectors Ltd.	ORB-RB-40004-MAR	ORB-RB-40004-MAR
=JA01+DA01-BT01	1	Piece	Temperature Sensor, PT1000, 4-wire, G1/4 process connection, -40 to 150°C	IFM Electronic AS	TM-025KCBR14- /US/	TM5101
=JA01+DA01-BT02	1	Piece	Temperature Sensor, PT1000, 4-wire, G1/4 process connection, -40 to 150°C	IFM Electronic AS	TM-025KCBR14- /US/	TM5101
=JA01+DA01-BT05	1	Piece	Temperature Sensor, PT1000, 4-wire, G1/4 process connection, -40 to 150°C	IFM Electronic AS	TM-025KCBR14- /US/	TM5101
=JA01+UC07-EB01-TT08	0					
=JA01+DA01-FS01	1		Air Filter, Glassfiber membrane V-shape, 592x592x296mm	Camfil A/S	Opakfil ES8 Filter Series	2511125000
=JA01+DA01-FS02	1		Air Filter, Glassfiber membrane V-shape, 592x592x296mm	Camfil A/S	Opakfil ES8 Filter Series	2511125000
=JA01+DA01-GQ06	1		Axial Fan, Ø800mm, EC Motor, 4.3kW, 3ph 400-480V 50-60Hz	EBM Papst	8300100272	8300100272
=JA01+DA01-GQ07	1		Axial Fan, Ø800mm, EC Motor, 4.3kW, 3ph 400-480V 50-60Hz	EBM Papst	8300100272	8300100272
=JA01+DA01-QM03	1		Ventilation Damper, 600x1000mm, Aluminum, -30 to 90°C	Klimatek AS	JS-A, Class 3	JS-A1200x1000-X
=JA01+DA01-QM03.MA01	1		Actuator, for adjusting dampers, modulating	Belimo Holding AG	SMQ Series Modulating Actuators	SMQ24A-SR
=JA01+DA01-QM04	1		Ventilation Damper, 600x1000mm, Aluminum, -30 to 90°C	Klimatek AS	JS-A, Class 3	JS-A1200x1000-X
=JA01+DA01-QM04.MA01	1		Actuator, for adjusting dampers, modulating	Belimo Holding AG	SMQ Series Modulating Actuators	SMQ24A-SR
=JA01+DA02-QM01	1		Ventilation Damper, 1200x1000mm, Aluminum, -30 to 90°C	Klimatek AS	JS-A, Class 3	JS-A1200x1000-X
=JA01+DA02-QM01.MA01	1		Actuator, for adjusting dampers, modulating	Belimo Holding AG	SMQ Series Modulating Actuators	SMQ24A-SR
=JA01+DA02-QM02	1		Ventilation Damper, 1200x1000mm, Aluminum, -30 to 90°C	Klimatek AS	JS-A, Class 3	JS-A1200x1000-X
=JA01+DA02-QM02.MA01	1		Actuator, for adjusting dampers, modulating	Belimo Holding AG	SMQ Series Modulating Actuators	SMQ24A-SR

Reference Item Number	Ballard Part # TBD
EPLAN Project Name	6014568 - Shell Baseload Power Hub
EPLAN Revision	03.P18
EPLAN Project Pages	623
=	++ + & B02

REVISION INFORMATION	
DESCRIPTION	
DATE	20-Nov-24

THIS DOCUMENT, SUBMITTED IN CONFIDENCE, CONTAINS PROPRIETARY INFORMATION WHICH SHALL NOT BE REPRODUCED OR TRANSFERRED TO OTHER DOCUMENTS OR DISCLOSED TO OTHERS OR USED FOR MANUFACTURING OR ANY OTHER PURPOSE WITHOUT PRIOR WRITTEN PERMISSION OF BALLARD POWER SYSTEMS INC. OR A RELATED WHOLLY-OWNED SUBSIDIARY OR AFFILIATE.

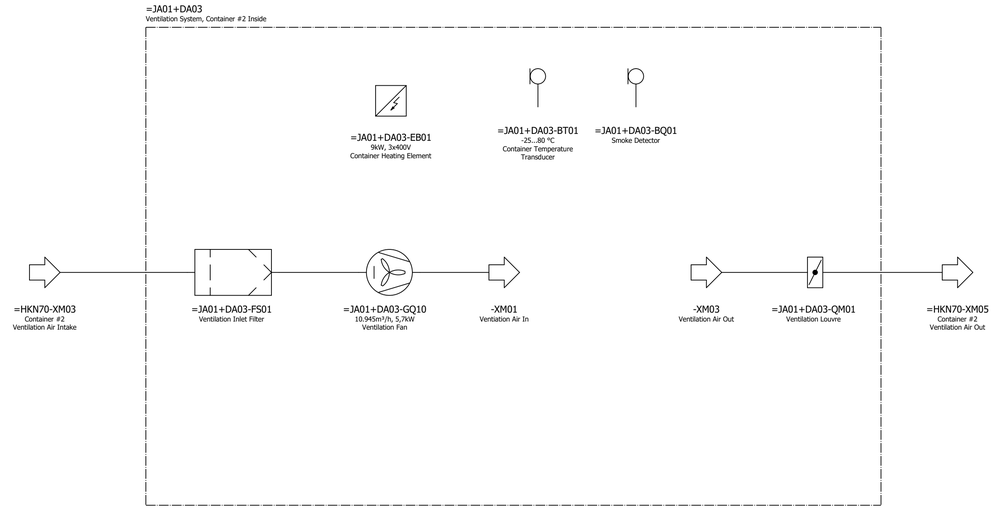
BALLARD™
CONFIDENTIAL

THIS DOCUMENT'S APPROVAL IS MANAGED BY E-SIGNATURE ON FILE IN BALLARD POWER SYSTEMS PLM SYSTEM

DRAWING	6014568 C03 Process and Instrumentation Diagram	REVISION	03.P18
DRAWING TITLE	Crosswind/Shell Baseload Power Hub, Fuel Cell Container 1MW, no BESS		
SHEET TYPE/DESC	Ventilation Air System - 40ft Container		
ALL SHEETS ARE THE SAME REVISION STATUS	SIZE A1	LANGUAGE EN	SHEET/TOTAL 14 / 16

FRMS103653/08

Ventilation Air System - 10ft Container



Parts List

Device tag	Qty	Unit	Description	Manufacturer		
				Name	Type Number	Order Number
=JA01+DA03-BQ01	1		Orbis Marine Optical Smoke Detector	Apollo Fire Detectors Ltd.	ORB-OP-42001-MAR	ORB-OP-42001-MAR
=JA01+DA03-BQ01	1		Orbis Marine Relay Base	Apollo Fire Detectors Ltd.	ORB-RB-40004-MAR	ORB-RB-40004-MAR
=JA01+DA03-BT01	1	Piece	Temperature Sensor, PT1000, 4-wire, G1/4 process connection, -40 to 150°C	IFM Electronic AS	TM-025KCBR14- /US/	TM5101
=JA01+DA03-EB01	1		Placeholder			
=JA01+DA03-FS01	0					
=JA01+DA03-GQ10	1		Ventilation Fan, Radial, EC Motor, 3ph, 400-480V, 5.7kW			
=JA01+DA03-QM01	0					

Reference Item Number	Ballard Part # TBD
EPLAN Project Name	601456B - Shell Baseload Power Hub
EPLAN Revision	03.P18
EPLAN Project Pages	623
= | ++ | + | & B02	

REVISION INFORMATION	
DESCRIPTION	
DATE	
20-Nov-24	

THIS DOCUMENT, SUBMITTED IN CONFIDENCE, CONTAINS PROPRIETARY INFORMATION WHICH SHALL NOT BE REPRODUCED OR TRANSFERRED TO OTHER DOCUMENTS OR DISCLOSED TO OTHERS OR USED FOR MANUFACTURING OR ANY OTHER PURPOSE WITHOUT PRIOR WRITTEN PERMISSION OF BALLARD POWER SYSTEMS INC. OR A RELATED WHOLLY-OWNED SUBSIDIARY OR AFFILIATE.

BALLARD™
CONFIDENTIAL

THIS DOCUMENT'S APPROVAL IS MANAGED BY E-SIGNATURE ON FILE IN BALLARD POWER SYSTEMS PLM SYSTEM

DRAWING	601456B C03 Process and Instrumentation Diagram
REVISION	03.P18
DRAWING TITLE	Crosswind/Shell Baseload Power Hub, Fuel Cell Container 1MW, no BESS
SHEET TYPE/DESC	Ventilation Air System - 10ft Container
ALL SHEETS ARE THE SAME REVISION STATUS	SIZE A1 | LANGUAGE EN | SHEET/TOTAL 15 / 16

FRMS103653/08