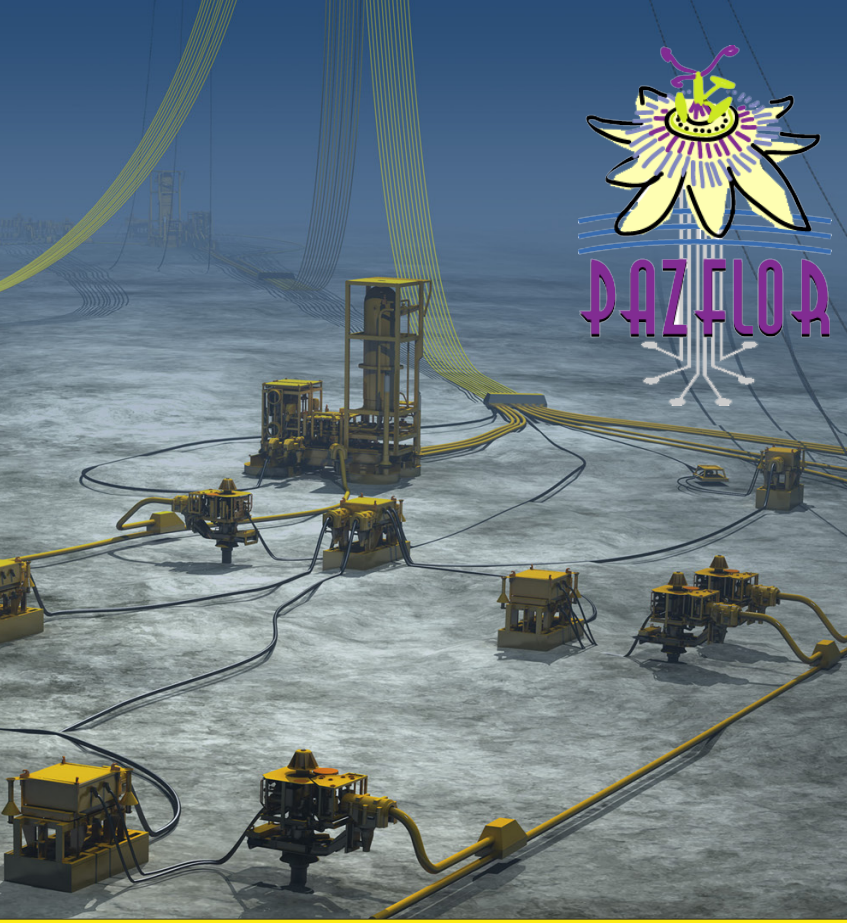


PAZFLOR

PERSONAL HANDBOOK SUBSEA SEPARATION SYSTEM EQUIPMENT

TOTAL

SONANGOL

FMC Technologies

This edition of Personal Handbook Subsea Separation System Equipment for Pazflor was completed from the publisher May 2011.

A publication from Industriell Dokumentasjon as, Kongsberg, Norway.

Table of Contents page

The purpose of this book is to provide general information on the subsea separation system equipment for the Pazflor project.

Any information may be changed/updated without further notice. Reference is made to the project Final Documentation File.

1.1 Introduction

List of Abbreviations:

ACC	Accumulator
ALVD	Subsea Acoustic Leakage and Vibration Detector
BSR	Bend Stiffener Restrictor
BV	Ball Valve
CAT	Connector Actuation Tool
CCW	Counter Clockwise
CIDV	Chemical Injection Dosing Valve
CIV	Chemical Injection Valve
CST	Choke Seal Test
CUL	Connector Unlock
CW	Clockwise
DUS	Dynamic Umbilical System
EHC	Electrical Hydraulic Chemical
EHU	Electric Hydraulic Umbilical
ESD	Emergency Shut Down
ETU	Electronic Test Unit
FAI	Fail As Is
FBS	Foundation Bottom Structure
FLOT	Flying Lead Orientation Tool
FLV	SCSSV Flush Valve
FSC	Fail Safe Close
FSO	Fail Safe Open
GA	General Arrangement
GSF	Global Santa Fe
GP	Guide Post
GV	Gate Valve
HP	High Pressure
HPU	Hydraulic Power Unit
HV	High Voltage
ICM	Insert Choke Module
ICV	Injection Choke Valve
IM	Inlet Module
IMF	Intermediate Frame
LB	Large Bore
LP	Low Pressure
MCP	Motor Control Panel
MM	Manifold Module
MIV	Methanol Injection Valve
MPFM	Multi Phase Flow Meter
MPV	Manifold Production Valve
MRT	Module Running Tool
MQC	Multi Quick Connector
PCM	Power and Control Module
P&ID	Piping & Instrumentation Diagram
PLC	Programmable Logic Controller
PM	Pump Module
PT	Pressure Transmitter
RHS	Rectangular Hollow Section
ROV	Remote Operated Vehicle
ROT	Rotation and Orientation Tool
RT	Running Tool
SCM	Subsea Control Module (Control Pod)
SCMTS	Subsea Control Module Test Stand
SM	Separator Module
SNDP	Subsea Nuclear Density Profiler
SPCU	Subsea Power and Communication Unit
SPCTU	Subsea Power and Communication Test Unit
SPS	Subsea Production System / Surface Pumping Systems
SSS	Subsea Separation System
SSU	Subsea Seperation Unit
SUS	Separator Umbilical System
SVN	Safety Valve Needle Valve
SWL	Safe Weight Load
TFHPU	Test & Flushing Hydraulic Power Unit
TT	Temperature Transmitter
UDM	Umbilical Distribution Module
UPV	Upper Production Valve
UTH	Umbilical Termination Head
UTI	Umbilical Termination Injection
UTP	Umbilical Termination Production
VBR	Vertebra Bend Restrictor
WJ	Well Jumper

1.2 Abbreviations

Field Key Parameters Miocene	
Water Depth	600-900 meter
Production Fluid Types	Heavy, acid and viscous Oil
Tie back to	FPSO via subsea separation system
Sand	Yes
Max Shut in pressure at WH	200 bar
Max Temperature at WH	69.7C

Field Key Parameters Oligocene	
Water Depth	1000-1200 meter
Production Fluid Types	Light and Paraffinic Oil
Tie back to	FPSO via subsea manifold system
Sand	Yes
Max Shut in pressure at WH	350 bar
Max Temperature at WH	111.5C

SSPS Scope of Supply:
3 Subsea Separator Systems (Miocene)
3 Manifold Systems (Oligocene)
25 Production XT Systems
22 Water Injection XT Systems (incl. 2 w/IWC)
2 Gas Injection XT Systems
49 WH Systems
2 Workover Control System (IWOCS, UDF, WO umbilical, Clamps and Gooseneck)
Subsea Distribution Units (UDM, UCM, UTP, UTI)
Topside Control facilitated for 78 wells + 20% (SCU, SPCU, smart tool, HPU)
Subsea Controls distribution equipment (SCM's, Sensors and harnesses, electrical, hydraulic and optical jumpers, Cobra Heads, MPFM, Single Phase Flow meter, SWIMS)
Subsea Isolation Valve
Tie In System
ROV Tools

Key Data:
The Pazflor field is located in Block 17, offshore Angola, approximately 40 km to the east of the Dalia FPSO and 150 km offshore. The Pazflor Subsea Production System is connected to a spread-moored FPSO via a series of subsea production and injection lines, umbilicals and associated risers.

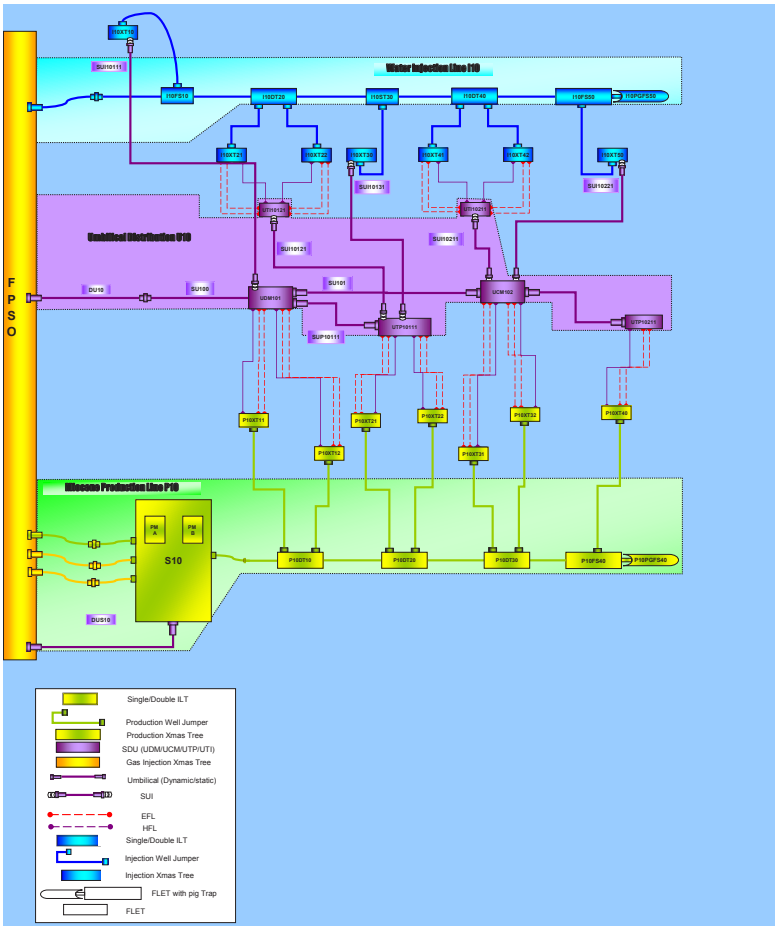
The Pazflor project will develop the resources of two independent groups of reservoirs:

- Miocene reservoirs (Hortensia, Perpetua, Zinia), in 600 to 900 m water depth, containing heavy, acid and viscous oil, developed with subsea gas/liquid separation and liquid boosting.
- Oligocene reservoirs (Acacia), in 1000 to 1200 m water depth, containing light and Paraffinic oil, developed with a production loop including riser bottom gas lift.

1.3 Field Key Parameters

2 Field Layout

2.1 Field Layout



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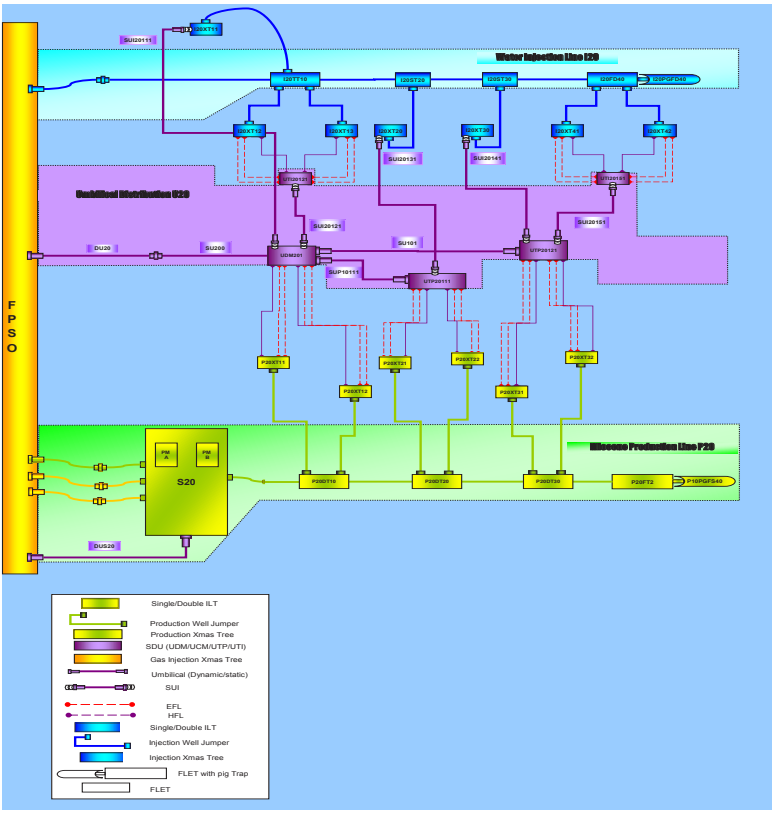

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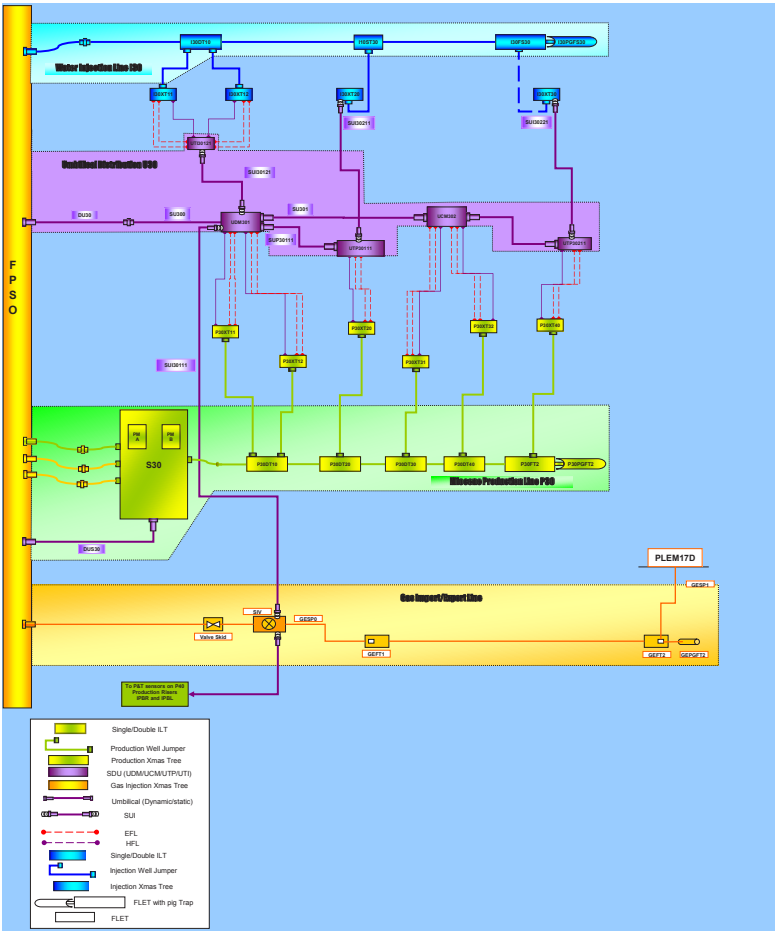

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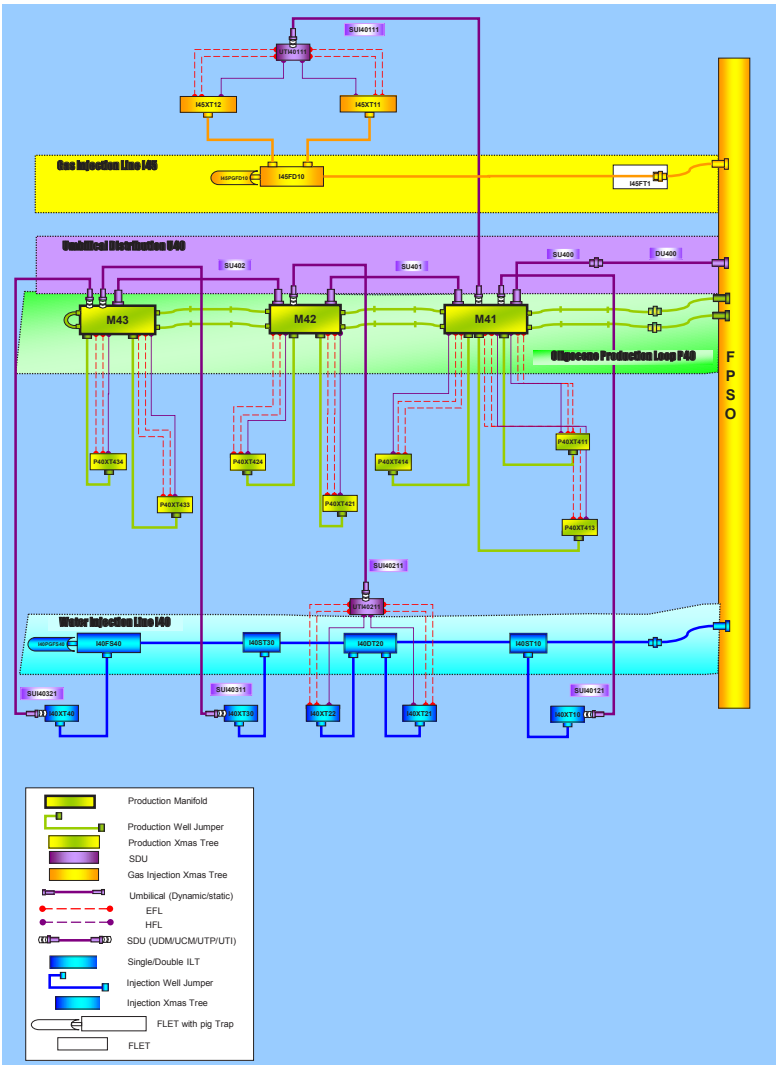
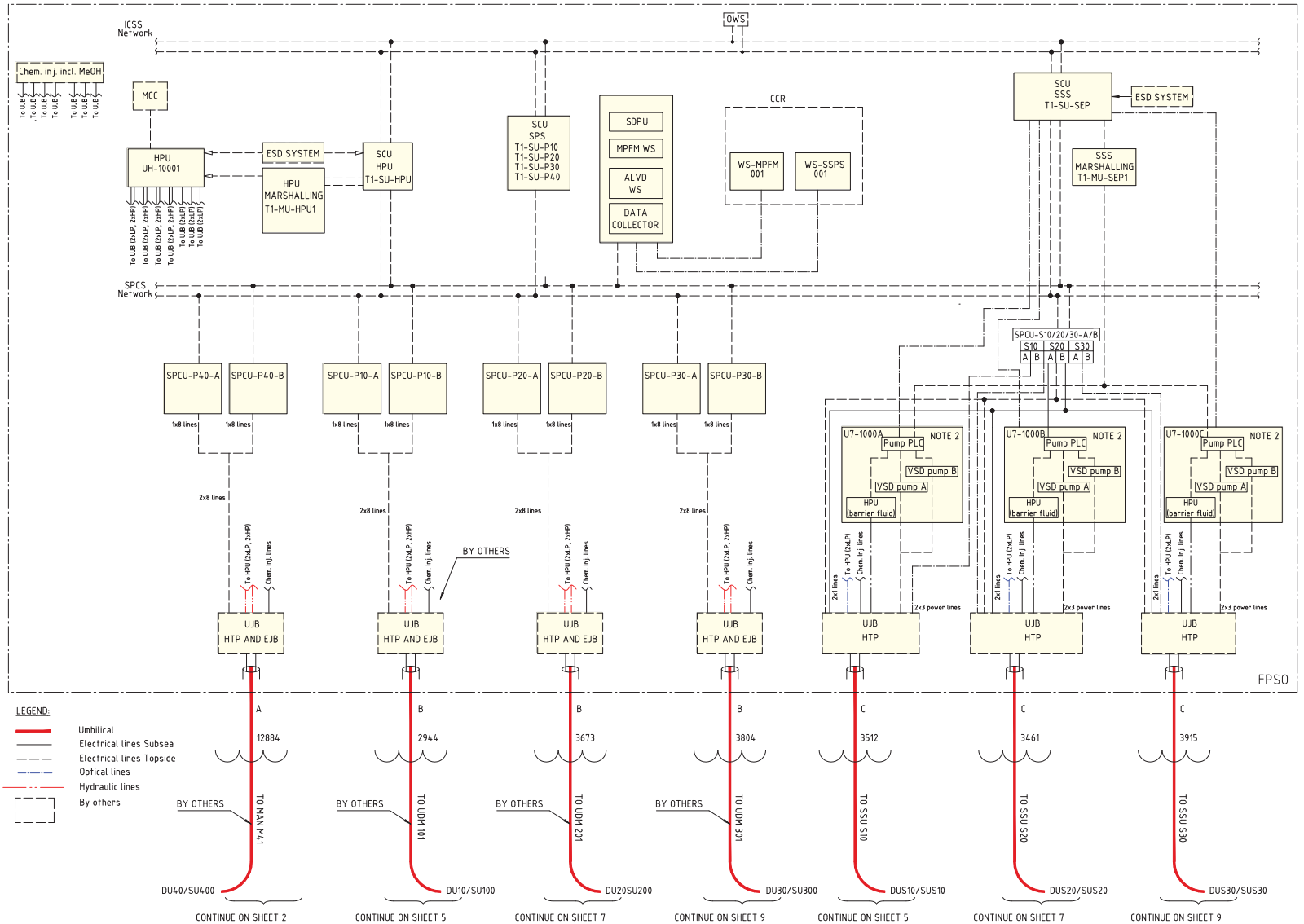


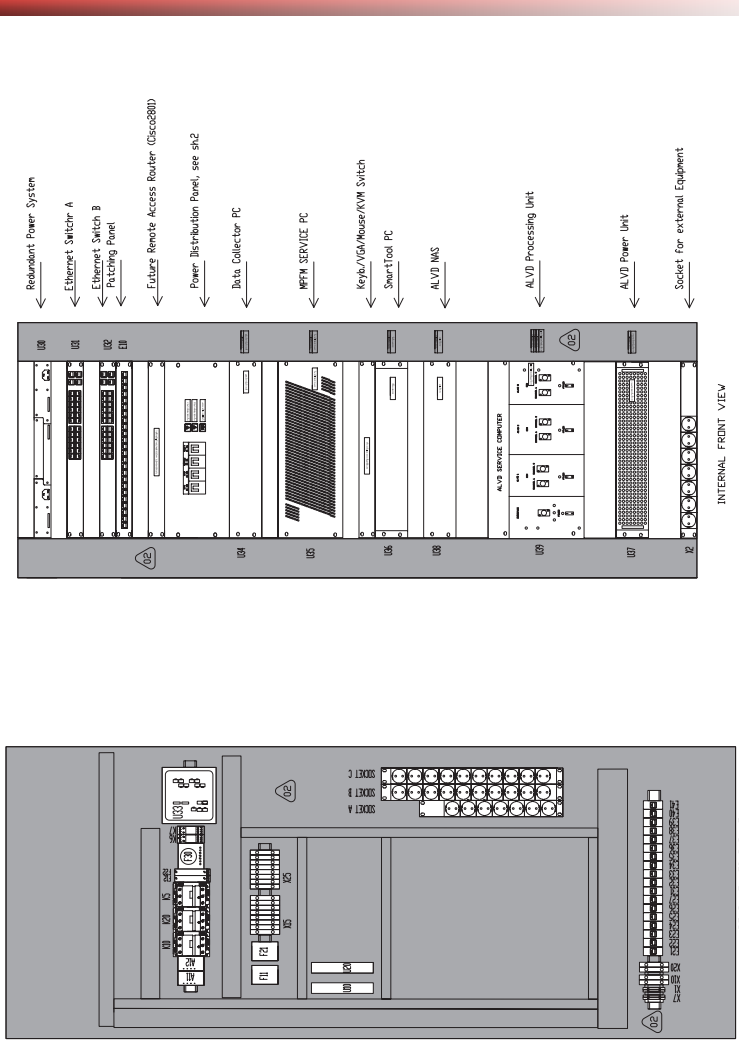
2.1.4 Field Layout P40

3 Topside Installation

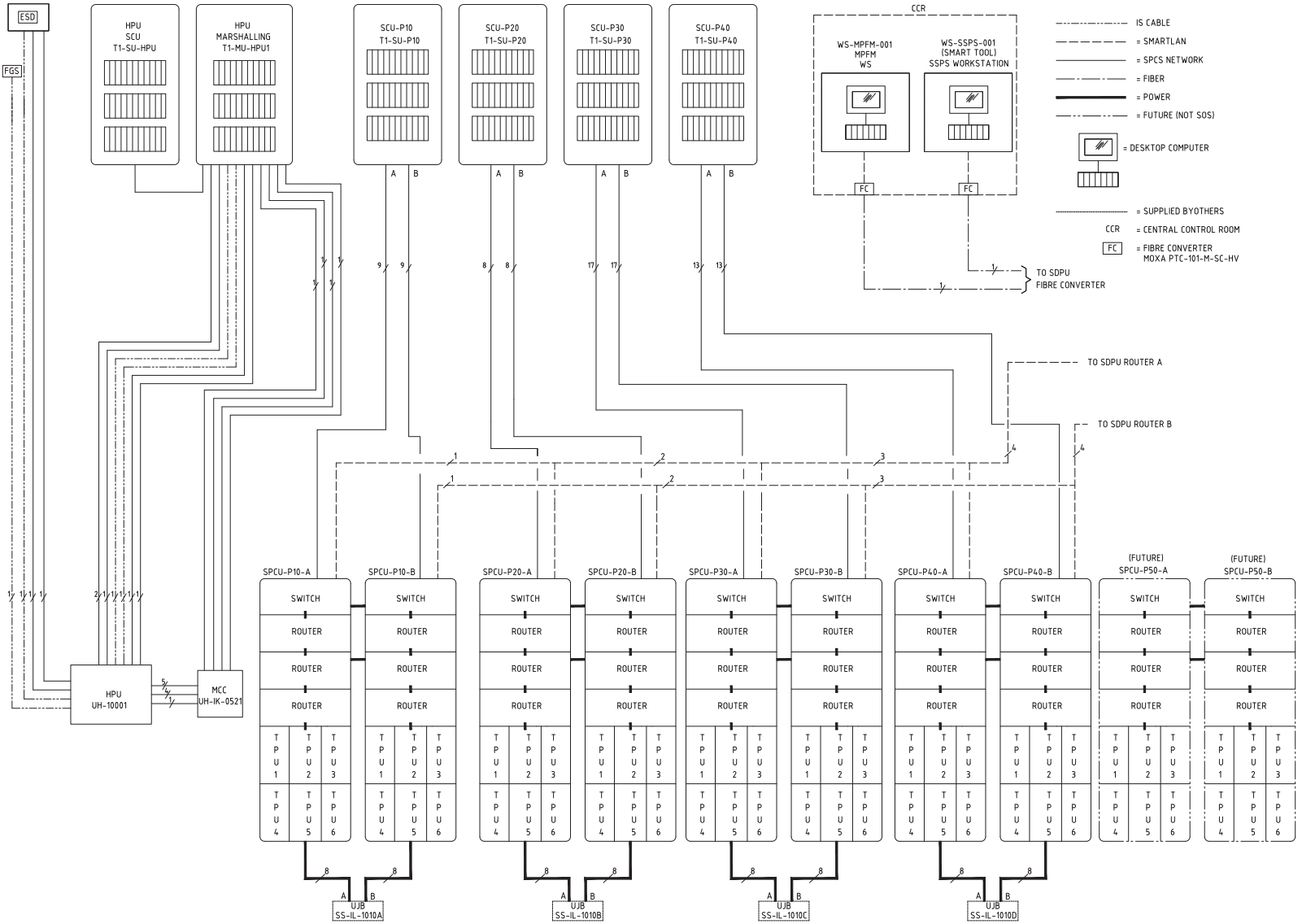
An electro-hydraulic Subsea Production Control System is used for the Pazflor Field. On SPS part, the system utilises “Signal-on-Power” electrical distribution technology with high bandwidth “LongSpeed” full duplex modems. This system results in a reduced number of electrical cores in the umbilical system when compared with separate power and signal systems. On SSS side, the system utilises Electical lines for power and Optical fibres for signal. This system avoids degradation of signal by the interferences caused by the pumps’ HV cables.

The Topsides equipment for the Subsea Production Control System includes the Hydraulic Power Unit (HPU), the Subsea Power and Communications Unit (SPCU), and the Subsea Control Unit (SCU).


ICSS Network
OWS
Chem. inj. incl. MeOH
MCC
HPU UH-10001
ESD SYSTEM
HPU MARSHALLING T1-MU-HPU1
SCU HPU T1-SU-HPU
SCU SPS T1-SU-P10 T1-SU-P20 T1-SU-P30 T1-SU-P40
SDPU
MPFM WS
ALVD WS
DATA COLLECTOR
CCR
WS-MPFM 001
WS-SSPS 001
SCU SSS T1-SU-SEP
ESD SYSTEM
SSS MARSHALLING T1-MU-SEP1
SPCS Network
SPCU-S10/20/30-A/B
S10 S20 S30
SPCU-P40-A
SPCU-P40-B
SPCU-P10-A
SPCU-P10-B
SPCU-P20-A
SPCU-P20-B
SPCU-P30-A
SPCU-P30-B
1x8 lines
2x8 lines
BY OTHERS
U7-1000A
U7-1000B
U7-1000C
NOTE 2
Pump PLC
VSD pump B
VSD pump A
HPU (barrier fluid)
2x1 lines
2x3 power lines
UJB HTP AND EJB
UJB HTP
FPSO
LEGEND:
Umbilical
Electrical lines Subsea
Electrical lines Topside
Optical lines
Hydraulic lines
By others
A
12884
B
2944
B
3673
B
3804
C
3512
C
3461
C
3915
BY OTHERS
TO MAN M41
TO UDM 101
TO UDM 201
TO UDM 301
TO SSU S10
TO SSU S20
TO SSU S30
DU40/SU400
DU10/SU100
DU20SU200
DU30/SU300
DUS10/SUS10
DUS20/SUS20
DUS30/SUS30
CONTINUE ON SHEET 2
CONTINUE ON SHEET 5
CONTINUE ON SHEET 7
CONTINUE ON SHEET 9
CONTINUE ON SHEET 5
CONTINUE ON SHEET 7
CONTINUE ON SHEET 9



3.2 Topside Cabinets, Typical, SCU, SPCU



3.3 Topside Control System Network Topology

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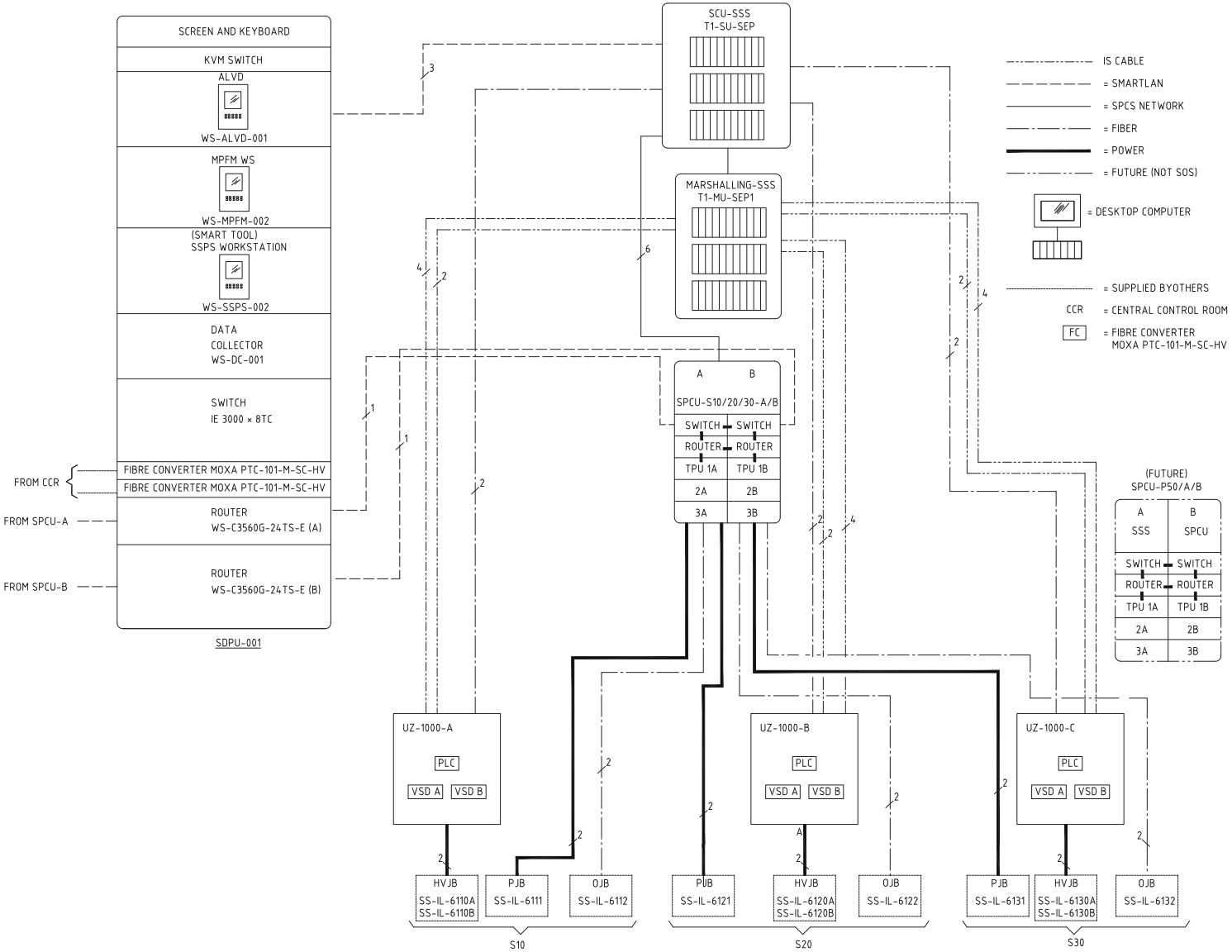

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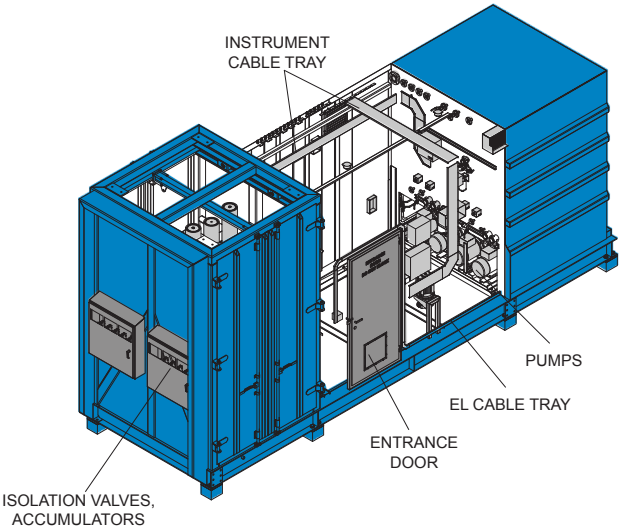
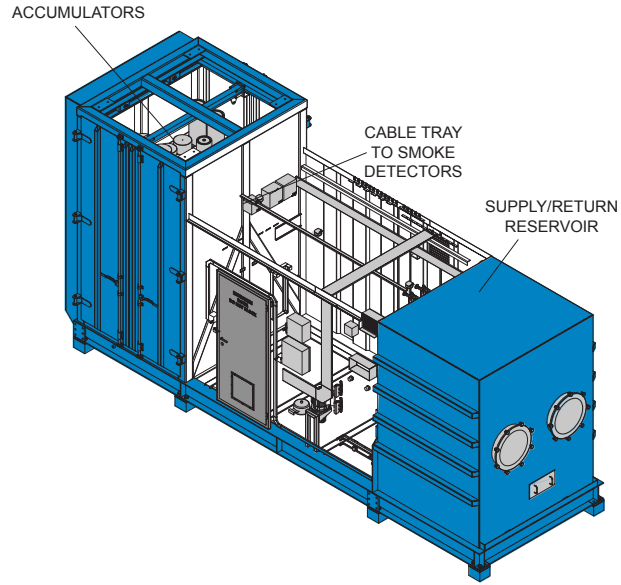
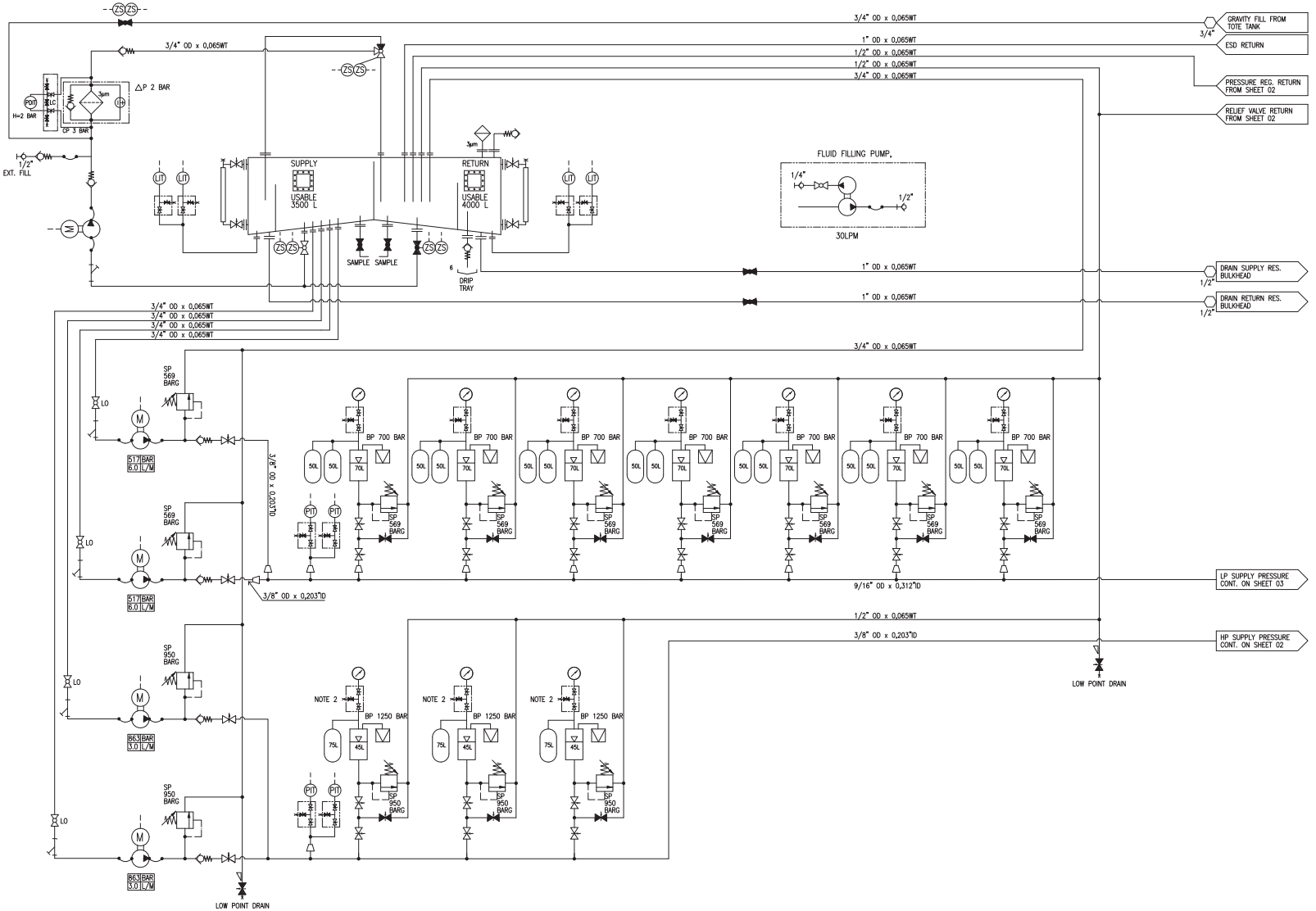
Topside Control System Network Topology





3.4 Topside Hydraulic Power Unit



3.4.1 Topside HPU Schematic

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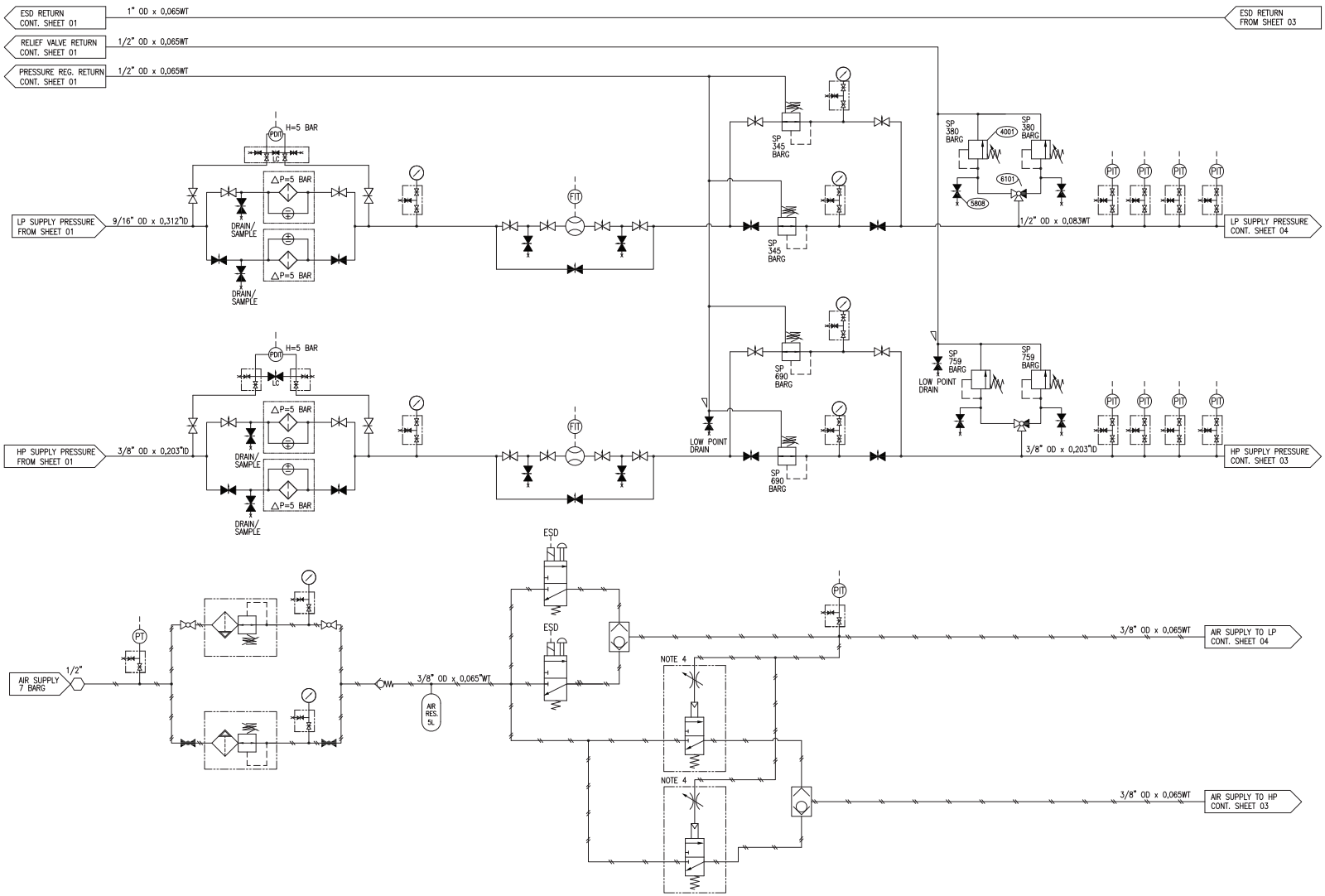

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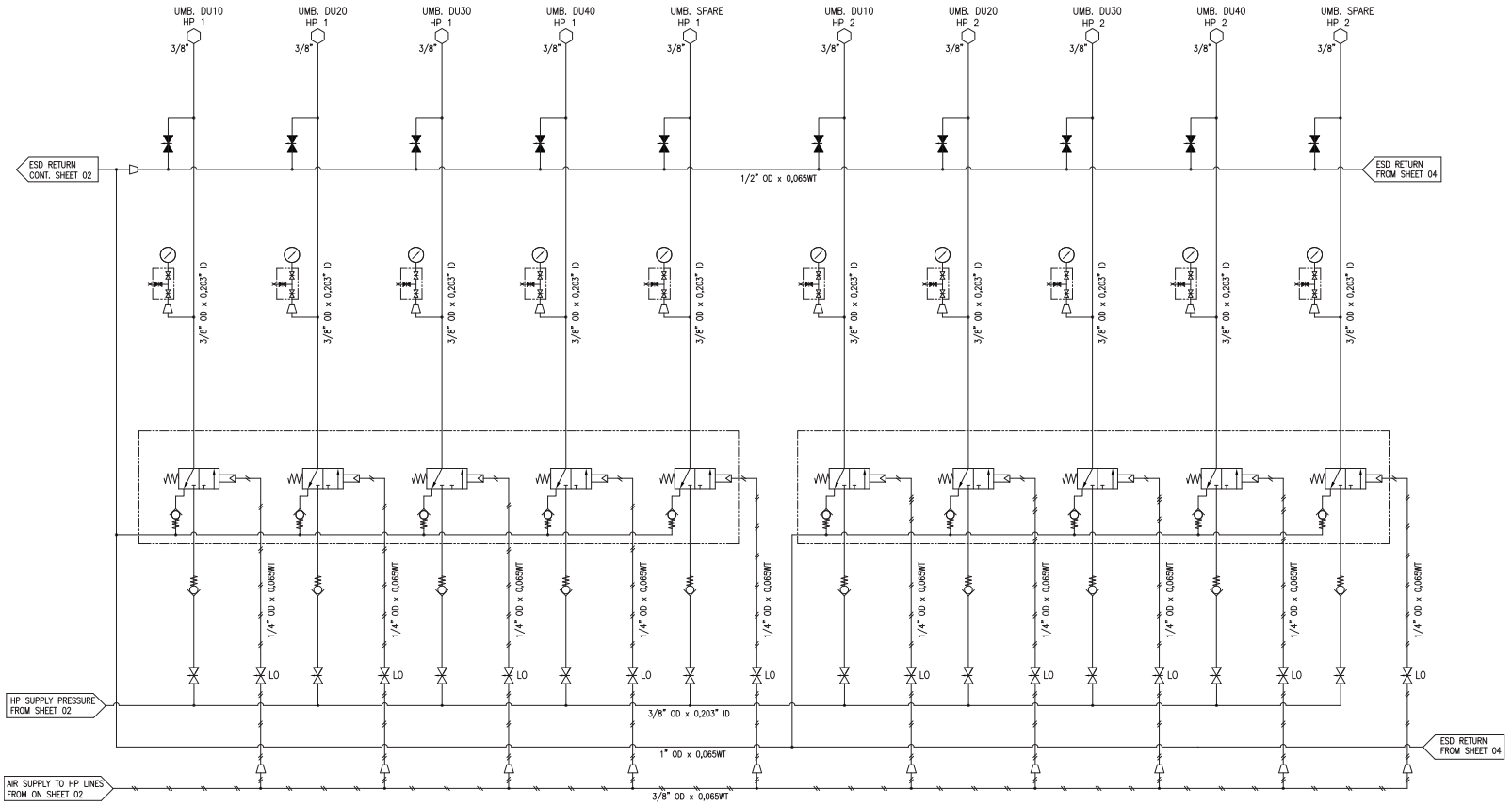
Topside HPU Schematic



Topside HPU Schematic

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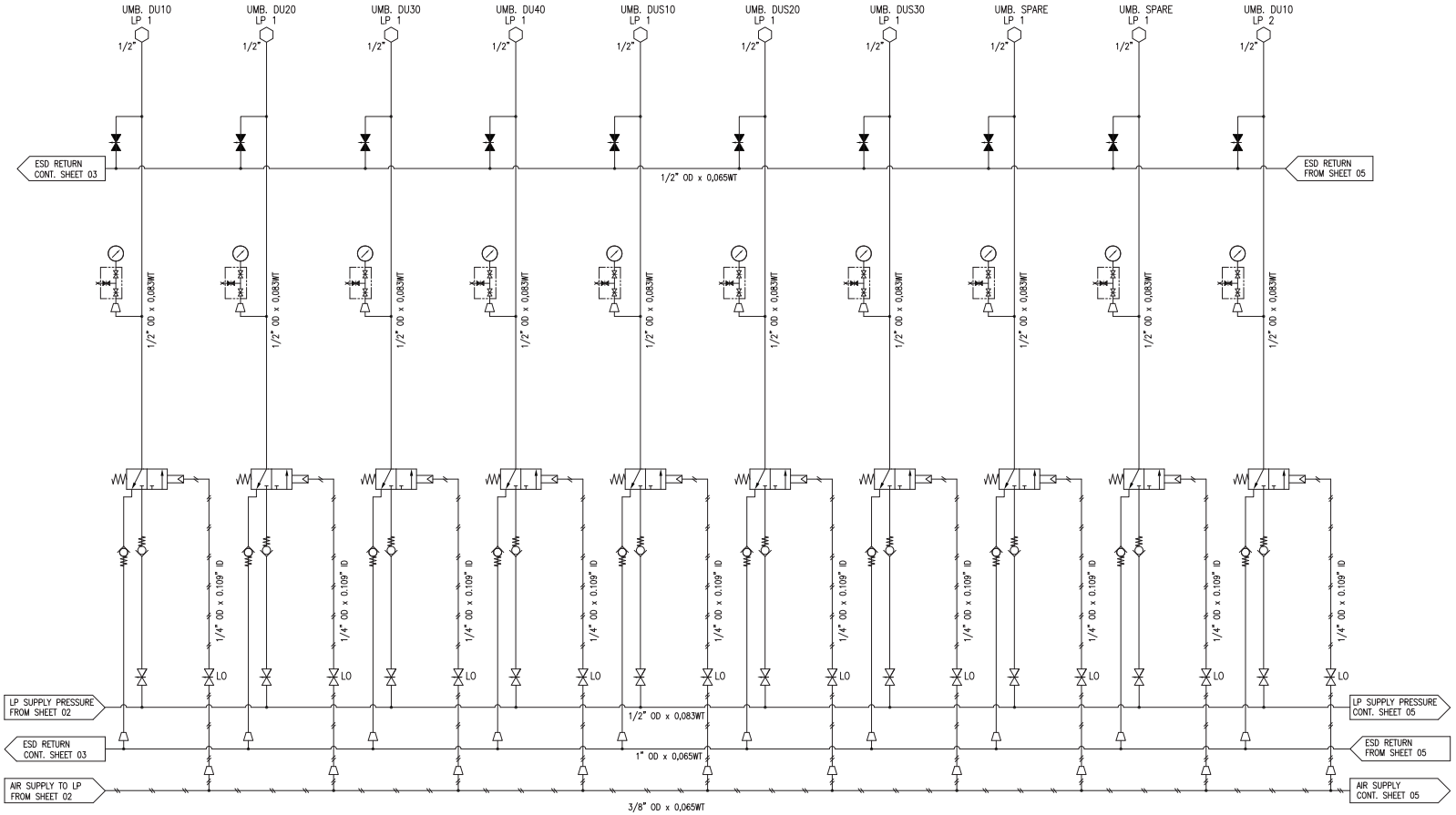

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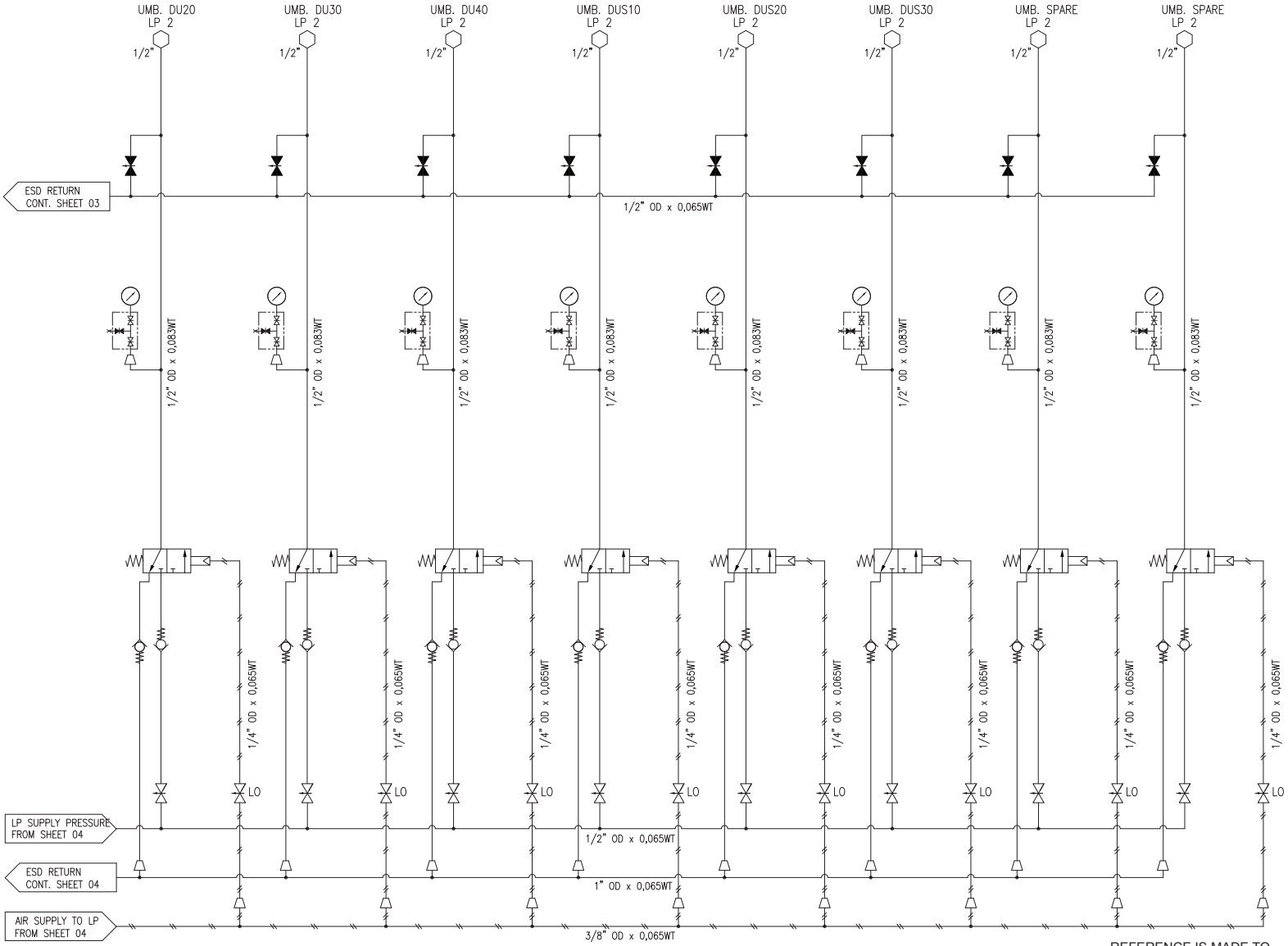
Topside HPU Schematic



Topside HPU Schematic

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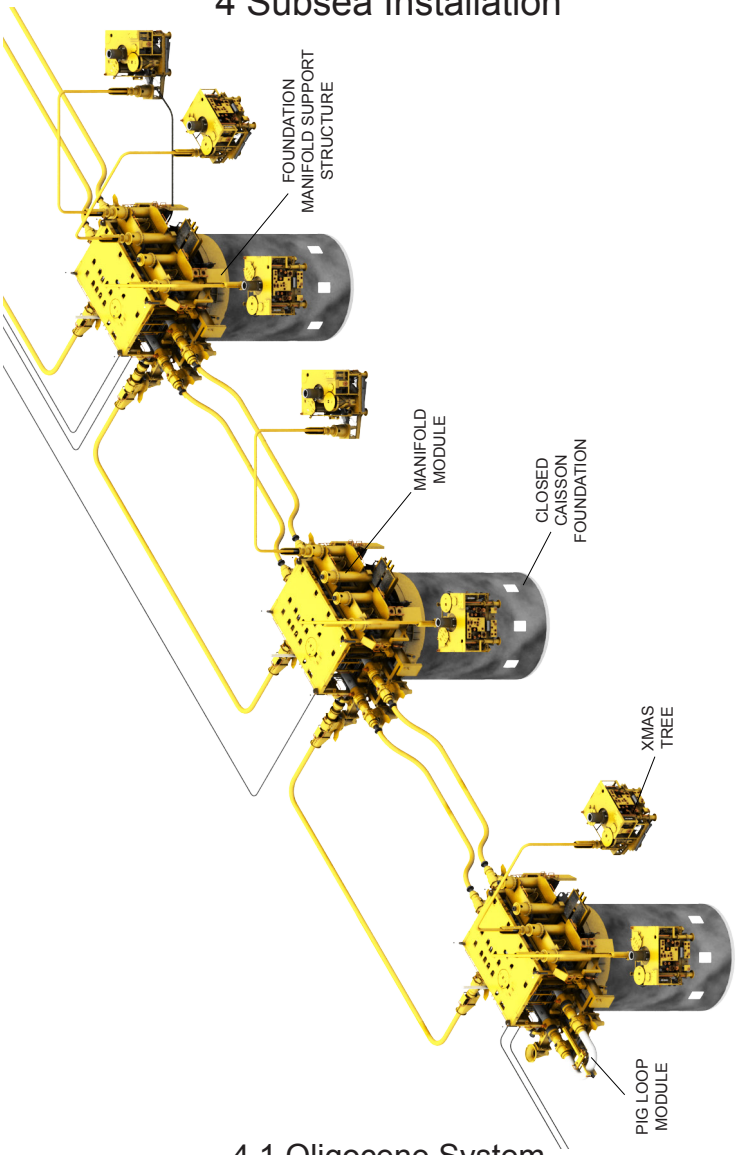
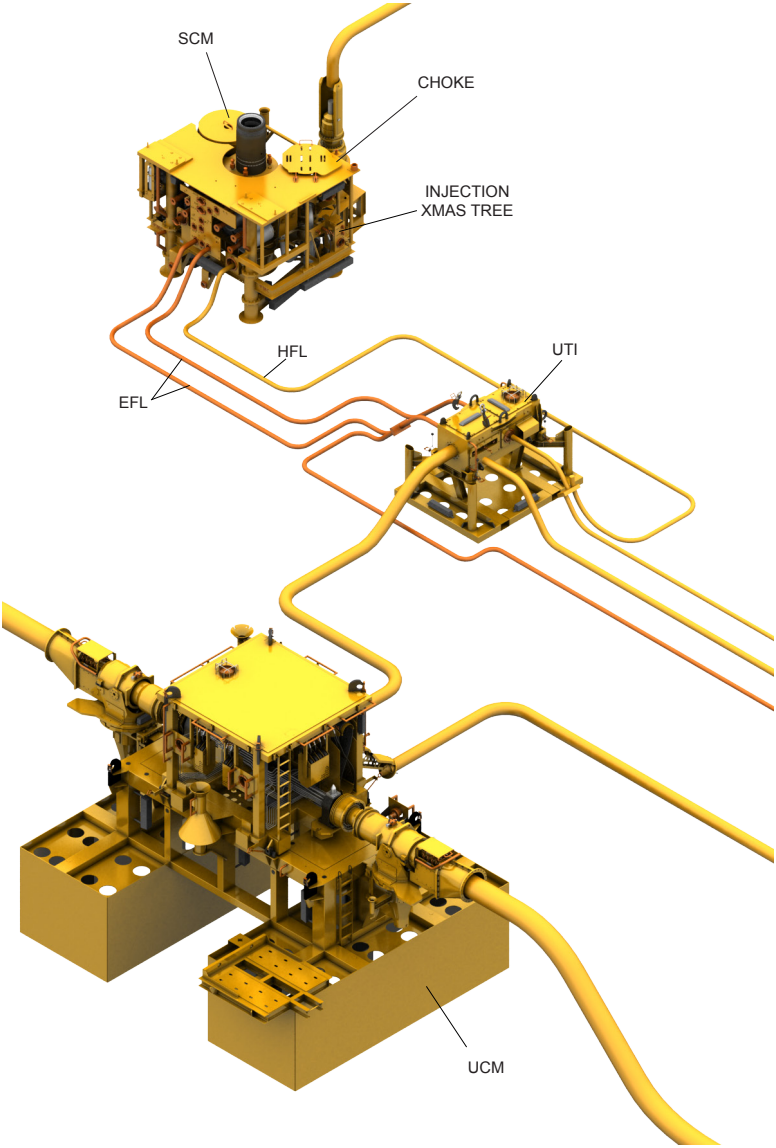
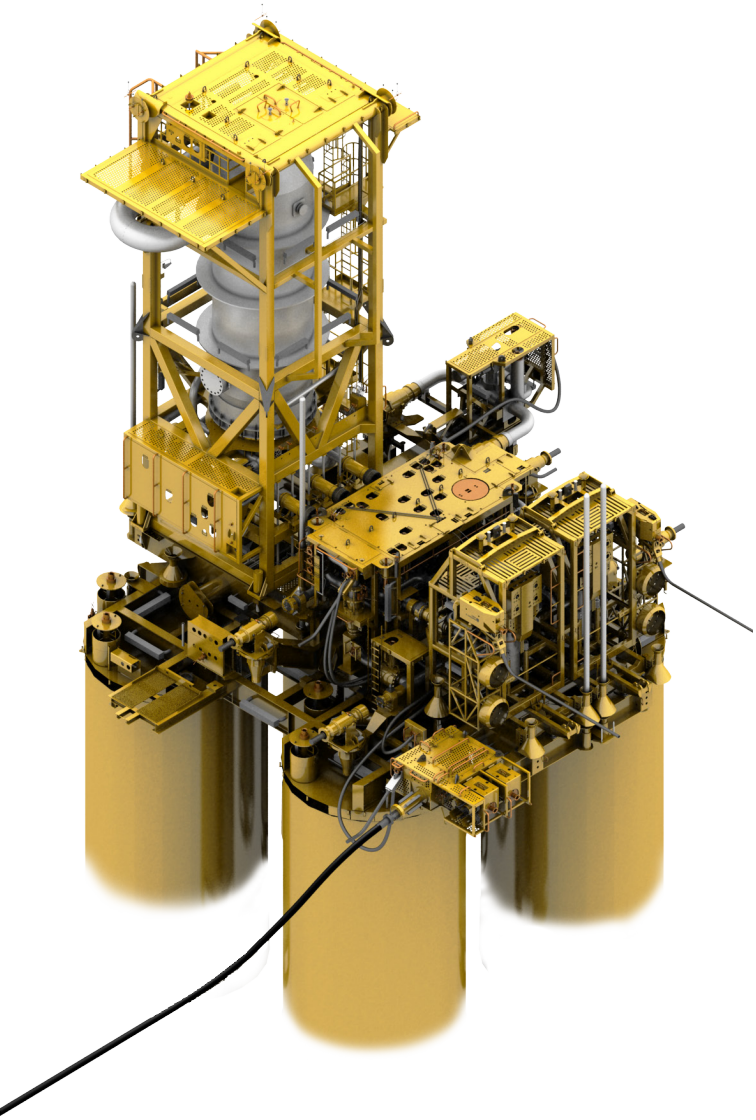
4 Subsea Installation



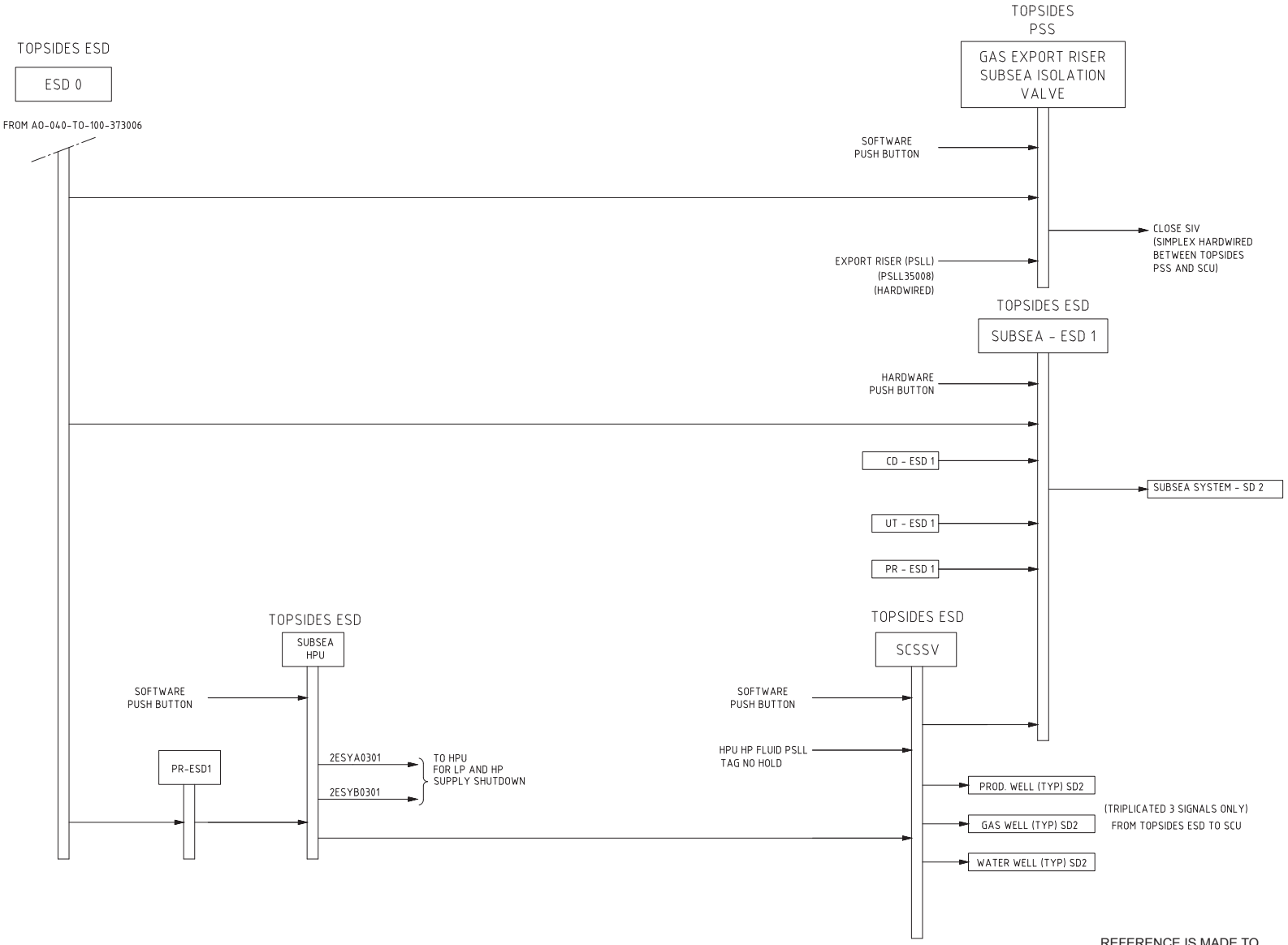
4.1 Oligocene System



4.2 Miocene System



4.3 Subsea Separation System



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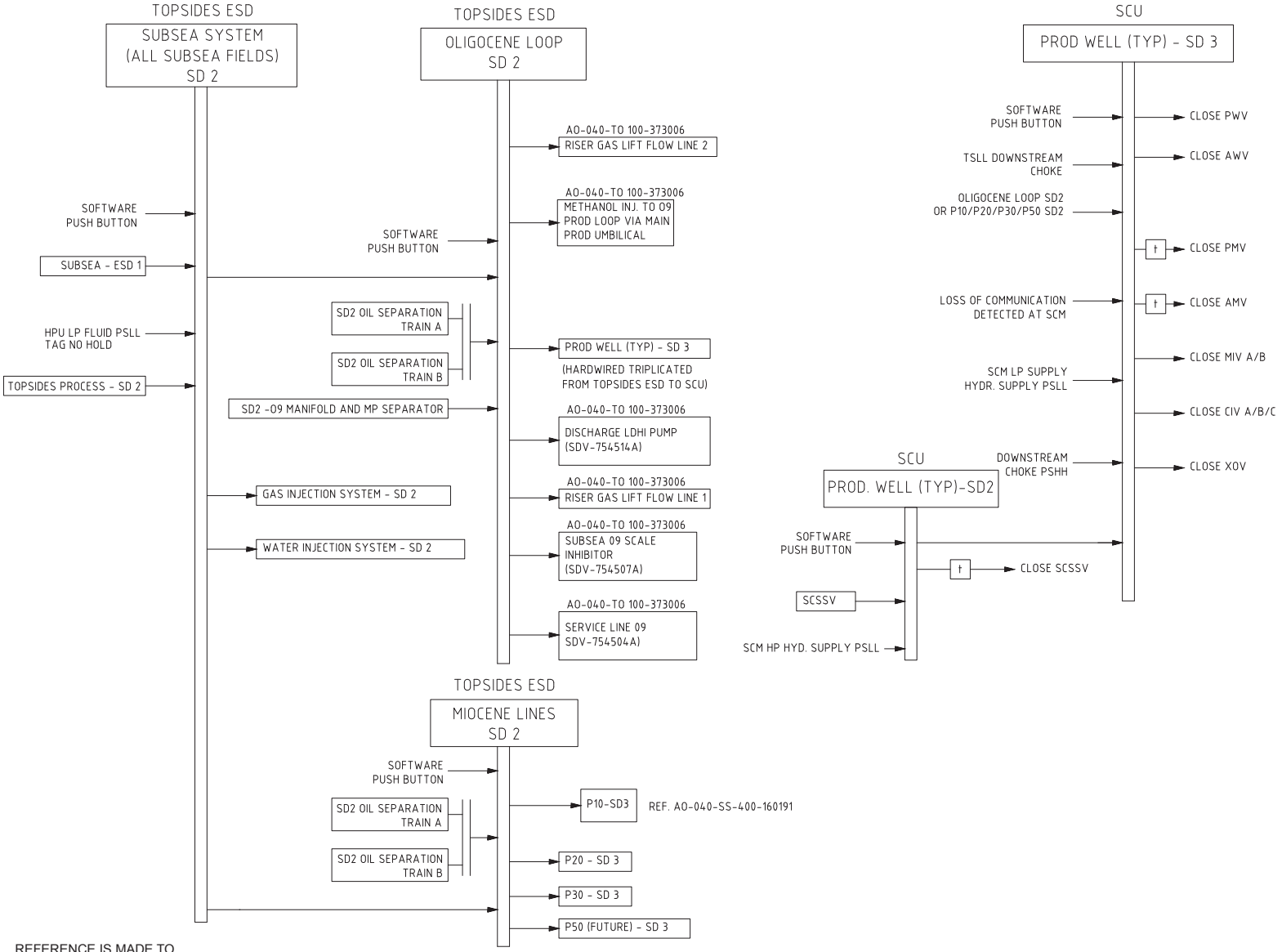

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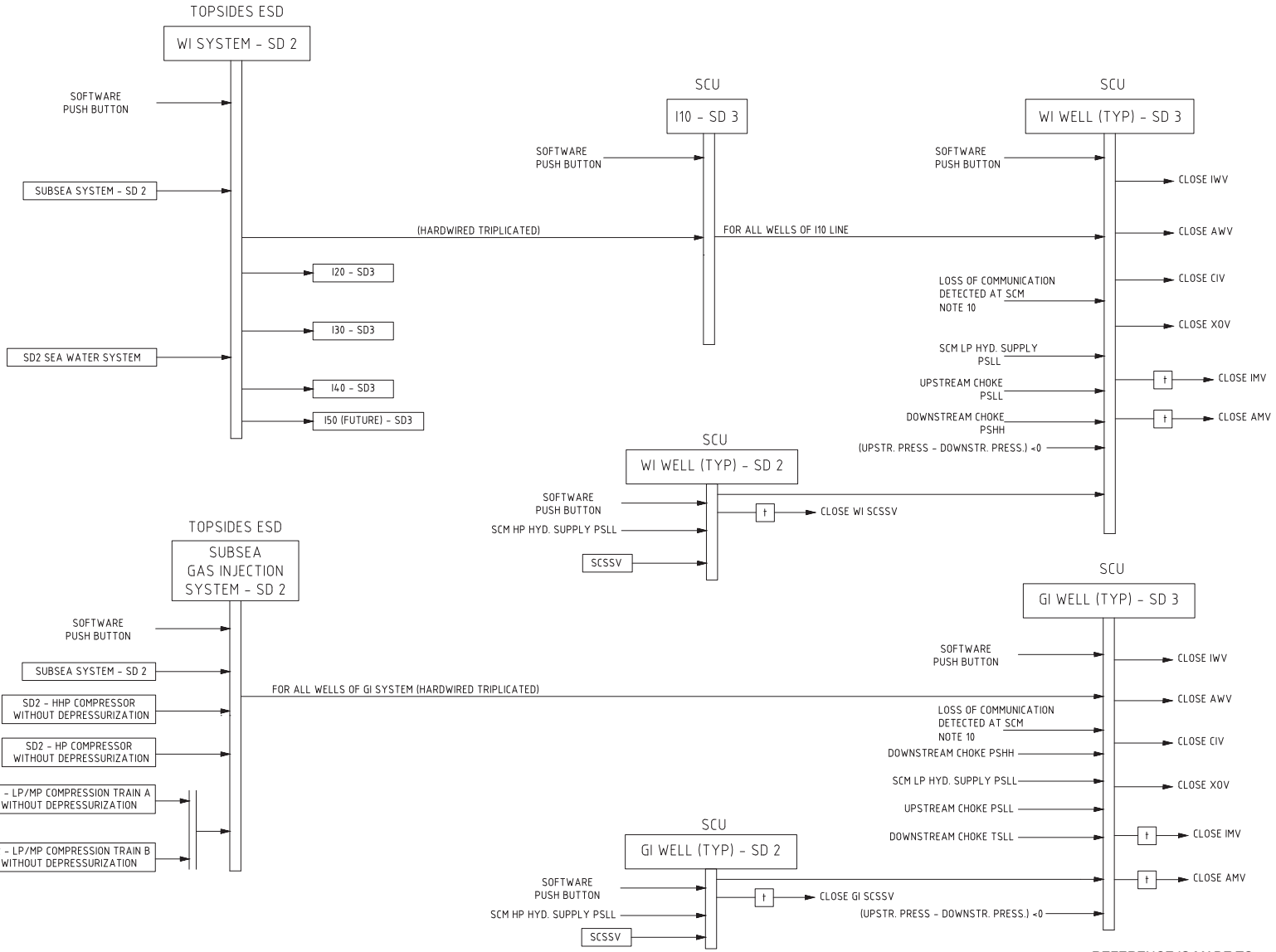
Subsea ESD Safety Bar



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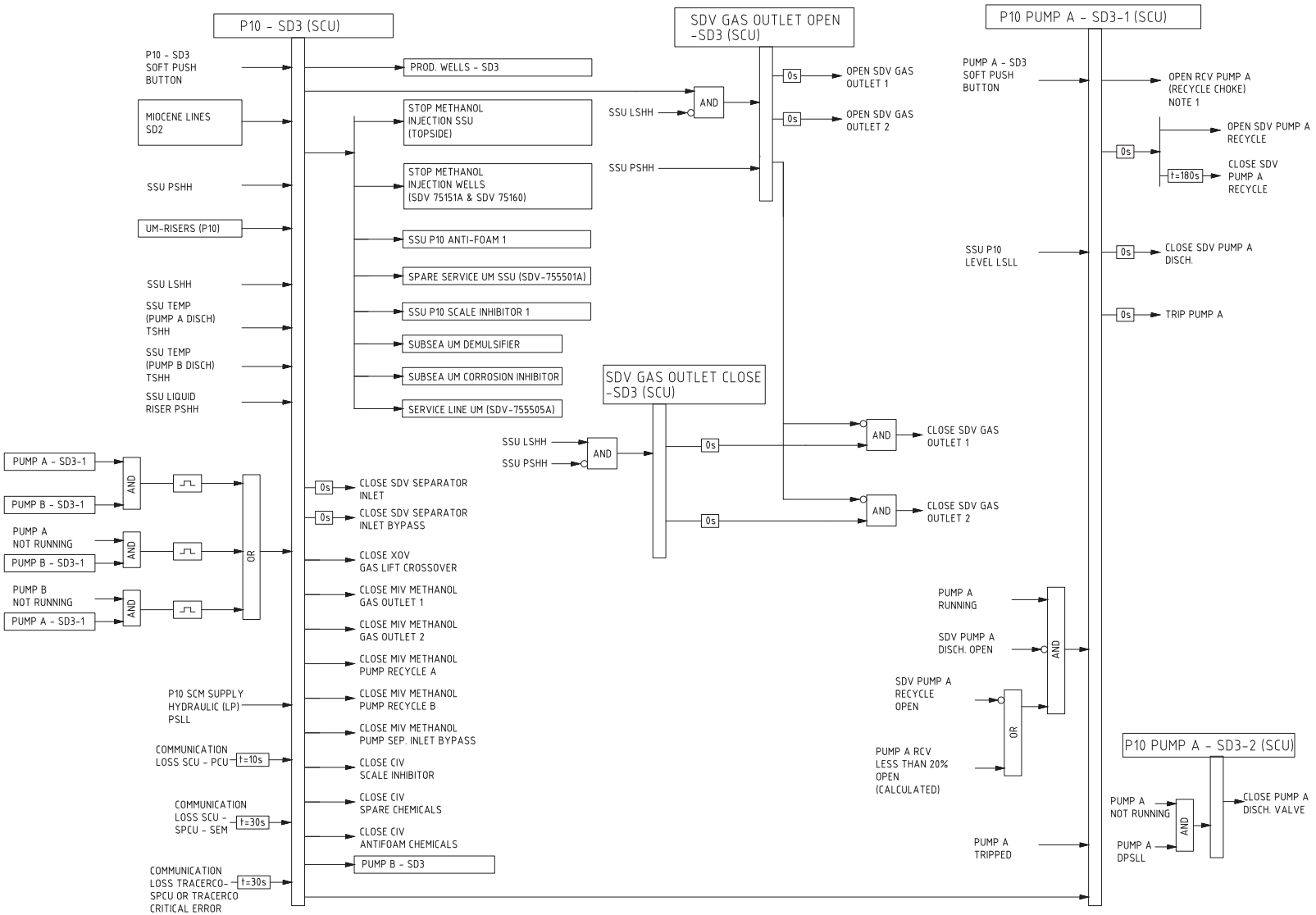

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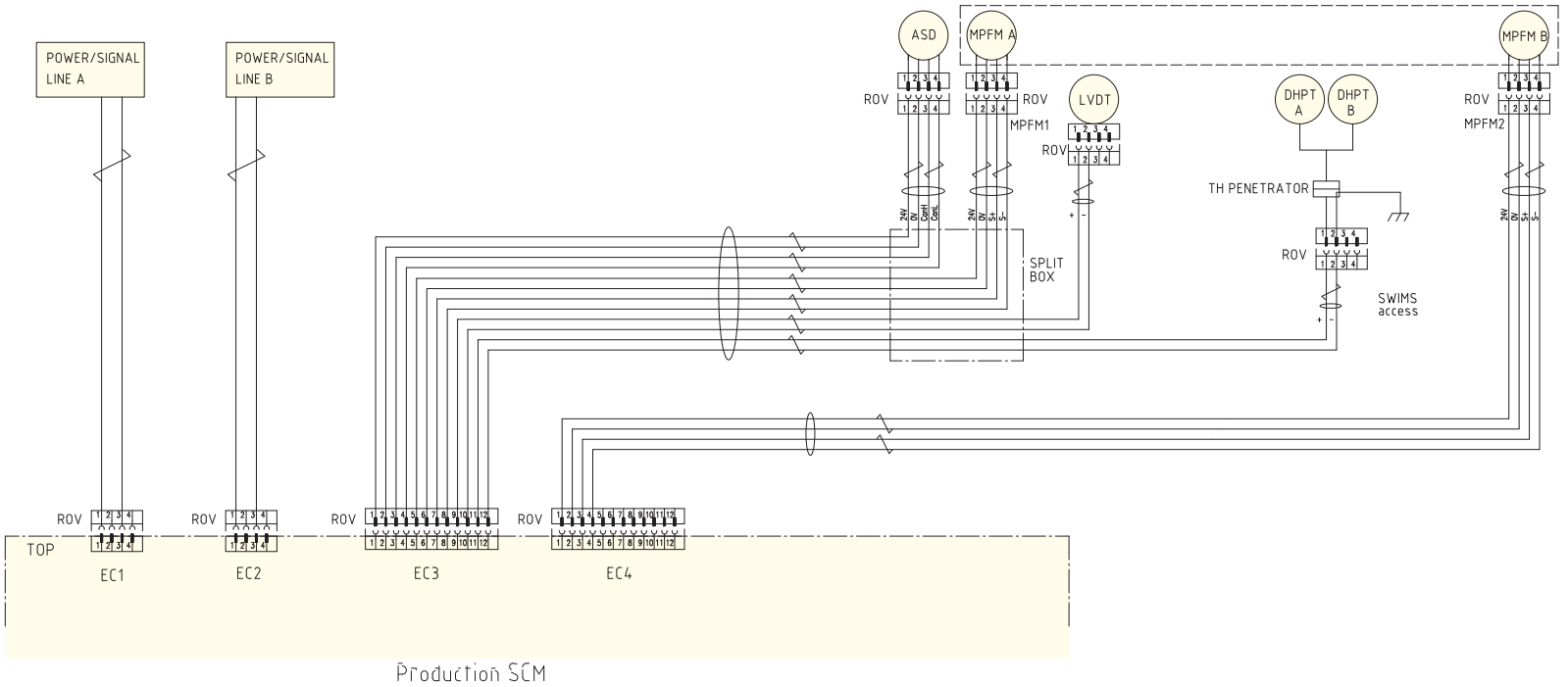
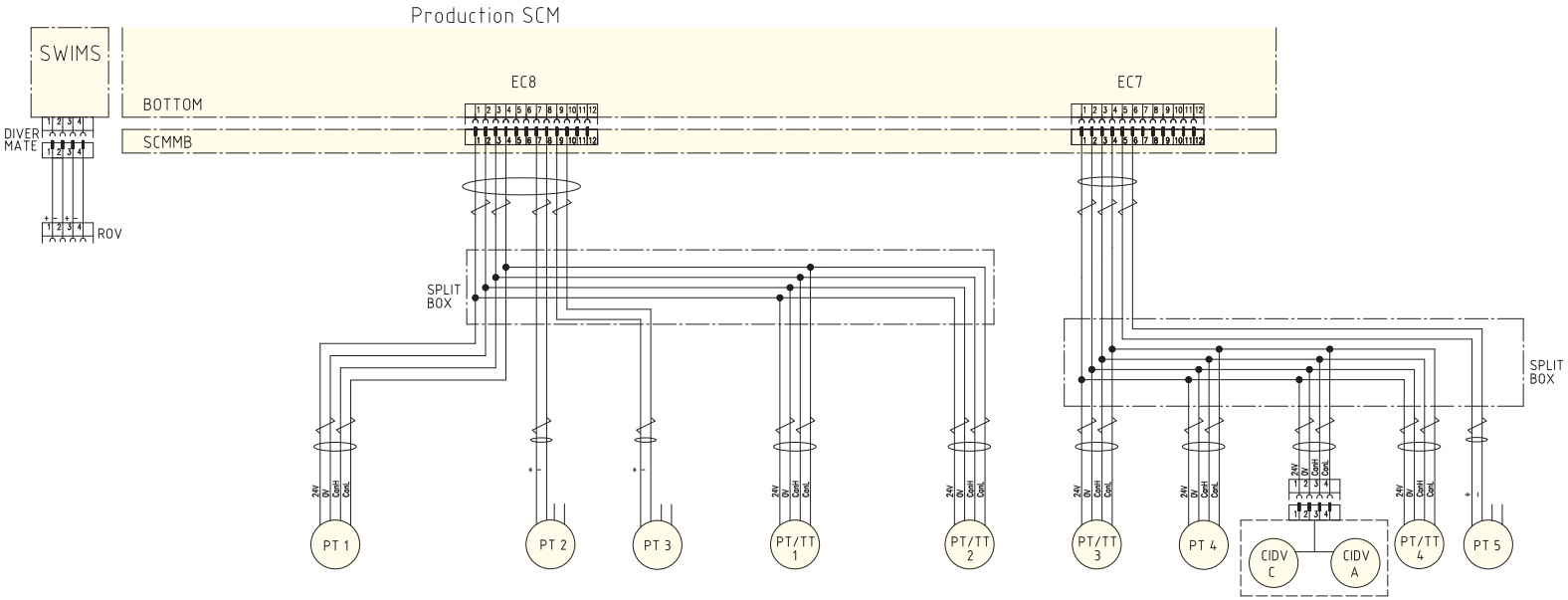
4.5 Sensor Schematic



4.5.1 Sensor Schematic Production SCM, bottom



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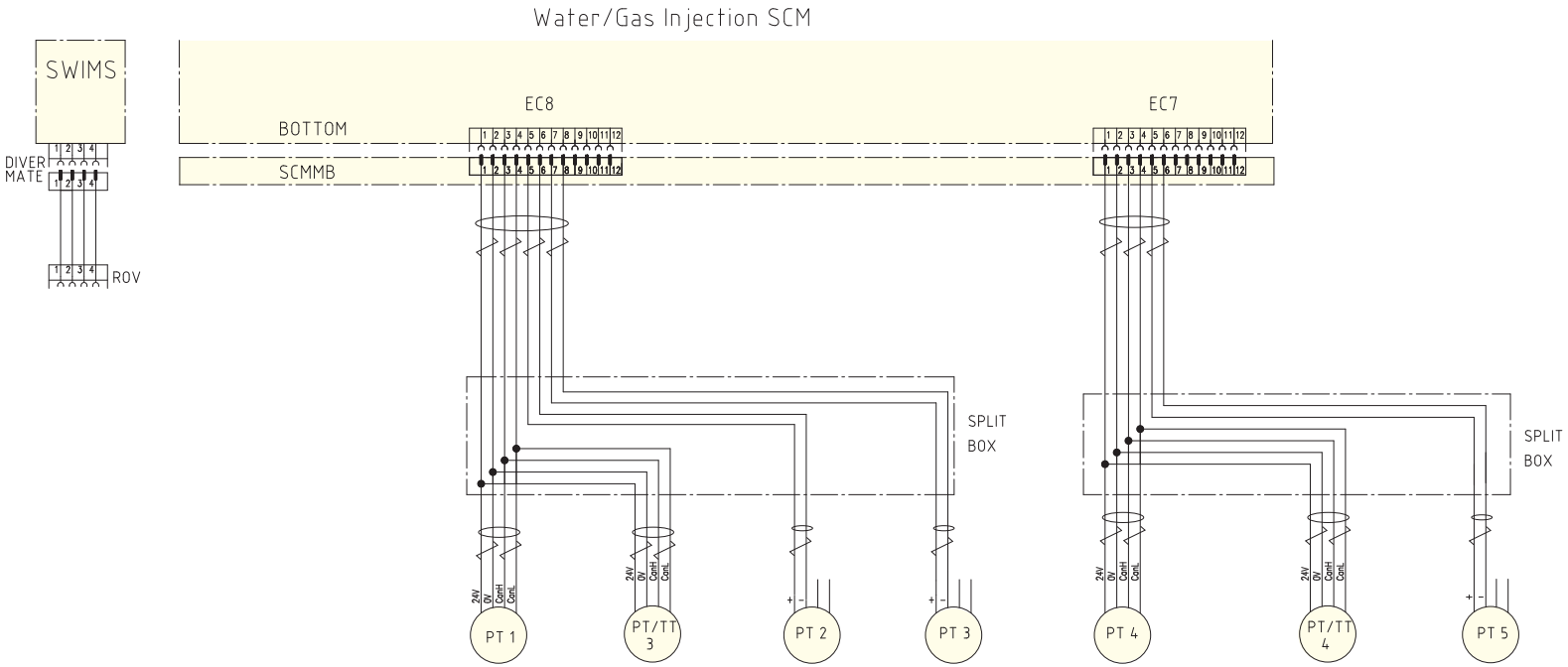
4.5.2 Sensor Schematic Production SCM, top



4.5.3 Sensor Schematic Water/Gas Injection SCM, top

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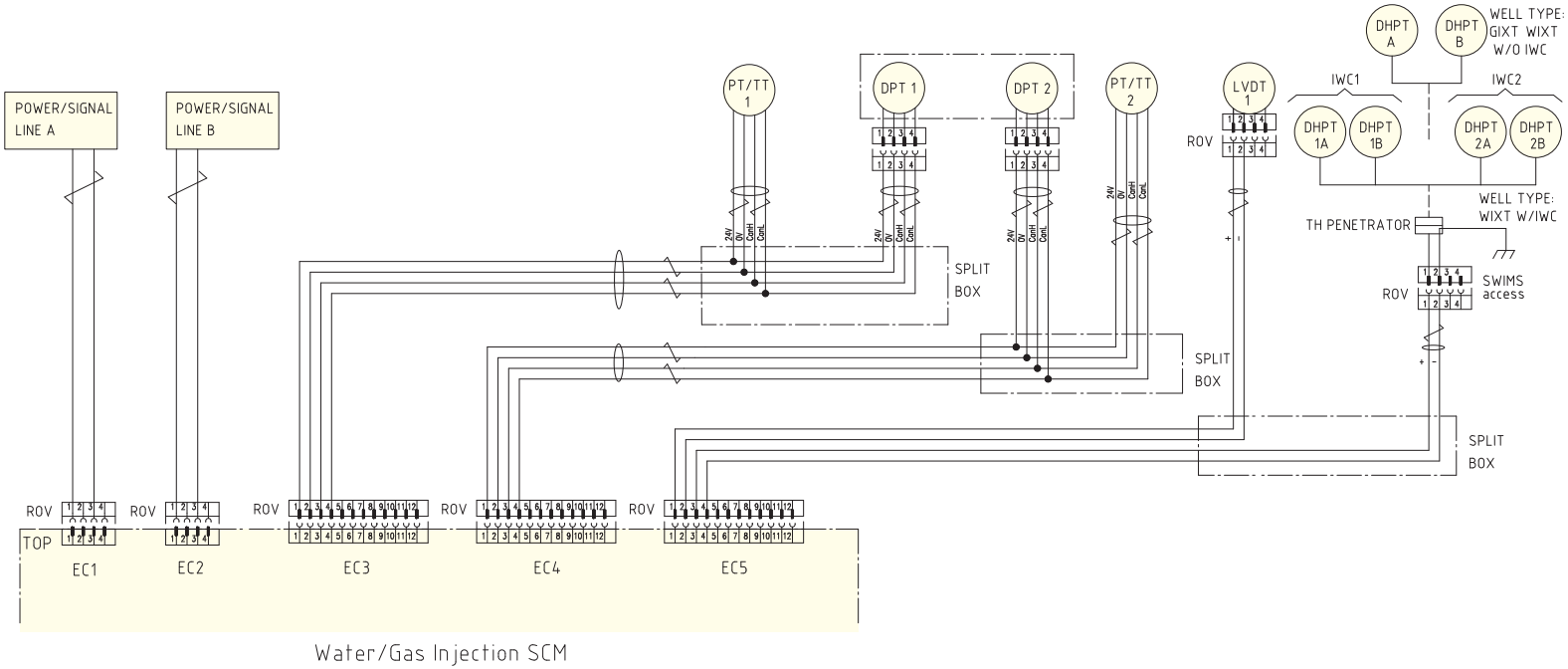

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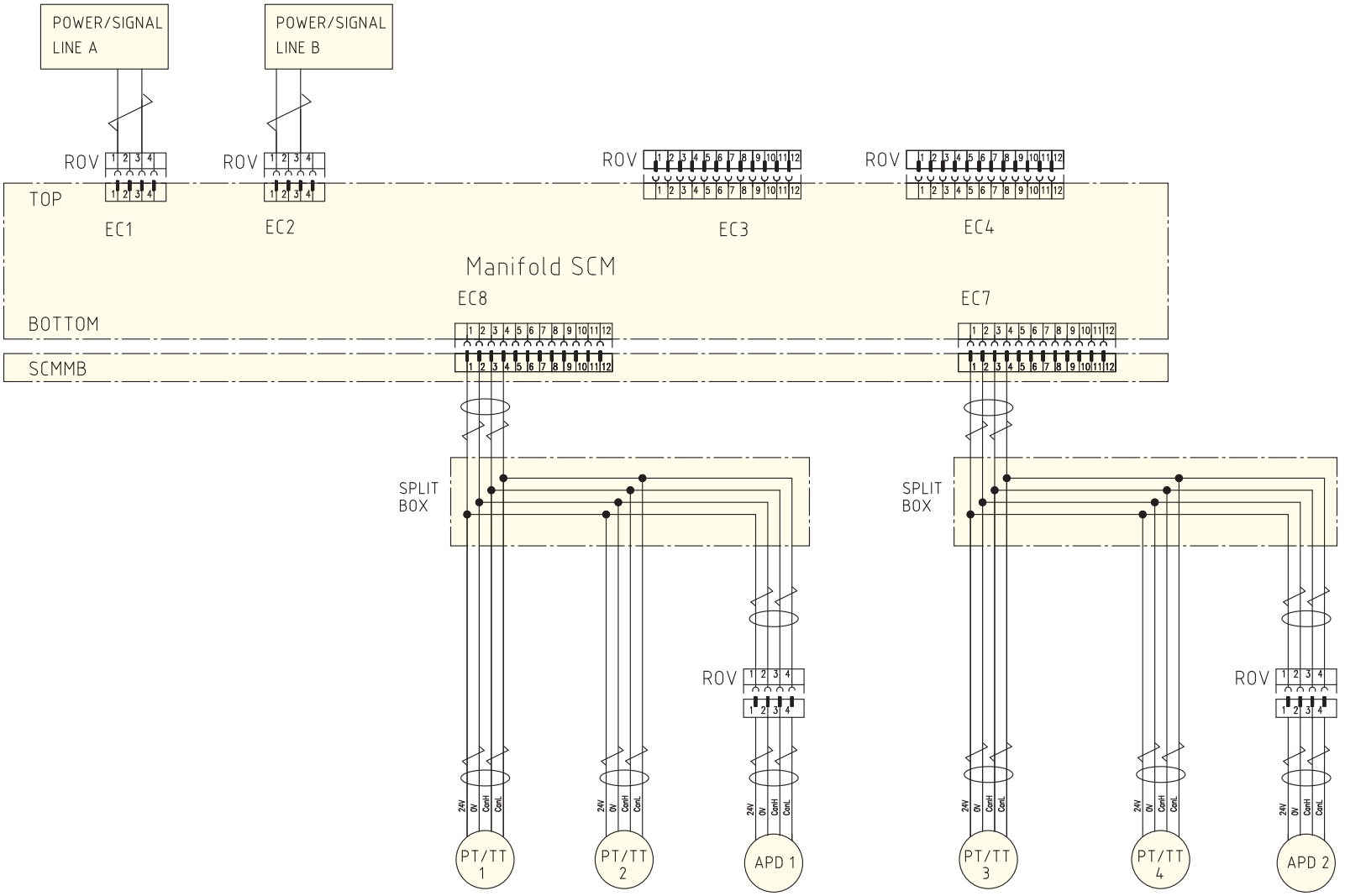
4.5.4 Sensor Schematic Water/Gas Injection SCM, bottom



4.5.6 Sensor Schematic Manifold SCM

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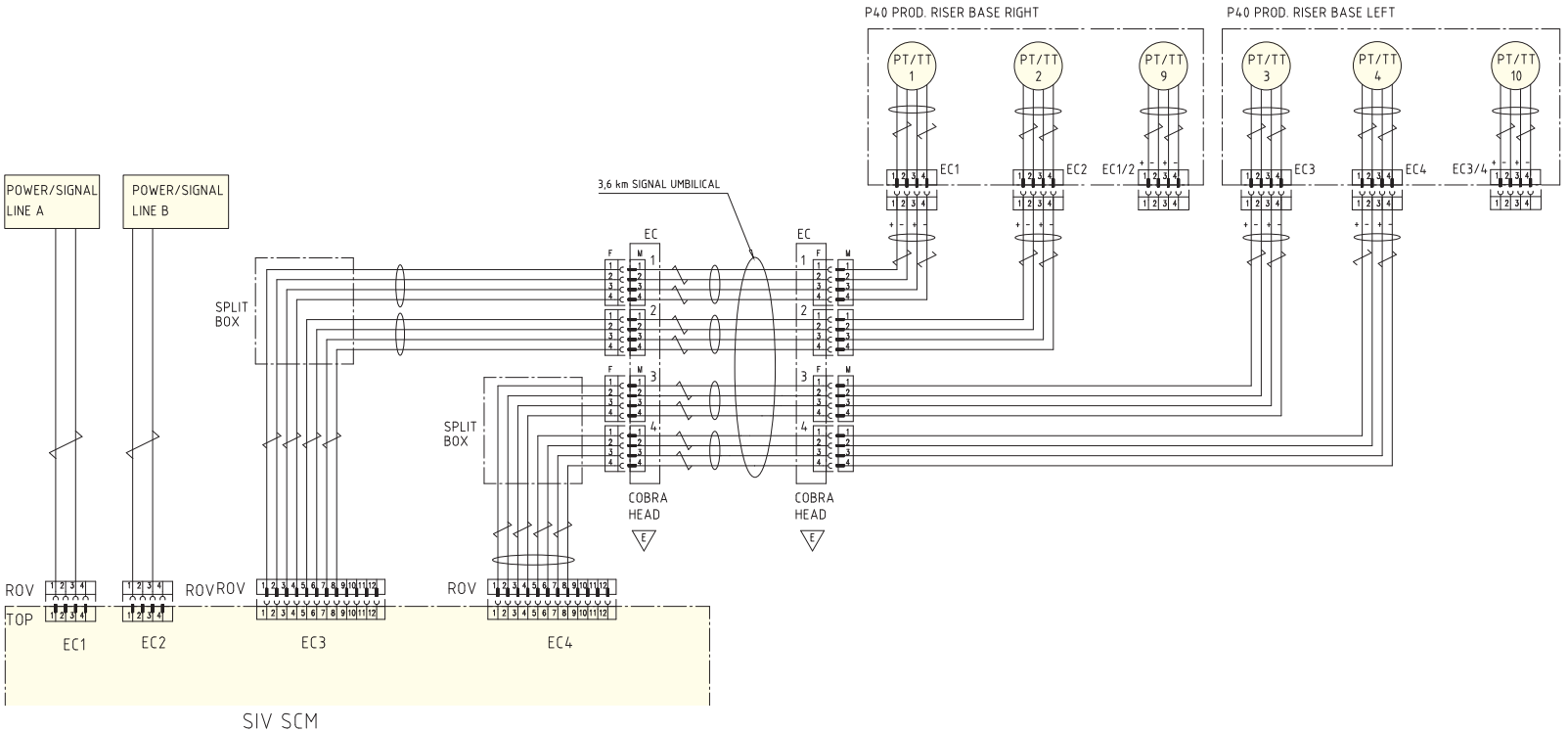

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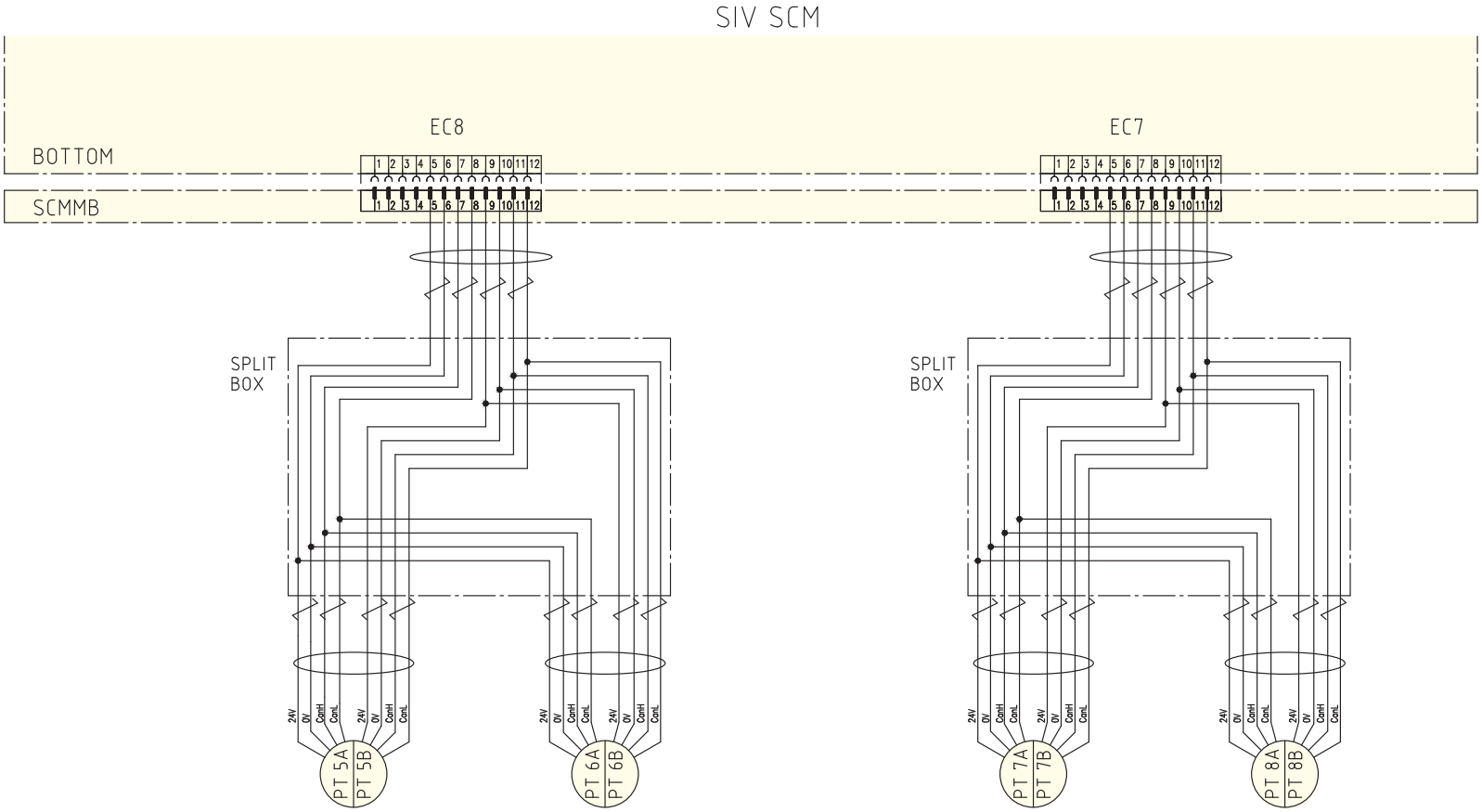
4.5.7 Sensor Schematic SIV SCM, bottom



4.5.8 Sensor Schematic SIV SCM, top

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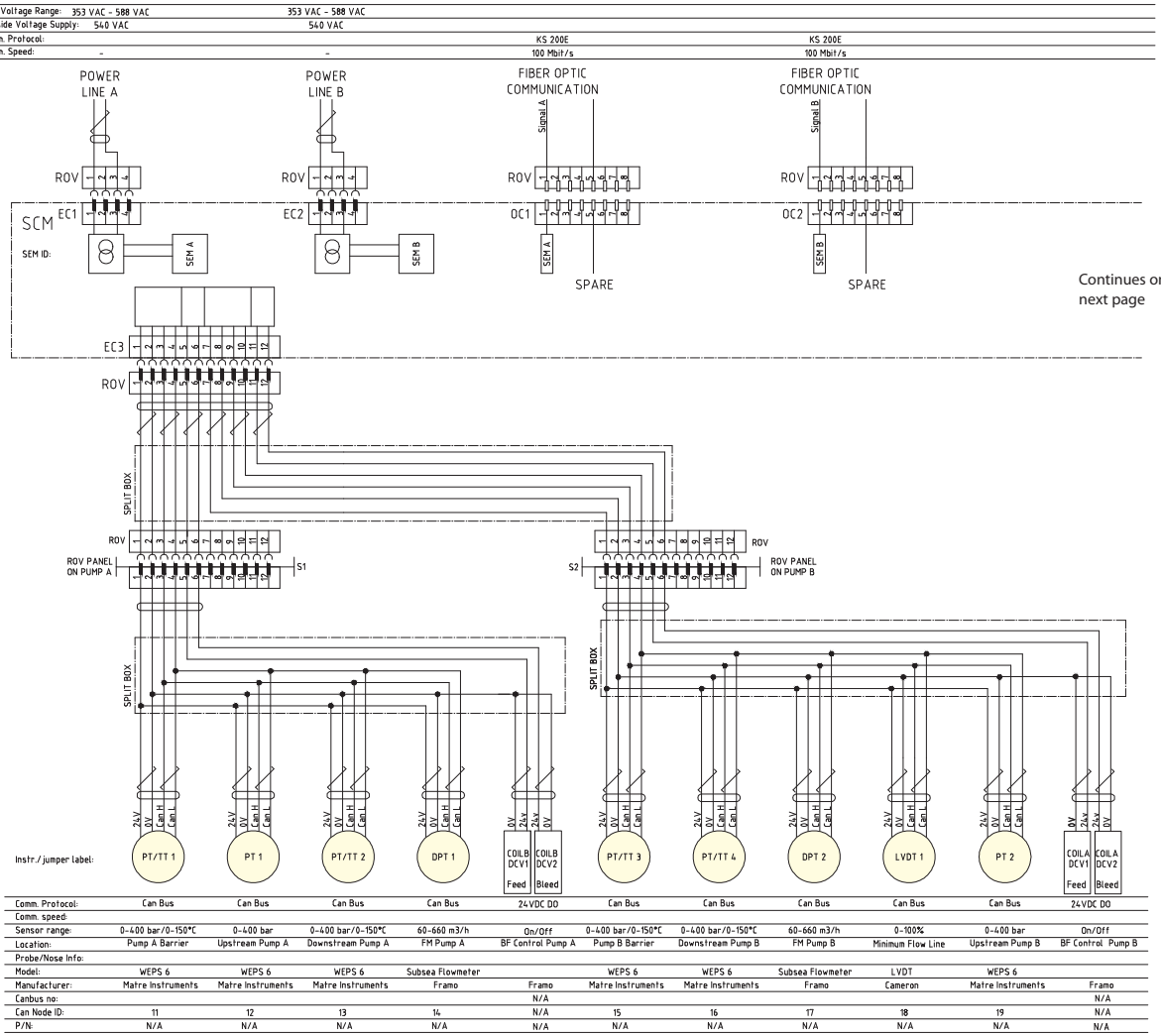
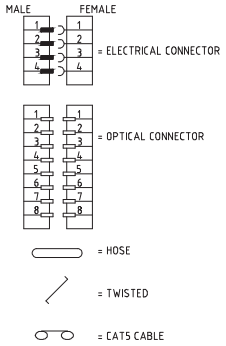


ABBREVIATIONS:

ALVD	= ACOUSTIC LEAK AND VIBRATION DETECTOR
BPS	= BIT PER SECOND
CIDV	= CHEMICAL INJECTION DOSING VALVE
DCV	= DIRECTIONAL CONTROL VALVE
DPT	= DIFFERENTIAL PRESSURE TRANSMITTER
EC	= ELECTRICAL CONNECTOR
FM	= FLOW METER
LT	= LEVEL TRANSMITTER
LVDT	= LINEAR VARIABLE DISPLACEMENT TRANSMITTER
OC	= OPTICAL CONNECTOR
PT	= PRESSURE TRANSMITTER
PT/TT	= PRESSURE AND TEMPERATURE TRANSMITTER
ROV	= REMOTE OPERATED VEHICLE
SCM	= SUBSEA CONTROL MODULE
SCMMB	= SUBSEA CONTROL MODULE MOUNTING BASE
SEM	= SUBSEA ELECTRONIC MODULE
SPFM	= SINGLE PHASE FLOW METER
TBD	= TO BE DEFINED

LEGEND:



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4.6 SSS SCM Sensor Schematic

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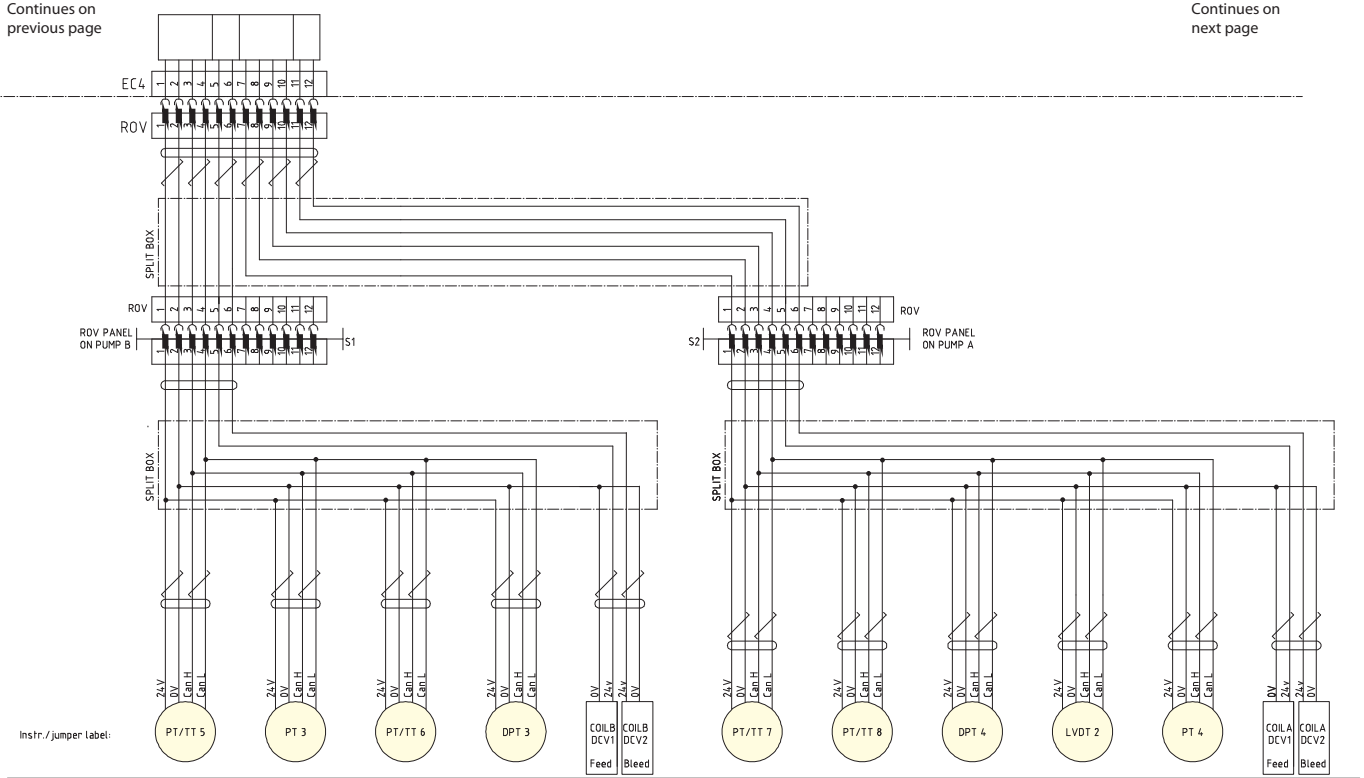
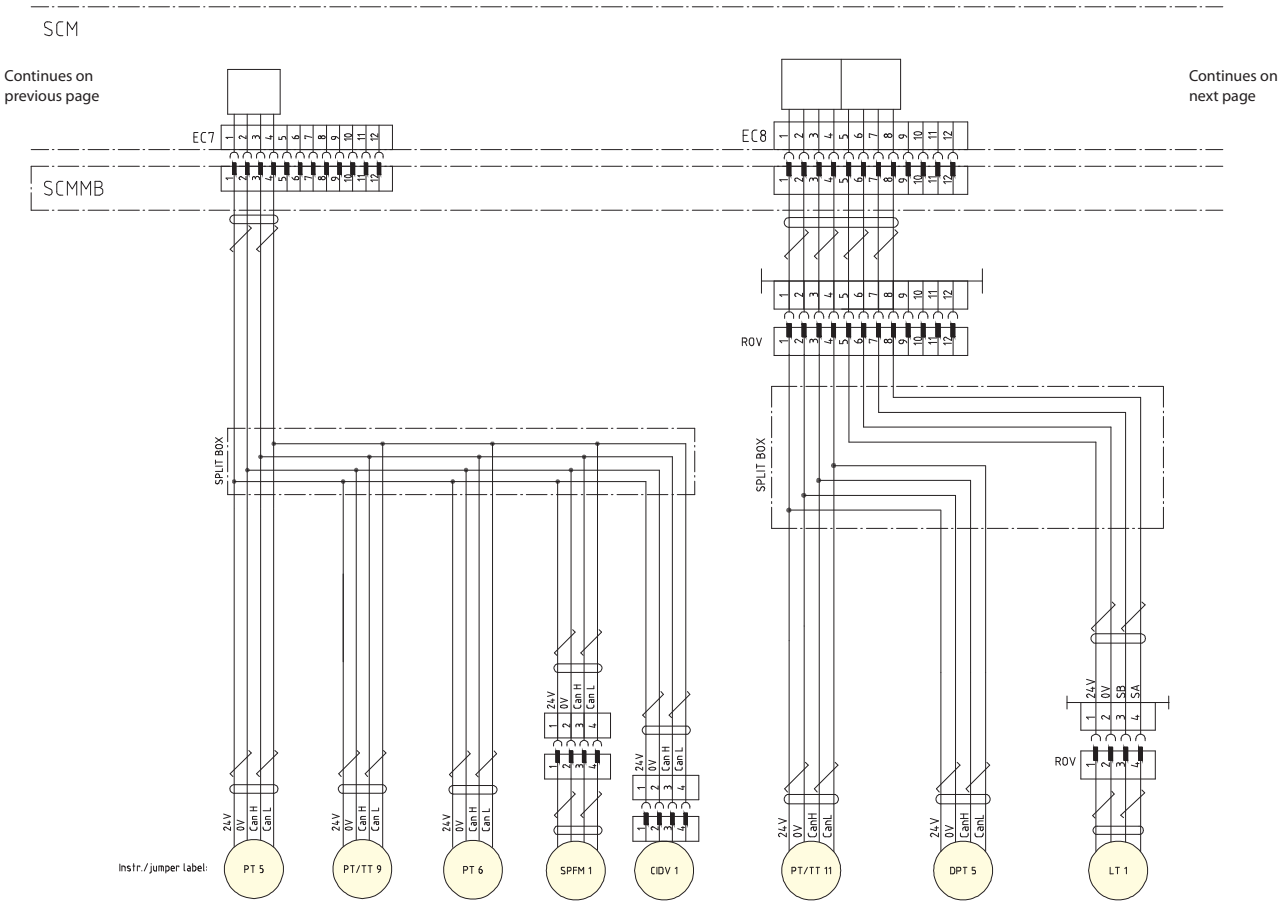


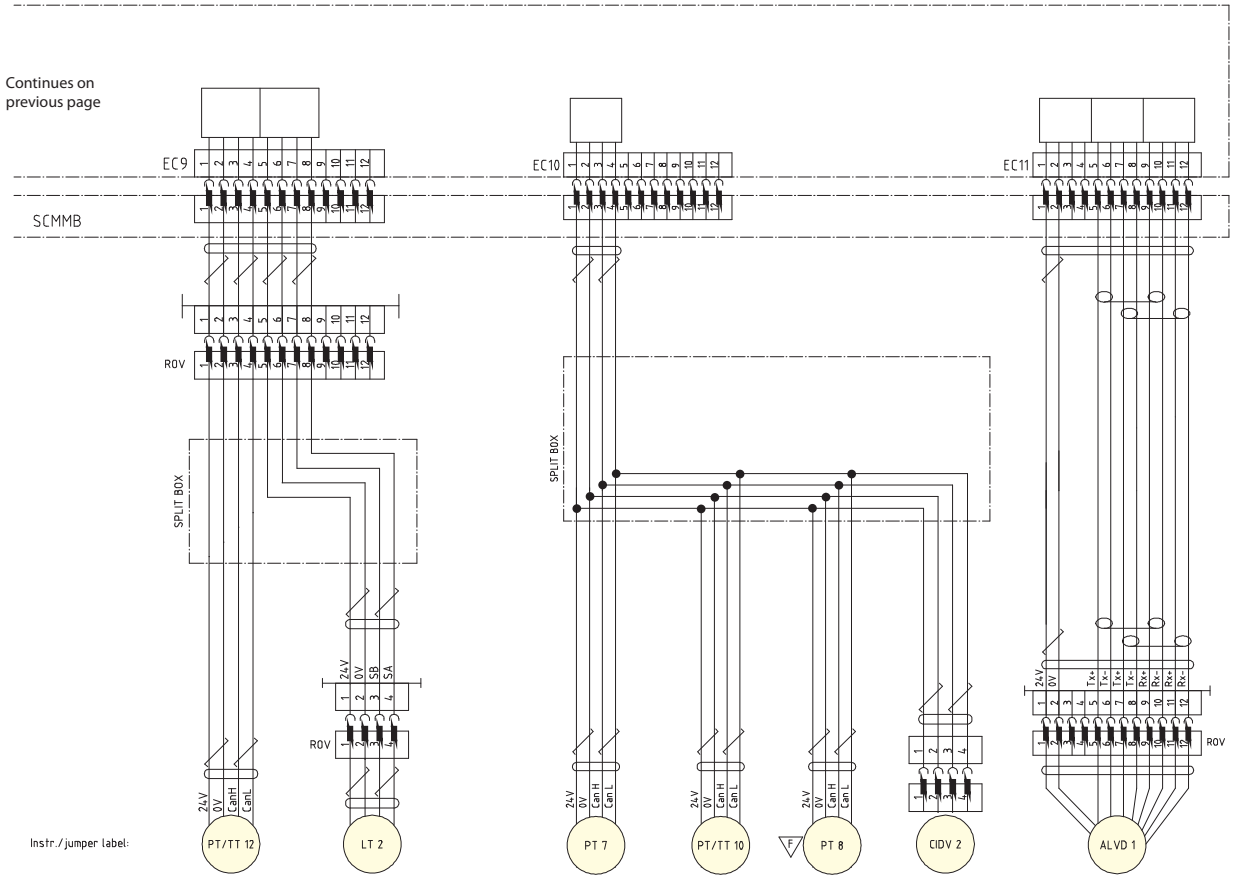
Comm. Protocol:	Can Bus	Can Bus	Can Bus	Can Bus	24VDC DO	Can Bus	Can Bus	Can Bus	Can Bus	Can Bus	24VDC DO
Comm. Speed:		E									
Sensor range:	0-400 bar/0-150°C	0-400 bar	0-400 bar/0-150°C	60-660 m3/h	On/Off	0-400 bar/0-150°C	0-400 bar/0-150°C	60-660 m3/h	0-100%	0-400 bar	On/Off
Location:	Pump B Barrier	Upstream Pump B	Downstream Pump B	FM Pump B	BF Control Pump B	Pump A Barrier	Downstream Pump A	FM Pump A	Minimum Flow Line	Upstream Pump A	BF Control Pump A
Probe/Nose Info:											
Model:	WEPS 6	WEPS 6	WEPS 6	Subsea Flowmeter		WEPS 6	WEPS 6	Subsea Flowmeter	LVDT	WEPS 6	
Manufacturer:	Matre Instruments	Matre Instruments	Matre Instruments	Framo	Framo	Matre Instruments	Matre Instruments	Framo	Cameron	Matre Instruments	Framo
Canbus no.:					N/A						N/A
Canbus Node ID:	21	22	23	24	N/A	25	26	27	28	29	N/A
P/N:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A



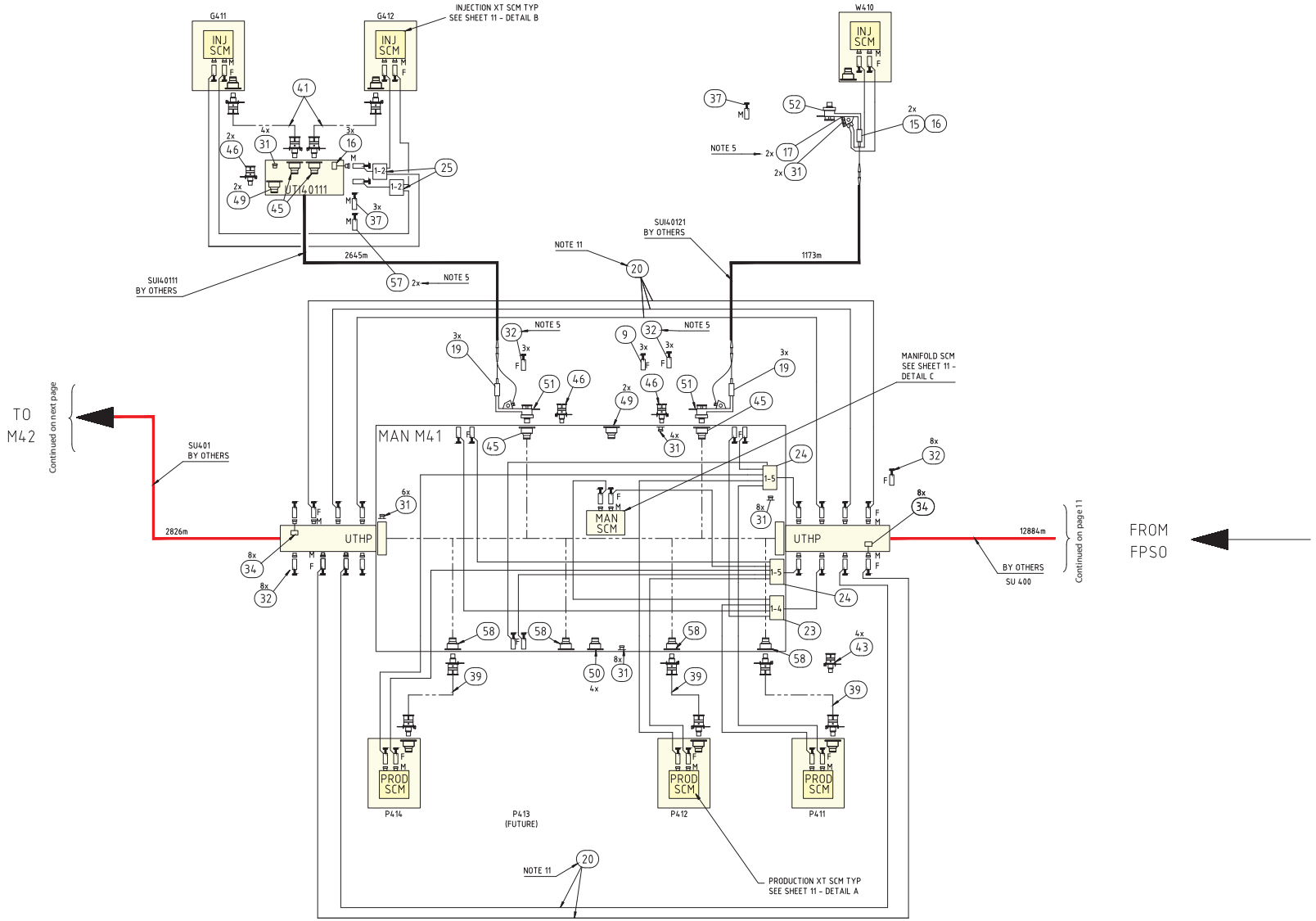
Comm. Protocol:	Can Bus	Can Bus	Can Bus	Can Bus	Can Bus	Can Bus	Can Bus	RS-485
Comm. Speed:								
Sensor range:	0-345 bar	0-345 bar/-30-150°C	0-345 bar	100-1000m3/h	50-1000 l/h / 1-15 l/h	0-345 bar/-30/-150°C	0-1,3 bar	14-1050 kg/m3
Location:	Gasline 1	Liquid Outlet	Gasline 2	Liquid Outlet	Manifold	Separator	Separator	Separator
Probe/Nose Info:	200mm	200mm	200mm			300mm		
Model:	WEPS 3	WEPS 3	WEPS 3	V-cone	Dual Core	WEPS 3	SDP-6	PRI 176
Manufacturer:	Matre Instr.	Matre Instr.	Matre Instr.	Sigurd Sørum	Skoflo	Matre Instr.	Matre Instr.	Tracerco
Canbus no.:								N/A
Can Node ID:	31	32	33	34	35/36	41	42	N/A
P/N:	P6000048350	P6000048350	P6000048350	P6000043394	P6000044442	P6000046408	P6000046413	P6000042368

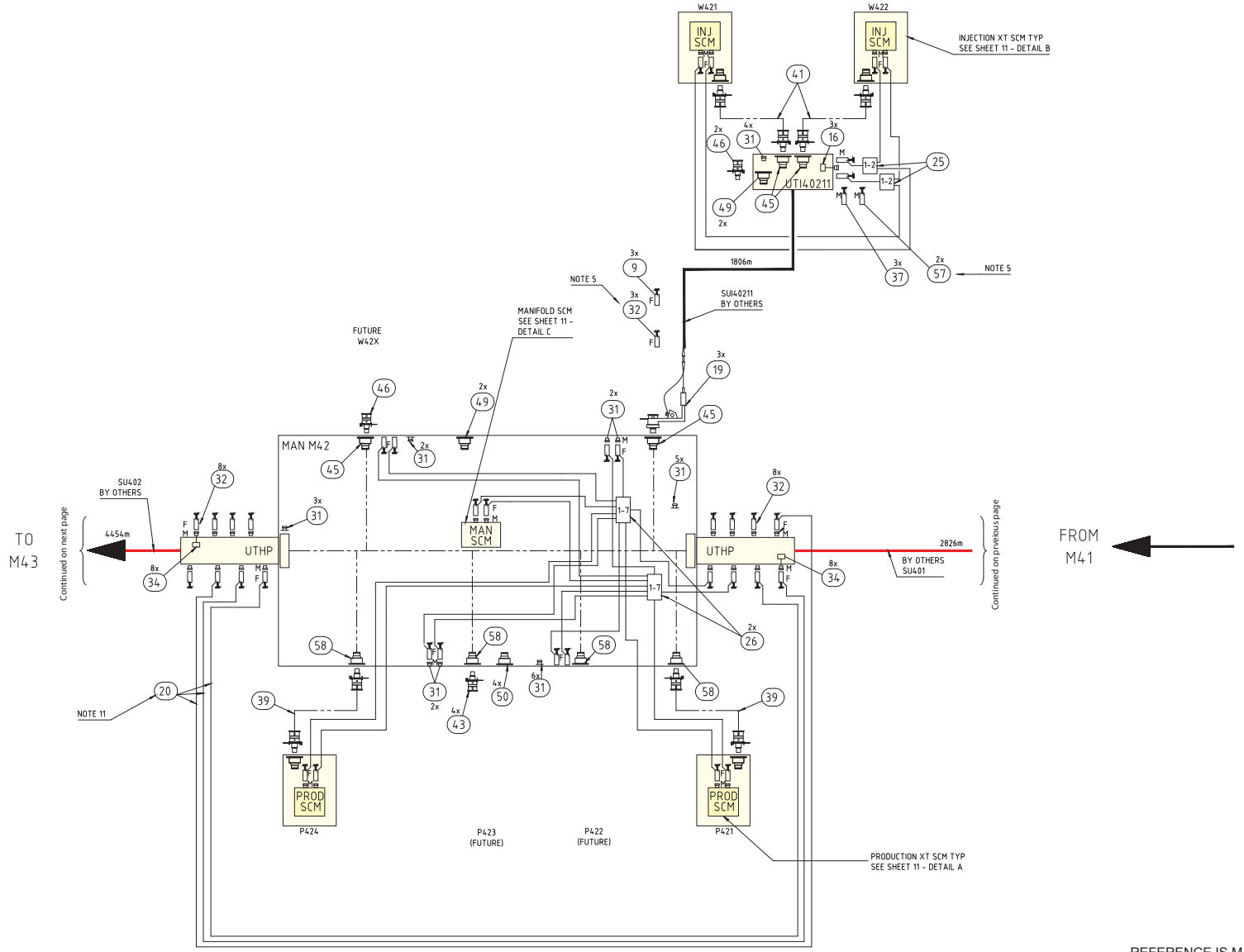
REFERENCE IS MADE TO
DA600032357/AO-040-SG-400-150007

SSS SCM Sensor Schematic

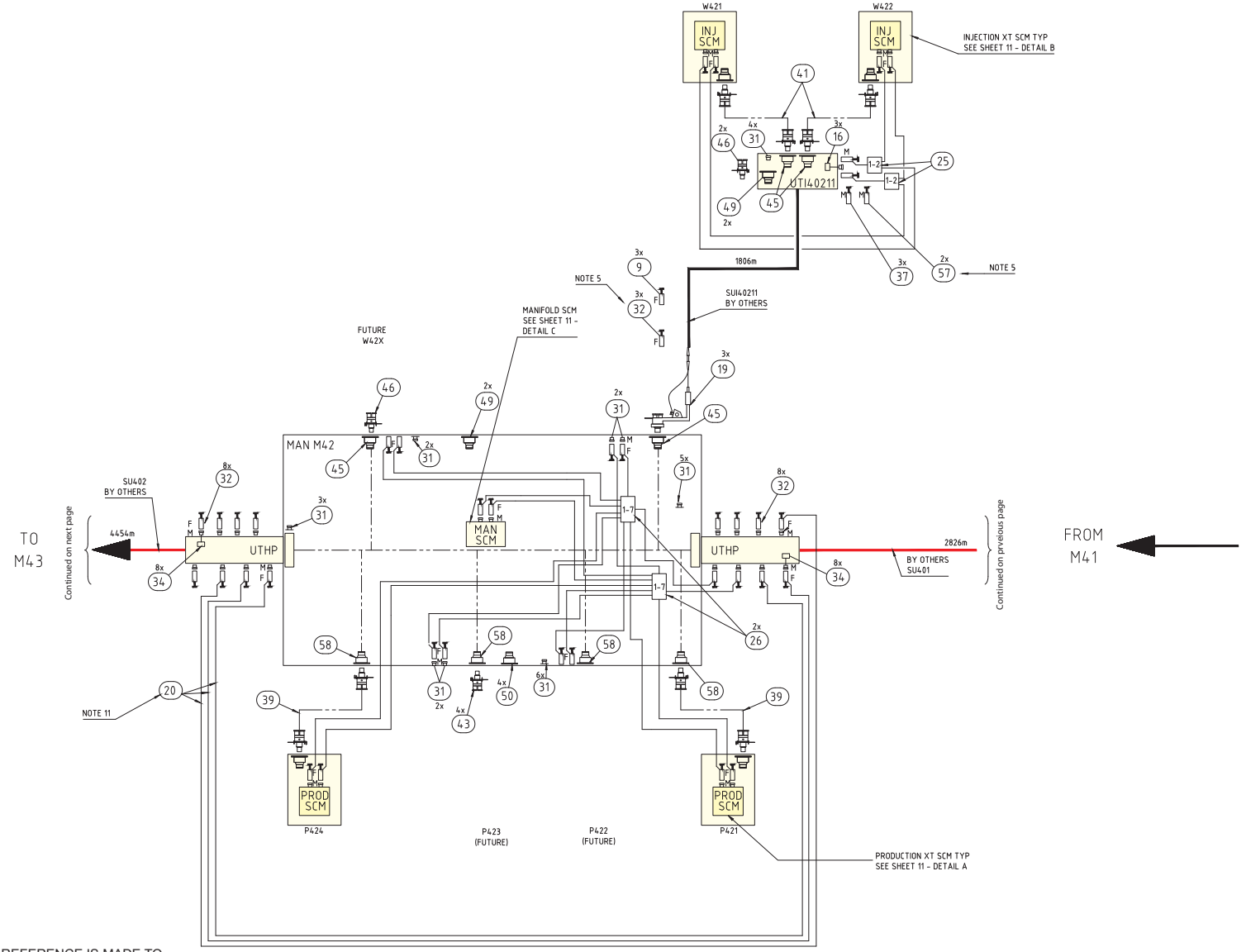


Comm. Protocol:	Can Bus	RS-485	Can Bus	Can Bus	Can Bus	Can Bus	Ethernet
Comm. Speed:							
Sensor range:	0-345 bar/-30-150° C	14-1050kg/m3	0-345 bar	0-345 bar/-30-150°C	0-345 bar	50-1000 l/h / 1-20 l/h	
Location:	Separator	Separator	Gasline 1	Liquid Outlet	Gasline 2	Manifold	Manifold
Probe/Nose Info:	300mm		200mm	200mm	200mm		
Model:	WEPS 3	PRI 176	WEPS 3	WEPS 3	WEPS 3	Dual Core	
Manufacturer:	Matre Instr.	Tracerco	Matre Instr.	Matre Instr.	Matre Instr.	Skoflo	Bjørge
Canbus no.:		N/A					N/A
Can Node ID:	51	N/A	61	62	63	64/65	N/A
P/N:	P6000046408	P6000042368	P6000048350	P6000048350	P6000048350	P6000044442	P6000044757


G411
G412
INJECTION XT SCM TYP
SEE SHEET 11 - DETAIL B
W410
INJ SCM
UT140111
SUI40111
BY OTHERS
2645m
SUI40121
BY OTHERS
1173m
NOTE 11
NOTE 5
MANIFOLD SCM
SEE SHEET 11 -
DETAIL C
MAN M41
MAN SCM
UTHP
TO
M42
Continued on next page
SU401
BY OTHERS
2826m
12884m
BY OTHERS
SU 400
Continued on page 11
FROM
FPSO
PROD SCM
P414
P413
(FUTURE)
P412
P411
PRODUCTION XT SCM TYP
SEE SHEET 11 - DETAIL A

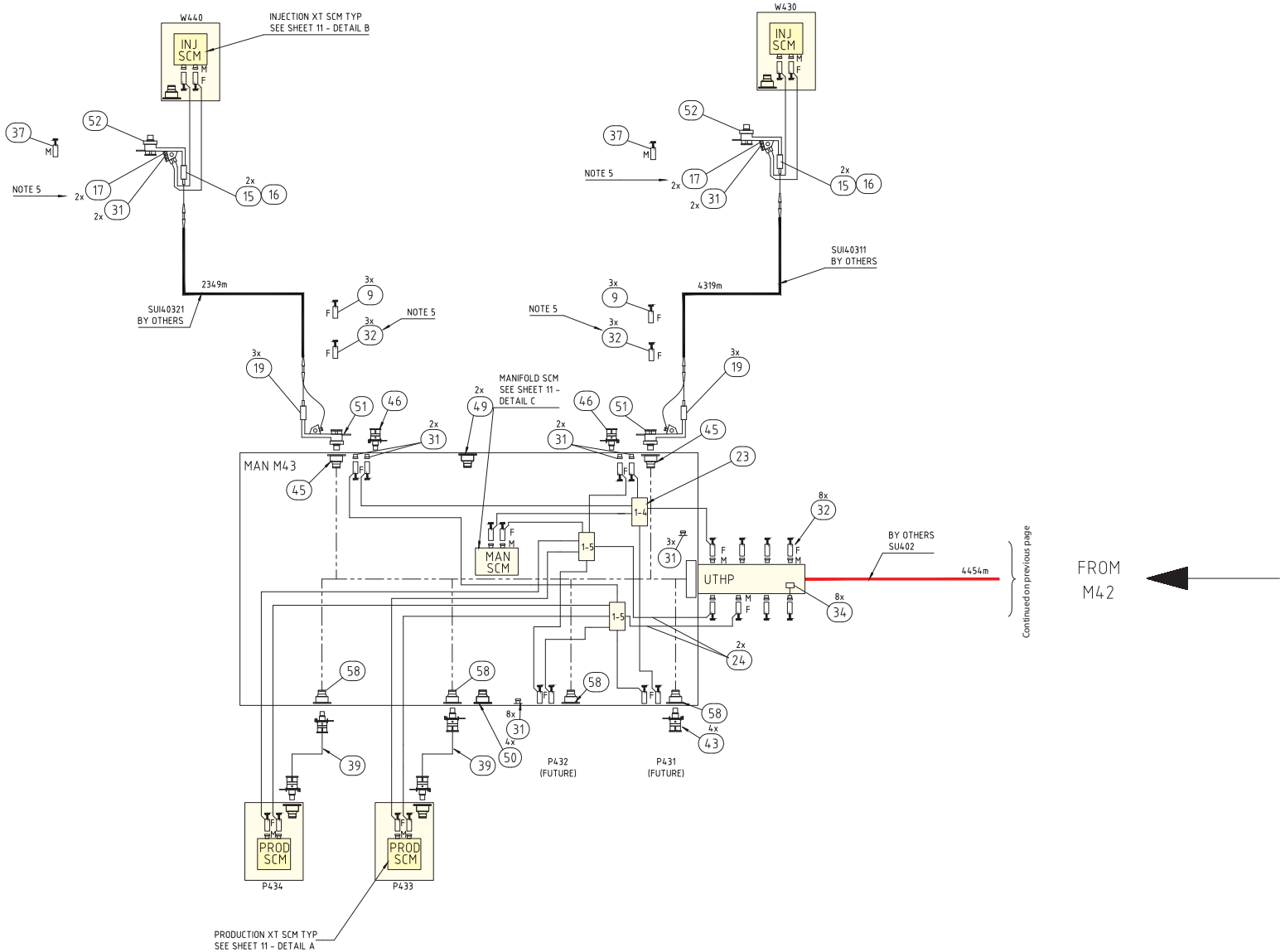


Control Hydraulic Schematic

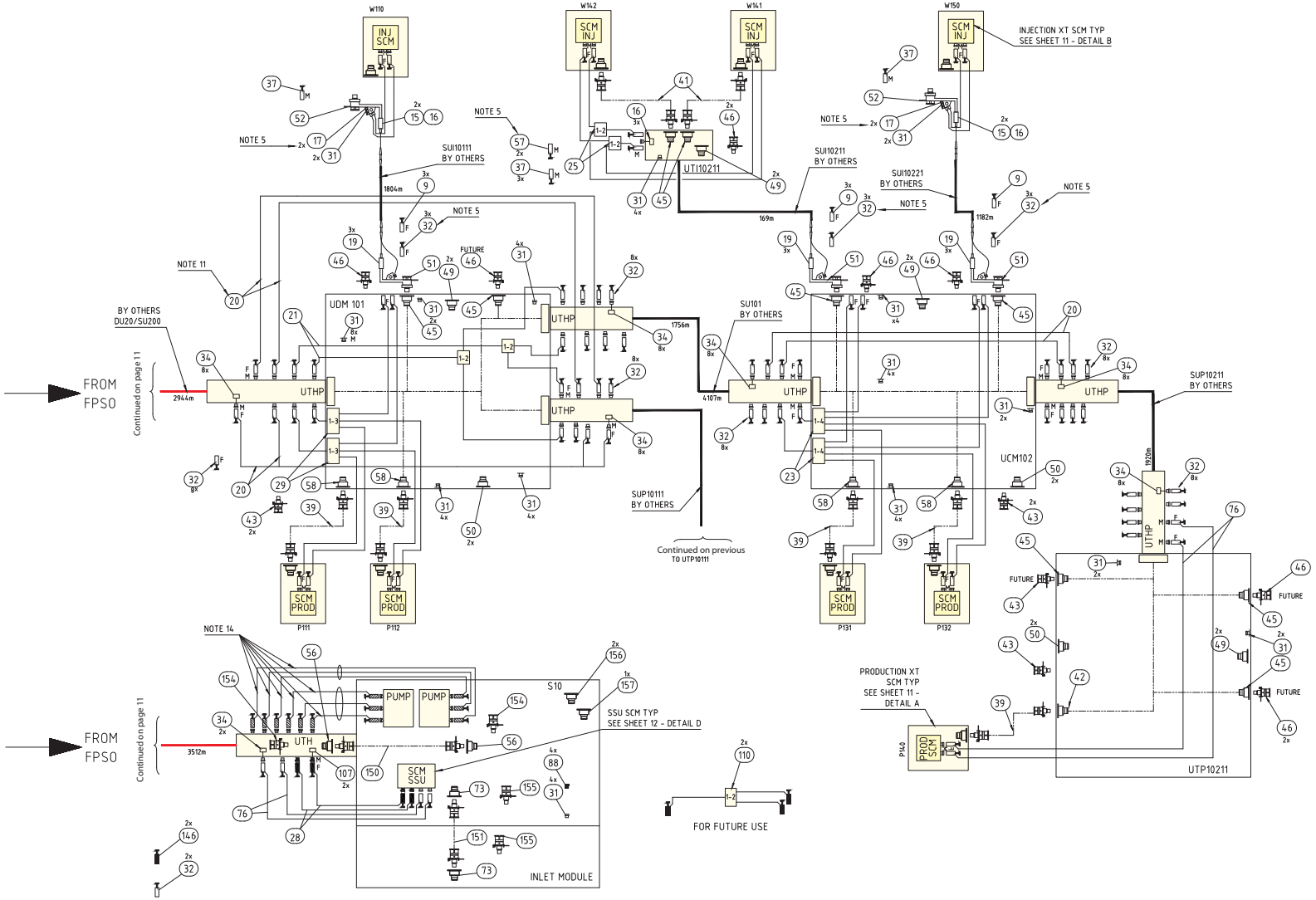


REFERENCE IS MADE TO
DA600032394/AO-040-SF-400-150001

Control Hydraulic Schematic

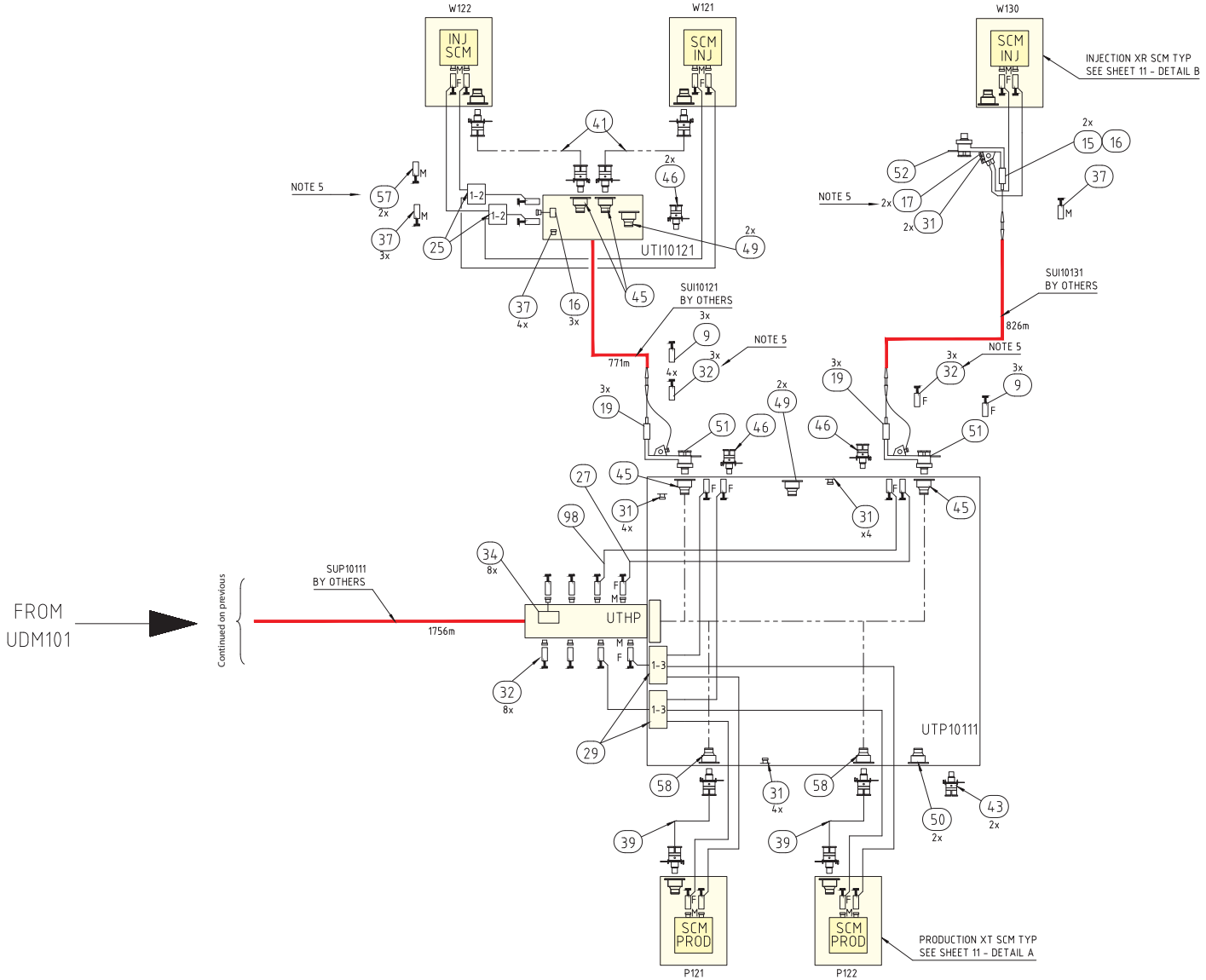


Control Hydraulic Schematic



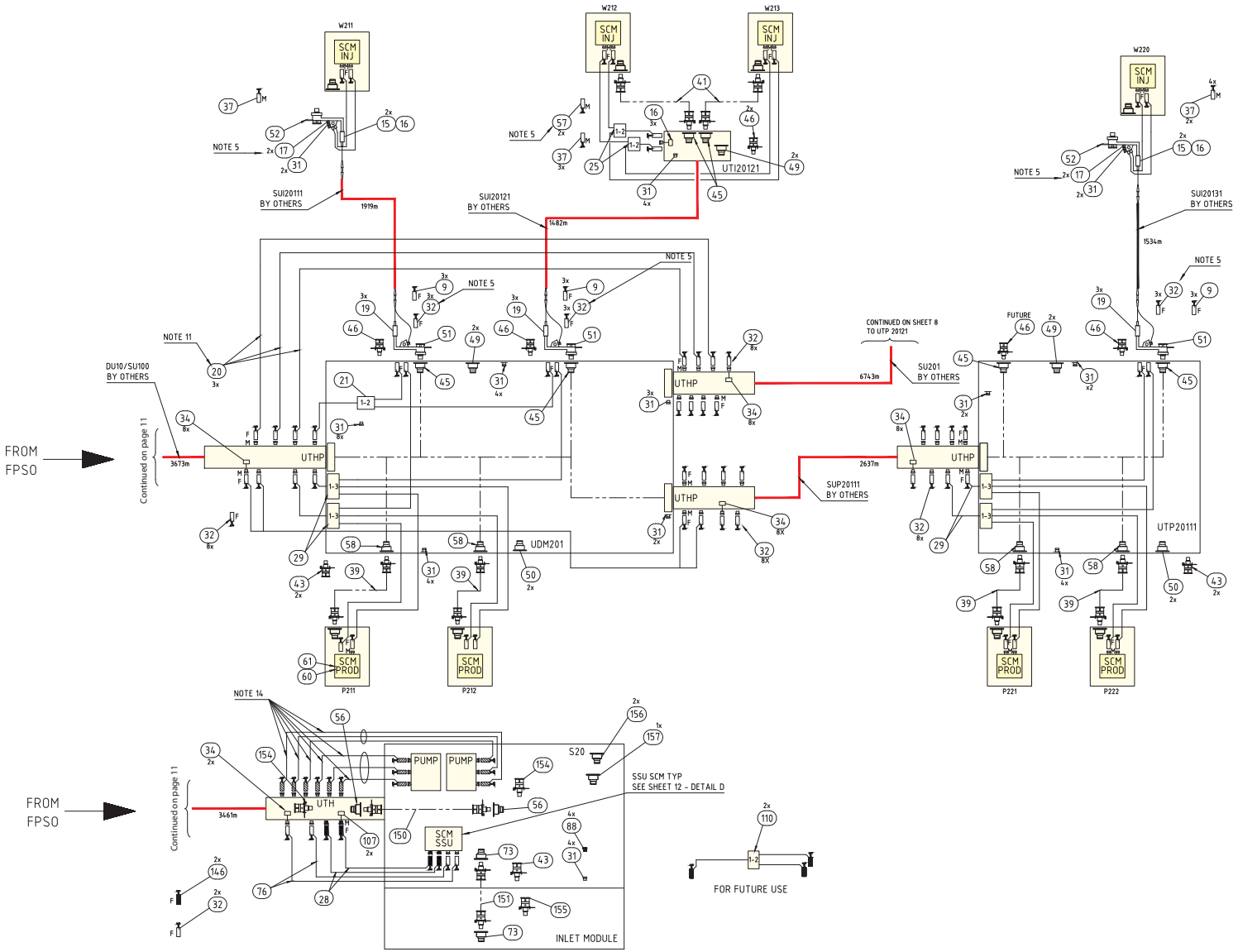
REFERENCE IS MADE TO
DA600032394/AO-040-SF-400-150001

Control Hydraulic Schematic



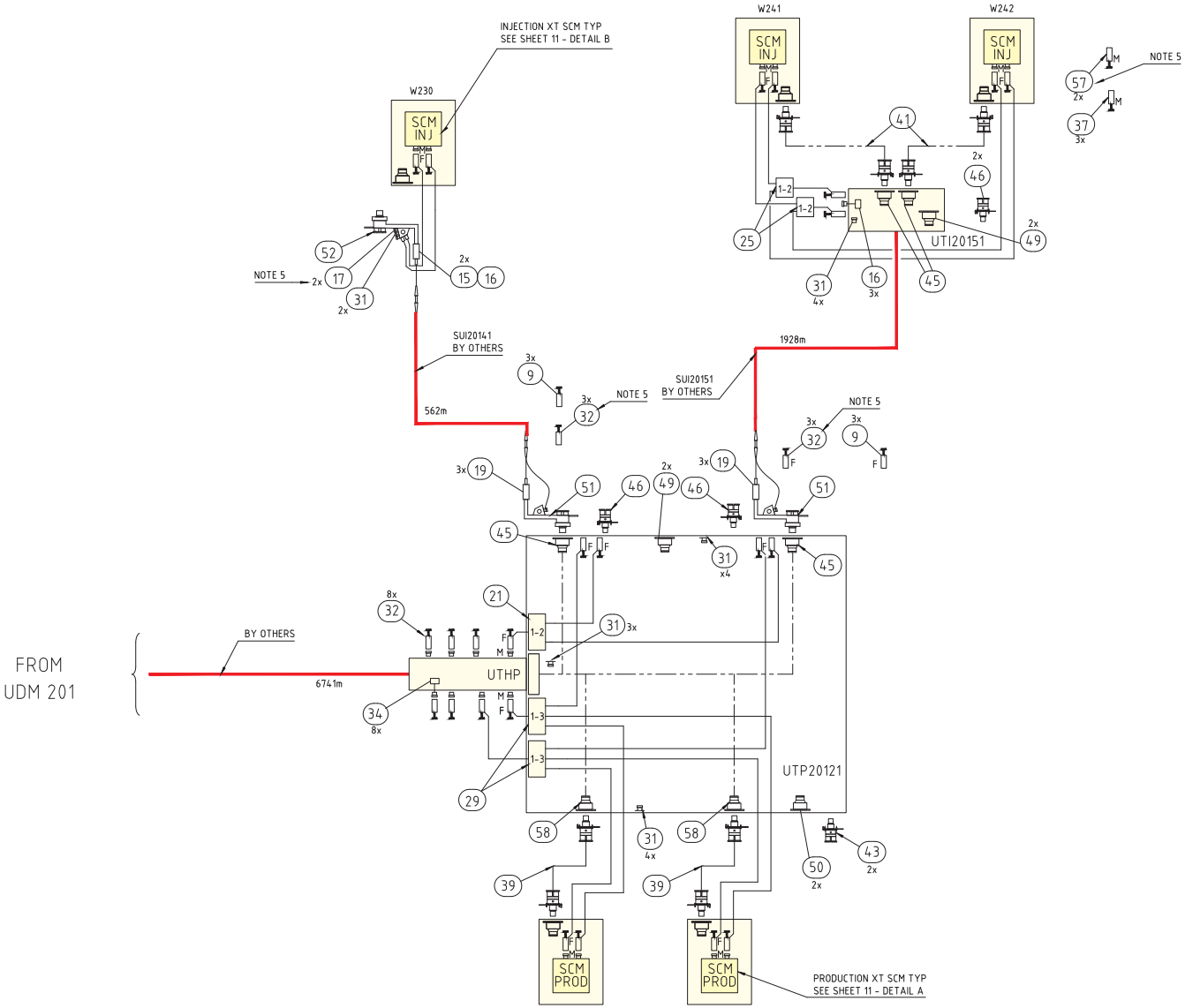
Control Hydraulic Schematic

REFERENCE IS MADE TO DA600032394/AO-040-SF-400-150001



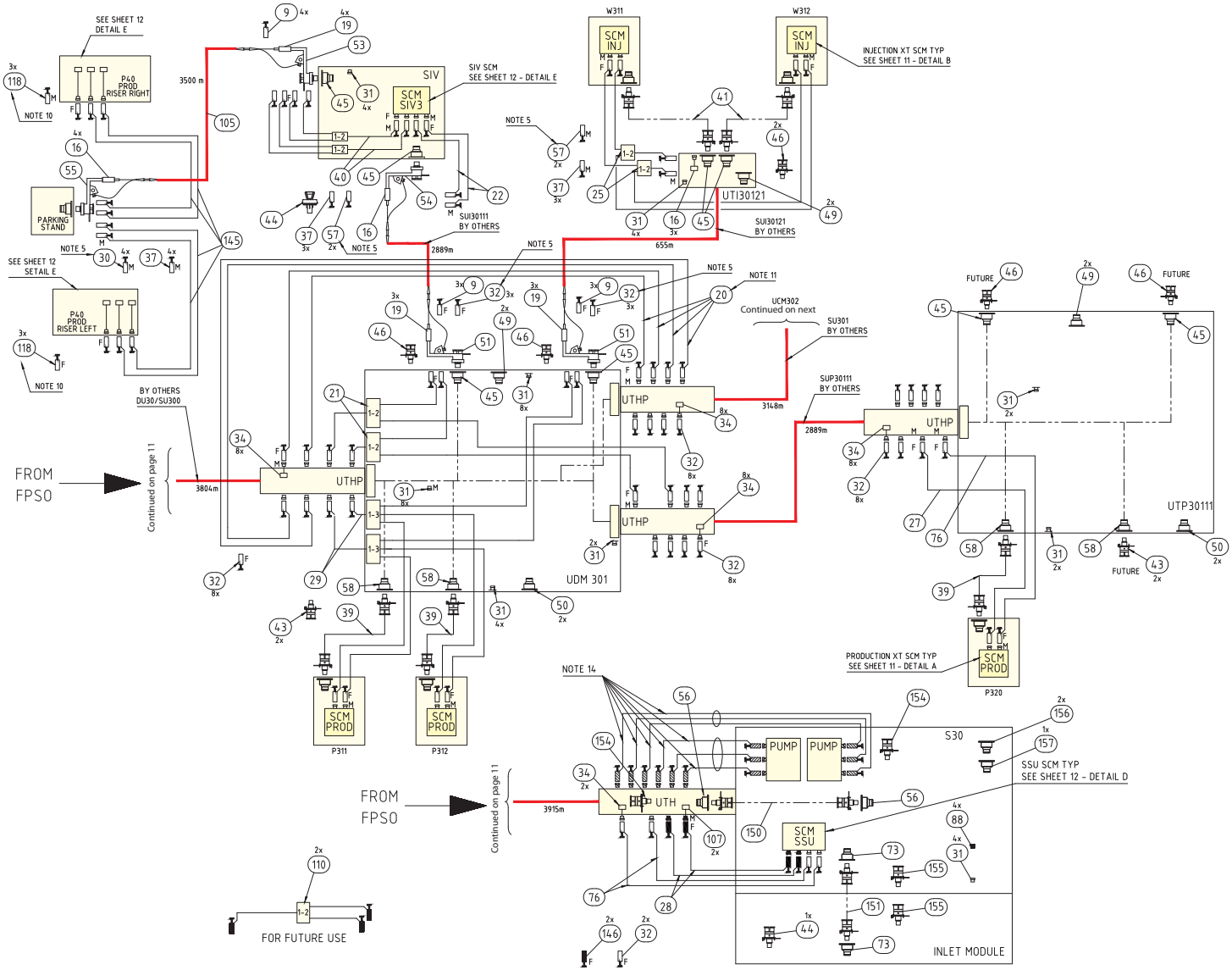
REFERENCE IS MADE TO DA600032394/AO-040-SF-400-150001

Control Hydraulic Schematic



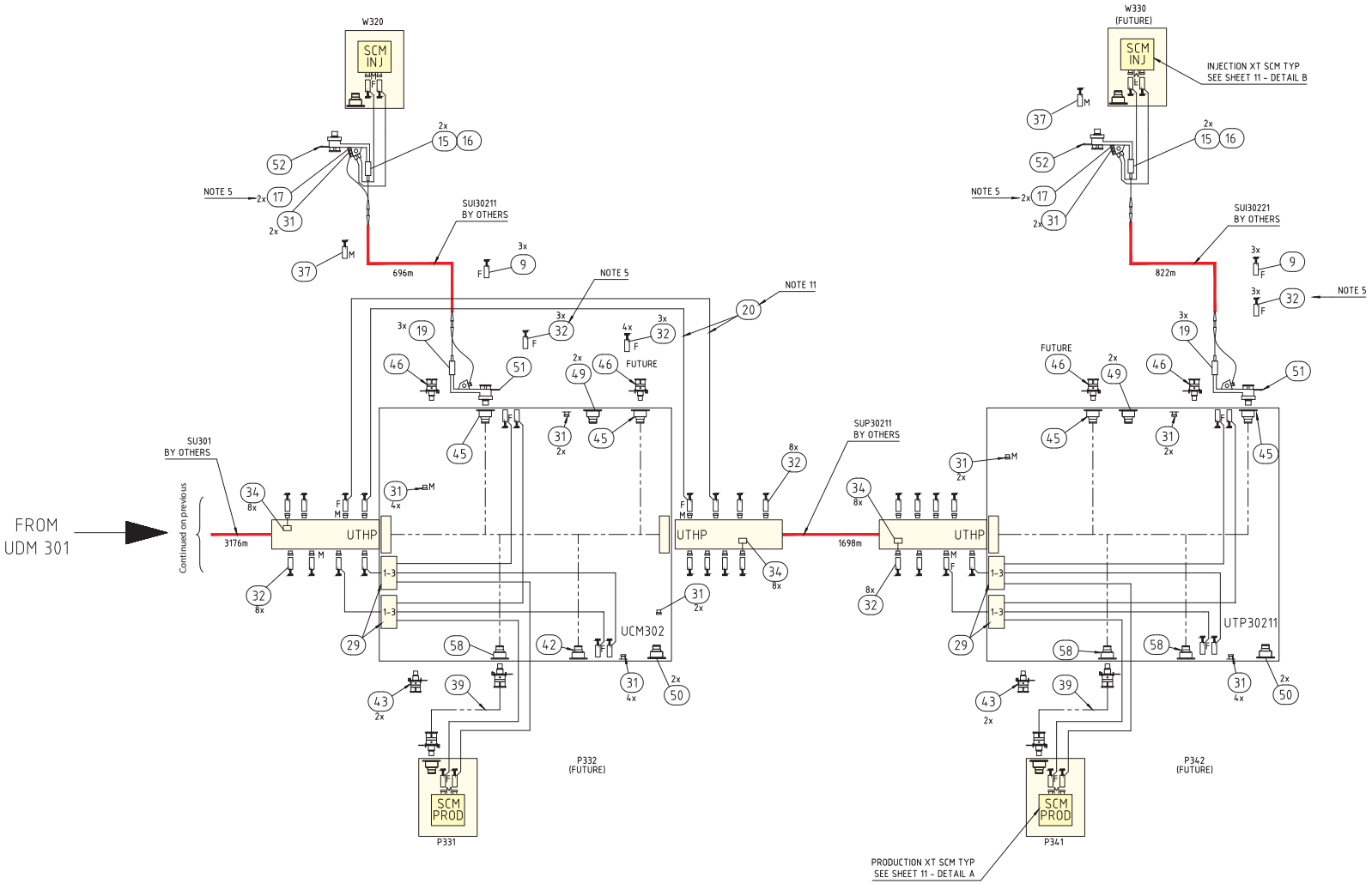
Control Hydraulic Schematic

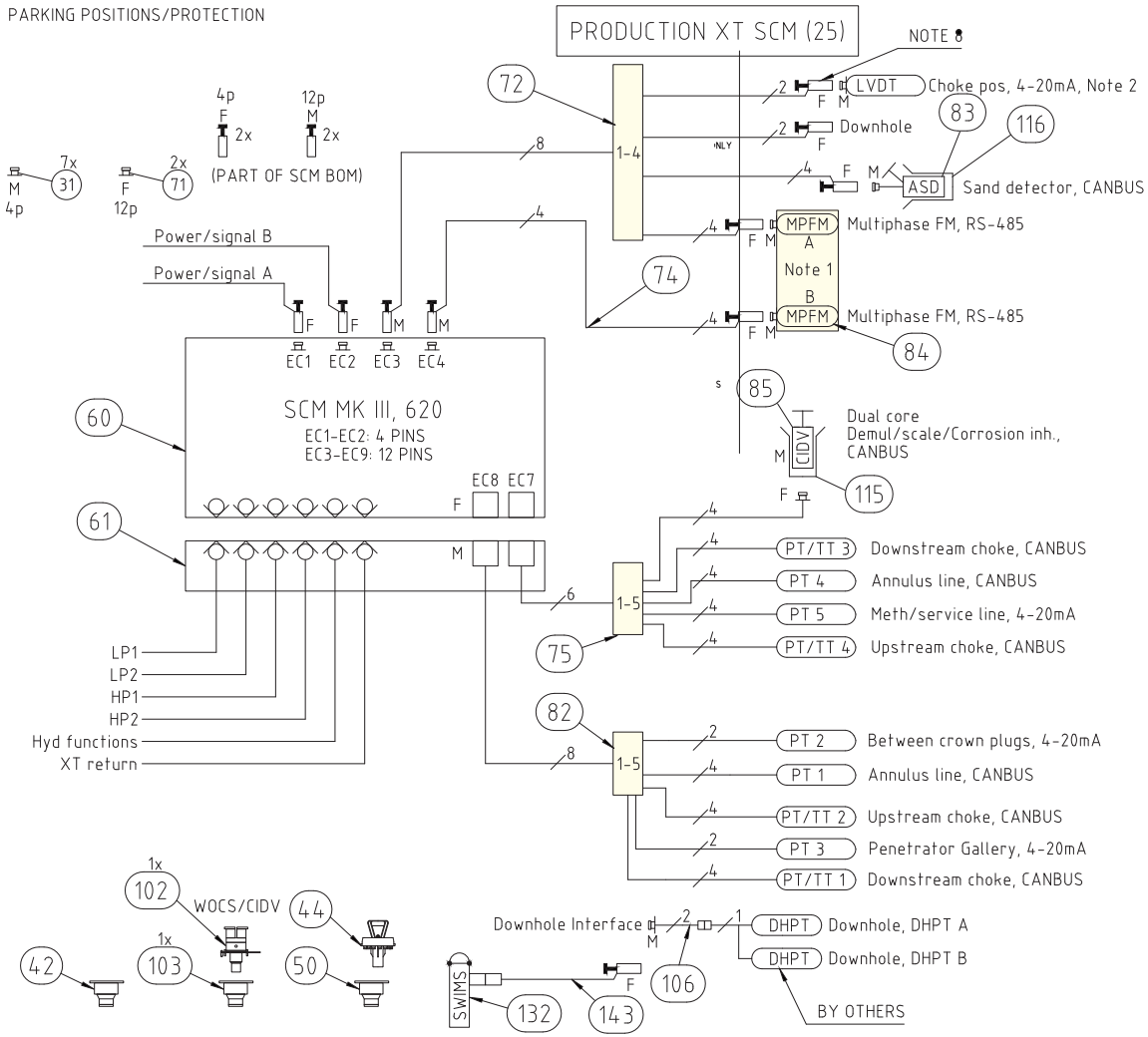
REFERENCE IS MADE TO DA600032394/AO-040-SF-400-150001



REFERENCE IS MADE TO
DA600032394/AO-040-SF-400-150001

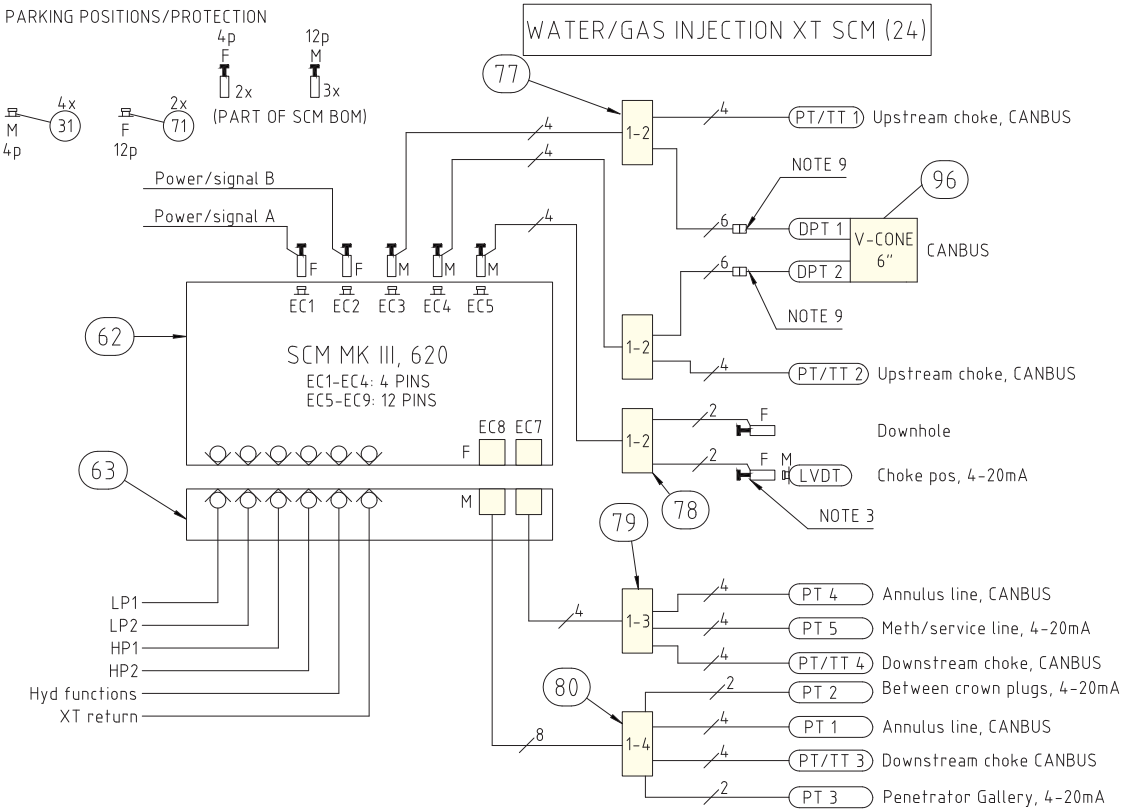
Control Hydraulic Schematic


FROM
UDM 301
Continued on previous
SU301
BY OTHERS
3176m
UTHP
W320
SCM
INJ
SUI30211
BY OTHERS
696m
NOTE 5
NOTE 11
FUTURE
UCM302
SUP30211
BY OTHERS
1698m
W330
(FUTURE)
INJECTION XT SCM TYP
SEE SHEET 11 - DETAIL B
SUI30221
BY OTHERS
822m
UTP30211
SCM
PROD
P331
P332
(FUTURE)
P341
P342
(FUTURE)
PRODUCTION XT SCM TYP
SEE SHEET 11 - DETAIL A



DETAIL A

SCM CONFIGURATION
LP HYD FUNCTIONS
1. HC3: PMV
2. HC4: PWV
3. HC5: PCV (O)
4. HC6: PCV (C)
5. HC7: AMV
6. HC8: AWV
7. HC9: AAV WOCS MODE C
8. HC10: XOV
9. HC11: MIV A
10. HC12: MIV B
11. HC13: BLINDED
12. HC14: CIV A
13. HC15: CIV B
14. HC16: CIV C
15. HC17: BLINDED
16. HC18: BLINDED
17. HC19: BLINDED
18. HC20: BLINDED
HP HYD FUNCTIONS
1. HC21: BLINDED
2. HC22: BLINDED
3. HC23: BLINDED
4. HC24: BLINDED
5. HC25: SCSSV OPEN
6. HC26: NOT IN USE
HYD SUPPLY/RETURN LINE
1. HC1: LP1 supply
2. HC2: LP2 supply
3. HC51: HP1 supply
4. HC52: HP2 supply
5. HC61: RETURN

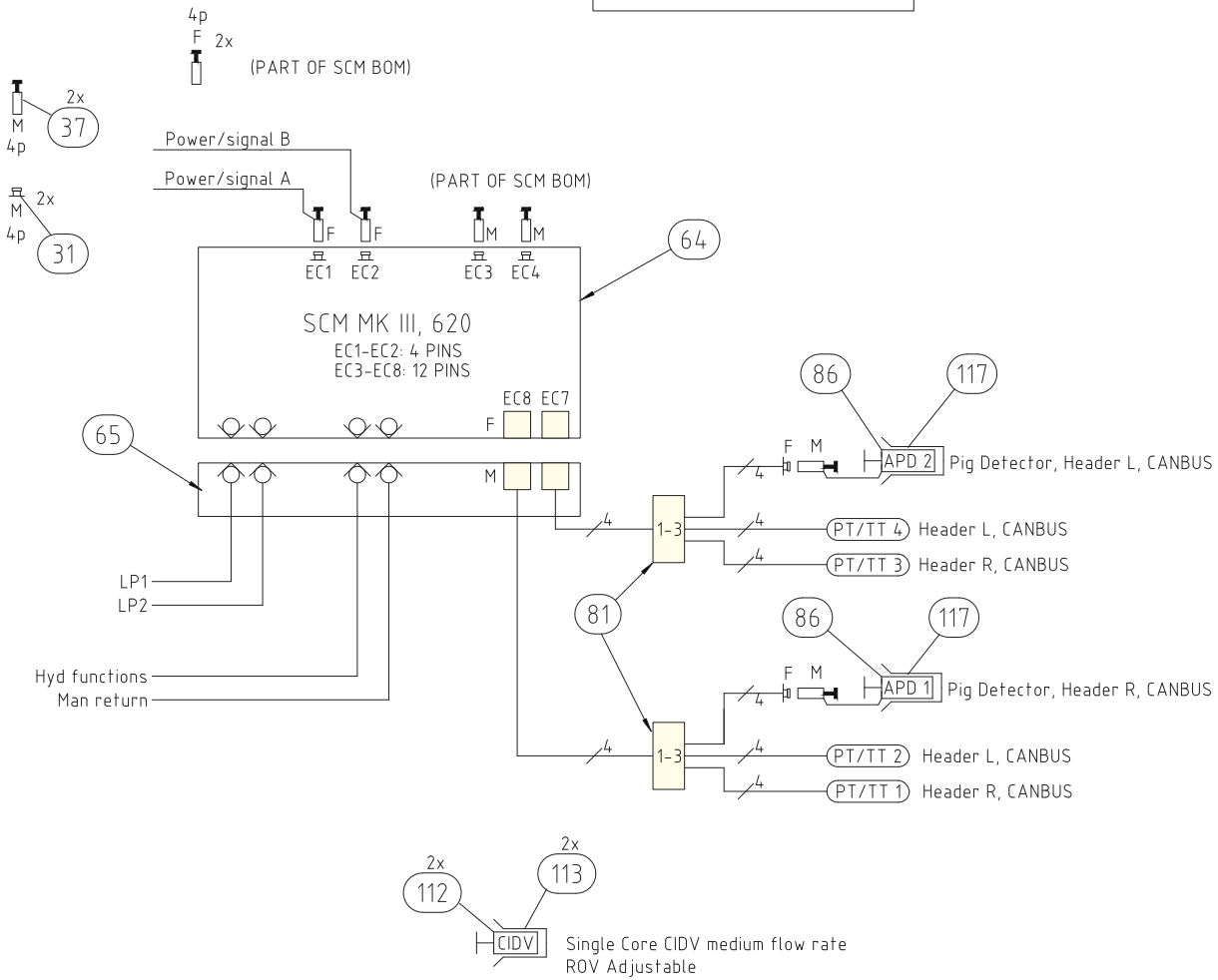


SCM CONFIGURATION

LP HYD FUNCTIONS
1. HC3: IMV
2. HC4: IWV
3. HC5: ICV (O)
4. HC6: ICV (C)
5. HC7: AMV
6. HC8: AWV
7. HC9: AAV WOCS MODE ONLY
8. HC10: XOV
9. HC11: MIVA
10. HC12: BLINDED
11. HC13: BLINDED
12. HC14: BLINDED
13. HC15: BLINDED
14. HC16: BLINDED
15. HC17: BLINDED
16. HC18: BLINDED
17. HC19: BLINDED
18. HC20: BLINDED
HP HYD FUNCTIONS
1. HC21: BLINDED
2. HC22: IWC 2
3. HC23/53: IWC 1/2
4. HC24/54: BLINDED
5. HC25/55: SCSSV OPEN/IWC 1
6. HC26/56: SCSSV FLUSHING
HYD SUPPLY/RETURN LINES
1. HC1: LP1 SUPPLY
2. HC2: LP2 SUPPLY
3. HC51: HP1 SUPPLY
4. HC52: HP2 SUPPLY
5. HC61: RETURN

PARKING POSITIONS/PROTECTION

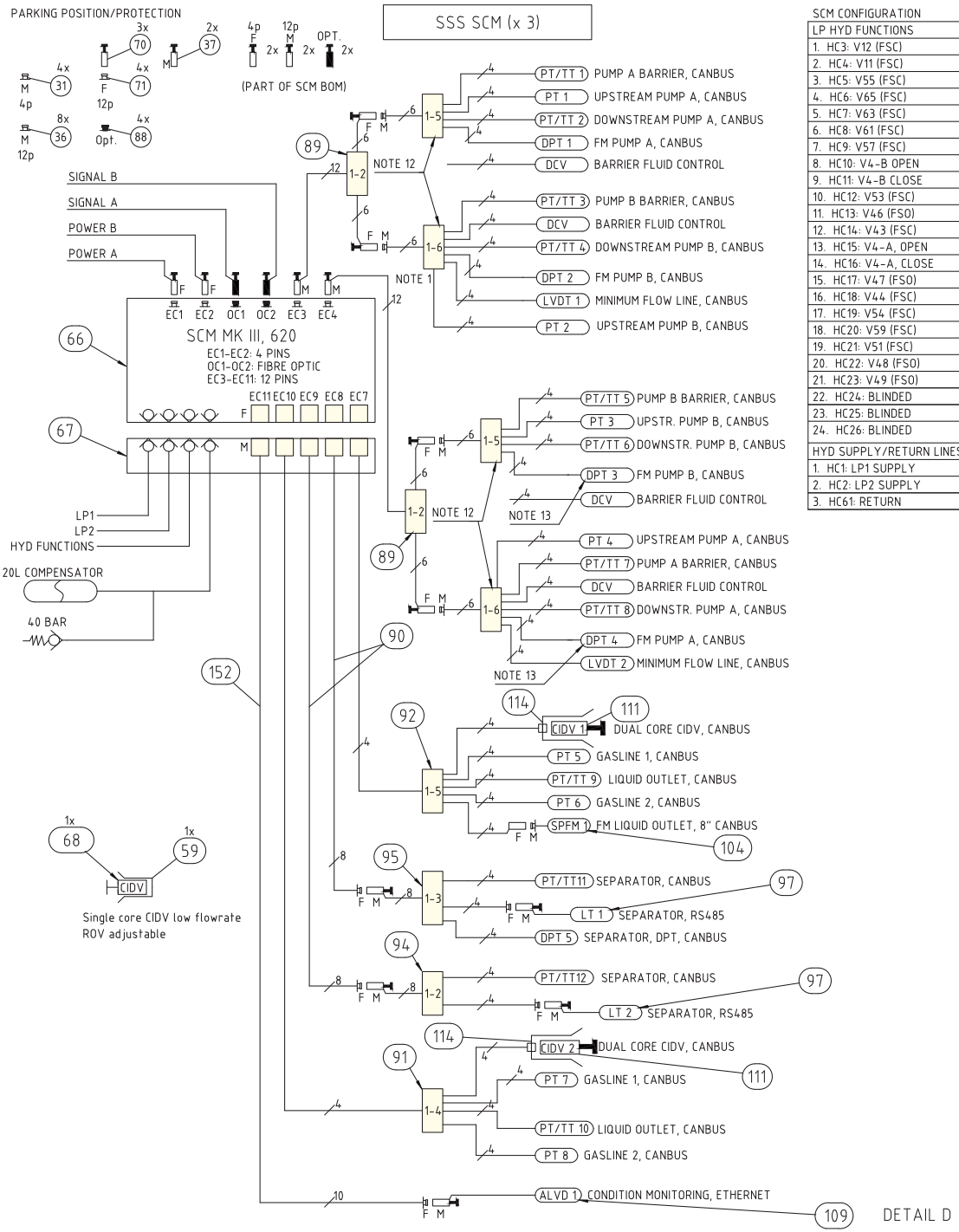
MANIFOLD SCM (3)



SCM CONFIGURATION

LP HYD FUNCTIONS
1. HC3: HV L
2. HC4: HV R
3. HC5: BV01 L
4. HC6: BV01 R
5. HC7: BV02 L
6. HC8: BV02 R
7. HC9: BV03 L
8. HC10: BV03 R
9. HC11: BV04 L
10. HC12: BV04 R
11. HC13: CIV R
12. HC14: CIV L
13. HC15: MIV
14. HC16: BLINDED
15. HC17: BLINDED
16. HC18: BLINDED
17. HC19: BLINDED
18. HC20: BLINDED
19. HC21: NOT USED, SIV ONLY
20. HC22: BLINDED
21. HC23: BLINDED
22. HC24: BLINDED
23. HC25: BLINDED
24. HC26: BLINDED
HYD SUPPLY/RETURN LINES
1. HC1: LP1 SUPPLY
2. HC2: LP2 SUPPLY
5. HC61: RETURN

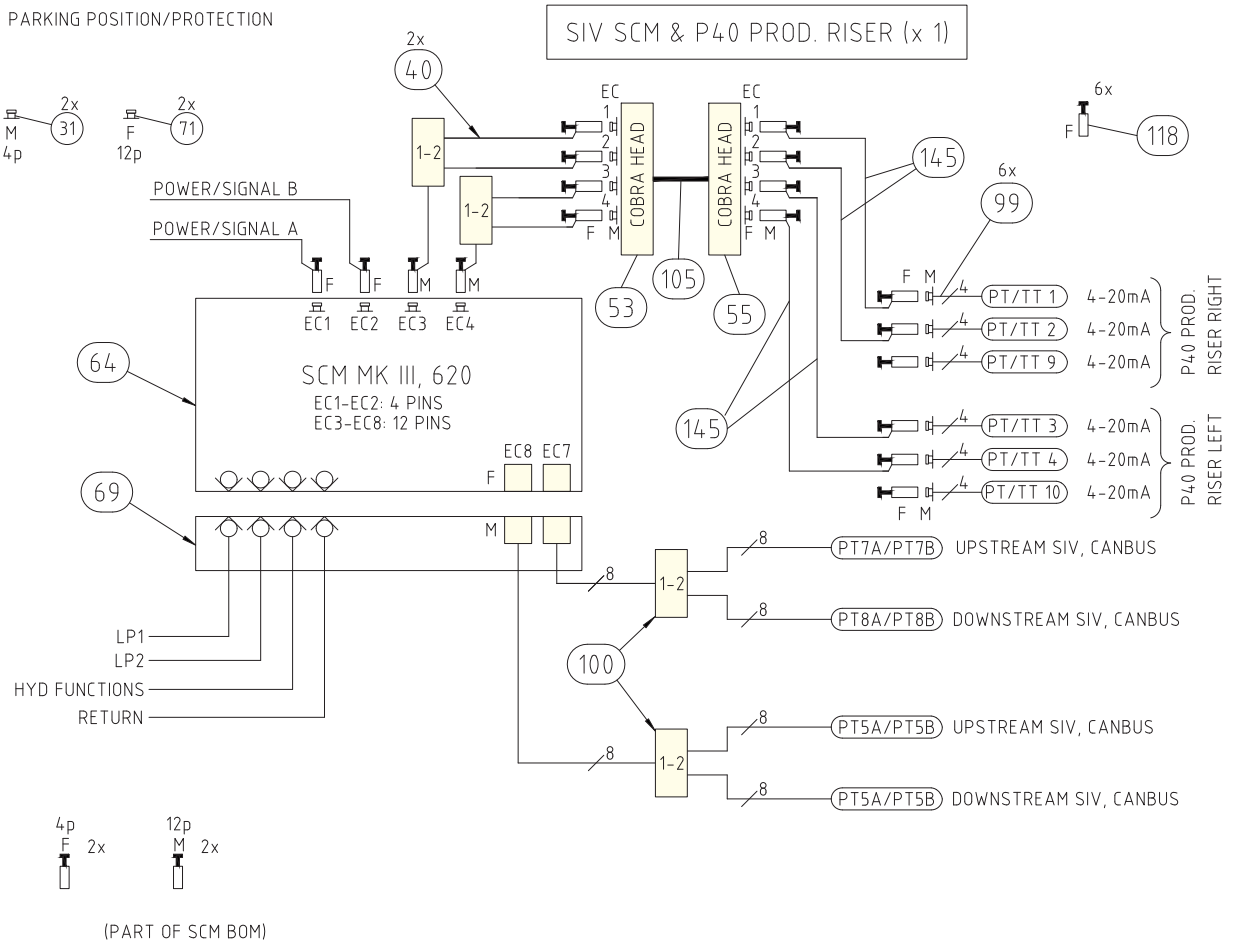
DETAIL C



SCM CONFIGURATION

LP HYD FUNCTIONS
1. HC3: V12 (FSC)
2. HC4: V11 (FSC)
3. HC5: V55 (FSC)
4. HC6: V65 (FSC)
5. HC7: V63 (FSC)
6. HC8: V61 (FSC)
7. HC9: V57 (FSC)
8. HC10: V4-B OPEN
9. HC11: V4-B CLOSE
10. HC12: V53 (FSC)
11. HC13: V46 (FSO)
12. HC14: V43 (FSC)
13. HC15: V4-A, OPEN
14. HC16: V4-A, CLOSE
15. HC17: V47 (FSO)
16. HC18: V44 (FSC)
17. HC19: V54 (FSC)
18. HC20: V59 (FSC)
19. HC21: V51 (FSC)
20. HC22: V48 (FSO)
21. HC23: V49 (FSO)
22. HC24: BLINDED
23. HC25: BLINDED
24. HC26: BLINDED
HYD SUPPLY/RETURN LINES
1. HC1: LP1 SUPPLY
2. HC2: LP2 SUPPLY
3. HC61: RETURN

REFERENCE IS MADE TO
DA60003239 4/AO-040-SF-400-150001
PAZFLOR



SCM CONFIGURATION

LP HYD FUNCTIONS
1. HC3: N/A (MANIFOLD ONLY)
2. HC4: N/A (MANIFOLD ONLY)
3. HC5: N/A (MANIFOLD ONLY)
4. HC6: N/A (MANIFOLD ONLY)
5. HC7: N/A (MANIFOLD ONLY)
6. HC8: N/A (MANIFOLD ONLY)
7. HC9: N/A (MANIFOLD ONLY)
8. HC10: N/A (MANIFOLD ONLY)
9. HC11: N/A (MANIFOLD ONLY)
10. HC12: N/A (MANIFOLD ONLY)
11. HC13: N/A (MANIFOLD ONLY)
12. HC14: N/A (MANIFOLD ONLY)
13. HC15: N/A (MANIFOLD ONLY)
14. HC16: BLINDED
15. HC17: BLINDED
16. HC18: BLINDED
17. HC19: BLINDED
18. HC20: BLINDED
19. HC21: SIV (CONT. HELD)
20. HC22: BLINDED
21. HC23: BLINDED
22. HC24: BLINDED
23. HC25: BLINDED
24. HC26: BLINDED
HYD SUPPLY/RETURN LINES
1. HC1: LP1 SUPPLY
2. HC2: LP2 SUPPLY
3. HC51: BLINDED
4. HC52: BLINDED
5. HC61: RETURN

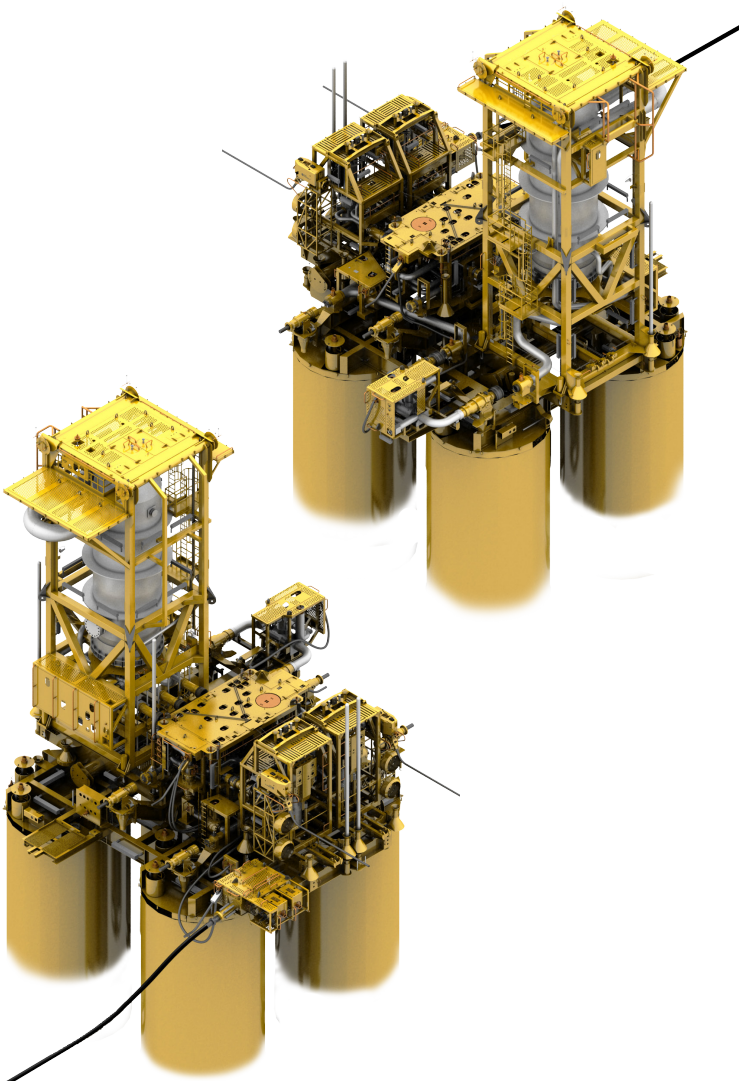
DETAIL E

REFERENCE IS MADE TO
DA600032394/AO-040-SF-400-150001

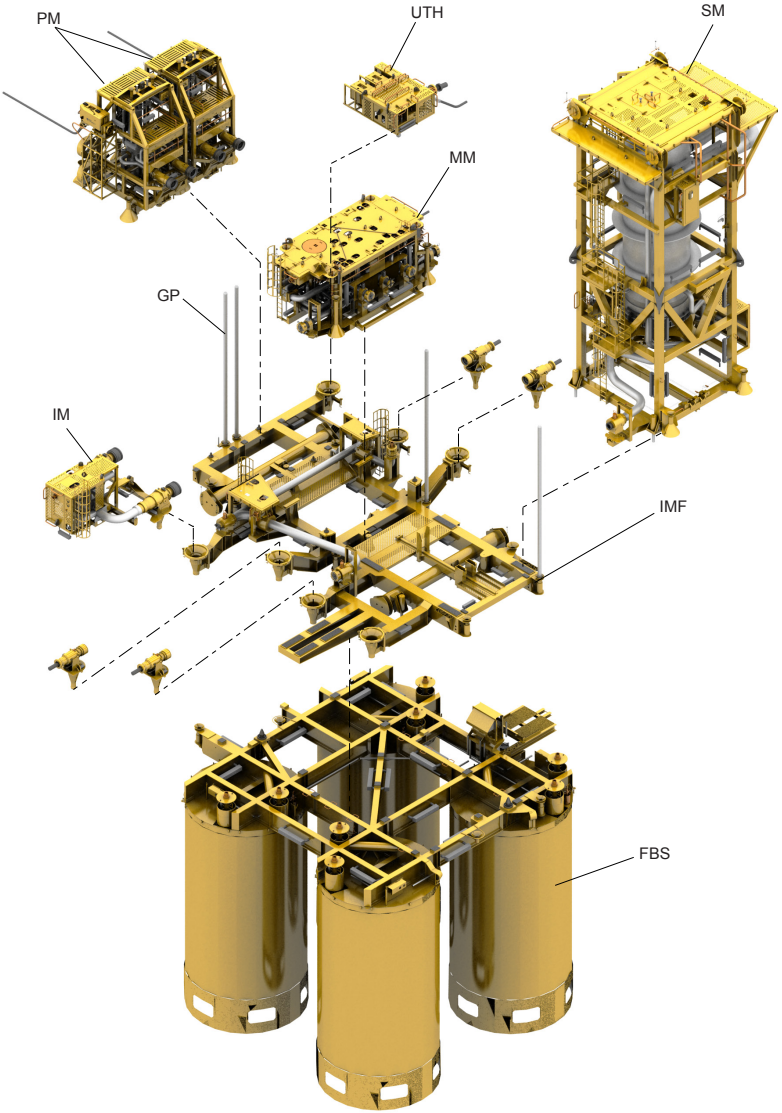
NO.	DESCRIPTION	QTY.	PN.
1	SCU 200, SPS	4	TYPICAL P6000044483
2	SCU 200, SSS	1	P6000042990
3	SPCU 200E, 1 X 8 LINES POWER/SIGNAL	8	TYPICAL P600046557
4	SUBSEA PUMP, CONTROL CABINET	3	TYPICAL P600041871
5	ALVD WS, SDPU-001	1	100025030
6	SCU HPU	1	P6000044482
7	SPCU 200E, 2 X 3 LINES WITH OPTICAL NODES	1	P6000042992
8	MPFM WS, SDPU-001	1	P6000042887
9	ELECTRICAL CONN, 04W SOCKET ROV, SUBSEA PROTECTION	61	P6000045363
10	HPU SYSTEM, 2 LP AND 2 HP	1	P6000043464
11	SERVER, DATA COLLECTION SYSTEM FOR SUBSEA DATA, SDPU-001	1	P6000043388
12	SDPU -SUBSEA DATA PROCESSING UNIT	1	P6000055338
13	MARSHALLING CABINET FOR HPU SCU	1	P6000044480
14	MARSHALLING CABINET FOR SSS SCU	1	P6000051125
15	ACT WITH HOSE AND 04W SOCKET ROV CONN, CH DS	22	P6000052343/P6000056231
16	ACT WITH HOSE AND 04W SOCKET FLOATING FLANGE ROV CONN, UTI/CH DS	39	P6000057384/P6000056235
17	ELECTRICAL CONN, 04W PIN ROV, LOOPED BETWEEN PIN 1-3 AND 2-4, TEST & PARKING	22	P6000011154
18	ELECTRICAL CONN, 04W PIN ROV, FLOATING FLANGE AND 90 DEGREE HOSE FITTING	61	2000015543
19	ACT WITH HOSE AND 04W PIN FLOATING FLANGE ROV CONN, CH US	61	P6000045102
20	EFL, 1 X 1 LEGS, F/ DISTRIBUTION, 04W SOCKET ROV CONN, UTH - UTH	25	TYPICAL P6000044846
21	EFL, 1 X 2 LEGS, F/ DISTRIBUTION, 04W SOCKET ROV CONN, UTH - UTH	6	TYPICAL P6000041901
22	EFL, 1 X 1 LEGS, F/ DISTRIBUTION, 04W SOCKET & 04W PIN ROV CONN, SCM - CH	2	P6000048359/P6000048360
23	EFL, 1 X 4 LEGS, F/ DISTRIBUTION, 04W SOCKET ROV CONN, UTH - SCM/CH	4	TYPICAL P6000044908
24	EFL, 1 X 5 LEGS, F/ DISTRIBUTION, 04W SOCKET ROV CONN, UTH - SCM/CH	4	TYPICAL P6000044919
25	EFL, 1 X 2 LEGS, F/ DISTRIBUTION, 04W PIN & 04W SOCKET ROV CONN, UTI - SCM	14	P6000044917/P6000044918
26	EFL, 1 X 7 LEGS, F/ DISTRIBUTION, 04W SOCKET ROV CONN, UTH - SCM/CH	2	P6000044900/P6000044916
27	EFL, 1-1 LEGS, F/ DISTRIBUTION, 04W SOCKET ROV CONN, UTH-SCM (CROSS-OVER)	3	TYPICAL P6000044927
28	OFL, 1 X 1 LEGS, F/ DISTRIBUTION, 08W OPTICAL SOCKET ROV CONN, UTH - SCM	6	P6000044923
29	EFL, 1 X 3 LEGS, F/ DISTRIBUTION, 04W SOCKET ROV CONN, UTH - SCM/CH	16	TYPICAL P6000044928
30	ELECTRICAL CONN, 04W PIN ROV, LOOPED BETWEEN PIN 1-2 AND 3-4, PROTECTION	4	P6000065910
31	ELECTRICAL CONN, 04W PIN ROV, PLASTIC PARKING WITH FIXED FLANGE	546	2000155.48
32	ELECTRICAL CONN, 04W SOCKET ROV, LOOPED BETWEEN PIN 1-3 AND 2-4, PROTECTION	243	P6000052641
34	ACT WITH HOSE AND 04W PIN FLOATING FLANGE ROV CONN, UTHP	190	P6000057340
35	ELECTRICAL CONN, 04W SOCKET ROV WITH FIXED FLANGE, PARKING	2	2000171689
36	ELECTRICAL CONN, 12W PIN ROV WITH FIXED FLANGE, PLASTIC PARKING	24	2000181.52
37	ELECTRICAL CONN, 04W PIN ROV, PROTECTION	36	2000157.08
38	ELECTRICAL CONN, 04W SOCKET ROV, WITH FLOATING FLANGE AND 90 DEGREE HOSE FITTING	35	P6000031106
39	HFL, 13-LINE, MQC-13 MKII BOTH ENDS, MAN/UDM/UTP/UCM - PXT	24+3	P6000045067/P6000045068
40	EFL, 1 X 2 LEGS, F/ DISTRIBUTION, 12W PIN & 04W SOCKET ROV CONN, SCM - CH SIV UPSTREAM	2	P6000044905
41	HFL, 5-LINE, MQC-13 MKII BOTH ENDS, UTI - IXT	13+3	P6000045069/P6000060419
42	MQC-13 (MKII), INBOARD PLATE, 13 LINES, W/O POPPETS ON METHANOL LINES, PXT	25	P6000044813
43	MQC-13 (MKII), OUTBOARD SEAL CAP, F/ 13 LINES, MAN/UDM/UTP/UCM	34	P6000044814
44	MQC-13 (MKII), OUTBOARD LTP PLASTIC	49	100017910
45	MQC-13 (MKII), INBOARD PLATE, F/5 LINES	66	100017910 + COUPLERS 100029234
46	MQC-13 (MKII), OUTBOARD SEAL CAP, F/ 5 LINES, MAN/UDM/UTP/UCM	42	P6000044817
47	MQC-13 (MKII), INBOARD PLATE, F/ 6 LINES, WOCS	24	P6000044818
48	MQC-13 (MKII), OUTBOARD LOGIC CAP, F/ 6 LINES, IXT	24	P6000055259
49	MQC-13 (MKII), INBOARD PARKING, F/ 5 LINES	42	P6000049872
50	MQC-13 (MKII), INBOARD PARKING, F/ 13 LINES, PROD SYSTEM	32	P6000044821
51	COBRA-HEAD MECH ASSY, UPSTREAM	59	P6000055392
52	COBRA-HEAD MECH ASSY, DOWNSTREAM	11	P6000055393
53	COBRA-HEAD MECH ASSY, UPSTREAM - SIV	1	P6000055394
54	COBRA-HEAD MECH ASSY, DOWNSTREAM - SIV END	1	P6000055395
55	COBRA-HEAD MECH ASSY, DOWNSTREAM - P40 END	1	P6000055396
56	MQC-13 (MKII), INBOARD PLATE, F/ 8 LINES, SSS	6	100001135+COUPLERS, P6000020418 AND 100041148
57	ELECTRICAL CONN, 04W PIN ROV, LOOPED BETWEEN PIN 1-3 AND 2-4, PROTECTION	16	P6000062750
58	MQC-13 (MKII), INBOARD PLATE, 13 LINES, MAN/UDM/UTP/UCM	34	100001135+COUPLERS P6000016555
59	CIDV RECEPTACLE, SINGLE CORE, LOW FLOW HORIZONTAL DOCKING, SSS MAN	3	P6000058902
60	SCM MK III, 620, PROD XT, SPS	25+1	P6000042968
61	SCMMB MKIII, PROD XT, SPS	25	P6000048955
62	SCM MK III, 620, IXT, SPS	24+1	P6000042969
63	SCMMB MKIII, IXT, SPS	24	P6000048955
64	SCM MK III, 620, MAN/SIV, SPS	4+1	P6000042970
65	SCMMB MKIII, MAN, SPS	3	P6000048955
66	SCM MK III, 620, MAN, SSS	3+1	P6000043122
67	SCMMB MKIII, MAN, SSS	3	P6000042975
68	CIDV, SINGLE CORE, LOW FLOW ROV, SSS MANIFOLD	3	P6000044443
69	SCMMB MKIII, SIV, SPS	1	P6000042972
70	ELECTRICAL CONN, 12W PIN ROV, PROTECTION	131	2000171.36
71	ELECTRICAL CONN, 12W SOCKET ROV, PARKING WITH FIXED FLANGE	112	2000177.02
72	EFL, 1 X 4 LEGS, F/ DISTRIBUTION, 12W PIN ROV FOR SCM EC3, 04W SOCKET ROV FOR DHPT/ASD/MPFM1, 04W SOCKET PADDLE ROV W/V-NOTCH FOR LVDT, PXT	25	P6000044718
73	MQC-13 (MKII), INBOARD PLATE, F/ 7 LINES, SSS	6	100001135+COUPLERS P6000020418 AND 100041148
74	EFL, 1 X 1 LEGS, F/DISTRIBUTION, 12W PIN ROV FOR SCM EC4, 04W SOCKET ROV FOR MPFM 2, PXT	25	P6000044720
75	SENSOR HARNESS, 1 X 5 LEGS, 12W PIN STP FOR SCM EC7, 04W SOCKET STP FOR CIDV RECEPTACLE, 2xPT/TT, 2xPT, PXT	25	P6000044715

NO.	DESCRIPTION	QTY.	PN.
76	EFL, 1 X 1 LEGS, F/ DISTRIBUTION, UTH - SCM	10	TYPICAL P6000044926
77	SENSOR HARNESS, 1 X 2 LEGS, 12W PIN ROV FOR SCM EC3/EC4, 04W SOCKET DVR FOR DPT, PT/TT, IXT	48	P6000058336
78	EFL, 1 X 2 LEGS, F/ DISTRIBUTION, 12W PIN ROV FOR SCM EC5, 04W SOCKET ROV FOR DHPT, 04W SOCKET PADDLE ROV W/V-NOTCH FOR LVDT, IXT	24	P6000044851
79	SENSOR HARNESS, 1 X 3 LEGS, 12W PIN STP FOR SCM EC7, 2xPT/TT, PT, IXT	24	P6000044721
80	SENSOR HARNESS, 1 X 4 LEGS, 12W PIN STP FOR SCM EC8, 2xPT/TT, 2xPT, IXT	24	P6000044722
81	SENSOR HARNESS, 1 X 3 LEGS, 12W PIN STP FOR SCM EC7/EC8, 04W SOCKET ROV FOR DPT, 2xPT/TT, MAN	6	P6000044940
82	SENSOR HARNESS, 1 X 5 LEGS, 12W PIN STP FOR SCM EC8, 3xPT/TT, 2xPT, PXT	25	P6000044719
83	SENSOR HARNESS, 1 X 1 LEGS, 04W PIN ROV W/FLOATING FLANGE FOR EC, ROV ASD, PXT	25	P6000046447
84	MPFM, RS485, ROXAR, PXT	25	P6000042048
85	CIDV, DUAL CORE, SKOFLO, VERTICAL DOCKING, PXT	25+2	P6000044445
86	SENSOR HARNESS, 1 X 1 LEGS, 04W PIN ROV FOR EC, ROV APD, MAN	6	P6000046449
87	OPTICAL CONN, HYDRALIGHT, 08W, SOCKET ROV, PROTECTION	6	2000171831
88	OPTICAL CONN, HYDRALIGHT, 08W PIN ROV, PARKING WITH FIXED FLANGE	12	2000155.22
89	EFL, 1 X 2 LEGS, F/ DISTRIBUTION, 12W PIN & ROV 12W SOCKET ROV CONN, SCM EC3/EC4 - PUMP, SSS	6	P6000044942
90	EFL, 1 X 1 LEGS, F/ DISTRIBUTION, 12W PIN STP CONN & 12W SOCKET ROV CONN, SCM EC8/EC9 - SEPARATOR, SSS	6	P6000044967
91	SENSOR HARNESS, 1 X 4 LEGS, 12W PIN STP FOR SCM EC10, 04W SOCKET STP W/SPLIT FOR CIDV RECEPTACLE, 3xPT/TT, SSS	3	P6000044944
92	SENSOR HARNESS, 1 X 5 LEGS, 12W PIN STP FOR SCM EC7, 04W SOCKET STP W/SPLIT FOR CIDV RECEPTACLE, 04W SOCKET DVR FOR SPFM1, 3xPT/TT, SSS	3	P6000044945
93	MQC-13 (MKII), OUTBOARD TEST PLATE, F/ 13 LINES, W/O POPPETS FOR METHANOL LINES, PXT	4	P6000042983
94	SENSOR HARNESS, 1 X 2 LEGS, 12W PIN ROV FOR EC9, 04W SOCKET ROV W/FLOATING FLANGE TO LT2, PT/TT, SSS	4	P6000044946
95	SENSOR HARNESS, 1 X 3 LEGS, 12W PIN ROV FOR EC8, 04W SOCKET ROV W/FLOATING FLANGE TO LT1, PT/TT, DPT, SSS	3	P6000044947
96	SENSOR HARNESS, 2 X 2 LEGS, 04W PIN DVR TO EC3 & EC4, V-CONE, DUAL DPT, IXT	24	P6000058338
97	SENSOR HARNESS, 1 X 1 LEGS, 04W PIN ROV FOR EC, ROV LT, SSS	6	P6000042368
98	EFL, 1 X 1 LEGS, F/ DISTRIBUTION, UTHP - CH	2	TYPICAL P6000044986
99	SENSOR HARNESS, 1 X 1 LEGS, 04W PIN ROV W/FLOATING FLANGE CONN, PT/TT, SPS	6	TYPICAL P6000044848
100	SENSOR HARNESS, 1 X 2 LEGS, 12W PIN STP W/FLOATING FLANGE FOR EC7/EC8, 2xPT/TT, SPS	2	P6000044852
101	V-VONE FLOWMETER W/DUAL DPT, SSS	6	P6000042953
102	MQC-13 (MKII), LOGIC CAP, W/CIDV ROV ADJ. VALVE, PXT	25+1	P6000044822
103	MQC-13 (MKII), INBOARD PLATE, 8 LINES, PXT	25	P6000044823
104	FLOWMETER, SPFM, WI, CANOPEN, SIGURD SORUM, SINGLE DPT (SSS)	3	P6000043394
105	P40 RISER ELECTRICAL CABLE INCLUDING CH ASSY	1	P6000056902
106	EFL, 1 X 1 LEGS, F/ DISTRIBUTION, 04W PIN ROV W/FLOATING FLANGE FOR EC9, DRY MATE CONN FOR DHPT, PXT/IXT	49	P6000044716
107	ACT WITH HOSE AND 8W PIN ROV FIBRE OPTIC CONN, UTH, SSS	6	P6000048354
109	LEAK DETECTOR, ACOUSTIC, ETHERNET, ALVD	3	P6000044757
110	OPTICAL JUMPER, 1 X 2 LEGS, F/ DISTRIBUTION, UTH - SCM, SPARE, SSU-JUMPER	6	P6000044925
111	CIDV, DUAL CORE, LOW/MEDIUM FLOW, HORIZONTAL DOCKING, SSS	6+1	P6000044442
112	CIDV, SINGLE CORE, MEDIUM FLOW, HORIZONTAL DOCKING, SPS	6+1	P6000044444
113	RECEPTACLE FOR SINGLE CORE CIDV, HORIZONTAL DOCKING, SPS	6	P6000058906
114	RECEPTACLE FOR DUAL CORE CIDV, HORIZONTAL DOCKING, SSS	6	P6000058905
115	RECEPTACLE FOR DUAL CORE CIDV, VERTICAL DOCKING, PXT	25	P6000044417
116	CLAMP FOR ASD	25	P6000048153
117	CLAMP FOR APD	6	P6000048339
118	ELECTRICAL CONN, 04W SOCKET ROV, LANYARD IN 30 DEGREE ORIENTATION, DRAG ONLY, DWARF PROTECTION, SPS	6	P6000063068
119	TEST & FLUSHING HPU - TFHPU, EX RATED	4	P6000045329
120	TEST & FLUSHING HPU - TFHPU, FOR NON HAZARDOUS ENV.	4	P6000043468
121	SENSOR SIMULATOR, SPS	8	P6000043050
122	TRANSPORTATION SKID, FOR MRT/SCM MK III	5	100028733
123	SCM MK III, TEST STAND, PAZFLOR	5	P6000042979
124	SCMMB MK III, TEST & FLUSHING PLATE	2	P6000042980
125	SMART TOOL 200, LAPTOP INCL. LICENSE AND TRANSPORTATION BOX	2	P6000051561
126	SPCTU 200, E, 620 VAC	8	P6000046536
127	SENSOR SIMULATOR, SSS	2	P6000043049
128	MQC-13 (MKII), OUTBOARD, 13 LINES, TEST AND FLUSHING PLATE	10	100009271
129	EFL, 1 X 1 LEGS, F/ DISTRIBUTION, ELECTRICAL TEST CABLES, 10 m/100m	2+2	P6000045048/P6000045049
130	OFL, 1 X 1 LEGS, F/ DISTRIBUTION, OPTICAL TEST CABLE, 08W SOCKET ROV, SSS	2	P6000038341
131	ELECTRICAL TEST CONNECTORS WITH PIG-TAIL	52	VARIOUS
132	SWIMS SUBSEA EQUIPMENT	2	P6000042644
133	SWIMS TOPSIDE EQUIPMENT	1	P6000042645
134	SWIMS TEST TOOL SET	1	P6000044835
135	SCM DUMMY, MK III	2	P6000042981
136	PSEMS 200, SPS	1	P6000042995
137	PSEMS 200 W/FIBER, SSS (NOT SOS)		P6000052864
138	TEM SIMULATOR 200 (ETU)	8	P6000036581
139	MPFM SIMULATOR, RS485, ROXAR, SPS	1	P6000042889
140	MQC-13 (MKII), INBOARD, 13 LINES, TEST AND FLUSHING PLATE	6	100009270
143	SENSOR HARNESS, 1 X 1 LEGS, 04W PIN DVR to SWIMS, 04W SOCKET ROV FOR DHPT, SWIMS	2	P6000042643
145	EFL, 1X1 LEGS, F/ DISTRIBUTION, 04W PIN ROV FOR CH, 04W SOCKET ROV FOR PRODUCTION RISER, SPS	4	TYPICAL P6000052340
146	OPTICAL CONN, HYDRALIGHT, 08W SOCKET ROV, LOOP-BACK CH 1-5, 2-6, 3-7, 4-8, PROTECTION, SSS	6	P6000018831
147	SSPS WS W/SMART TOOL, SDPU-001	1	P6000059561
149	SSPS WS DESKTOP, CCR	1	P6000059562
150	HFL, MQC-13 MKII BOTH ENDS, 8-LINE, 24 M, MAN - UTH, SSS	3	P6000048758
151	HFL, MQC-13 MKII BOTH ENDS, 7-LINE, 23 M, MAN - INLET MODULE, SSS	3	P6000048759
152	EFL, 1 X 1 LEGS, F/ DISTRIBUTION, 12W PIN STP FOR SCM EC11, 12W SOCKET ROV TO ALVD, SSS	3	P6000048365
153	MPFM WS DESKTOP, CCR	1	P6000060228
154	MQC-13 (MKII), OUTBOARD SEAL CAP, F/ 8 LINES, SSS	6	P6000053184
155	MQC-13 (MKII), OUTBOARD SEAL CAP, F/7 LINES, SSS	6	P6000053183
156	MQC-13 (MKII), INBOARD PARKING, 8 LINES, SSS	6	100001135+COUPLERS 7105050
157	MQC-13 (MKII), INBOARD PARKING, 7 LINES SSS	3	100001135+COUPLERS 7105050

5 SSS Scope of Supply



5.1 Stack-up



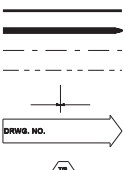
5.2 SSS Subsea Scope of Supply

Module Name	CPY Nr	Width mm	Length mm	Heigth mm	Net Dry Weight excl. cont. excl. pres. Fluid Kg	Dry Weight w/ preservation fluid Kg	Submerged Weights Kg	Reported weight incl. entrapped water Kg
FBS	AO-040-SS-400-160050	16715	17290	14750	210100	220600	190800	251600
IMF	AO-040-SS-400-160053	21973	19318	4195	140700	148600	125400	182600
IM	AO-040-SS-400-160149	6200	7258	5637	32300	35400	27600	35400
SM	AO-040-SS-400-160119	9080	12004	19238	301700	479700	262400	479700
MM	AO-040-SS-400-160077	10260	6200	3985	78900	93400	65700	93400
PM	AO-040-SS-403-160140	4600	6399	7565	48000	57730	43800	57700
Dummy PUMP	AO-040-SS-403-160263	4323	6399	7565		21680		
UTH	AO-040-SS-400-160100	4540	4610	3185	10700	11000	8600	12000

REFERENCE IS MADE TO
AO-040-SS-400-160048

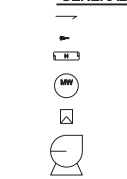
6 Piping and Instrumentation Diagrams

PIPE LINE SYMBOLS:



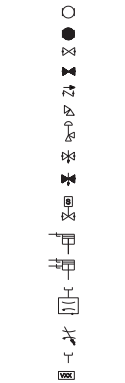
PROCESS LINE
MAJOR PROCESS LINE
MODULE LIMIT
VENDOR MODULE LIMIT
ZONE LIMIT/ATTRIBUTE BREAK
CONTINUATION DRAWING REFERENCE
TIE-IN POINT BETWEEN TOPSIDE AND SUBSEA
TIE-IN POINT BETWEEN SUBSEA AND FLOWLINE

GENERAL SYMBOLS:



DOWNWARD SLOPE
FLOW DIRECTION
PIPE THERMAL INSULATION
MAN WAY
TUBING HANGER PLUG
PUMP
TANK / DRUM
EQUIPMENT THERMAL INSULATION
MONO-BORE CONNECTOR
3" CONNECTOR, 2" BORE
MULTI-BORE CONNECTOR
MQC-PLATE
COMPENSATOR

VALVES & ACTUATORS:

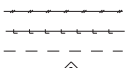


BALL VALVE
CLOSED BALL VALVE
GATE VALVE
CLOSED GATE VALVE
CHECK VALVE
CHOKE
CHOKE, REMOTELY OPERATED
NEEDLE VALVE
CLOSED NEEDLE VALVE
SOLENOID VALVE
SINGLE ACTING HYDRAULIC ACTUATOR
DOUBLE ACTING HYDRAULIC ACTUATOR
MITV
ADJUSTABLE FLOW RESTRICTOR (CHEMICAL INJECTION DOSING VALVE)
ROV OPERATED
ROV-MARKING OF VALVES

INSTRUMENTATION & SIGNALS:

ACOUSTIC SAND DETECTOR
MPFM
SINGLE PHASE FLOWMETER
LOCAL INSTRUMENT
INSTRUMENTATION SHARED DISPLAY
LOGIC LOCATED IN THE PCU.
SIGNAL TO PSS
SIGNAL FROM PSS
COOLER
FILTER
ORIFICE WITH RESTRICTION

TRANSMISSION / SUPPLY LINES:



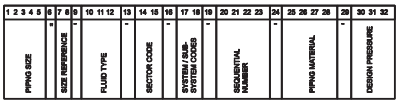
HARD-WIRED
HYDRAULIC LINE
SIGNAL LINE
SIGNAL SPLIT

FITTINGS:

PIGGABLE TEE
SELF SEALING HYDRAULIC COUPLER
BLIND COUPLER
PIPE CAP
REDUCER
ECCENTRIC REDUCER (FLUSH WITH BOTTOM OF PIPE)
WATER INGRESS PREVENTOR
FLANGE CONNECTION

PIPING LINE NUMBERING SYSTEM, SSPS

THE SSPS PIPING LINE NUMBERING SYSTEM IS ACCORDING TO AO-040-SG-400-010085, AND SUMMARIZED BELOW.



1-5: PIPE SIZE: THE SIZE SHALL BE GIVEN IN INCHES AND FRACTIONAL INCHES.
6: INCH SYMBOL (")
7-8: SIZE REFERENCE: OD, ID, OR ND MAY BE USED.
9: SEPARATOR CHARACTER (-)
10-12:FLUID TYPE
13: SEPARATOR CHARACTER (-)
14-15:SECTOR CODE
16: SEPARATOR CHARACTER (-)
17-18:SYSTEM AND SUB-SYSTEM CODE
19: SEPARATOR CHARACTER (-)
20-23:SEQUENTIAL NUMBER
24: SEPARATOR CHARACTER (-)
25-28:PIPING MATERIAL
29: SEPARATOR CHARACTER (-)
30-32:DESIGN PRESSURE: THE DESIGN PRESSURE SHALL BE GIVEN IN BARS (bara)

INSTRUMENT FUNCTION CODES:

AAV - ANNULUS ACCESS VALVE
AI - ACOUSTIC INDICATOR
ALVD - ACOUSTIC LEAK & VIBRATION DETECTOR, RETRIEVABLE
AMV - ANNULUS MASTER VALVE
AT - ACOUSTIC TRANSMITTER
AWV - ANNULUS WING VALVE
BV - BALL VALVE
CIDV - CHEMICAL INJECTION DOSAGE VALVE
CITV - CHEMICAL INJECTION THROTTLE VALVE
CIV - CHEMICAL INJECTION VALVE
dPT - DIFFERENTIAL PRESSURE TRANSMITTER
ESD - EMERGENCY SHUT DOWN
FE - FLOW ELEMENT
FI - FLOW INDICATOR
FT - FLOW TRANSMITTER
FY - FLOW CONVERTER/COMPUTER
H - HIGH
HH - HIGH HIGH
HV - HEADER VALVE
ICC - INJECTION CHOKE CLOSE
ICO - INJECTION CHOKE OPEN
ICV - INJECTION CHOKE VALVE
IMV - INJECTION MASTER VALVE
IWV - INJECTION WING VALVE
L - LOW
LL - LOW LOW
LI - LEVEL INDICATOR
LIC - LEVEL INDICATOR CONTROLLER
LT - LEVEL TRANSMITTER
LY - LEVEL CONVERTER/COMPUTER
MITV - METHANOL INJECTION THROTTLE VALVE
MIV - METHANOL INJECTION VALVE
PCC - PRODUCTION CHOKE CLOSE
PCO - PRODUCTION CHOKE OPEN
PCV - PRODUCTION CHOKE VALVE
PI - PRESSURE INDICATOR
PMV - PRODUCTION MASTER VALVE
PS - PRESSURE SWITCH
PSS - PROCESS SHUTDOWN SYSTEM
PT - PRESSURE TRANSMITTER
PWV - PRODUCTION WING VALVE
PY - PRESSURE CONVERTER/COMPUTER
SCSSV - SURFACE CONTROL SUB SURFACE SAFETY VALVE
TI - TEMPERATURE INDICATOR
TT - TEMPERATURE TRANSMITTER
XI - MISCELLANEOUS INDICATOR
XOV - CROSS OVER VALVE
XY - MISCELLANEOUS CONVERTER / COMPUTER
ZI - POSITION INDICATOR
ZT - POSITION TRANSMITTER

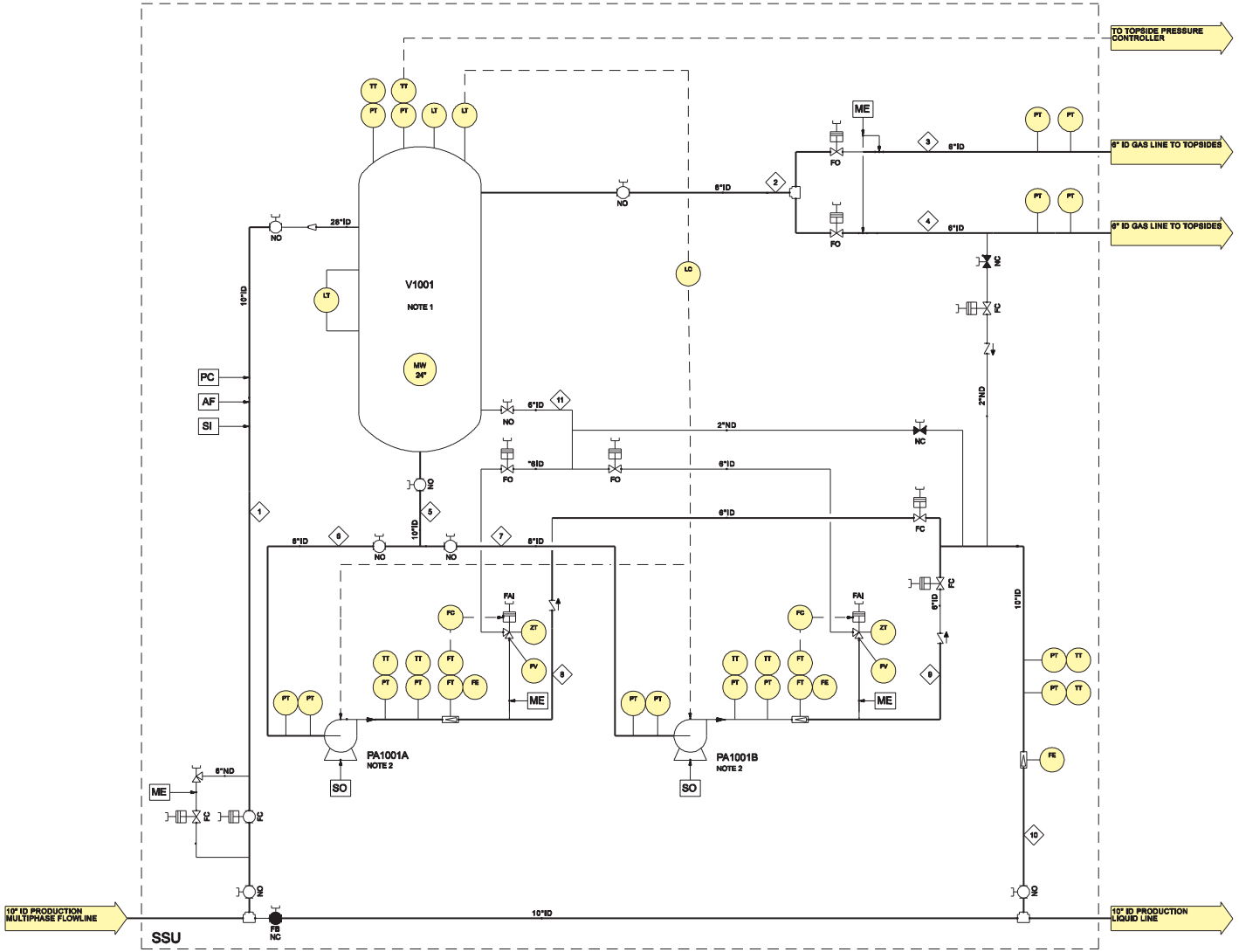
FLUID TYPES:

AF - ANTIFOAM
CI - CORROSION INHIBITOR
DE - DEMULSIFIER
HC - HYDOCARBON G/L (2 PHASES)
HG - HYDROCARBON GAS
HI - HYDRATE INHIBITOR
HL - HYDOCARBON LIQUID
ME - METHANOL
PC - PH CONTROLLER
PPD - POUR POINT DEPRESSANT
SI - SCALE INHIBITOR
SO - SEAL OIL (BARRIER FLUID)
WI - WATER INJECTION
XX - SERVICE FLUID (NOT SPECIFIED)

ABBREVIATIONS:

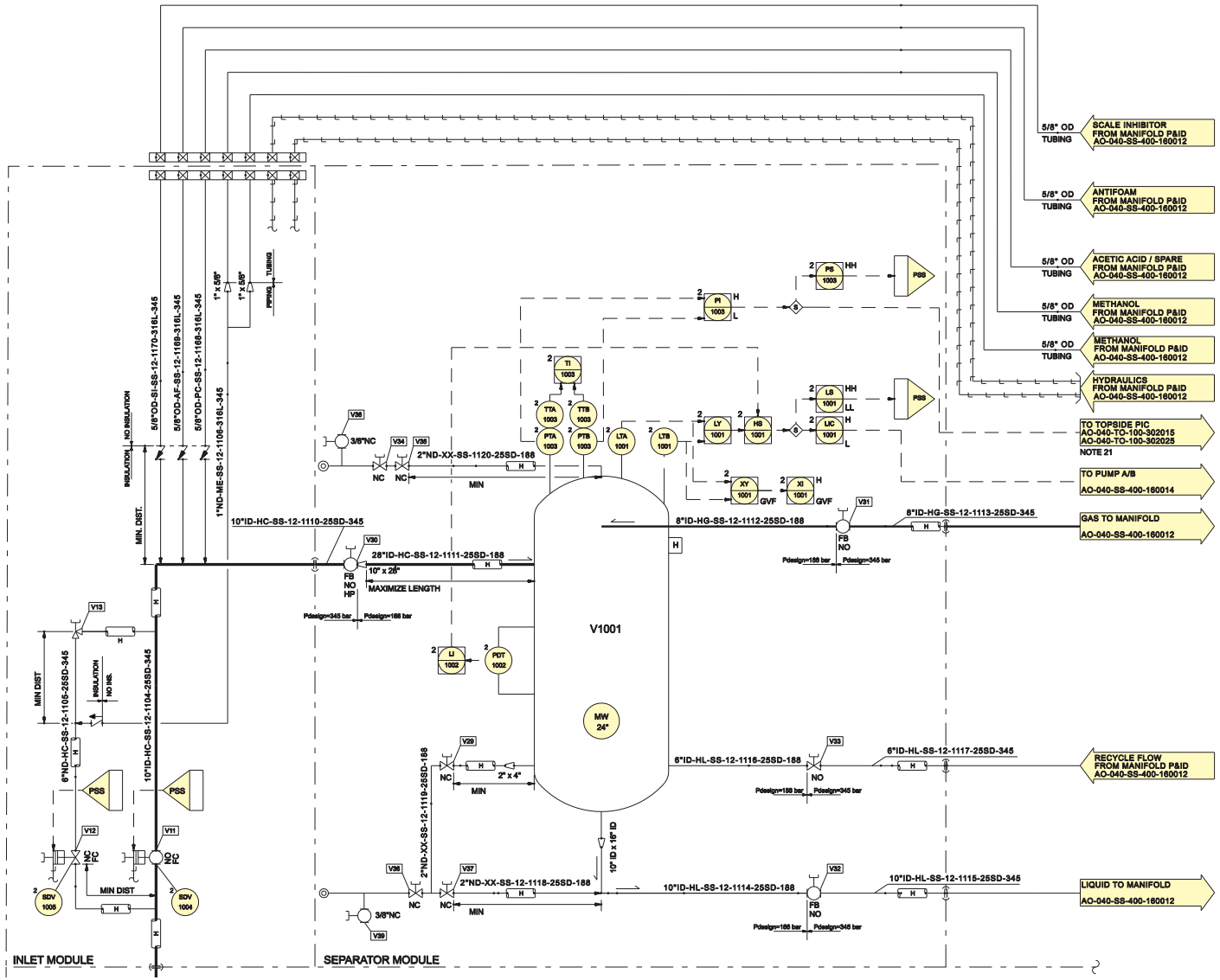
BR - BARRIER FLUID RETURN
BS - BARRIER FLUID SUPPLY
BX - BARRIER FLUID EXTRA
FAI - FAIL AS IS
FB - FULL BORE
FC - FAIL CLOSED
FO - FAIL OPEN
H - HEAT CONSERVATION
HP - HIGH POINT
ID - INNER DIAMETER
LVDT - LINEAR VARIABLE DISPLACEMENT TRANSDUCER
MQC - MULTI QUICK CONNECTION
MW - MAN WAY
NC - NORMALLY CLOSED
ND - NOMINAL DIAMETER
NO - NORMALLY OPEN
OD - OUTER DIAMETER
ROV - REMOTELY OPERATED VEHICLE
SCM - SUBSEA CONTROL MODULE
SCMMB - SCM MOUNTING BASE
SIV - SUBSEA ISOLATION VALVE
THPL - TUBING HANGER PLUG, LOWER
THPU - TUBING HANGER PLUG, UPPER
UDM - UMBILICAL DISTRIBUTION MODULE
UCM - UMBILICAL CONNECTION MODULE
UTP - UMBILICAL TERMINATION PRODUCTION
UTI - UMBILICAL TERMINATION INJECTION

6.1 Legend Pazflor SSU P&ID



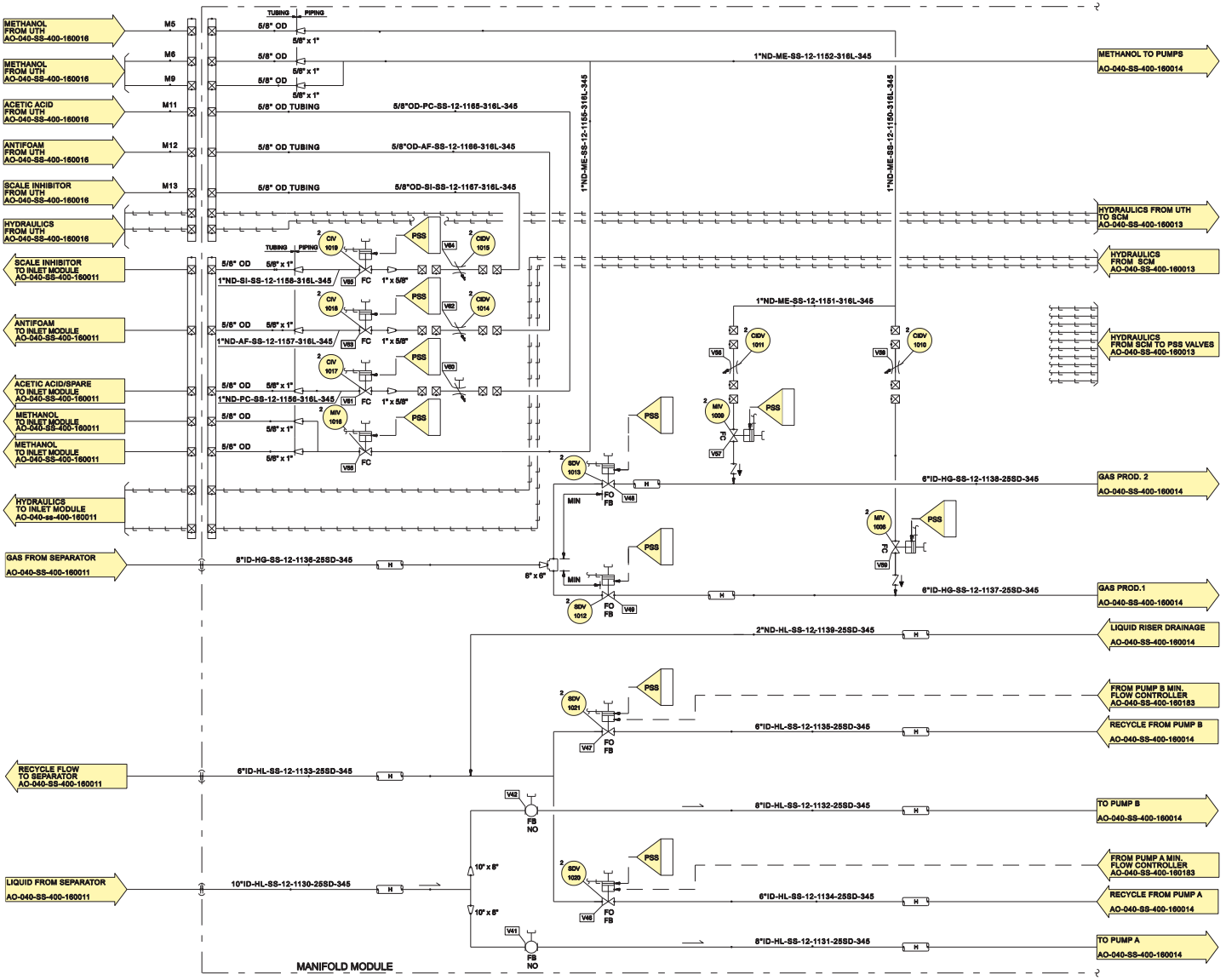
6.2 PFD

REFERENCE IS MADE TO AO-040-SS-400-160015



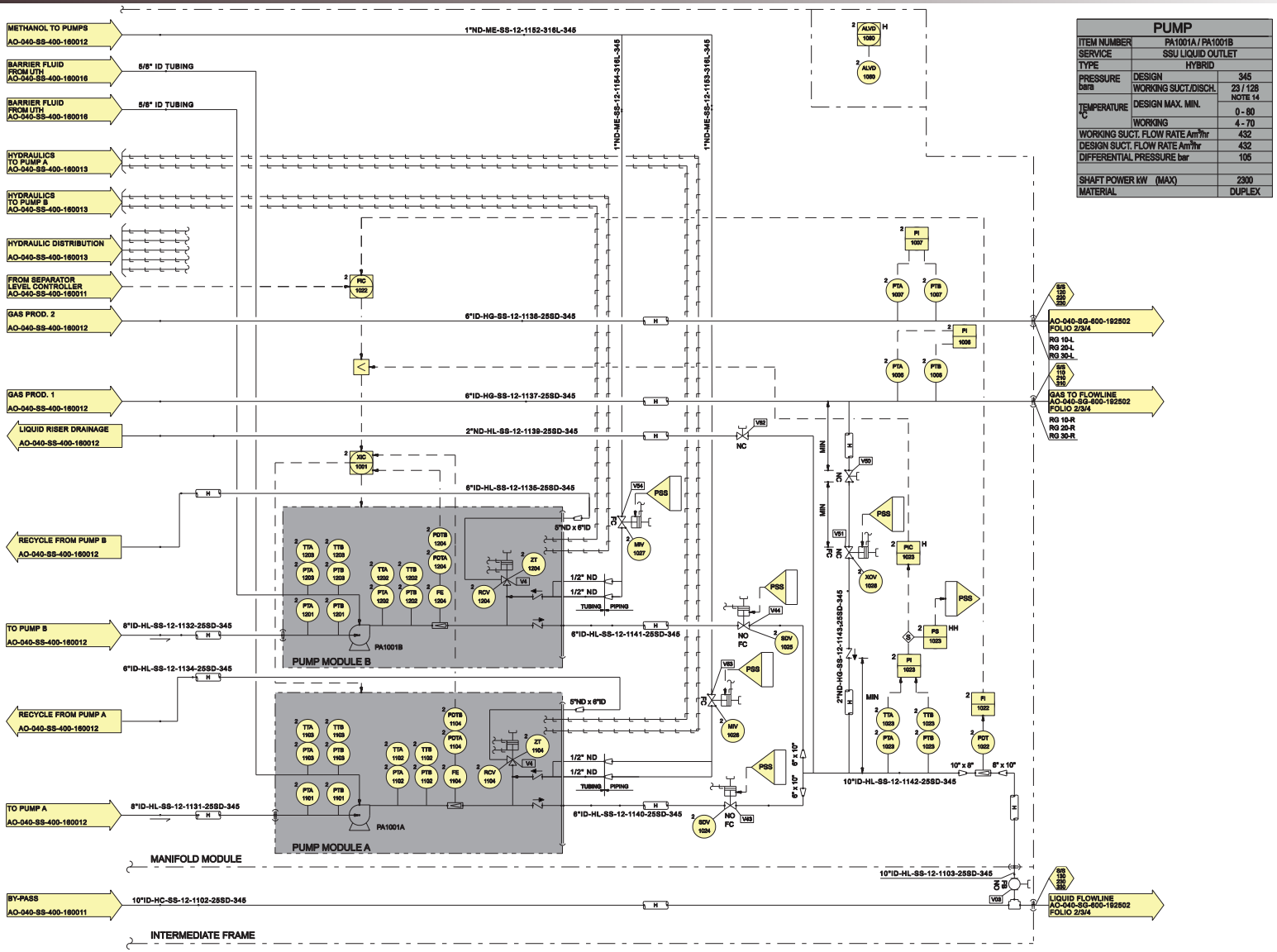
REFERENCE IS MADE TO AO-040-SS-400-160011

6.3 Separator P&ID



6.4 Manifold Part 1 P&ID

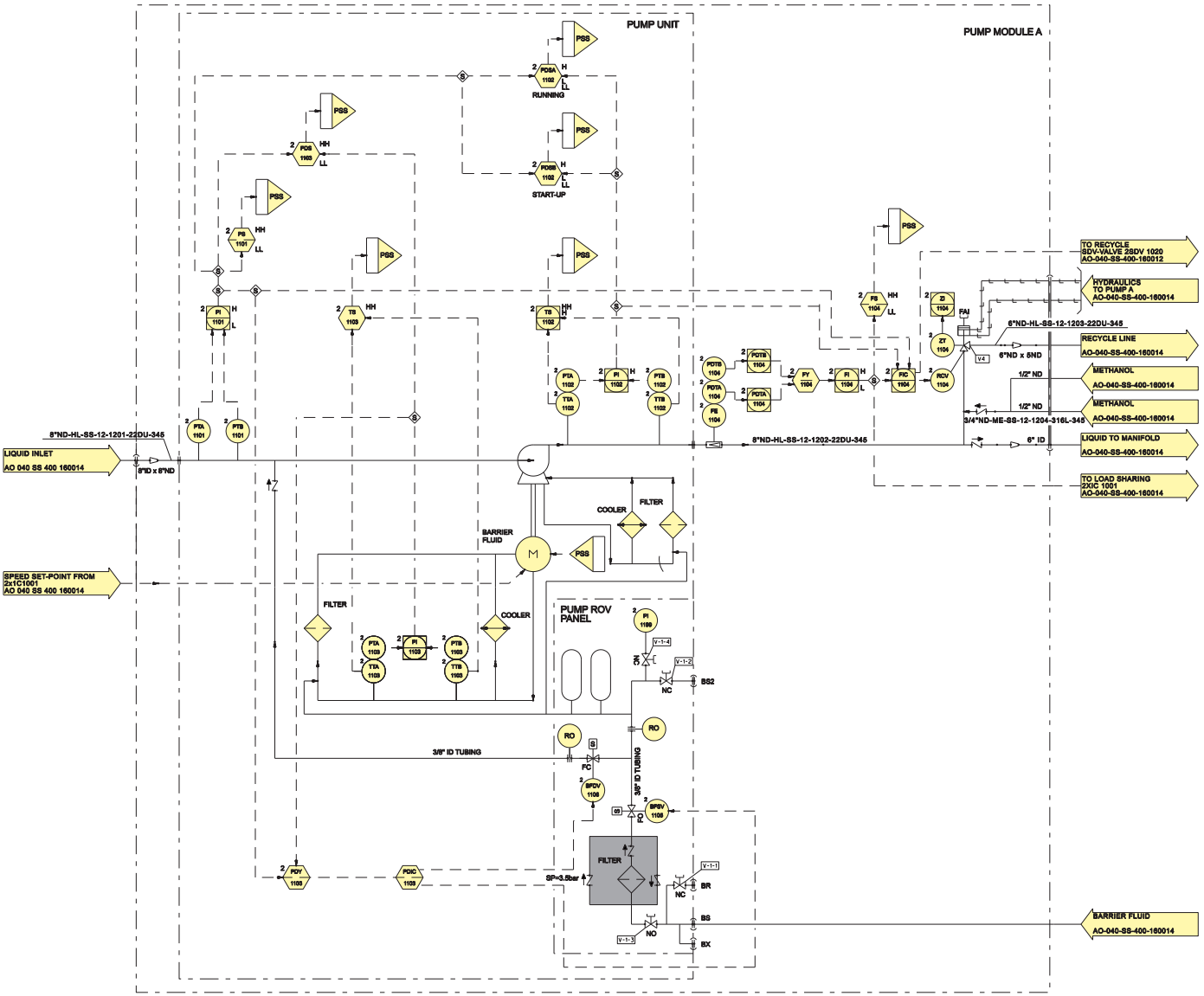
REFERENCE IS MADE TO AO-040-SS-400-160012



PUMP		
ITEM NUMBER	PA1001A / PA1001B	
SERVICE	SSU LIQUID OUTLET	
TYPE	HYBRID	
PRESSURE barg	DESIGN	345
	WORKING SUCT./DISCH.	23 / 126 NOTE 14
TEMPERATURE °C	DESIGN MAX. MIN.	0 - 80
	WORKING	4 - 70
WORKING SUCT. FLOW RATE Am³/hr		432
DESIGN SUCT. FLOW RATE Am³/hr		432
DIFFERENTIAL PRESSURE bar		105
SHAFT POWER kW (MAX)		2300
MATERIAL		DUPLEX

REFERENCE IS MADE TO
AO-040-SS-400-160014

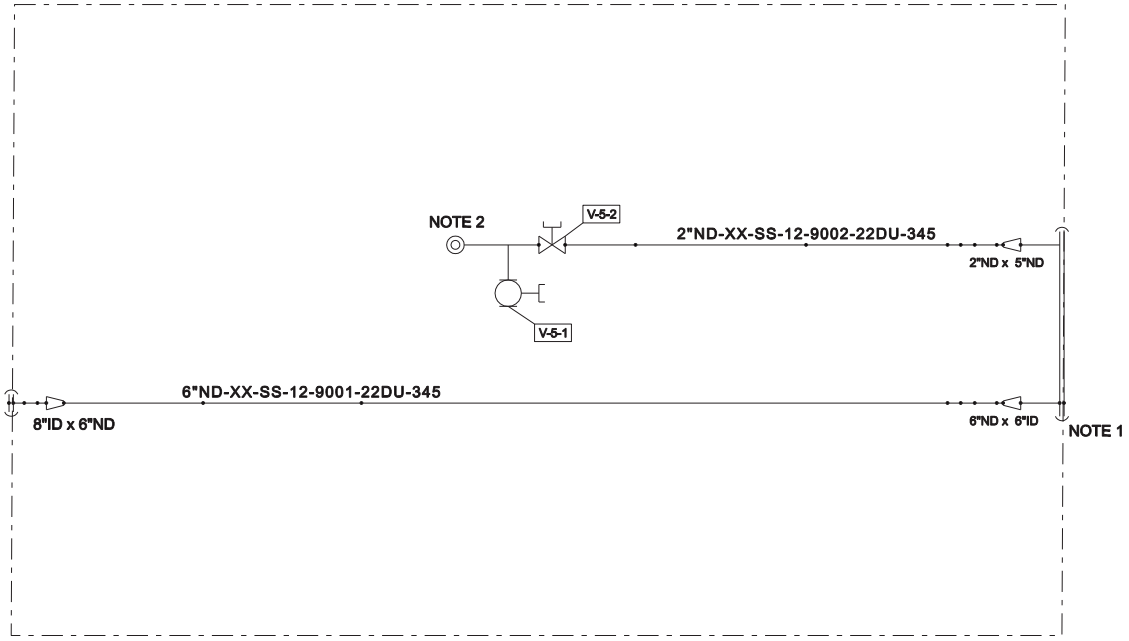
6.4.1 Manifold Part 2 P&ID



6.5 Pump Module P&ID

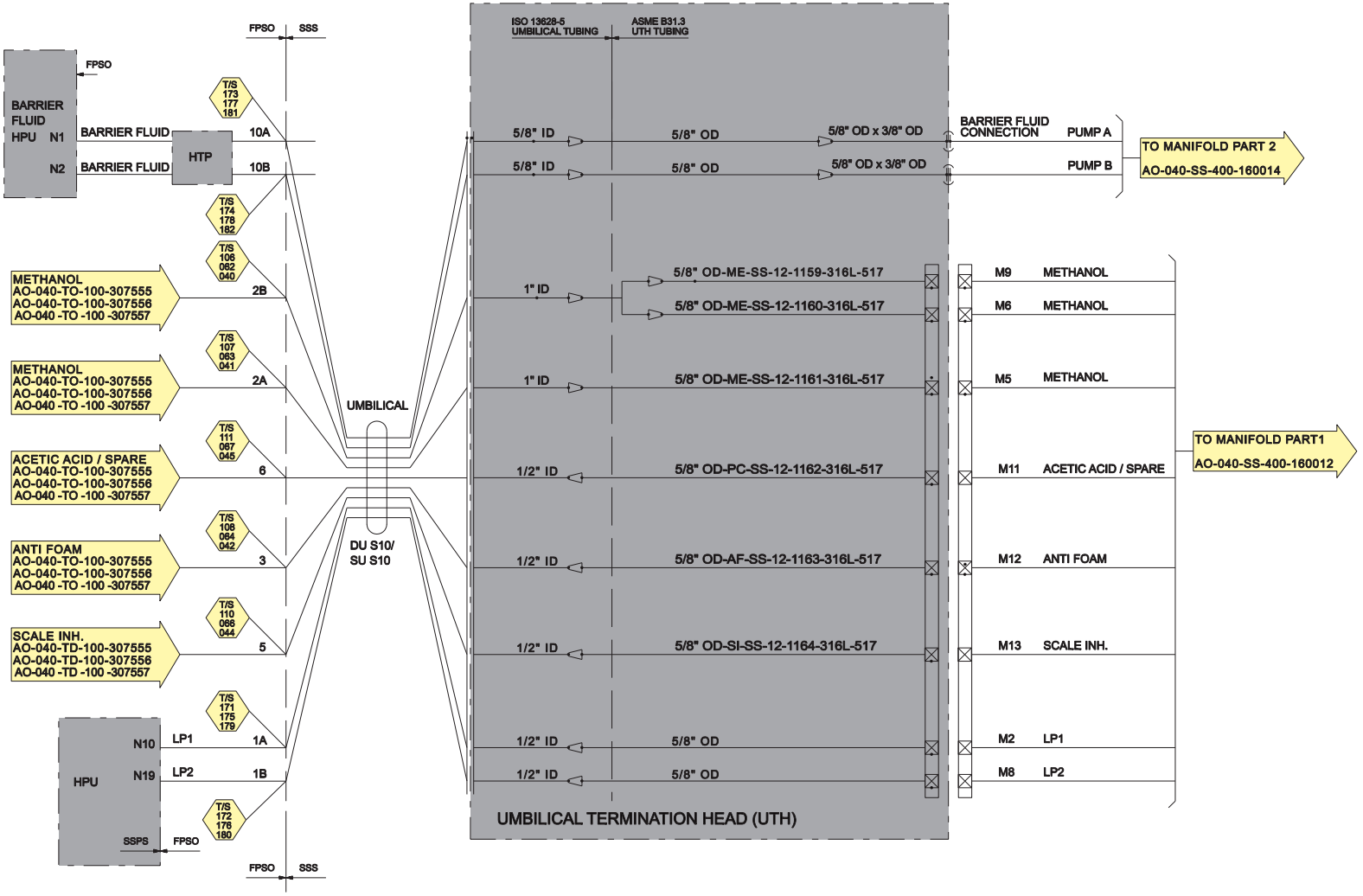
REFERENCE IS MADE TO
AO-040-SS-400-1600183

6.6 Dummy Pump Module P&ID



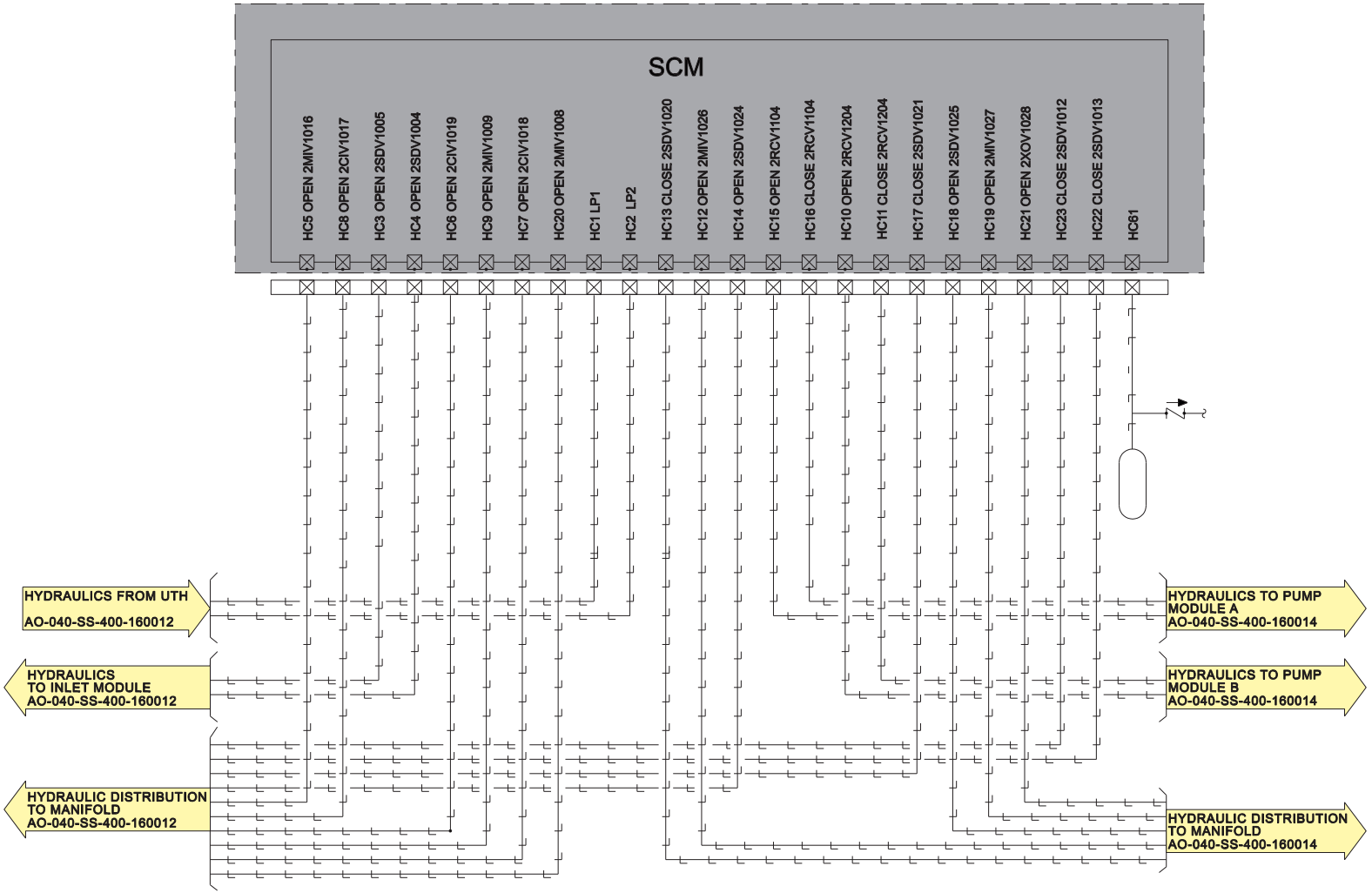
NOTES:
1. MULTIBORE CONNECTOR.
2. 3" HUB, 2" BORE

REFERENCE IS MADE TO
AO-040-SS-400-1600184



6.7 UTH P&ID

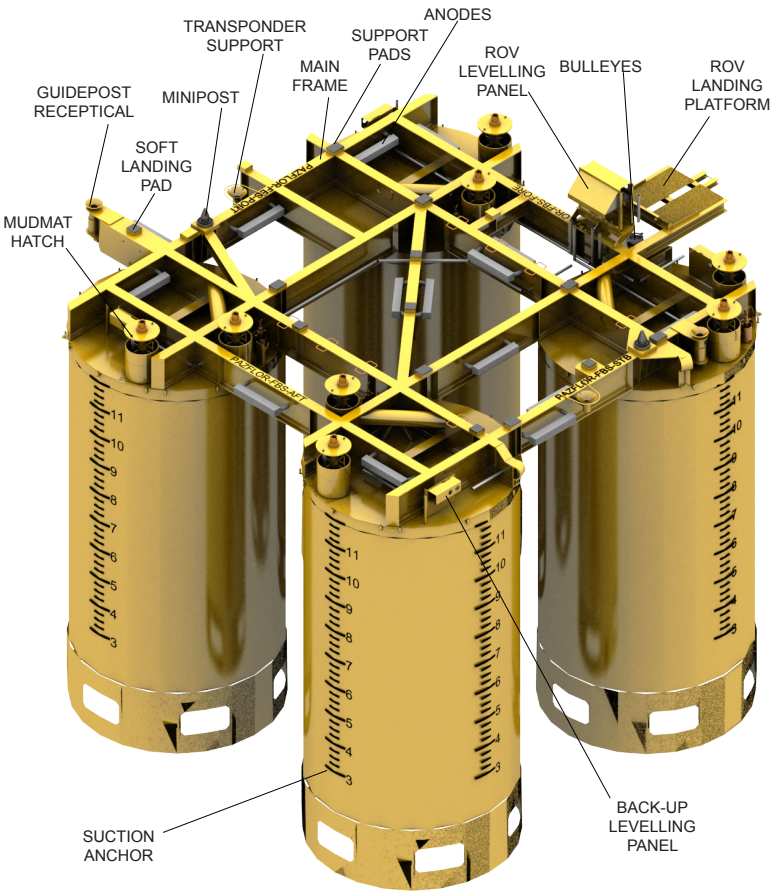
REFERENCE IS MADE TO AO-040-SS-400-160016



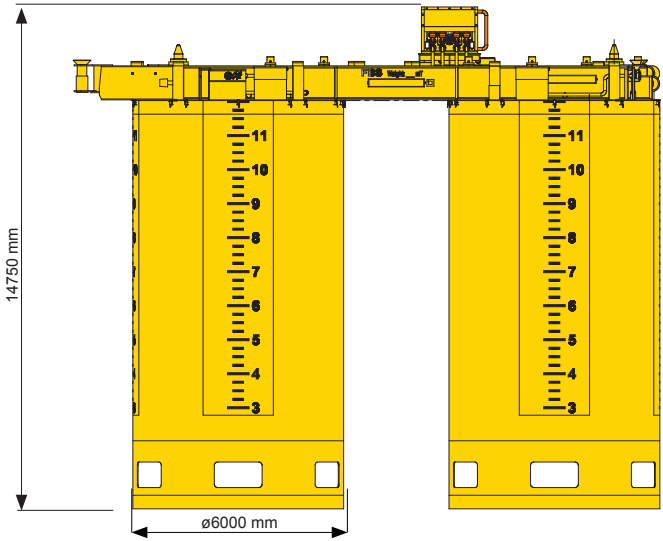
REFERENCE IS MADE TO
AO-040-SS-400-160013

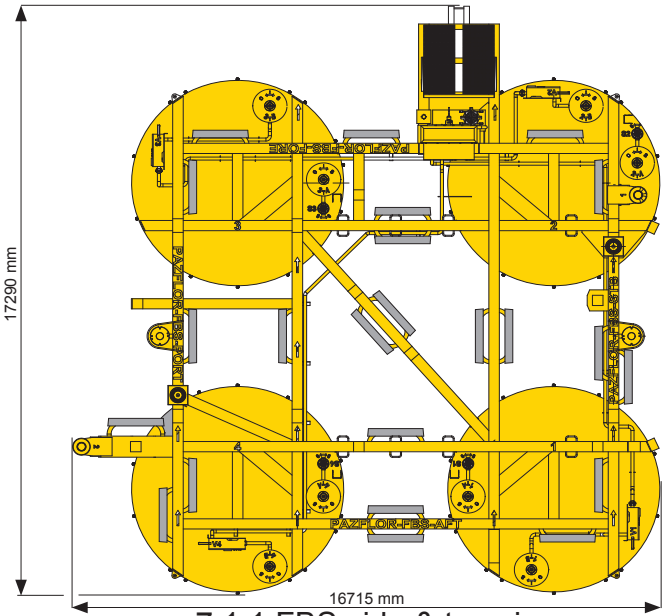
6.8 Subsea Hydraulic Distribution P&ID

7 Foundation Bottom Structure

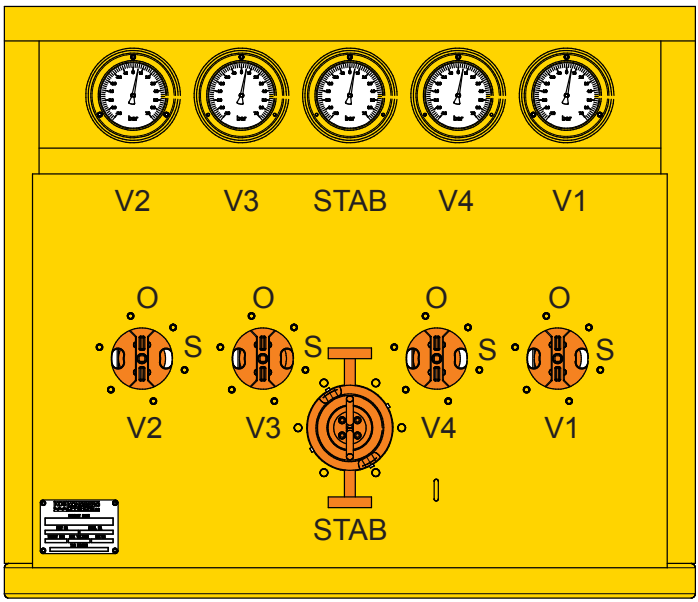


7.1 FBS 3D view



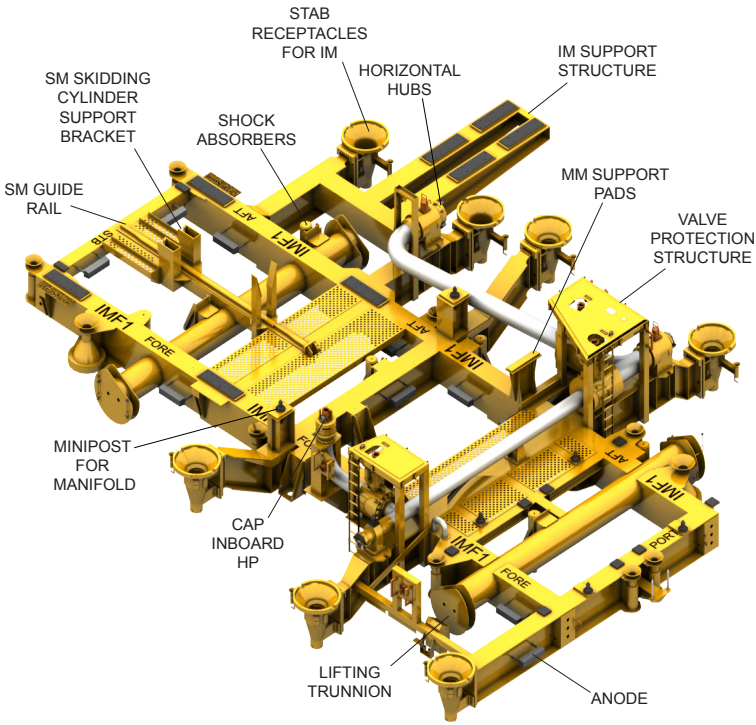


7.1.1 FBS side & top view

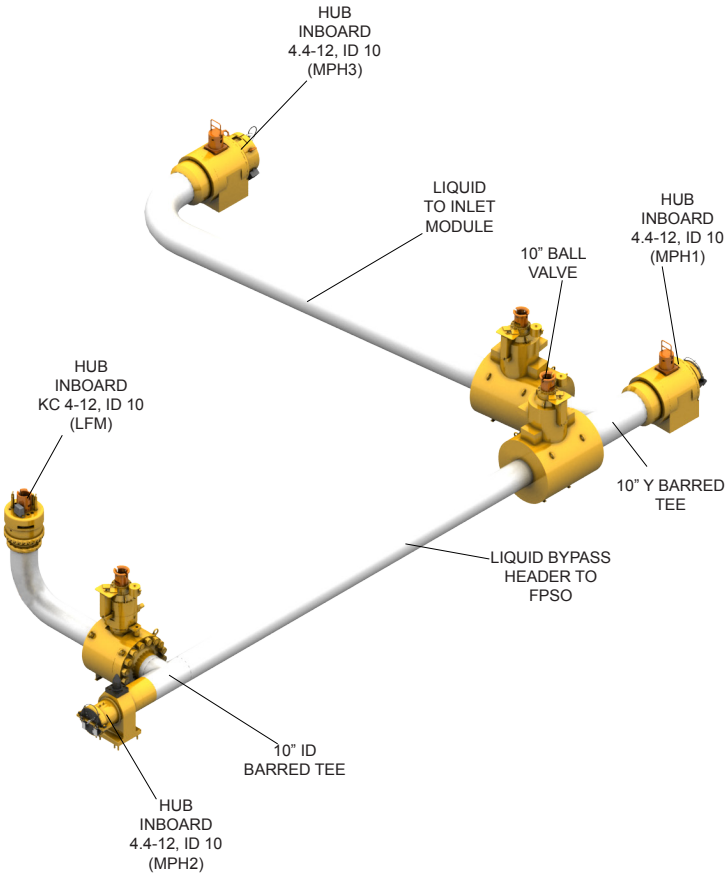


7.1.2 FBS ROV Leveling Panel

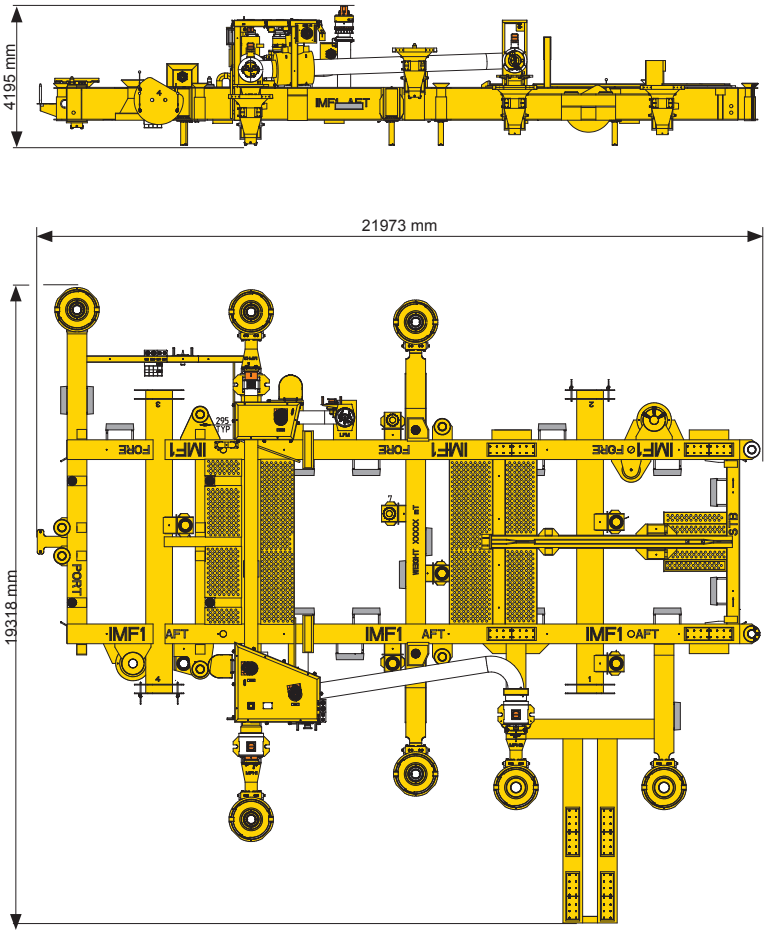
8 Intermediate Frame



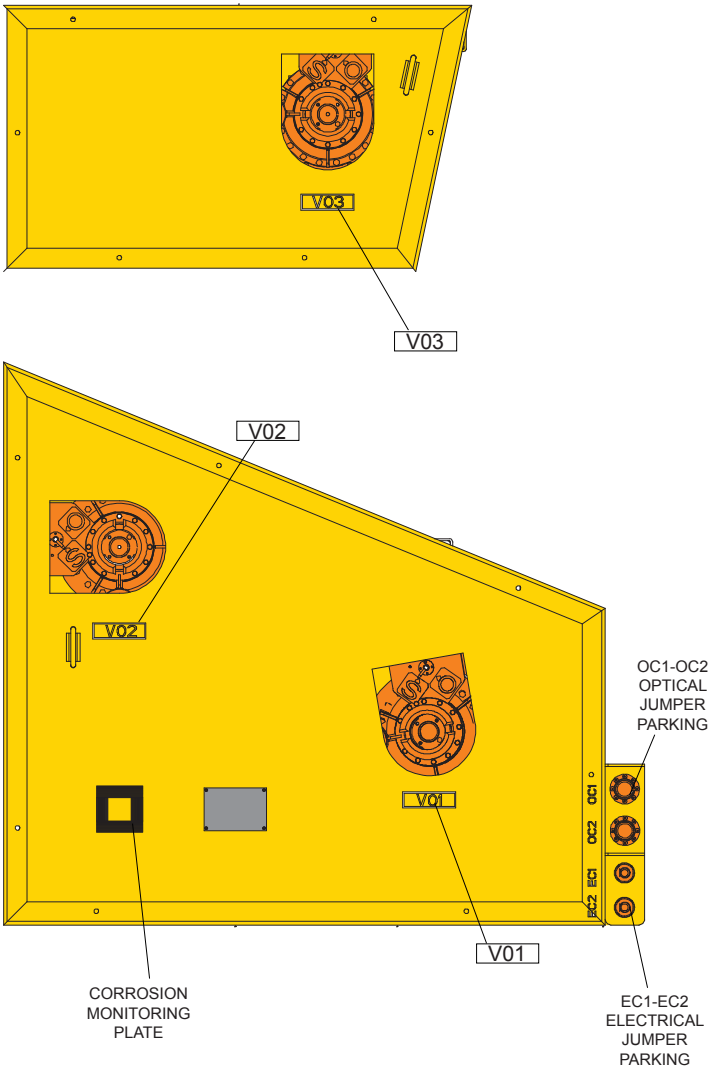
8.1 IMF



8.1.1 IMF Large Bore

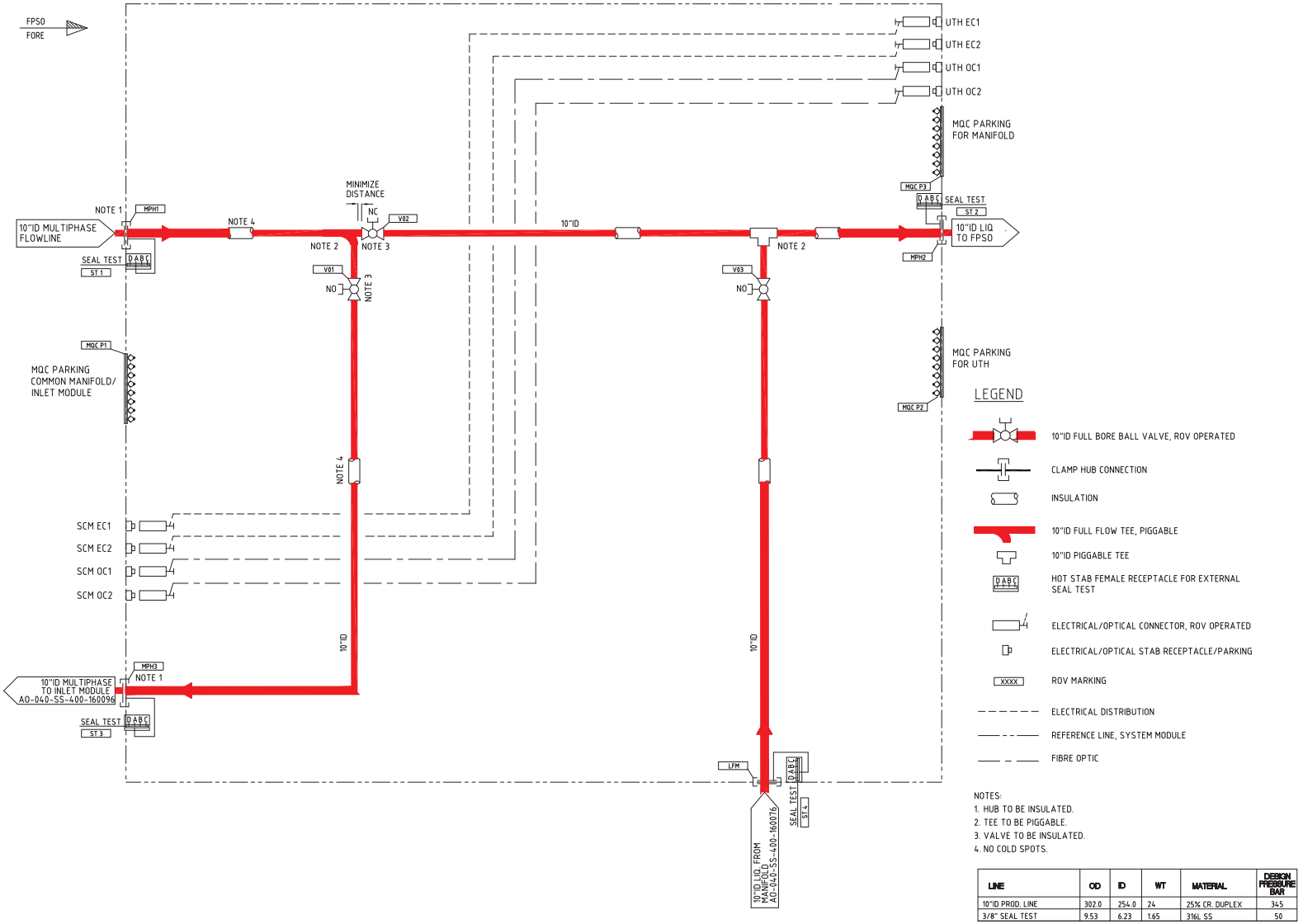


8.1.2 IMF side and top view



Valve data: ref page 150

8.1.3 IMF ROV Panel



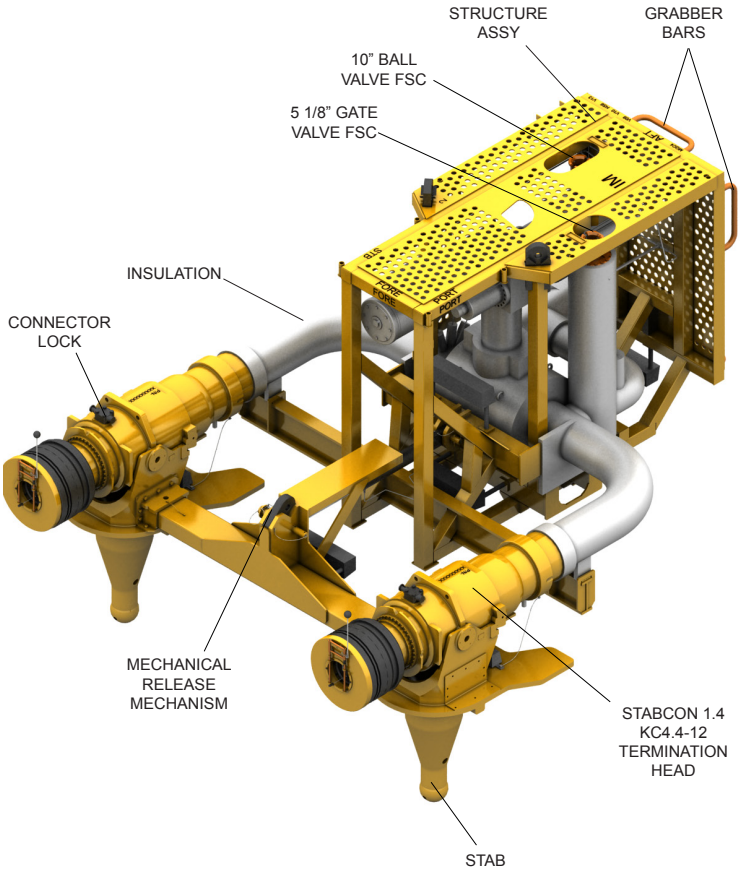
NOTES:
1. HUB TO BE INSULATED.
2. TEE TO BE PIGGABLE.
3. VALVE TO BE INSULATED.
4. NO COLD SPOTS.

LINE	OD	ID	WT	MATERIAL	DESIGN PRESSURE BAR
10"ID PROD. LINE	302.0	254.0	24	25% CR. DUPLEX	345
3/8" SEAL TEST	9.53	6.23	1.65	316L SS	50

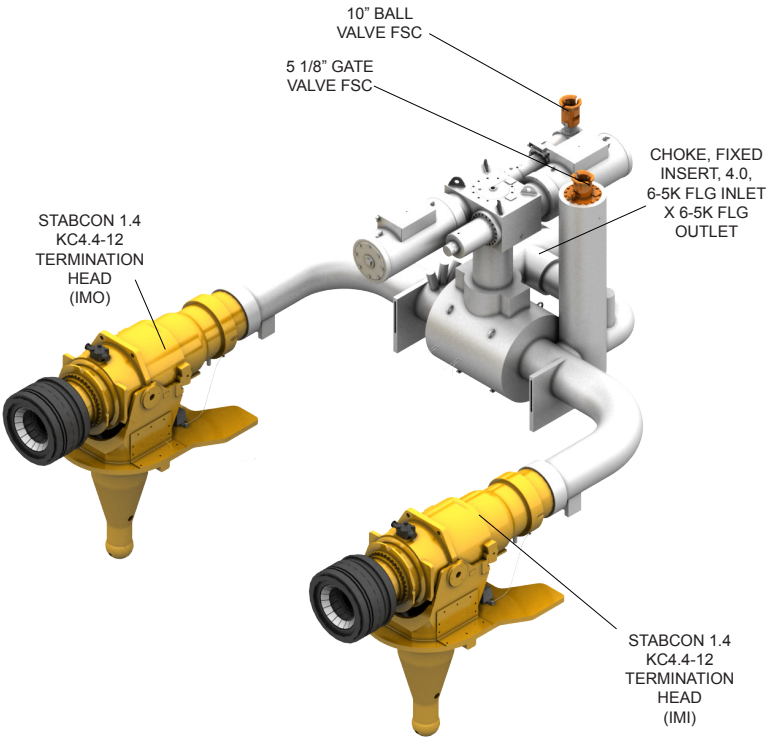
8.1.4 IMF Flow Schematic

REFERENCE IS MADE TO
AO-040-SS-400-160049

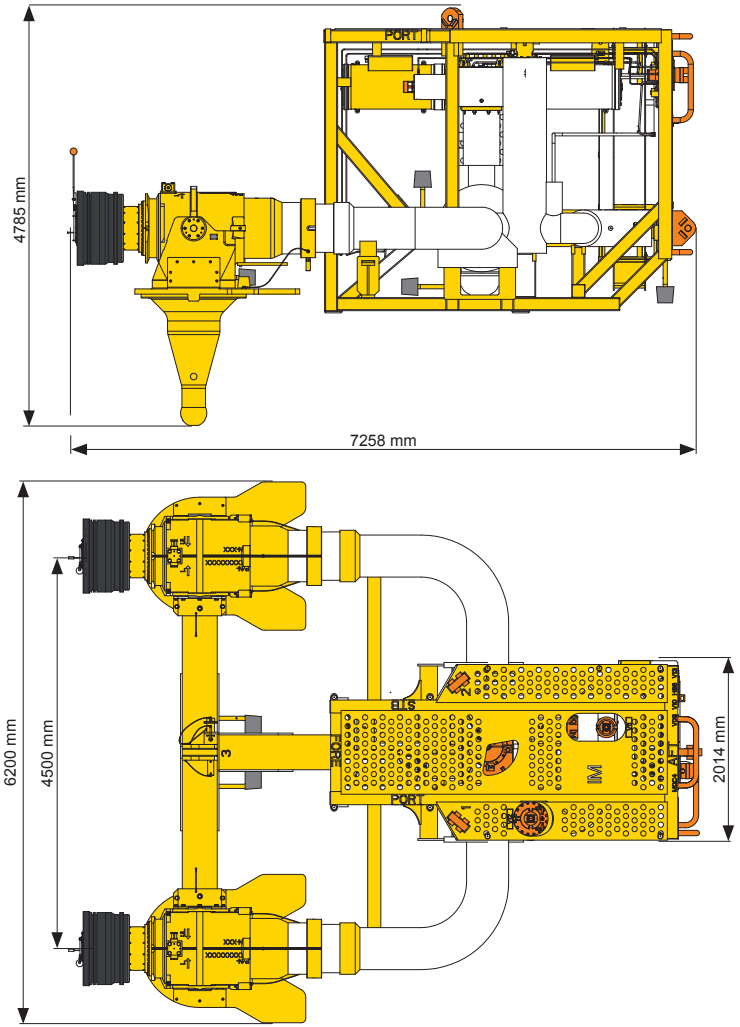
9 Inlet Module



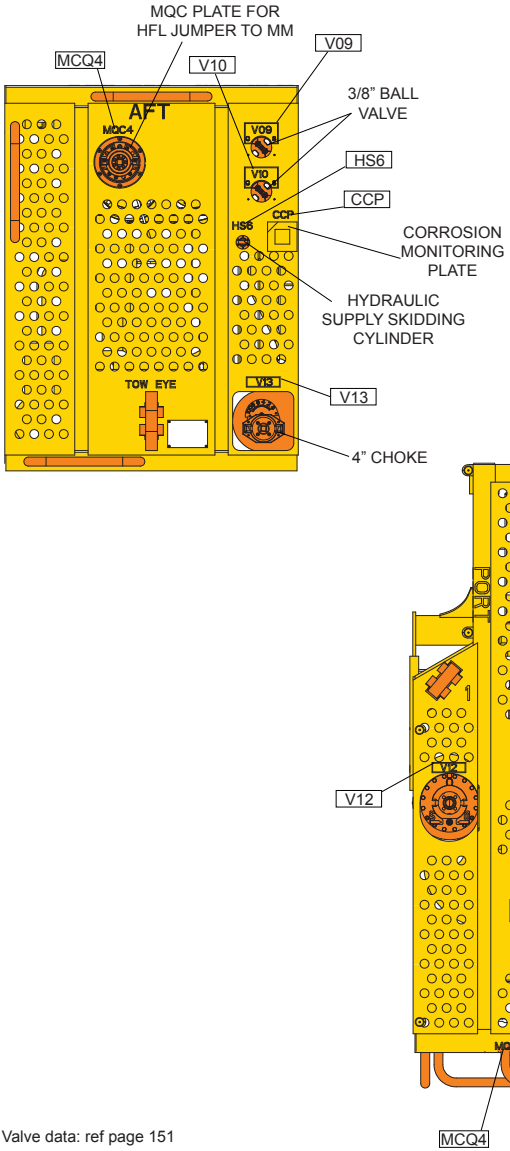
9.1 IM 3D view



9.1.1 IM Large bore

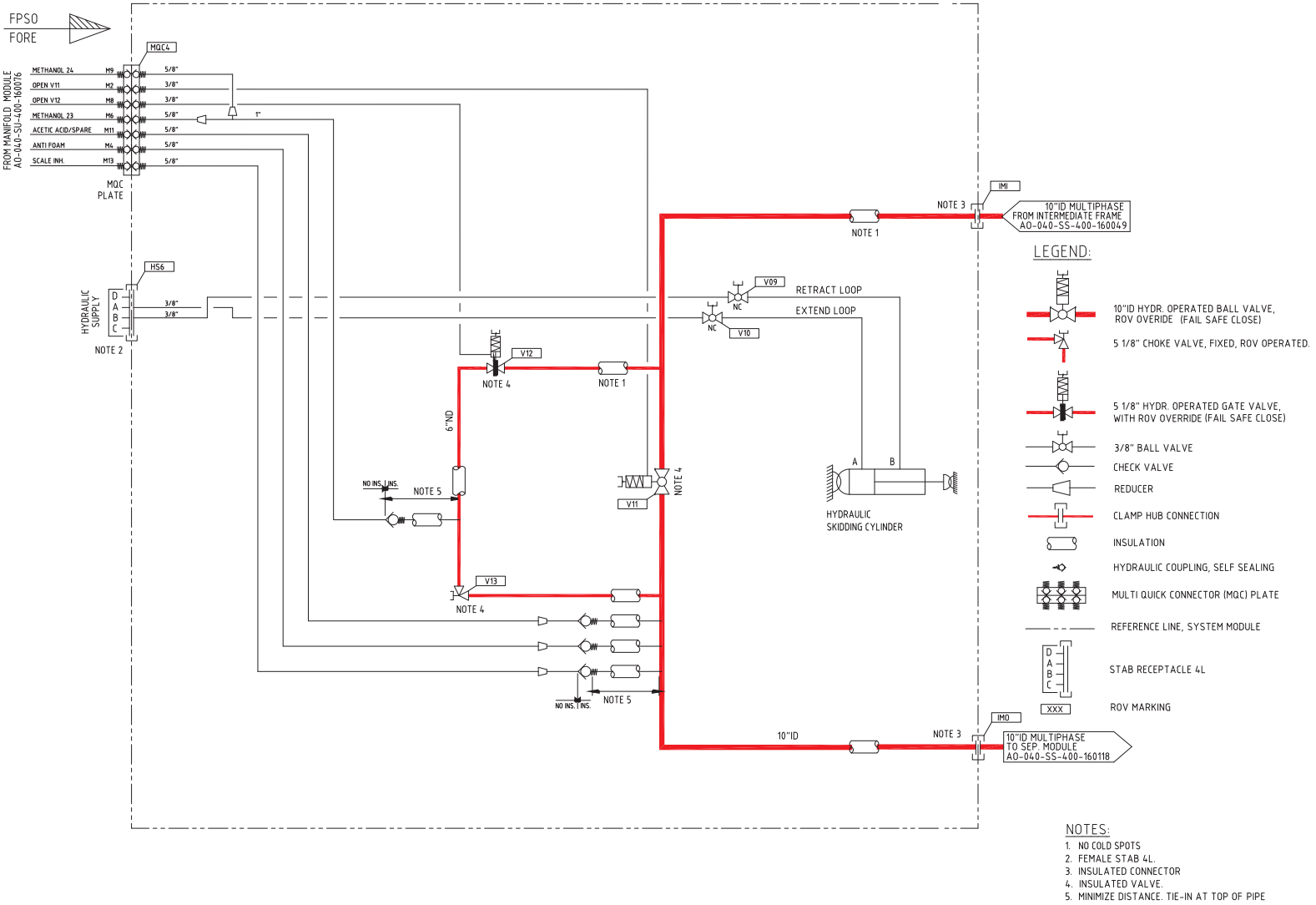


9.1.2 IM Side and top view



Valve data: ref page 151

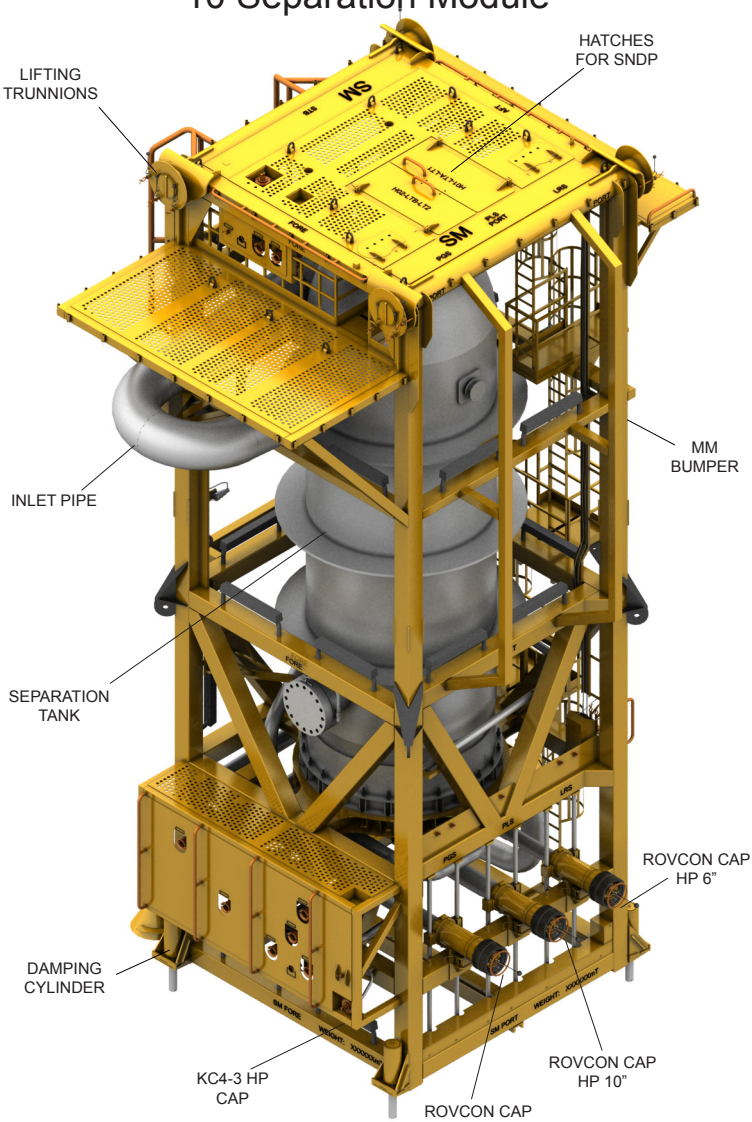
9.1.3 IM ROV Panel



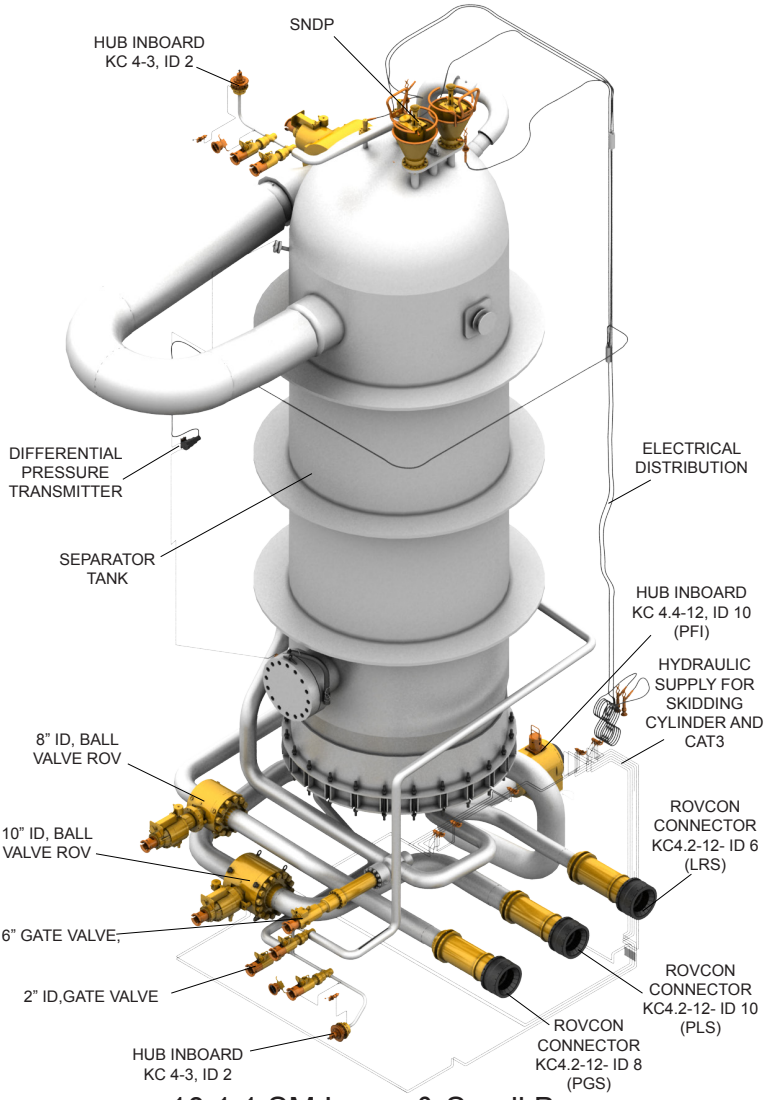
REFERENCE IS MADE TO
AO-040-SS-400-160096

9.1.4 IM Flow Schematic

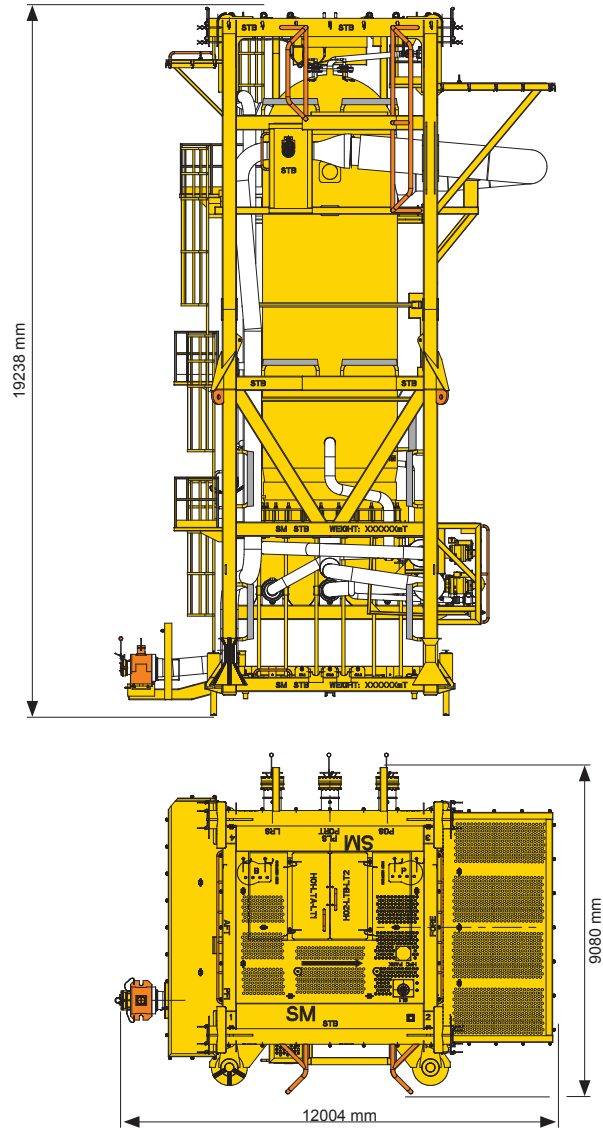
10 Separation Module



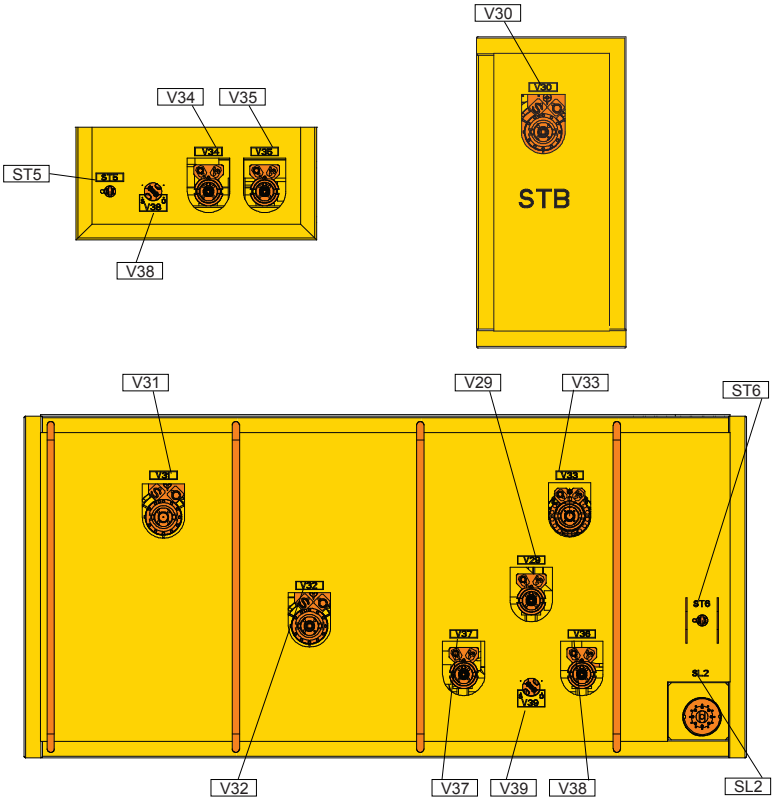
10.1 SM 3D view



10.1.1 SM Large & Small Bore

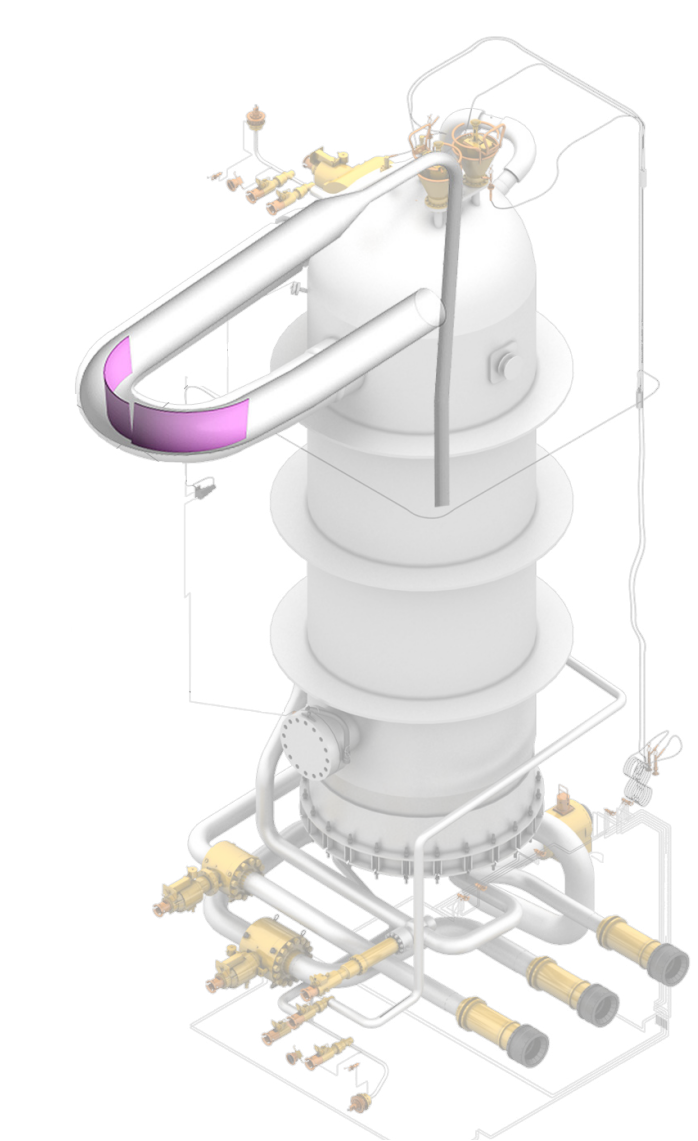


10.1.2 SM side and top view

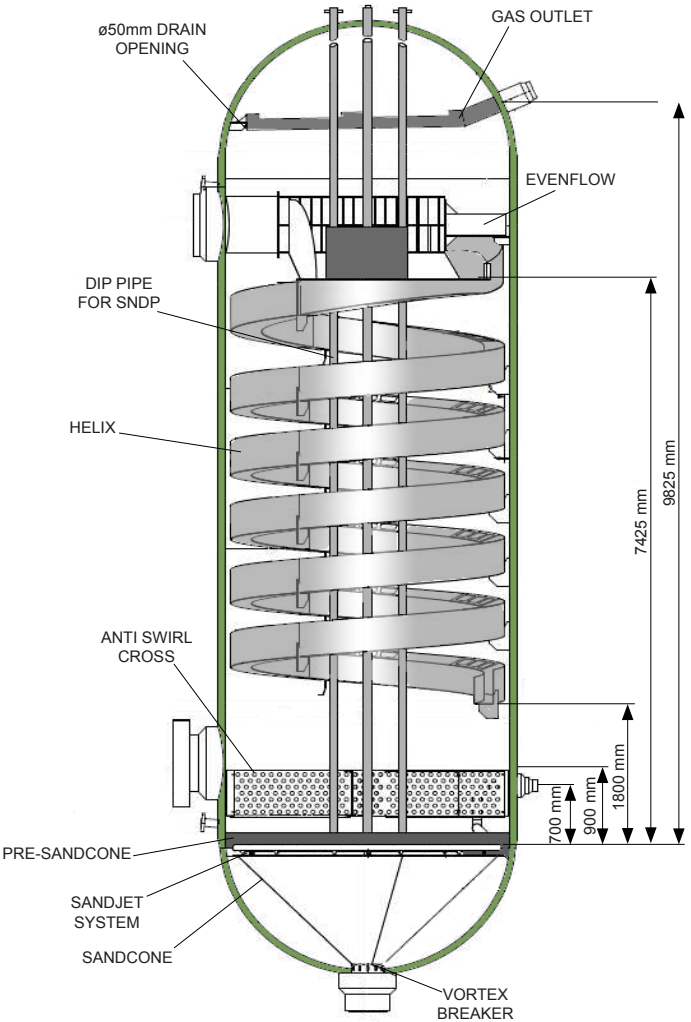


Valve data: ref page 152

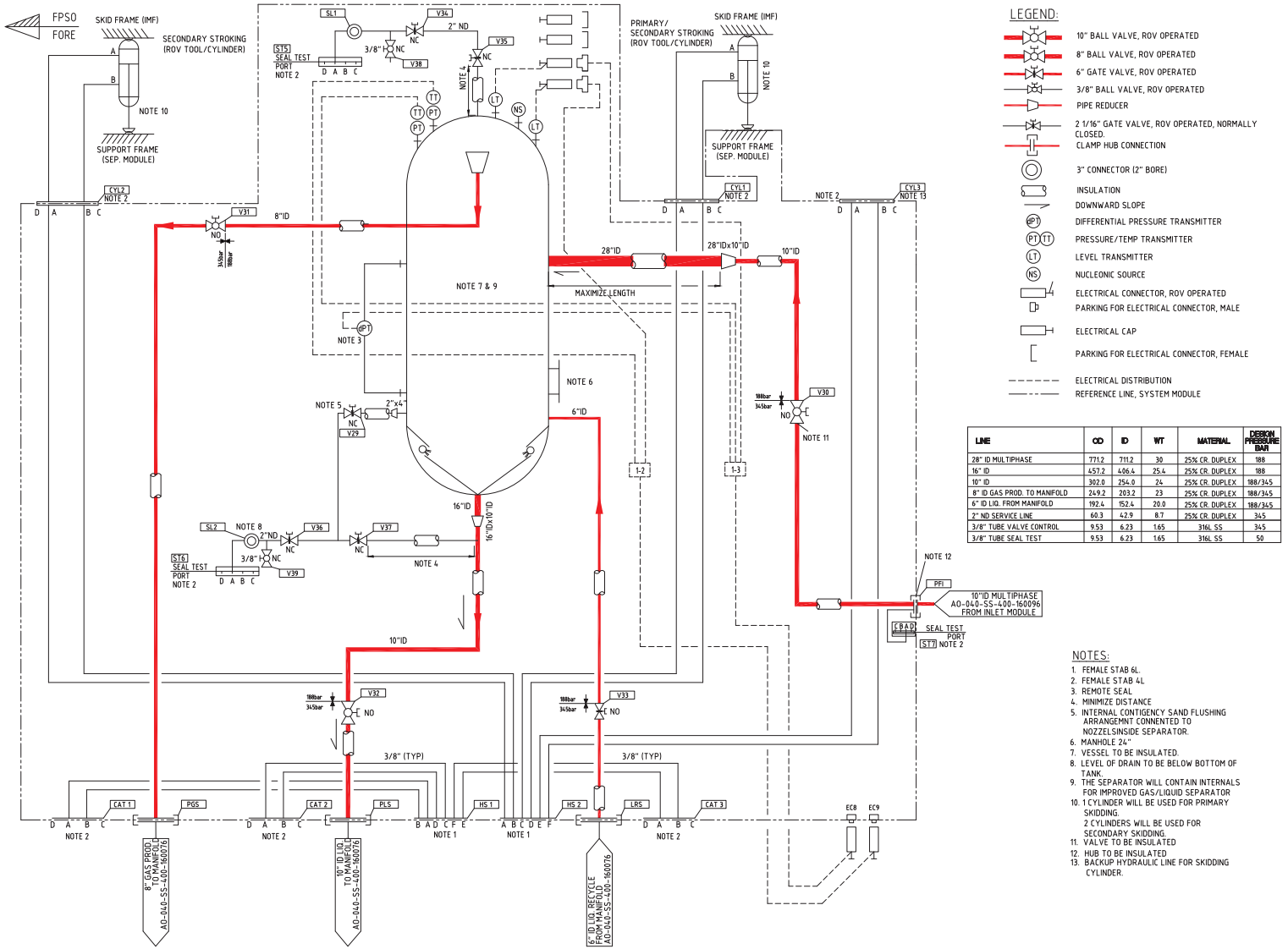
10.1.3 SM ROV Panel



10.1.4 SM Large Pipe Internals



10.1.4 SM Internals



LEGEND:

- 10" BALL VALVE, ROV OPERATED
- 8" BALL VALVE, ROV OPERATED
- 6" GATE VALVE, ROV OPERATED
- 3/8" BALL VALVE, ROV OPERATED
- PIPE REDUCER
- 2 1/16" GATE VALVE, ROV OPERATED, NORMALLY CLOSED.
- CLAMP HUB CONNECTION
- 3" CONNECTOR (2" BORE)
- INSULATION
- DOWNWARD SLOPE
- DIFFERENTIAL PRESSURE TRANSMITTER
- PRESSURE/TEMP TRANSMITTER
- LEVEL TRANSMITTER
- NUCLEONIC SOURCE
- ELECTRICAL CONNECTOR, ROV OPERATED
- PARKING FOR ELECTRICAL CONNECTOR, MALE
- ELECTRICAL CAP
- PARKING FOR ELECTRICAL CONNECTOR, FEMALE
- ELECTRICAL DISTRIBUTION
- REFERENCE LINE, SYSTEM MODULE

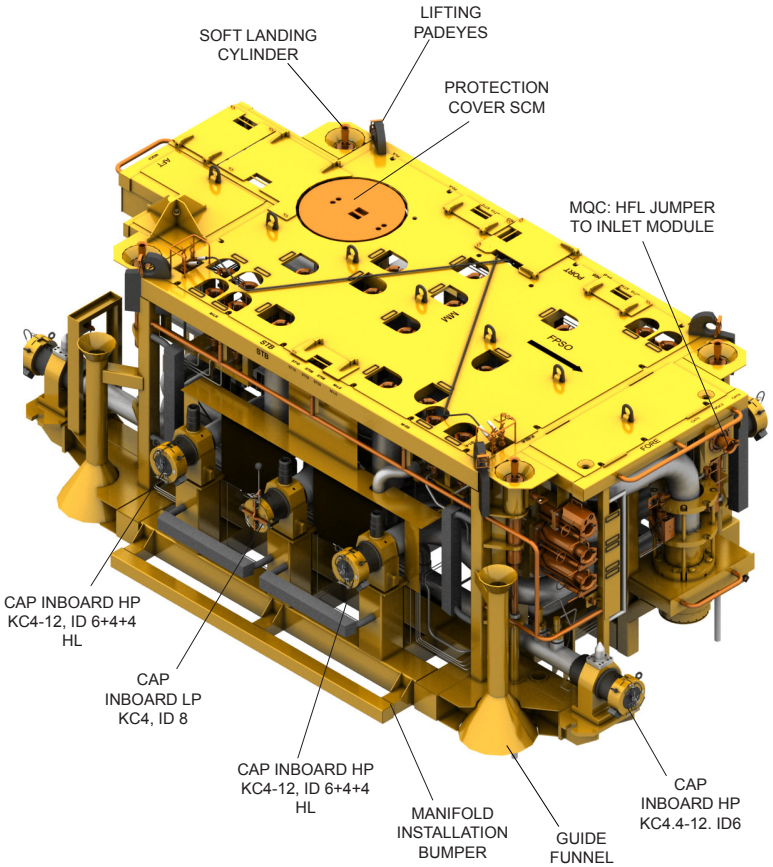
LINE	OD	ID	WT	MATERIAL	DESIGN PRESSURE BAR
28" ID MULTIPHASE	771.2	711.2	30	25% CR. DUPLEX	188
16" ID	457.2	406.4	25.4	25% CR. DUPLEX	188
10" ID	302.0	254.0	24	25% CR. DUPLEX	188/345
8" ID GAS PROD. TO MANIFOLD	249.2	203.2	23	25% CR. DUPLEX	188/345
6" ID LIQ. FROM MANIFOLD	192.4	152.4	20.0	25% CR. DUPLEX	188/345
2" ND SERVICE LINE	60.3	42.9	8.7	25% CR. DUPLEX	345
3/8" TUBE VALVE CONTROL	9.53	6.23	1.65	316L SS	345
3/8" TUBE SEAL TEST	9.53	6.23	1.65	316L SS	50

NOTES:

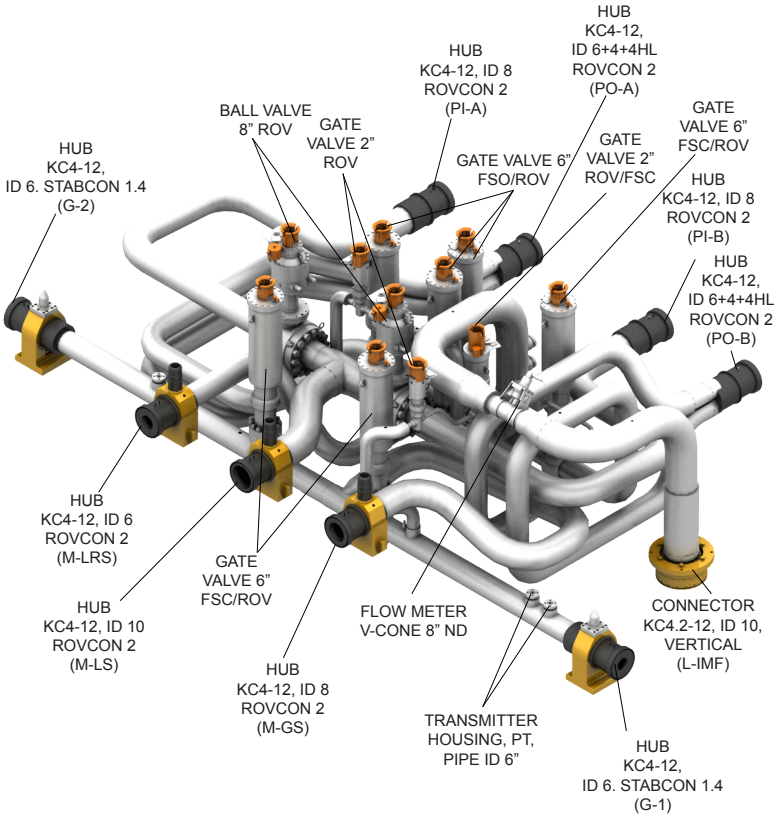
1. FEMALE STAB 6L.
2. FEMALE STAB 4L.
3. REMOTE SEAL
4. MINIMIZE DISTANCE
5. INTERNAL CONTIGENCY SAND FLUSHING ARRANGEMNT CONNENTED TO NOZZELSINSIDE SEPARATOR.
6. MANHOLE 24"
7. VESSEL TO BE INSULATED.
8. LEVEL OF DRAIN TO BE BELOW BOTTOM OF TANK.
9. THE SEPARATOR WILL CONTAIN INTERNALS FOR IMPROVED GAS/LIQUID SEPARATOR
10. 1 CYLINDER WILL BE USED FOR PRIMARY SKIDDING.
    2 CYLINDERS WILL BE USED FOR SECONDARY SKIDDING.
11. VALVE TO BE INSULATED
12. HUB TO BE INSULATED
13. BACKUP HYDRAULIC LINE FOR SKIDDING CYLINDER.

REFERENCE IS MADE TO
AO-040-SS-400-160118

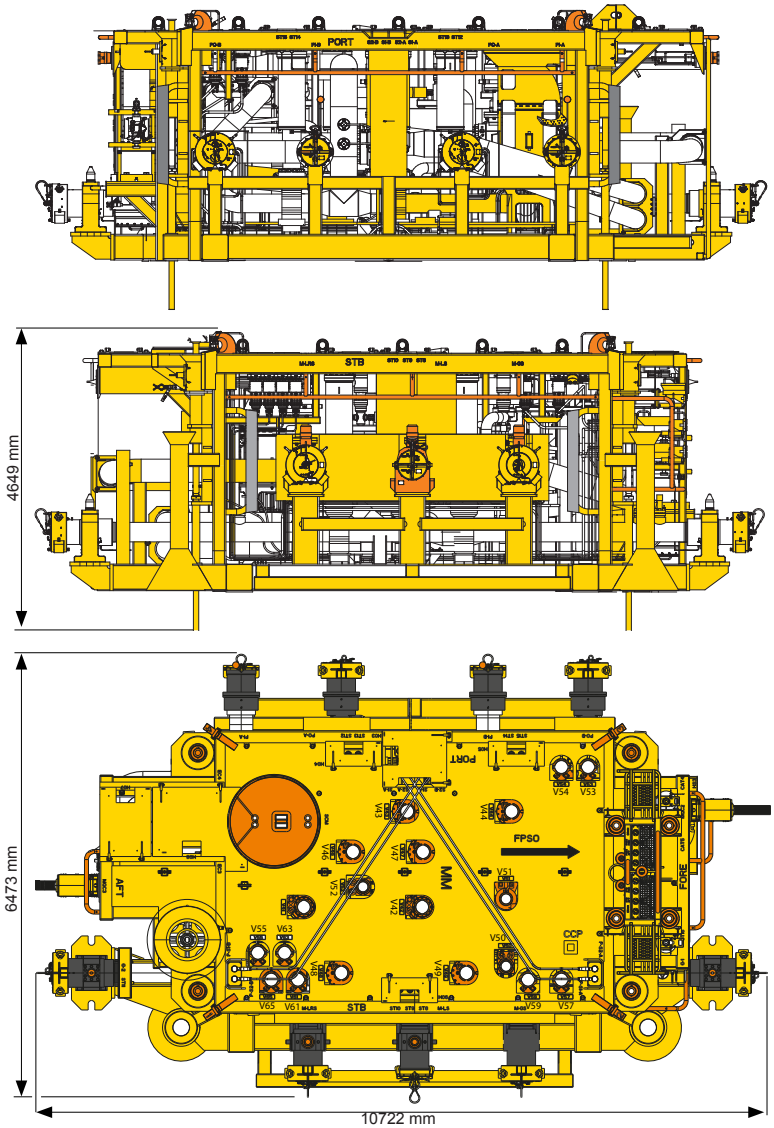
10.1.5 SM Flow Schematic



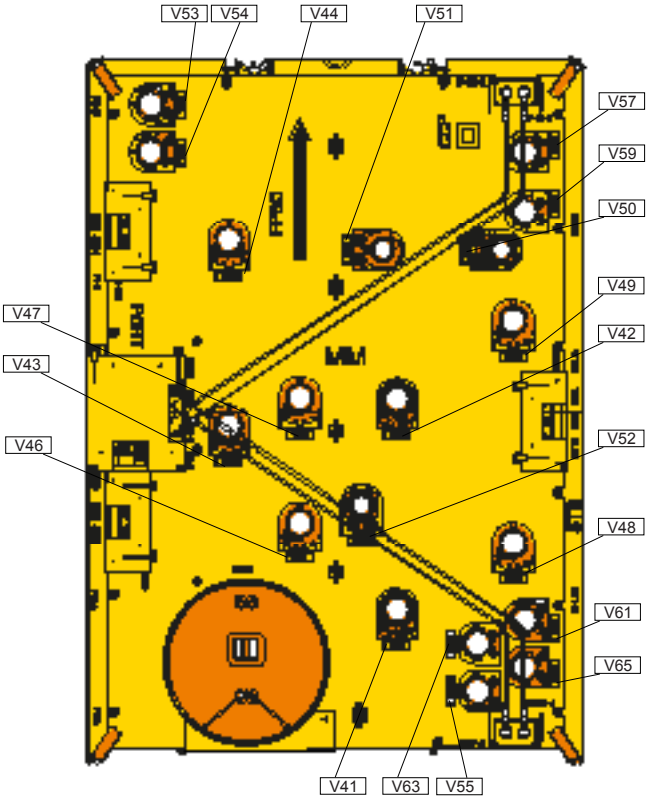
11.1 MM 3D view



11.1.1 MM Large Bore

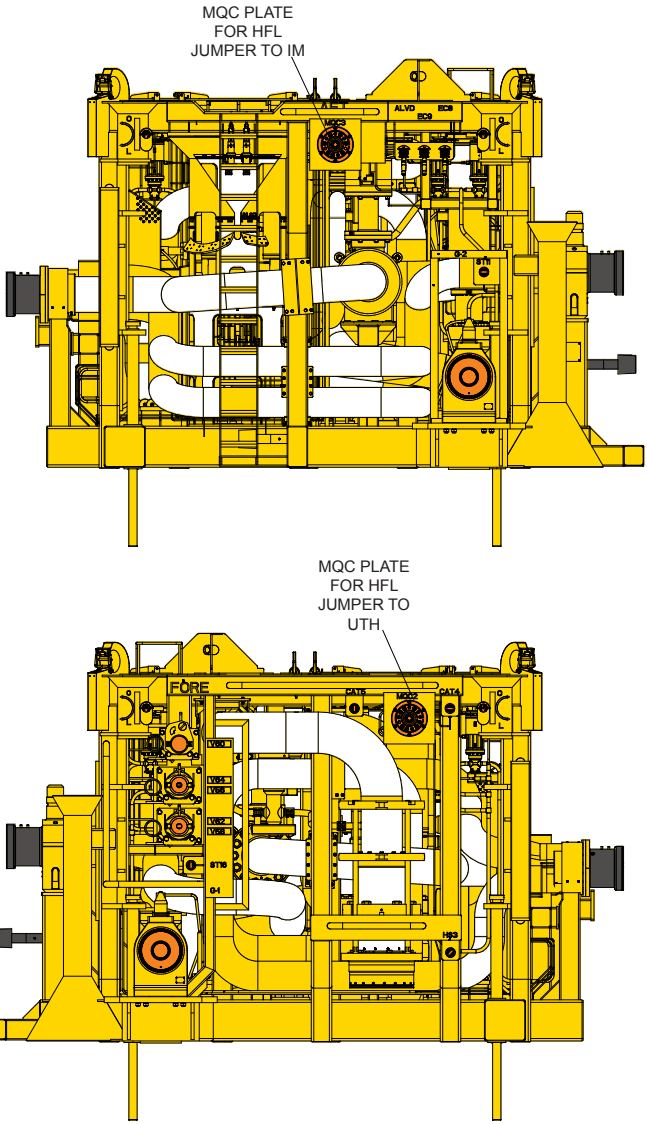


11.1.2 MM Side and Top view

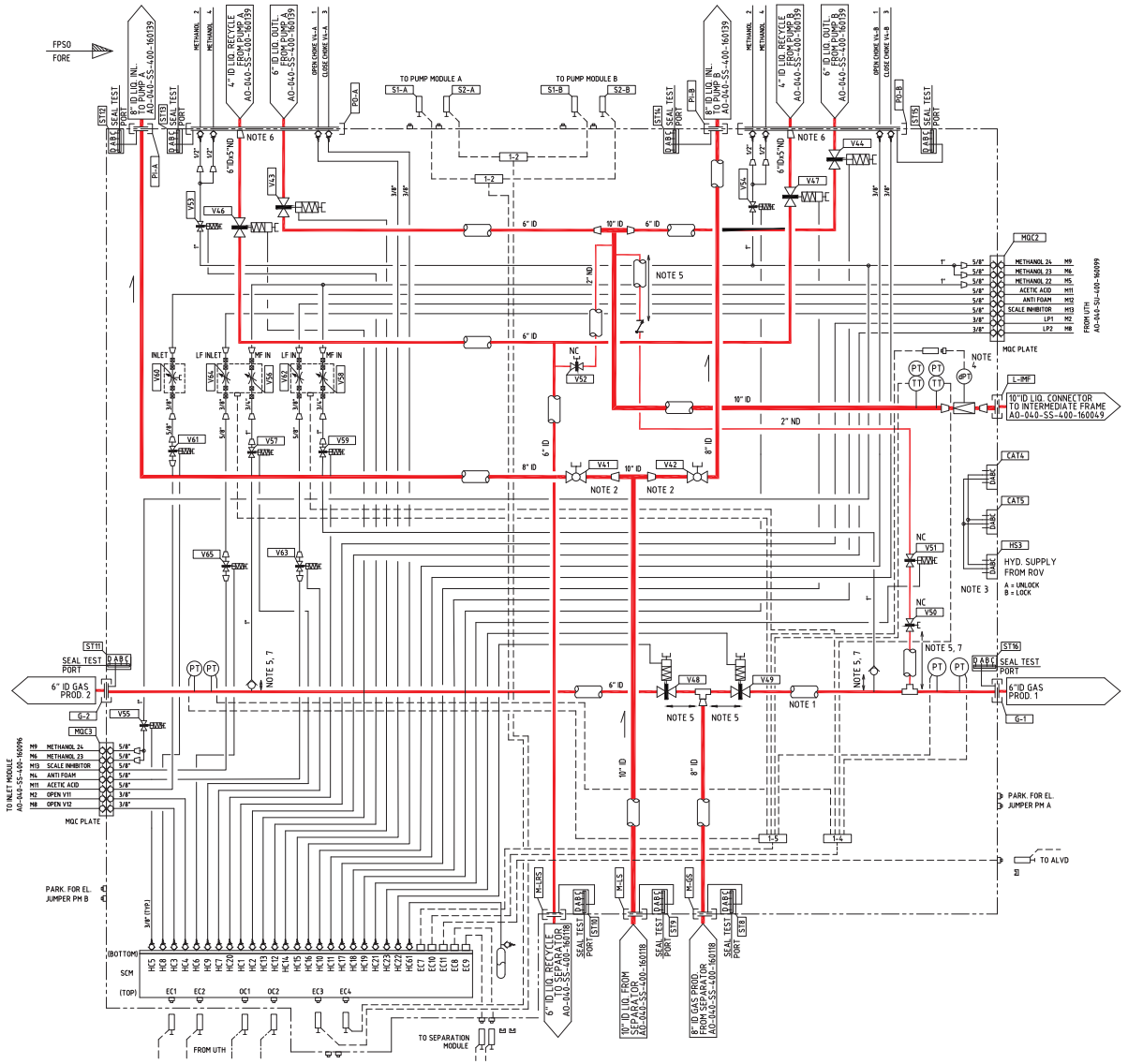


Valve data: ref page 153

11.1.3 MM Top ROV Panel



11.1.4 MM ROV Panel



LEGEND:

- 8" ID FULL BORE BALL VALVE, ROV OPERATED
- 6" ID FULL BORE GATE VALVE, HYDRAULIC OPERATED WITH ROV OVERRIDE FAIL SAFE OPEN
- 6" ID FULL BORE GATE VALVE, HYDRAULIC OPERATED WITH ROV OVERRIDE FAIL SAFE CLOSE
- 2 1/16" ID GATE VALVE, HYDRAULIC OPERATED WITH WITH ROV OVERRIDE FAIL SAFE CLOSE
- 2 1/16" ID GATE VALVE, ROV OPERATED
- 1" ID GATE VALVE, HYDRAULIC OPERATED WITH ROV OVERRIDE FAIL SAFE CLOSE
- 2" CHECK VALVE
- 1" CHECK VALVE
- 1" CHEM. INJ. DOSING VALVE, ROV OPERATED, RETRIEVABLE
- 1" CHEM. INJ. DOSING VALVE, REMOTE CONTROLLED, RETRIEVABLE
- HYDRAULIC COUPLER WITH SPRING CLOSE, CHECK VALVE
- V-CONE FLOW METER, 8" ID
- STAB 4L RECEPTACLE WITH PROTECTION INSERT
- MULTI QUICK CONNECTOR (MQC) PLATE
- PRESSURE / PRESSURE TEMPERATURE TRANSMITTER
- DIFFERENTIAL PRESSURE TRANSMITTER
- SLOPE
- COMPENSATOR TANK 20 L. RELIEF PRESSURE 40 bar.
- ELECTRICAL DISTRIBUTION
- REFERENCE LINE, SYSTEM MODULE
- FIBRE OPTIC
- ELECTRICAL / OPTICAL STAB CONNECTOR, ROV OP.
- ELECTRICAL / OPTICAL STAB CONNECTOR, DRY MATE
- ELECTRICAL / OPTICAL STAB RECEPTACLE/PARKING
- ELECTRICAL / OPTICAL SPLIT BOX
- CONNECTOR
- ROV MARKING
- THERMAL INSULATION
- PIPE REDUCER
- ECCENTRIC PIPE REDUCER
- PIGGABLE TEE
- EL. REC. PROTECTION CAP

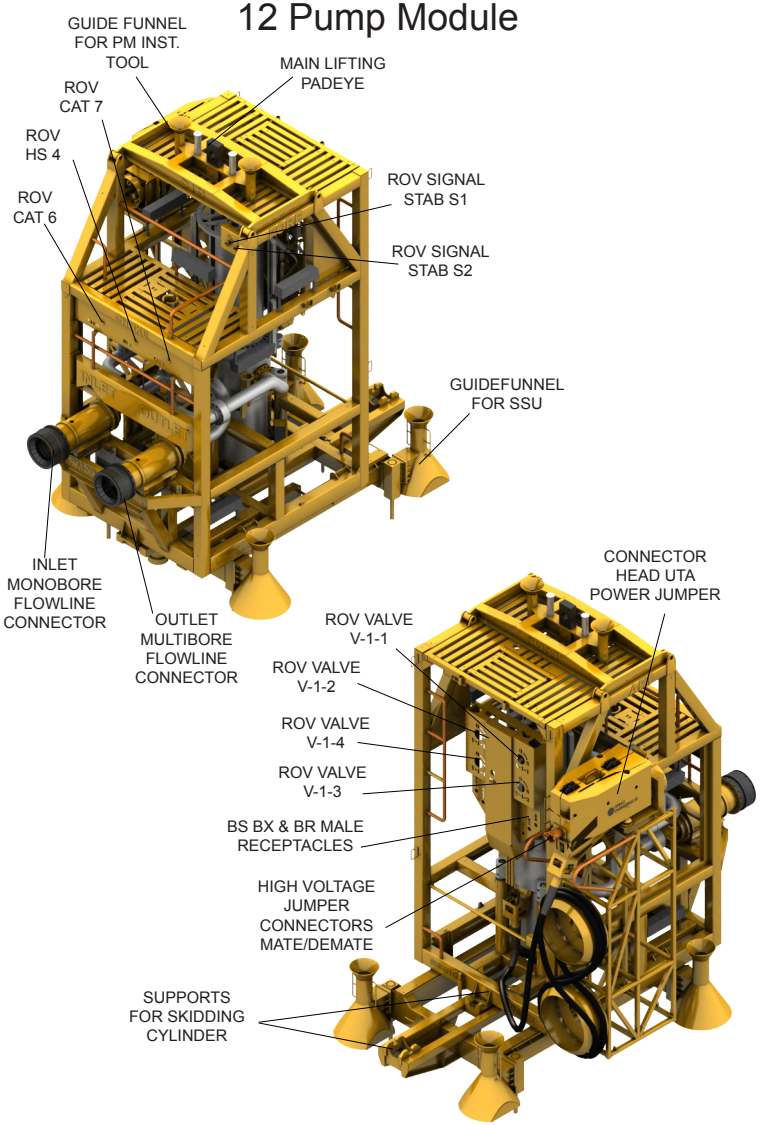
NOTES:
1. 6" ID GAS PROD. LINE TO BE PIGGABLE.
2. PUMP INLET PIPING TO BE SYMMETRIC BETWEEN TEE AND INLET HUBS.
3. STAB RECEPTACLES 4L FOR 10" VERTICAL CONNECTOR ACTUATOR TOOL.
4. DP-TRANSMITTER TO BE INSTALLED 45 DEG. OFFSET TO HORIZONTAL LINE.
5. DISTANCE TO BE MINIMIZED.
6. ECCENTRIC REDUCER TO AVOID LOWPOINT. REDUCER INTERFACE TOWARDS HUB: ID 103.3MM , WT 19.0MM.
7. PIPE CONNECTION AT TOP OF PIPE.

LINE	OD	ID	WT	MATERIAL	DESIGN PRESS. BAR
10"ID LIQ. LINES	302.0	254.0	24.0	25% CR. DUPLEX	345
8"ID LIQ. & GAS LINES	249.2	203.2	23.0	25% CR. DUPLEX	345
6"ID LIQ. & GAS LINES	192.4	152.4	20.0	25% CR. DUPLEX	345
2"ND LIQ. RISER DRAIN/GAS LIFT	60.3	42.9	8.7	25% CR. DUPLEX	345
1" ND METHANOL LINES	33.4	20.6	6.4	25% CR. DUPLEX	345
1" ND METHANOL LINES	33.4	20.6	6.4	316L SS	345
1/2" ND METHANOL LINES	21.3	11.7	4.8	316L SS	345
5/8" TUBE CHEMICALS	15.88	11.06	2.41	316L SS	345
3/8" TUBE LP/VALVE CONTROL	9.53	6.23	1.65	316L SS	380
3/8" TUBE CAT LINES	9.53	6.23	1.65	316L SS	207
3/8" TUBE SEAL TEST	9.53	6.23	1.65	316L SS	50

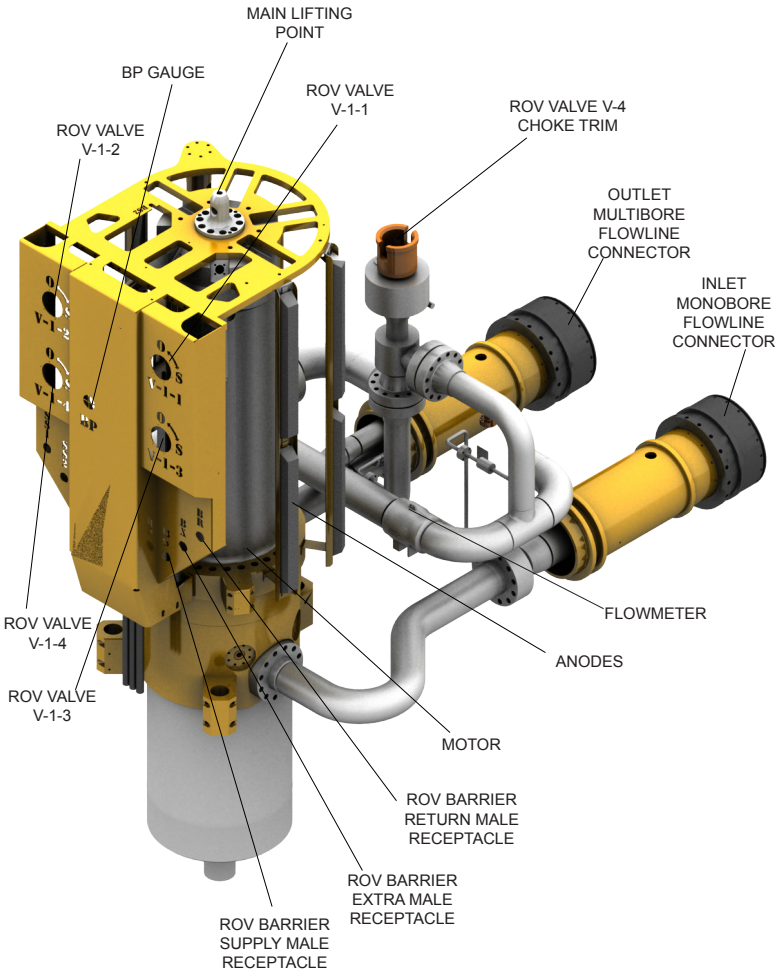
REFERENCE IS MADE TO AO-040-SS-400-160076

11.1.5 MM Flow Schematic

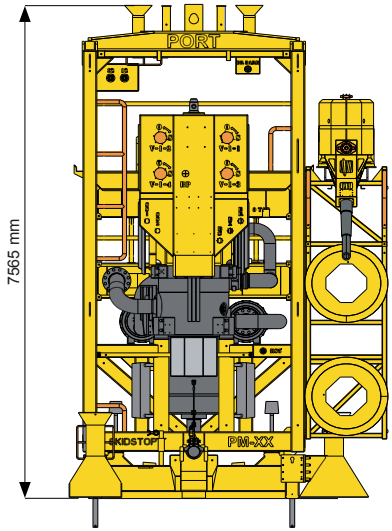
12 Pump Module

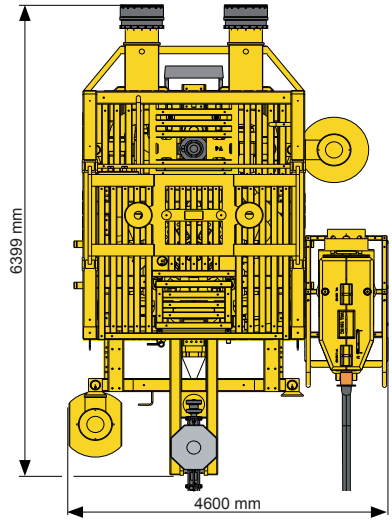


12.1 PM 3D view

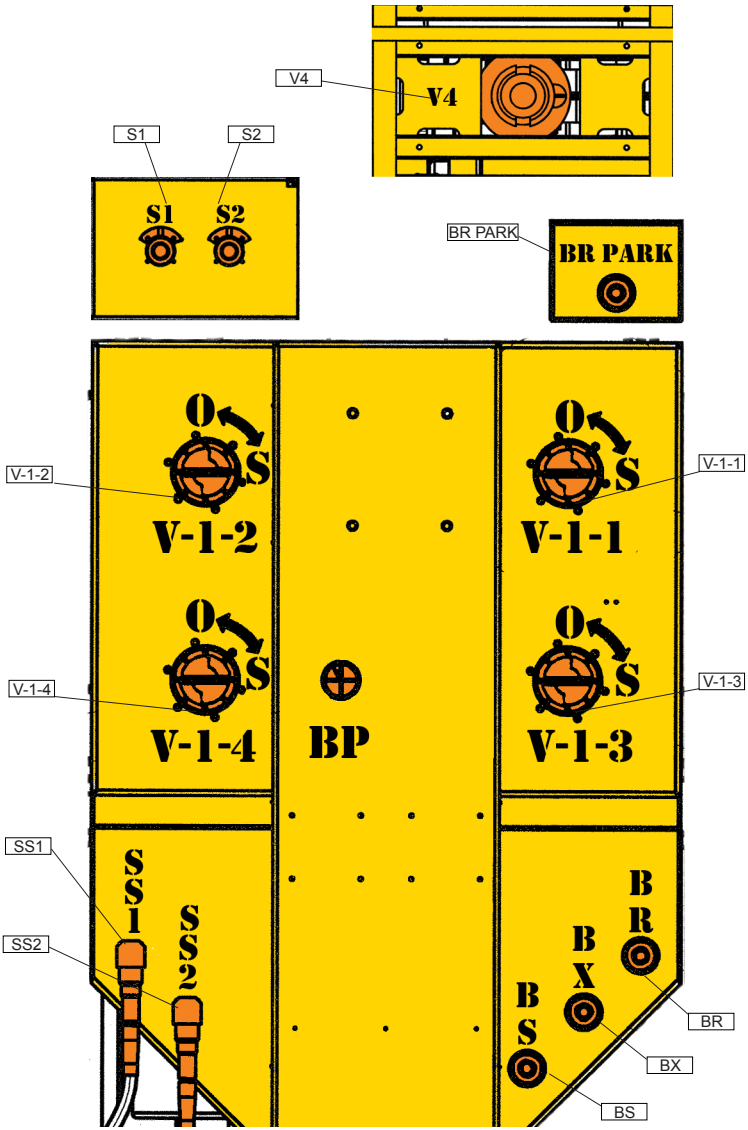

MAIN LIFTING POINT
BP GAUGE
ROV VALVE V-1-1
ROV VALVE V-1-2
ROV VALVE V-1-4
ROV VALVE V-1-3
ROV VALVE V-4 CHOKE TRIM
OUTLET MULTIBORE FLOWLINE CONNECTOR
INLET MONOBORE FLOWLINE CONNECTOR
FLOWMETER
ANODES
MOTOR
ROV BARRIER RETURN MALE RECEPTACLE
ROV BARRIER EXTRA MALE RECEPTACLE
ROV BARRIER SUPPLY MALE RECEPTACLE

12.1.1 Pump



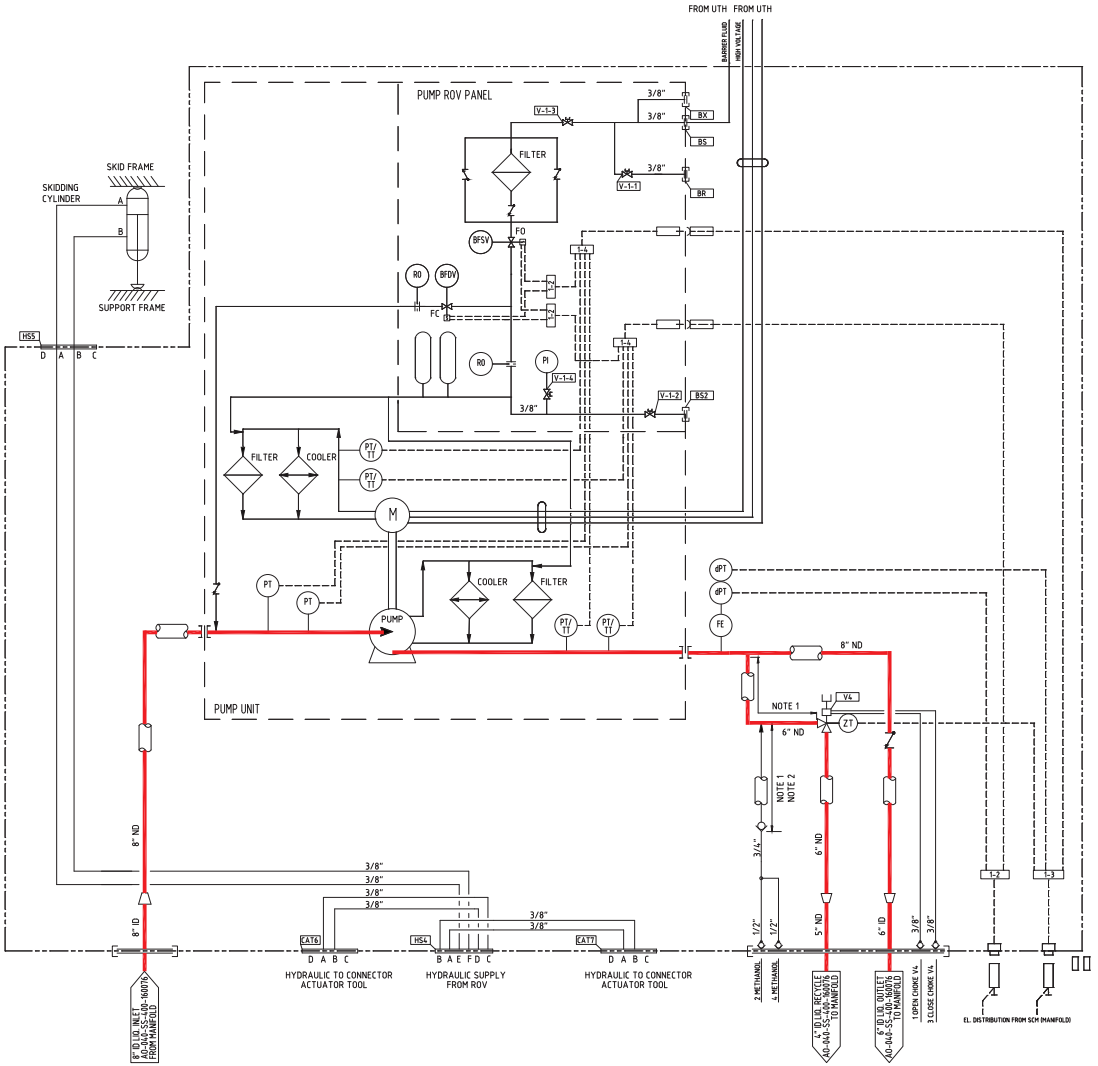


12.1.2 PM Side and Top view



Valve data: ref page 154

12.1.3 PM ROV Panel



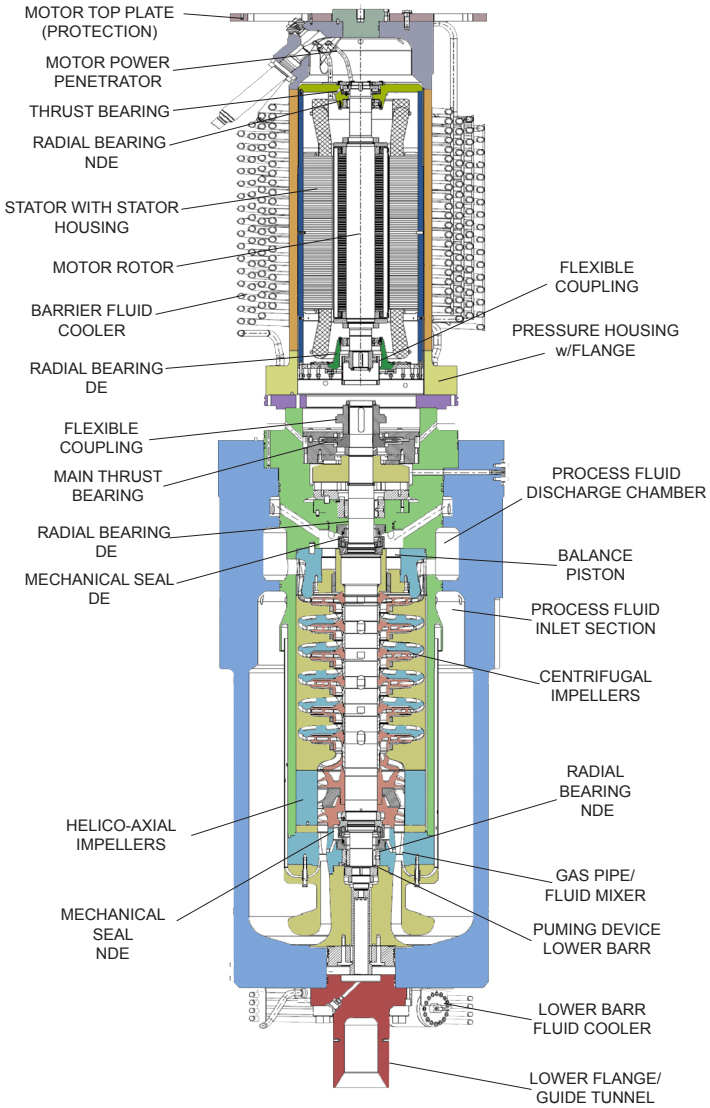
LEGEND:

- CHOKE, HYDRAULIC OPERATED WITH ROV OVERRIDE
- 3/8" BALL VALVE, ROV OPERATED
- 8" CHECK VALVE
- 1" CHECK VALVE
- HYDRAULIC COUPLER WITH SPRING CLOSE, CHECK VALVE
- FE — FLOW ELEMENT
- ELECTRICAL DISTRIBUTION
- REFERENCE LINE, SYSTEM MODULE
- SPO COMPACT FLANGES
- CONNECTOR
- STAB 4L, RECEPTACLE WITH PROTECTION INSERT (D A B C)
- STAB 6L, RECEPTACLE WITH PROTECTION INSERT (B A E F D C)
- XXXXX — ROV MARKING
- THERMAL INSULATION
- PIPE REDUCER
- PROTECTION CAP
- ELECTRICAL SPLIT BOX
- ELECTRICAL STAB RECEPTACLE
- PIN/RECEPTACLE/ MALE
- SOCKET/PLUG/ FEMALE
- BARRIER FLUID ACCUMULATOR
- ZT — POSITION TRANSMITTER
- PT — PRESSURE TRANSMITTER
- TT — TEMPERATURE TRANSMITTER
- dPT — DIFFERENTIAL PRESSURE TRANSMITTER
- RO — RESTRICTION ORRIFICE
- PI — PRESSURE INDICATOR
- BFSV — BARRIER FLUID SUPPLY VALVE
- BFDV — BARRIER FLUID DUMP VALVE

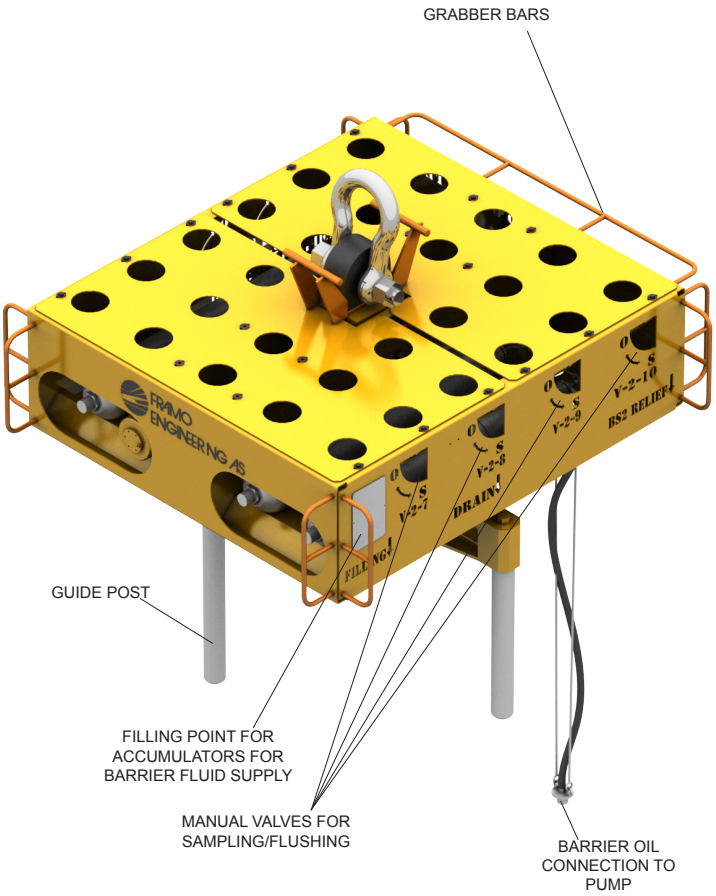
LINE	OD	ID	WT	MATERIAL	DESIGN PRESSURE BAR NOTE 3
8" ND	219.1	173.1	23.0	22% CR. DUPLEX	345
6" ND	168.3	131.7	18.3	22% CR. DUPLEX	345
8" ID	249.2	203.2	23.0	25%	345
6" ID	192.4	152.4	20.0	25%	345
5" ND	141.3	19.0	103.3	25%	345
3/4" METHANOL LINES	26.7	15.5	5.6	316L SS	345
1/2" METHANOL LINES	21.3	11.7	4,8	316L SS	345
3/8" TUBE LP/VALVE CONTROL	9.53	6.23	1.65	316L SS	380

REFERENCE IS MADE TO AO-040-SS-400-160139

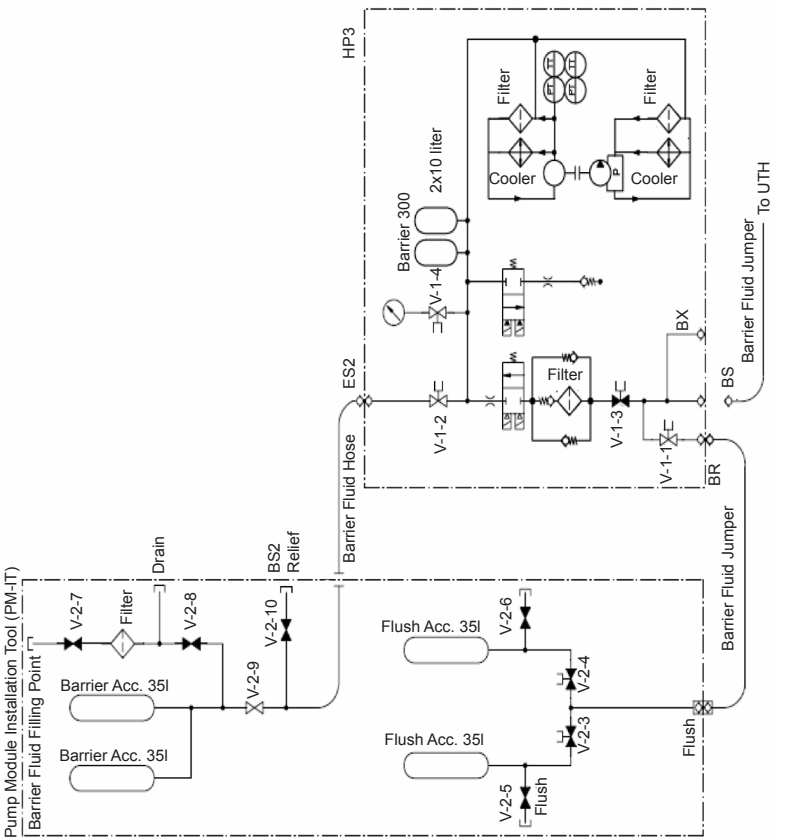
12.1.4 PM Flow Schematic



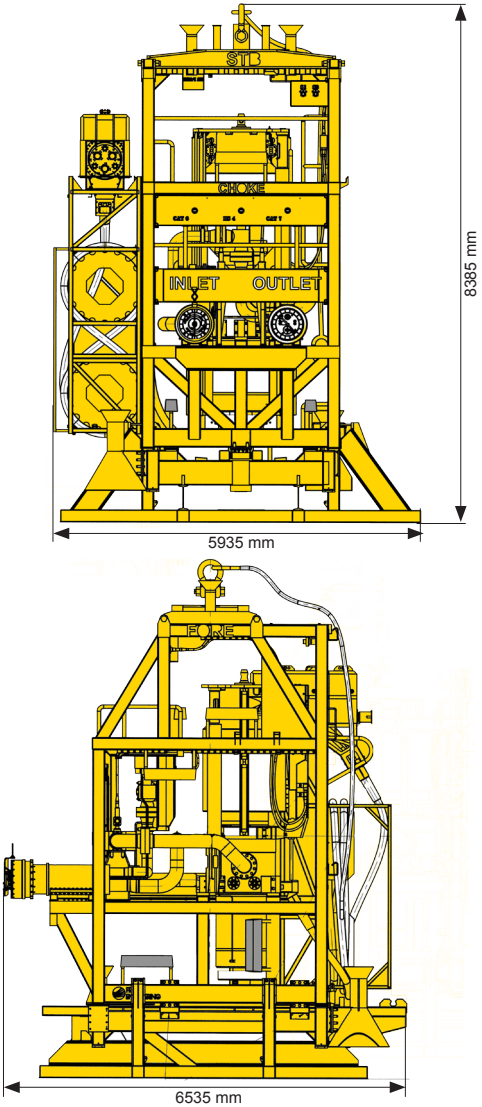
12.1.5 Pump internal view



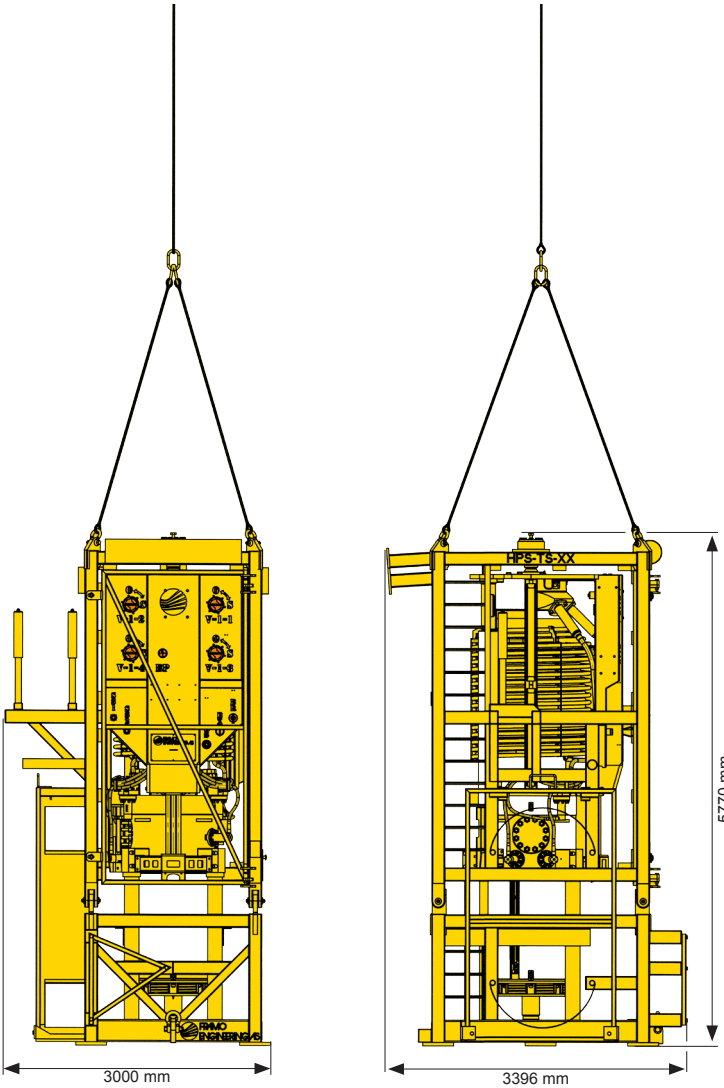
12.2 PM Running Tool



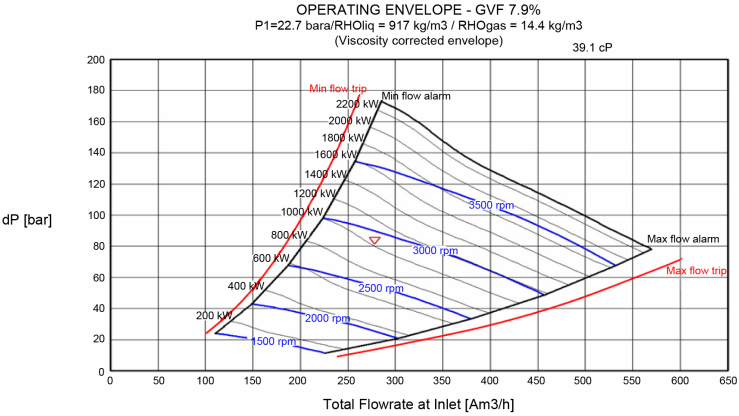
12.2.1 PM Running Tool Schematics

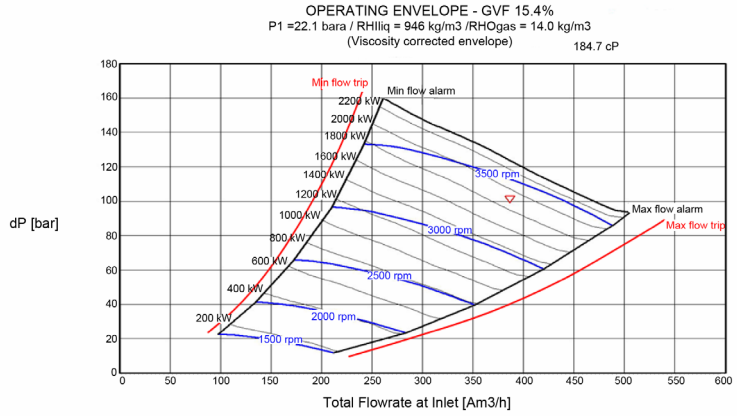


12.3 Sea Fastening Skid

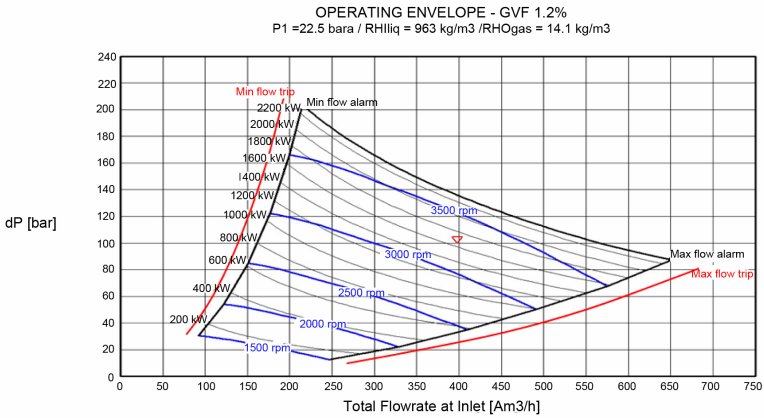


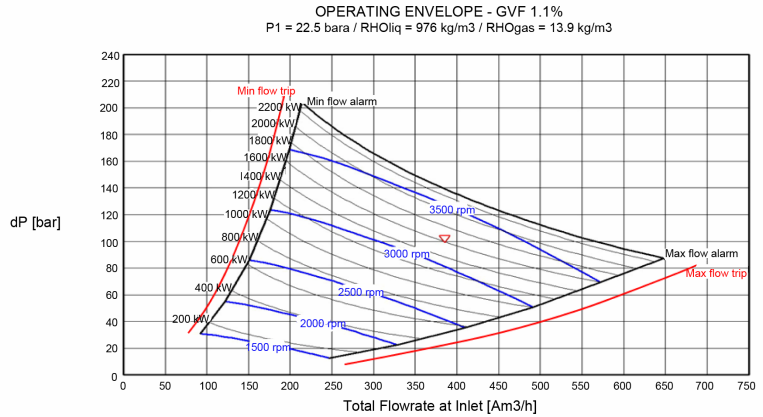
12.3.1 Pump Transport skid



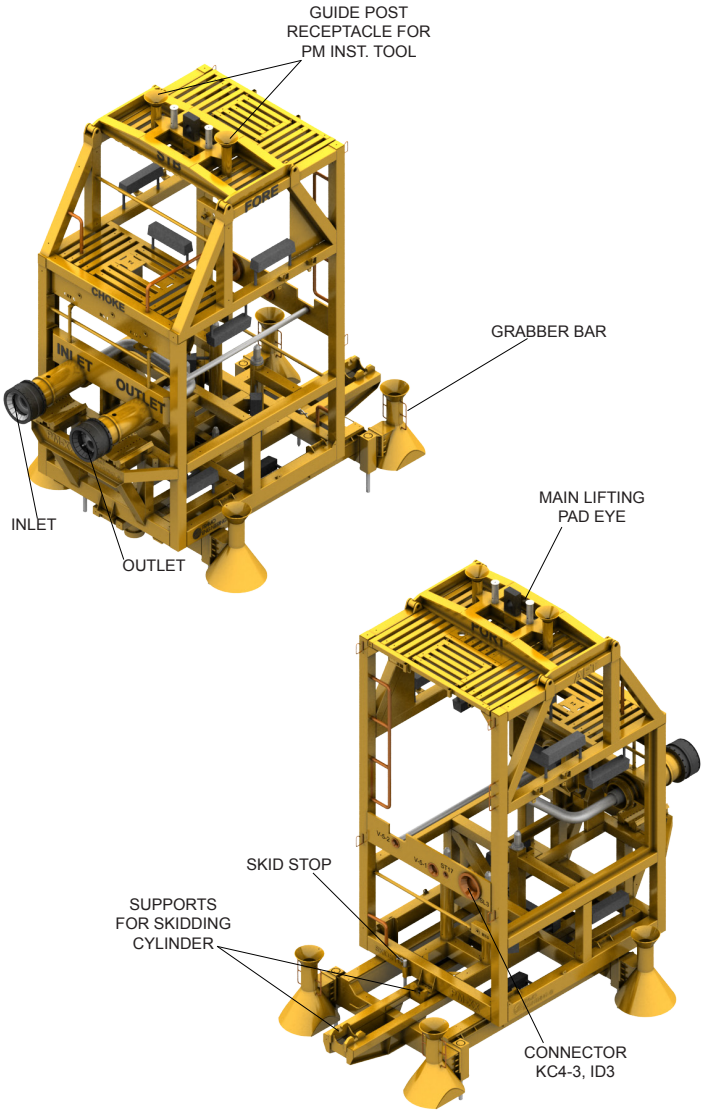


12.3.2 Pump Performance Curve

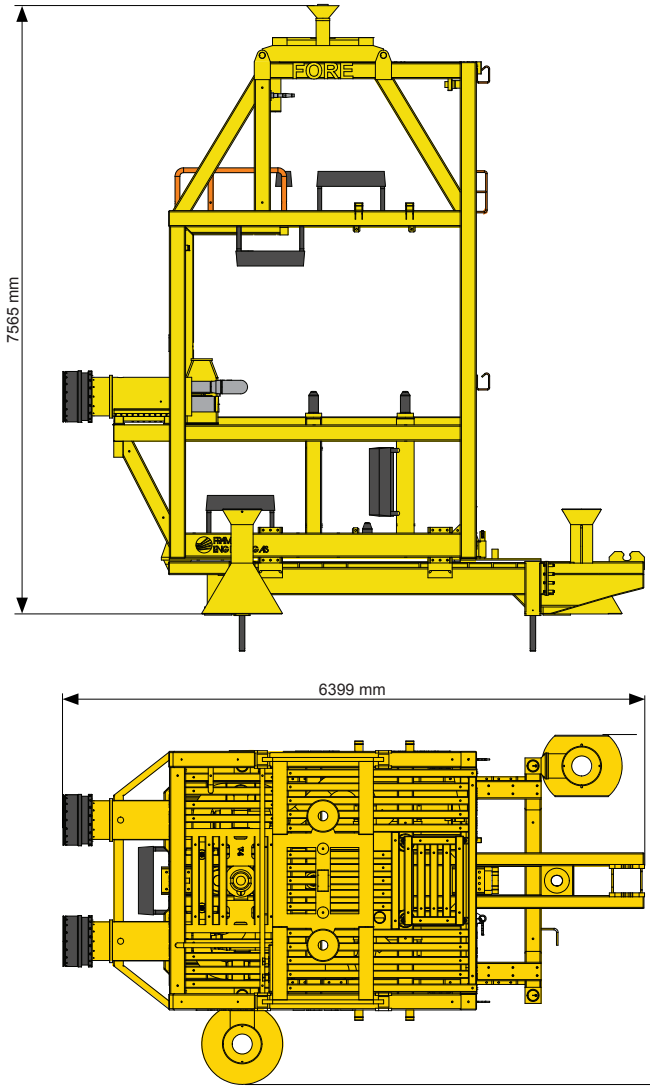




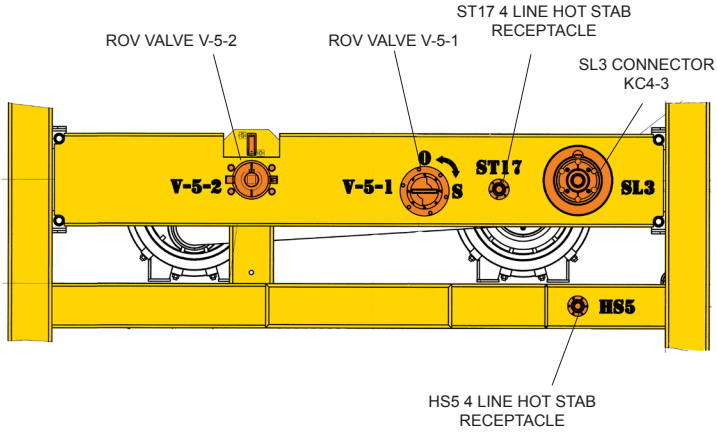
12.3.3 Pump Performance Curve



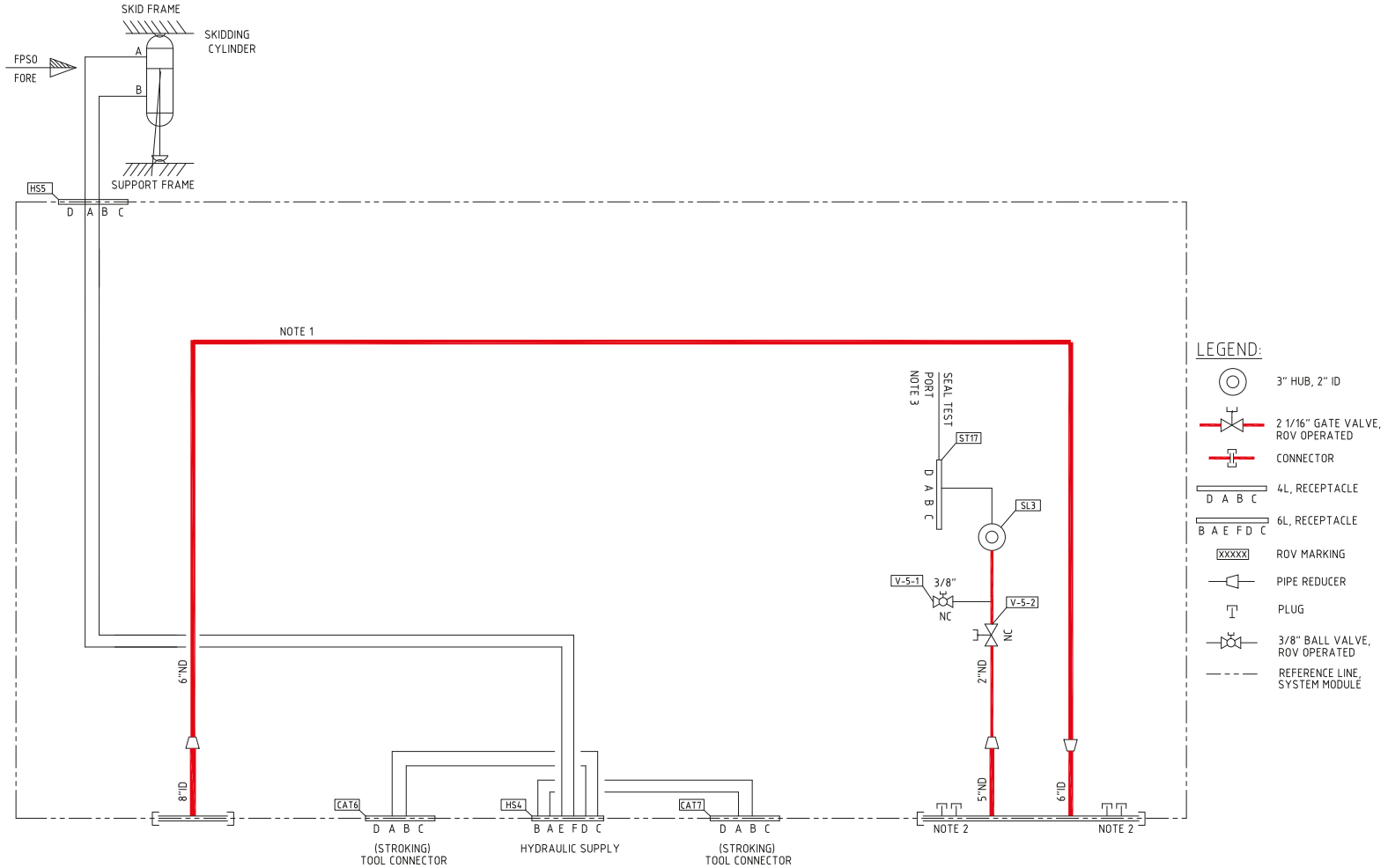
12.4 Dummy PM 3D view



12.4.1 Dummy PM Side and Top view



12.4.2 Dummy PM ROV Panel

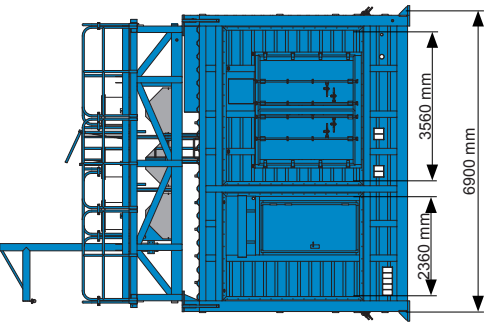


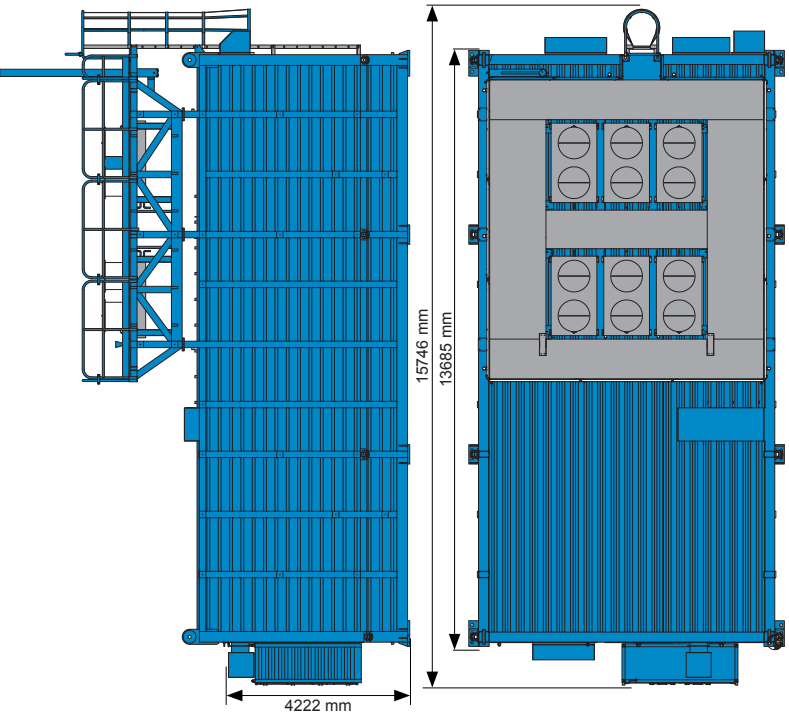
LINE	OD	ID	WT	MATERIAL	DESIGN PRESSURE BAR
6"ND	168,3	131,7	18,3	22% Cr DUPLEX	345
2"ND	60,3	42,9	8,7	22% Cr DUPLEX	345

NOTES:
1. THE PIPING MUST BE OF SUFFICENT LENGTH TO ALLOW FOR CUTTING AND WELDING.
2. 2 OFF HYDRAULIC SUPPLY LINES & 2 OFF MEOH LINES IN CONNECTOR IS PLUGGED.
3. REMOTE SEAL.

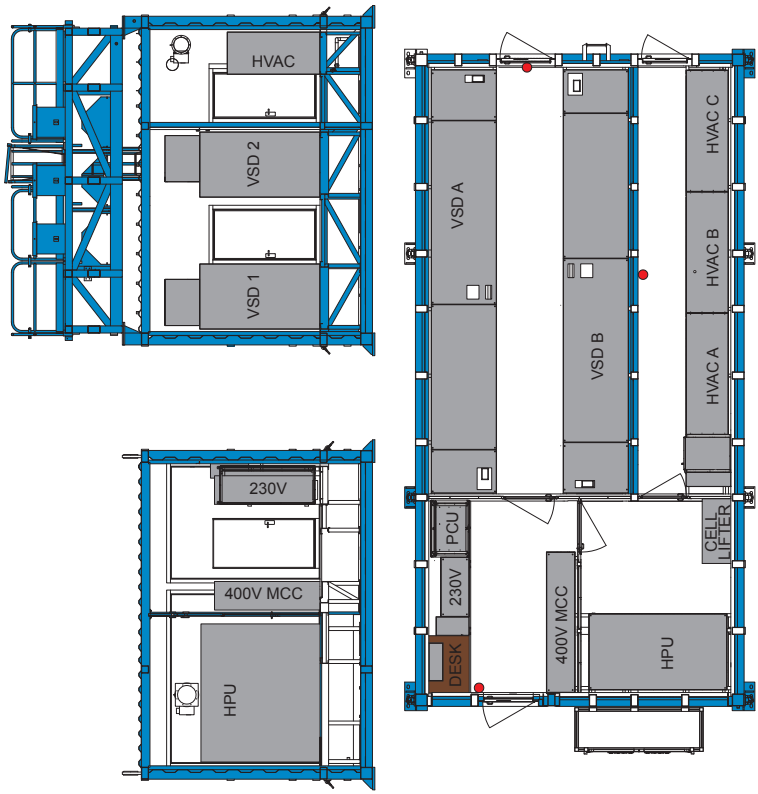
REFERENCE IS MADE TO AO-040-SS-400-160190

12.4.3 Dummy PM Flow Schematic

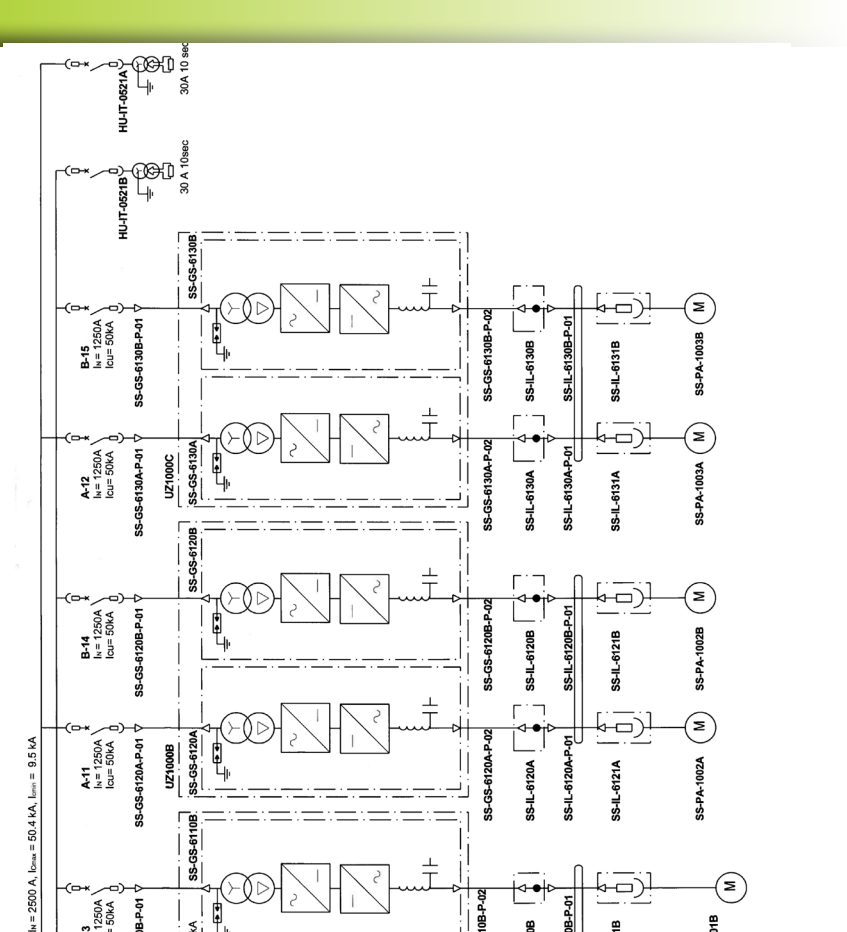




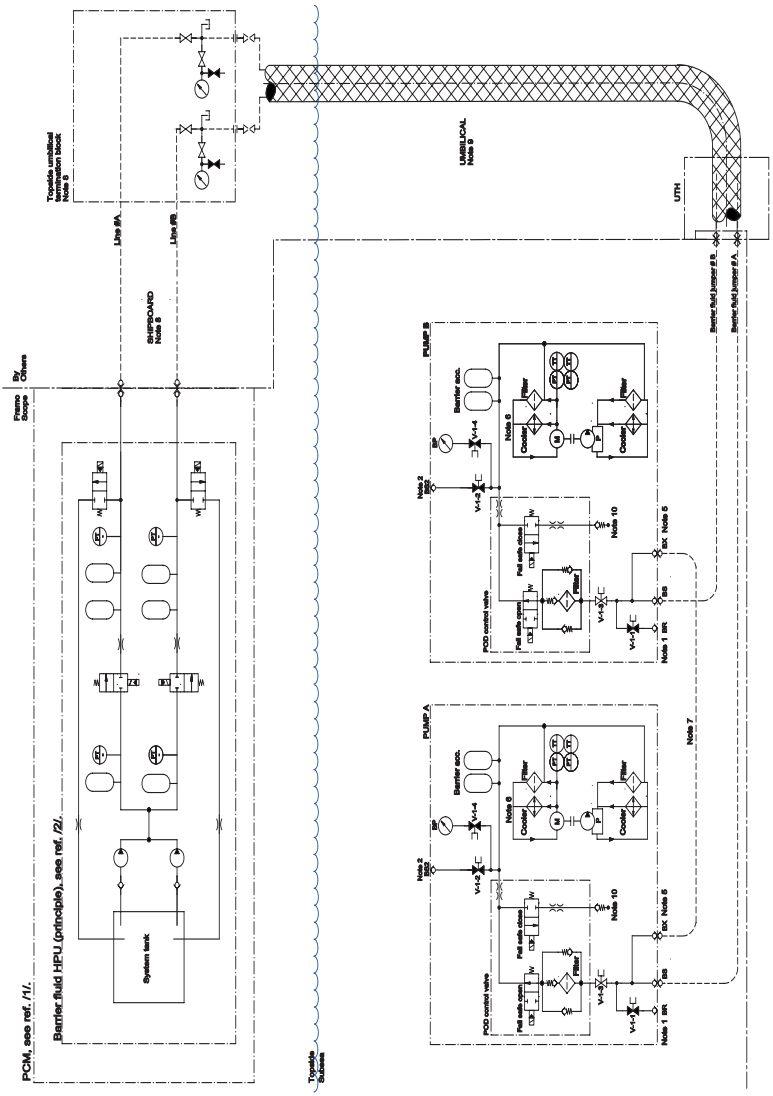
12.5 PCM



12.5.1 PCM Layout

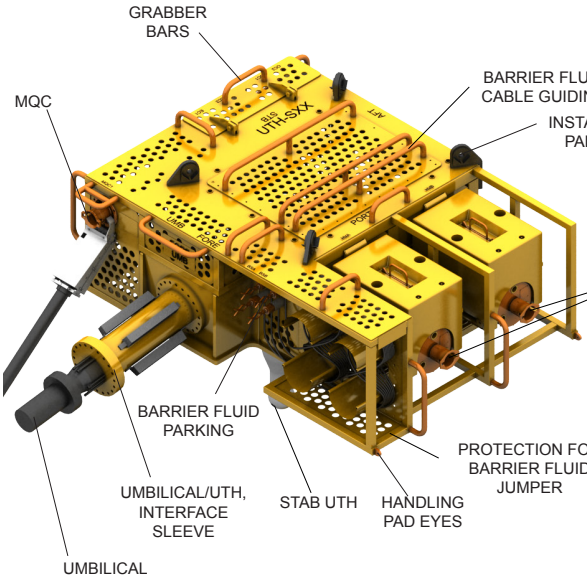


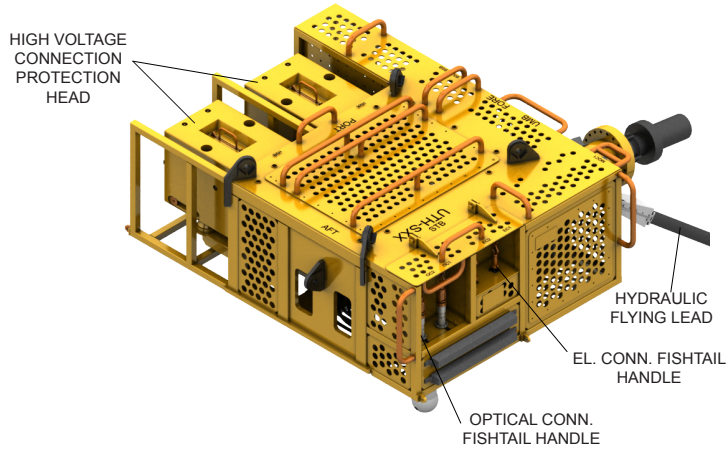
12.6 Single Line Diagram for Pump Power Supply



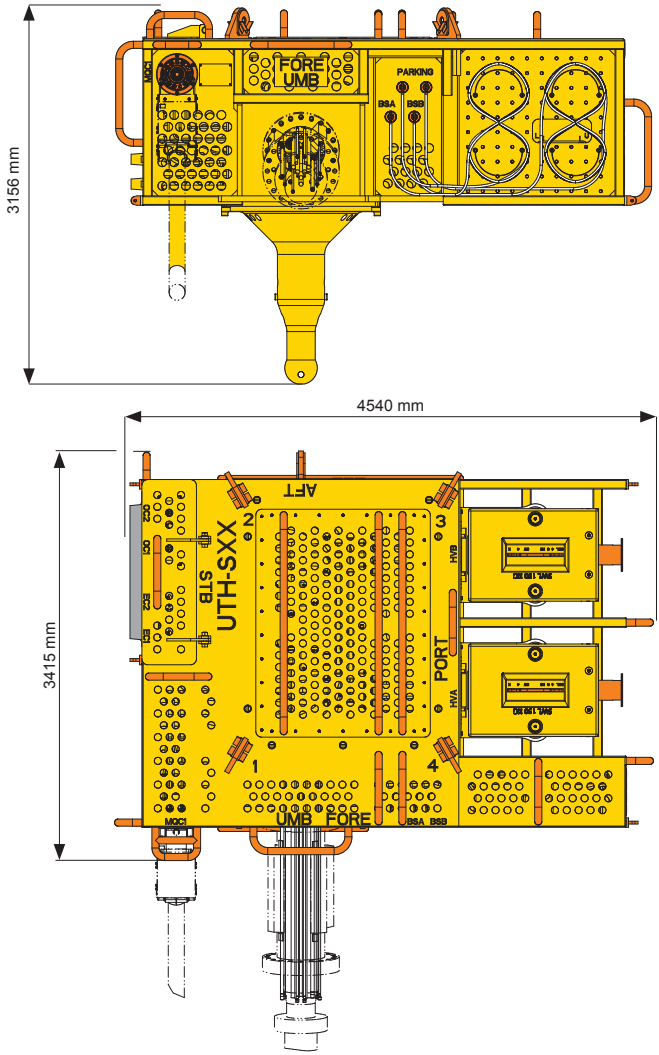
12.7 Barrier Fluid Schematic

13 Umbilical

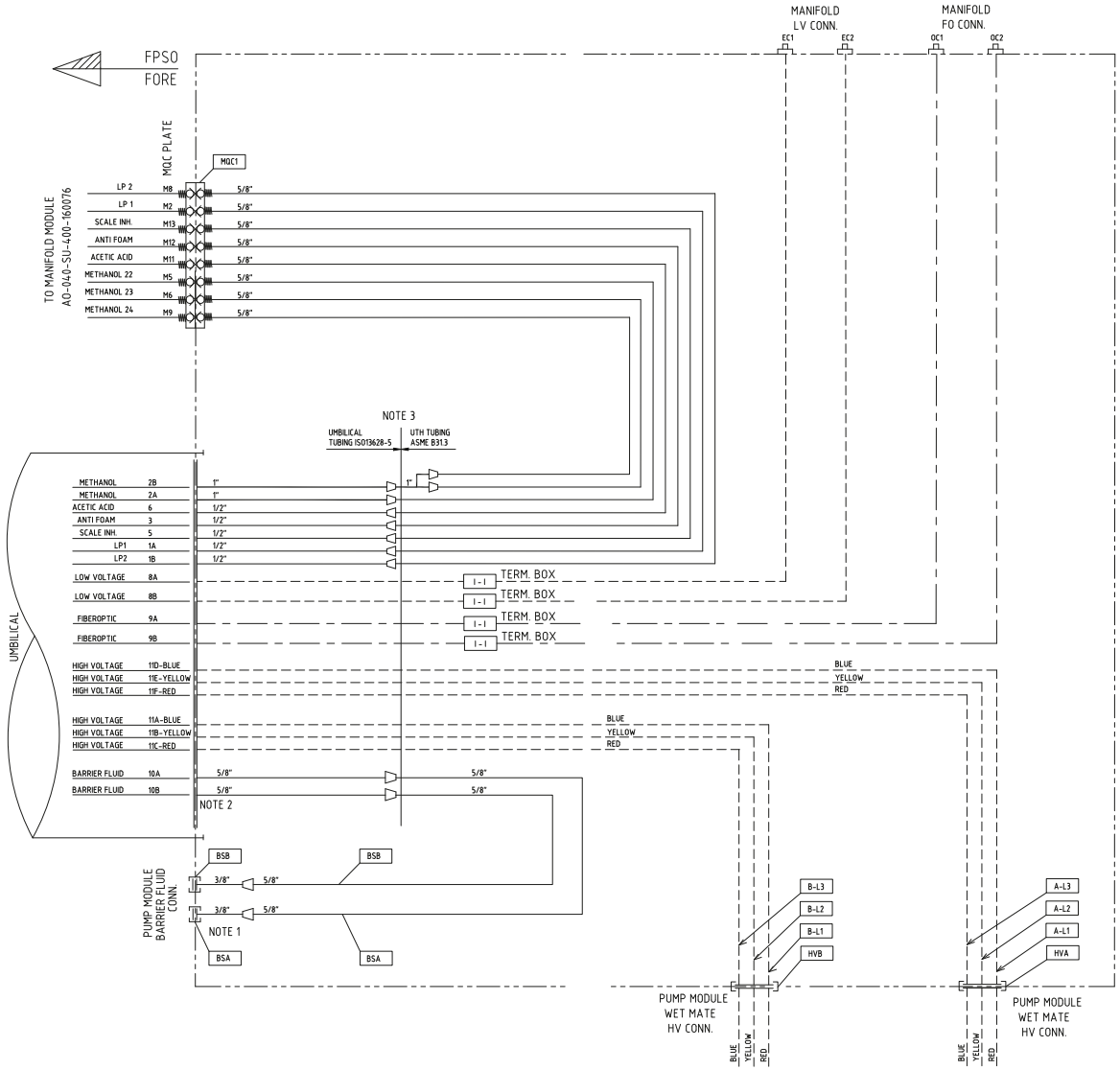




13.1 UTH 3D view



13.1.1 UTH Side and Top view



LEGEND:

- REDUCER
- HYDRAULIC COUPLING, SELF SEALING
- ELECTRICAL/OPTICAL STAB RECEPTACLE.
- TERMINATION BOX
- CONNECTION
- MULTI QUICK CONNECTOR (MQC) PLATE
- PROCESS LINE
- HYDRAULIC TUBING
- ELECTRICAL DISTRIBUTION
- FIBER OPTIC
- REFERENCE LINE, SYSTEM MODULE

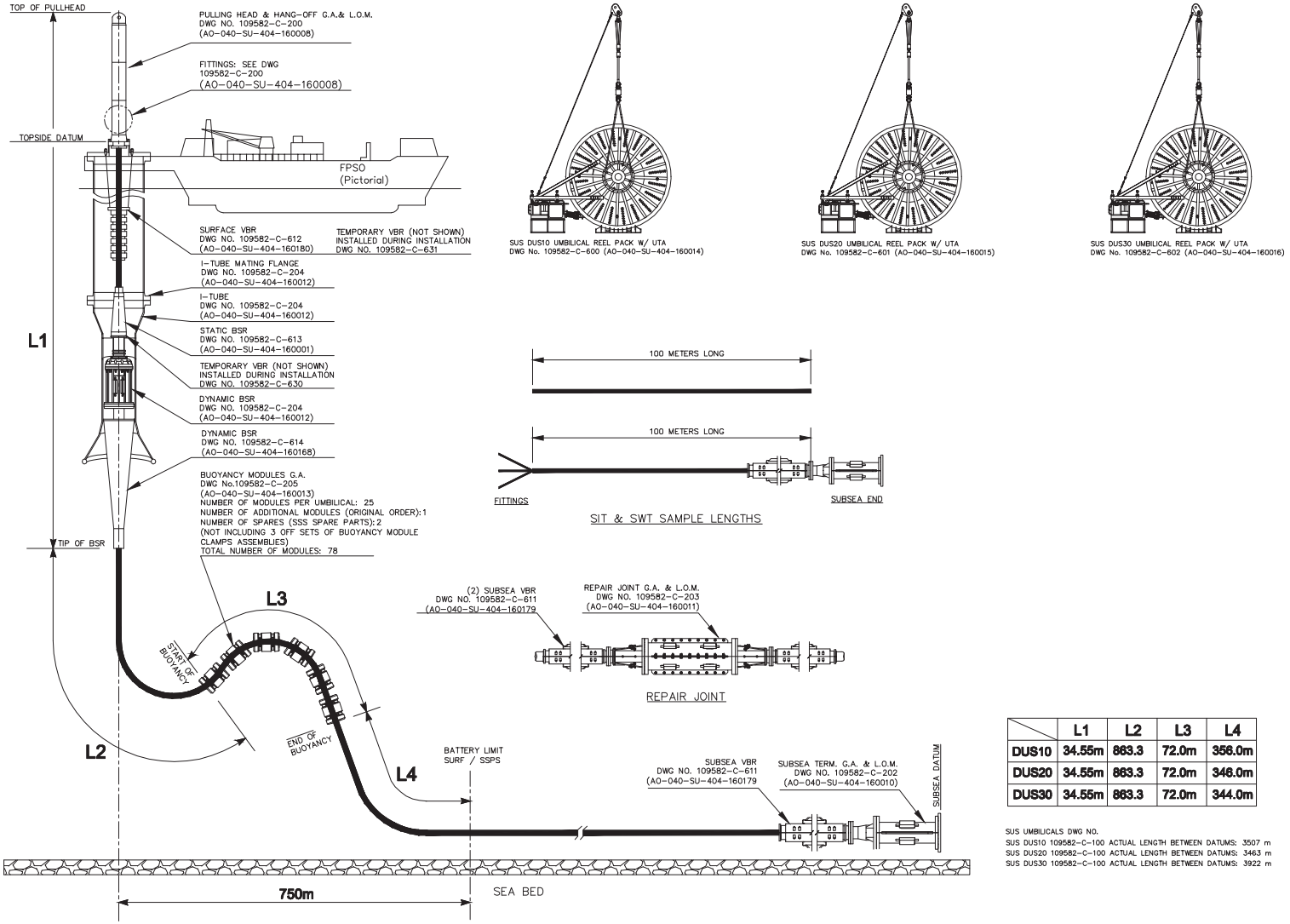
LINE	OD	WT	ID	MATERIAL	DESIGN PRESSURE BAR
5/8" HYDRAULICS TUBING, ASME B31.3	15.88	2.41	11.06	AISI 316L	380
5/8" CHEMICALS & BARRIER FLUID TUBING, ASME B31.3	15.88	2.41	11.06	AISI 316L	345
1/2" CHEMICALS, HYDRAULICS UMBILICAL TUBING, ISO 13628-5	15.62	1.46	12.7	25% CR.DUPLEX	345
5/8" BARRIER FLUID UMBILICAL TUBING, ISO 13628-5	18.88	1.50	15.88	25% CR.DUPLEX	345
1" METHANOL UMBILICAL TUBING, ISO 13628-5	29.4	2.00	25.4	25% CR.DUPLEX	345

NOTES:

1. WALTHER COUPLING w/3/8" TUBE INTERFACE
2. FLANGED CONNECTION TO UMBILICAL
3. SPEC. BREAK FOR TUBING

REFERENCE IS MADE TO AO-040-SS-400-160099

13.1.2 UTH Flow Schematic

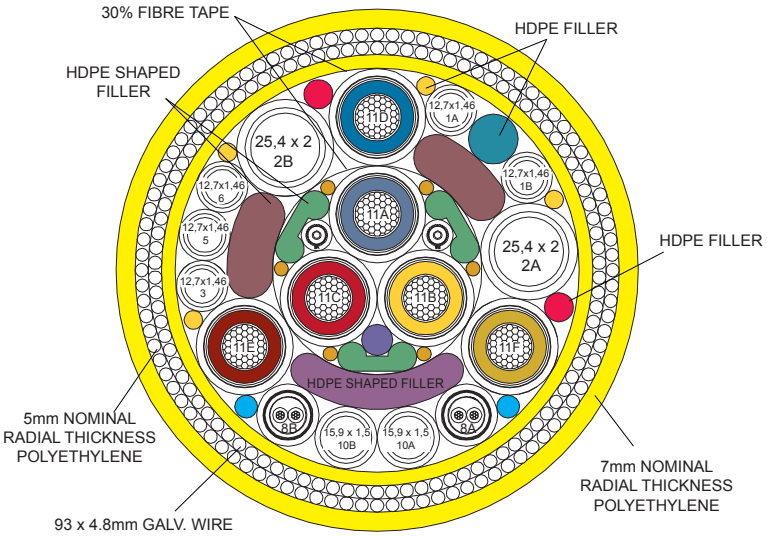


	L1	L2	L3	L4
DUS10	34.55m	863.3	72.0m	356.0m
DUS20	34.55m	863.3	72.0m	346.0m
DUS30	34.55m	863.3	72.0m	344.0m

SUS UMBILICALS DWG NO.
SUS DUS10 109582-C-100 ACTUAL LENGTH BETWEEN DATUMS: 3507 m
SUS DUS20 109582-C-100 ACTUAL LENGTH BETWEEN DATUMS: 3463 m
SUS DUS30 109582-C-100 ACTUAL LENGTH BETWEEN DATUMS: 3922 m

13.2 Umbilical Scope of Supply

REFERENCE IS MADE TO
AO-040-SU-404-160001



Line Nos.	No. OFF	Hose/Cable/Tube Type	Max. Working Press. or Voltage/Wave	Line Function	Shipping Fluid
2A-2B	2	25,4 I/D x 2,00 w/t	345 bar	Methanol Injection	MEG/water 50% mix
1A-1B	2	12,7 I/D x 1,46 w/t	380 bar	L.P. Supply	Transaqua HT
3	1	12,7 I/D x 1,46 w/t	345 bar	Antifoam	MEG/water 50% mix
5	1	12,7 I/D x 1,46 w/t	345 bar	Scale Inhibitor	MEG/water 50% mix
6	1	12,7 I/D x 1,46 w/t	345 bar	Acetic Acid	MEG/water 50% mix
10A-10B	2	15,9 I/D x 1,50 w/t	345 bar	Barrier Fluid	Shell Morlina
11A-11F	6	185mm Core	15 kV	Power	N/A
8A-8B	2	6mm sq. T.S.P.T.A	0,9-1,5 kV	LV Power	N/A
9A-9B	2	Fiber Optic (Armoured)	(12) fiber	Signal	N/A

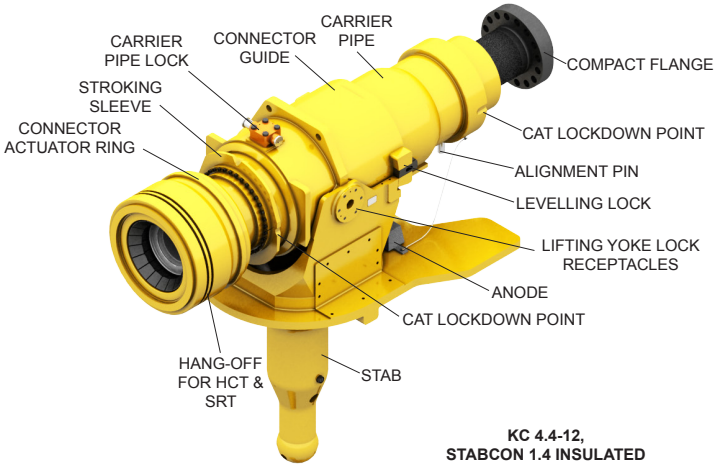
Nominal Mass	71,0	Kg/m
Nominal Mass in Air	66,5	kgf/m
Nominal Weight in Seawater	41,4	kgf/m
Umbilical O/D	192	mm
Approx. Break strengh	2131	kN
Safe Working Load	856	kN
Installation MBRs	86% of tube yield	

LOAD CASE	TENSION [kN]	RADIUS (LC) [m]	RADIUS (DC) [m]
INSTALLATION	0	3,60	2,96
	680	6,31	4,45
STORAGE OF UMBILICAL	20*	-	2,17

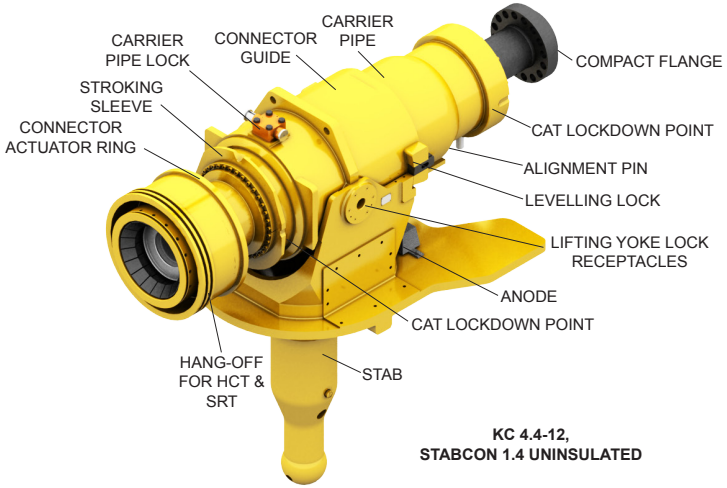
*maximum back-tension

13.2.1 Umbilical Cross Section

14 Terminations



KC 4.4-12,
STABCON 1.4 INSULATED



KC 4.4-12,
STABCON 1.4 UNINSULATED

14.1 Stabcon Termination Heads

Insulated Termination Heads

P/N	Description
P6000046347	STABCON 1.4, KC4.4-12, ID10, insulated
P6000041987	KC4.4-12, ID10, STABCON 1.4, insulated, MPH1 multiphase flowline

Uninsulated Termination Heads

P/N	Description
P6000041990	KC4.4-12, ID6, STABCON 1.4, uninsulated, G1/G2 gas header
P6000041984	KC4.4-12, ID10, STABCON 1.4, uninsulated, MPH2 to FPSO

Connectors. MM:

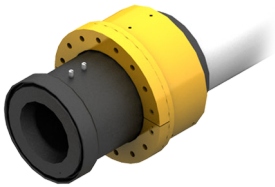
P/N	Description	Reference
P6000041897	Vertical mechanical ID10 LFM	Large Bore, p. 96

Connectors. SM:

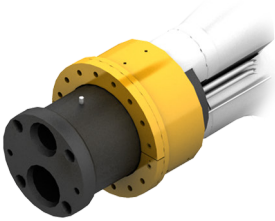
P/N	Description	Reference
P6000041894	KC4.2-12, ID10, CAT3, PLS	Large Bore, p. 88
P6000041898	KC4.2-12, ID6, CAT3, LRS	
P6000054172	(KC4.2-12, ID8, CAT3, PGS	

Connectors. PM:

P/N	Description	Reference
P6000041900	KC4.2-12, ID6+4+4HL, CAT3, PO	Large Bore, p. 103
P6000041903	KC4.2-12, ID8, CAT3, PI	

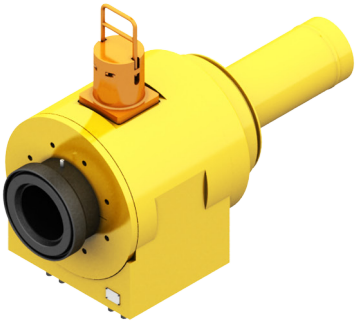


HUB, KC4.4-12, ID8,
ROVCON 2



HUB, KC4.4-12, ID 6+4+4HL,
ROVCON 2

HUB INBOARD, KC4.4-12,
STABCON 1.4 UNINSULATED



HUB INBOARD, KC4.4-12,
INSULATED STABCON 1.4

Stabcon Hubs, Unisulated

P/N	Description
P6000041913	STABCON 1.4, ID10, uninsulated, MPH2 to FPSO)

Stabcon Hubs Insulated

P/N	Description
P6000041914	STABCON 1.4, ID10, insulated, MPH1 multiphase flowline
P6000041915	Vertical, ID10, LFM to MM
P6000049037	STABCON 1.4, ID10, insulated, MPH3 to ILM
P6000041938	STABCON 1.4, ID6, G1/G2
P6000049037	STABCON 1.4, ID10, insulated, PFI
P6000023488	KC4-3, ID2, SL1/SL2

Stabcon Hubs, Multibore

P/N	Description
P6000041936	ROVCON 2, ID6+4+4HL, PO-A/PO-B

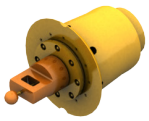
Stabcon Hubs, Multibore

P/N	Description
P6000041934	ROVCON 2, ID6, M-LRS
P6000041935	ROVCON 2, ID10, M-LS
P6000041940	ROVCON 2, ID8, M-GS
P6000047353	ROVCON 2, ID8, PI-A/PI-B

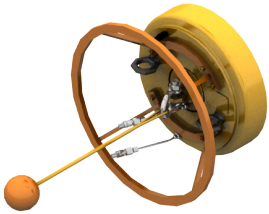
P6000041770 LP, ID10 Stabcon 1.4, MPH1/MPH2
P6000022273 LP, ID10, ROVCON 2, M-LS
P6000041781 LP, ID8 ROVCON 2, PI-A/PI-B
P6000041770 LP ID10, STABCON 1.4, PFI

P6000041848 HPRI, VERTICAL, ID10, LFM

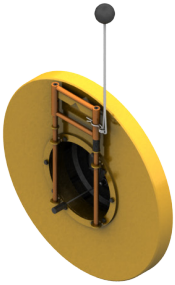
P6000061293 HP, ID10, STABCON 1.4, MPH3
P6000061292 HP, ID6+4+4HL, ROVCON 2, PO-A/PO-B
P6000061295 HP, ID6, ROVCON 2, M-LRS
P6000061294 HP, ID8, ROVCON 2, M-GS
P6000067988 HP, ID6, STABCON 1.4, G1/G2



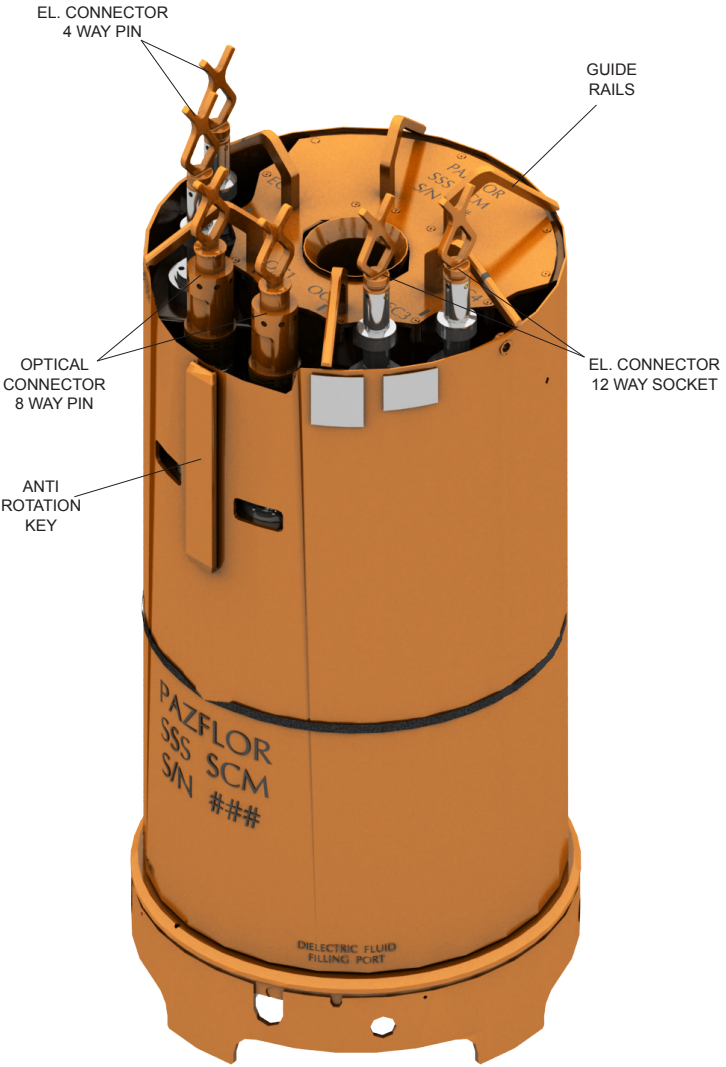
P6000055176 KC4-3, ID2, SL1/SL2



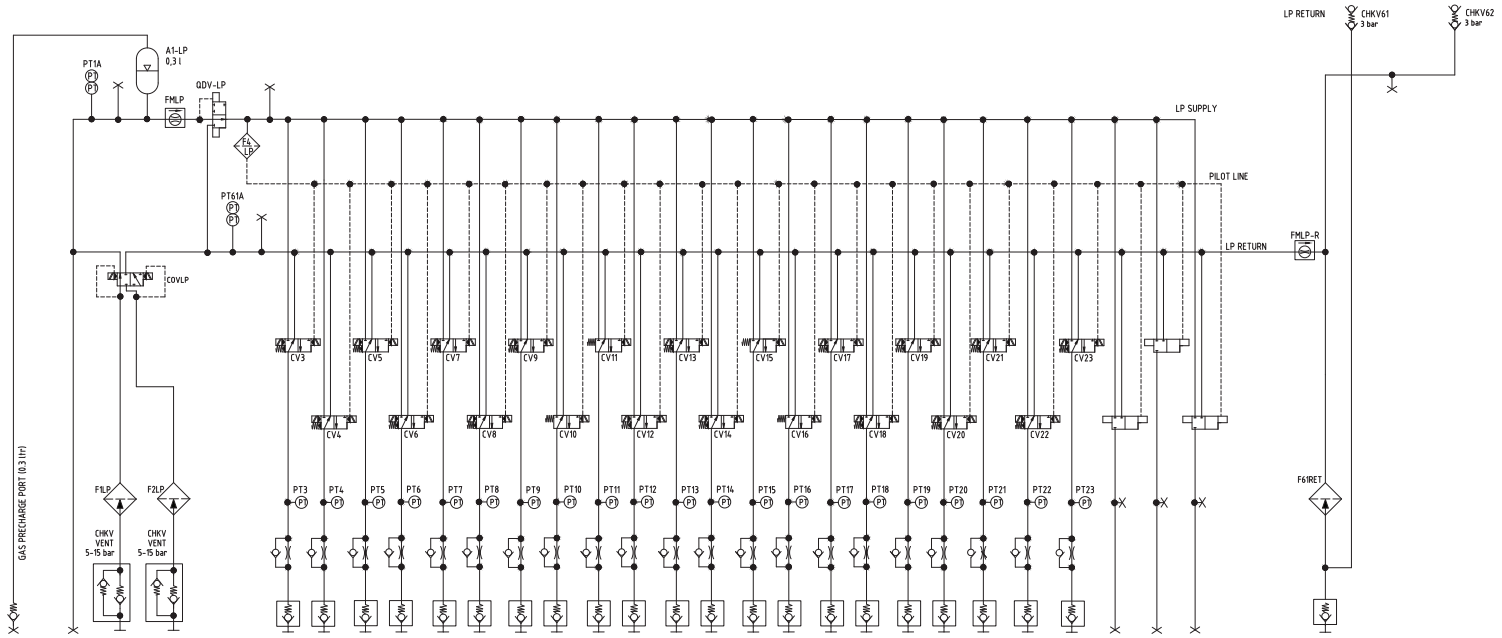
P6000055624 HP, ID10, ROVCON 2, PLS
P6000041852 HP, ID8, ROVCON 2, PGS
P6000041845 HP, ID6, ROVCON 2, LRS
P6000041850 HP, ID6+4+4HL, ROVCON 2, PO
P6000041852 HP, ID8, ROVCON 2, PI



P6000041825 HP, ID10, STABCON 1.4



15.1 SCM 3D view



HYDR. LINES:	HC71	HC1		HC2		HC3	HC4	HC5	HC6	HC7	HC8	HC9	HC10	HC11	HC12	HC13	HC14	HC15	HC16	HC17	HC18	HC19	HC20	HC21	HC22	HC23	HC24	HC25	HC26		HC61
W.P. [BAR]:		345		345		345	345	345	345	345	345	345	345	345	345	345	345	345	345	345	345	345	345	345	345	345					50
FLOW RESTRICTION [BAR / (l/s)²]:						1600	5900	1600	1600	1600	1600	1600	5900	5900	1600	1600	1600	5900	5900	1600	1600	1600	1600	1600	1600	1600					
Function: Separator SCM	Ext. LP Accumul.	LP 1		LP 2		V12	V11	V55	V65	V63	V61	V57	V4-B OPEN	V4-B CLOSE	V53	V46	V43	V4-A OPEN	V4-A CLOSE	V47	V44	V54	V59	V51	V48	V49					RETURN
NOTE:	BLIND																										BLIND	BLIND	BLIND		

Component not included in master BOM

Quick Dump Valve

Change-over Valve

Function Line Valve

Internal Check Valve

External Check Valve with Valve Cap.

Filling Valve for gas precharge

Hydraulic Coupler

Hydraulic Coupler with bleed to sea function

Piston Compensator

Piston Accumulator

Flow Restrictor

Pilot Line

Pressure Transmitter (PT)

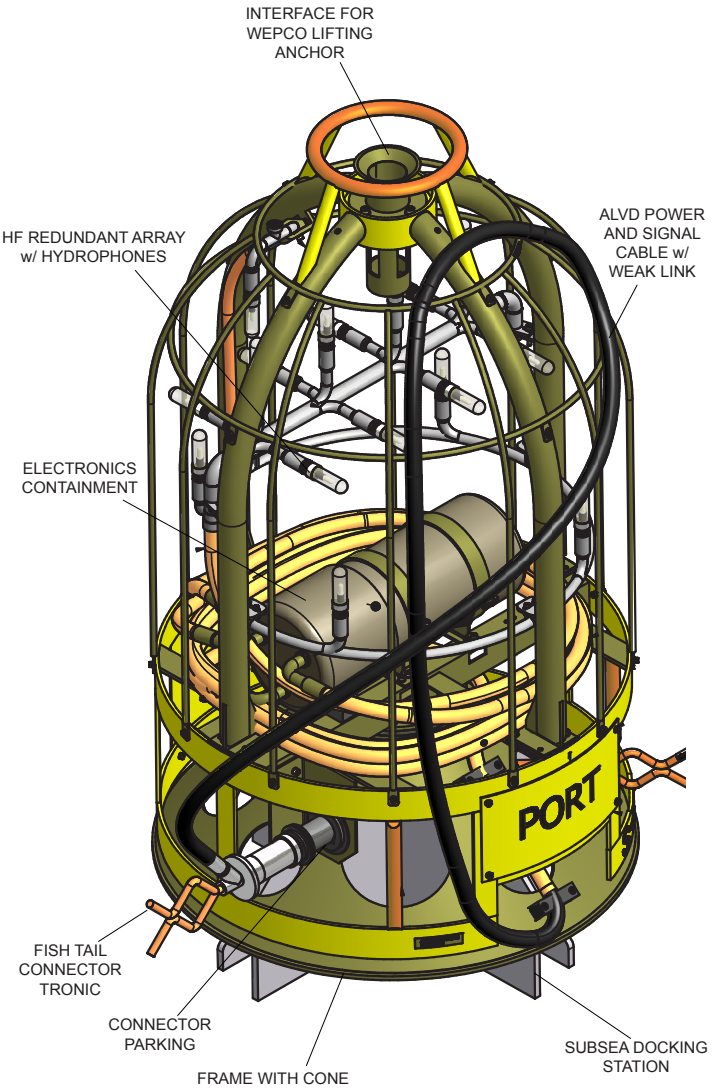
Filter with Bypass Valve and free backflow

Filter

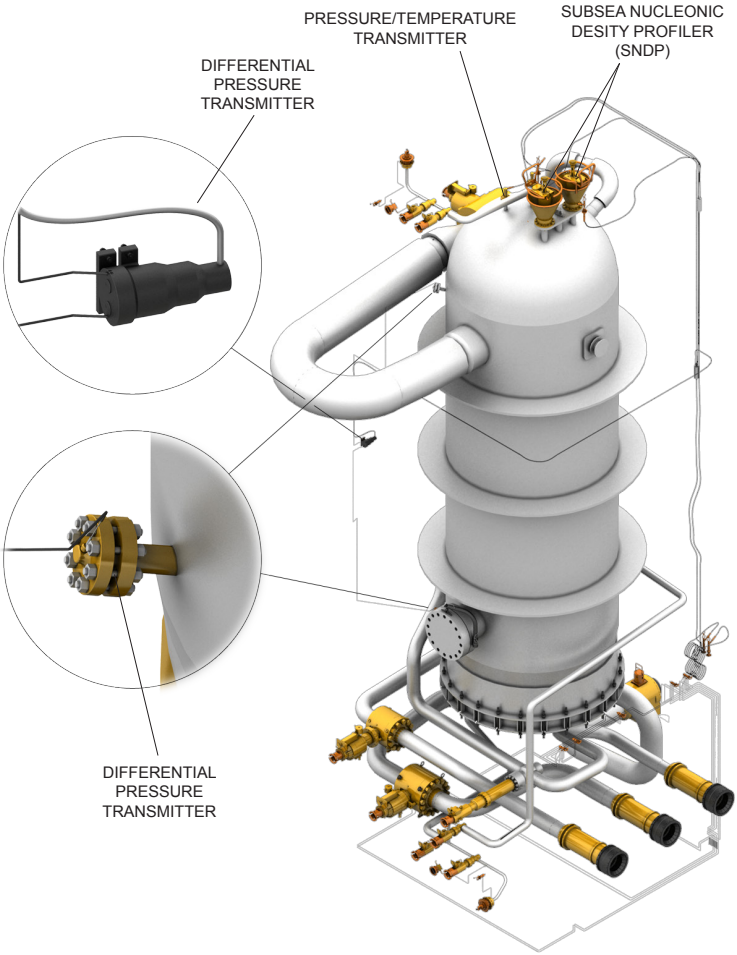
Flowmeter

REFERENCE IS MADE TO AO-040-SS-400-160118

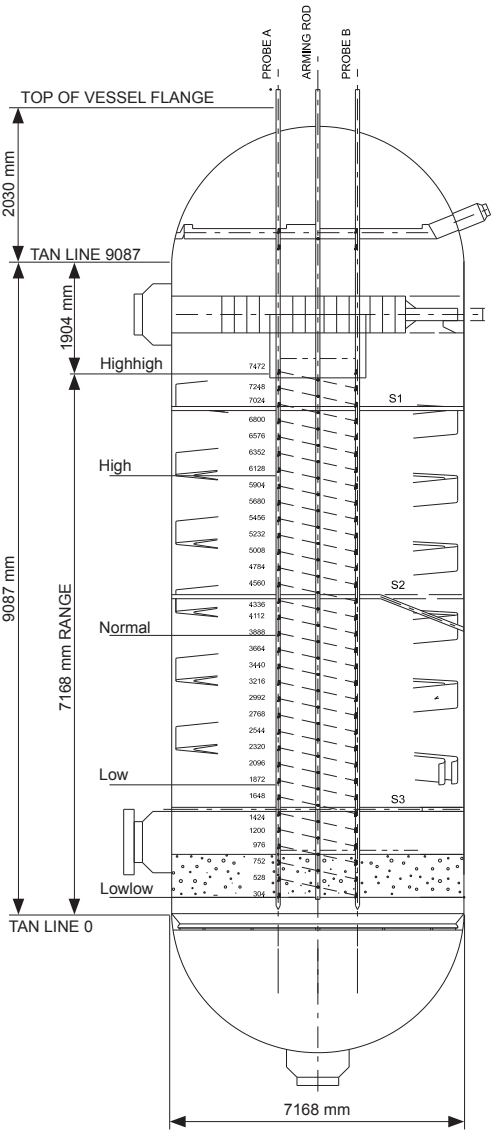
15.1.1 SCM Schematic



15.2 ALVD 3D view

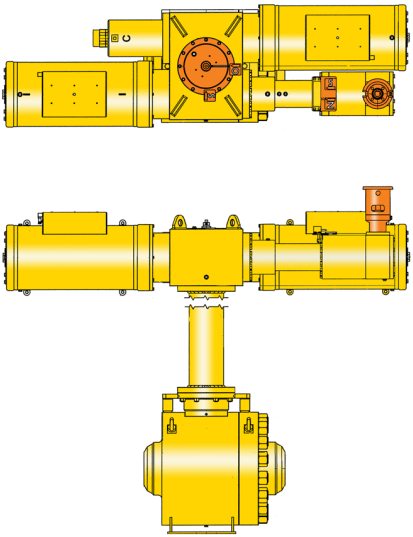


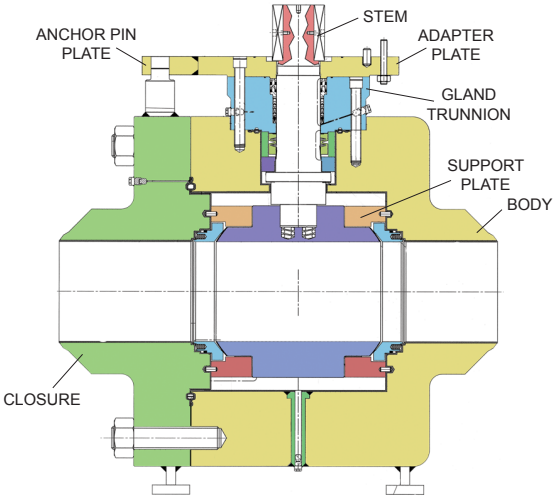
15.3 SM Sensor



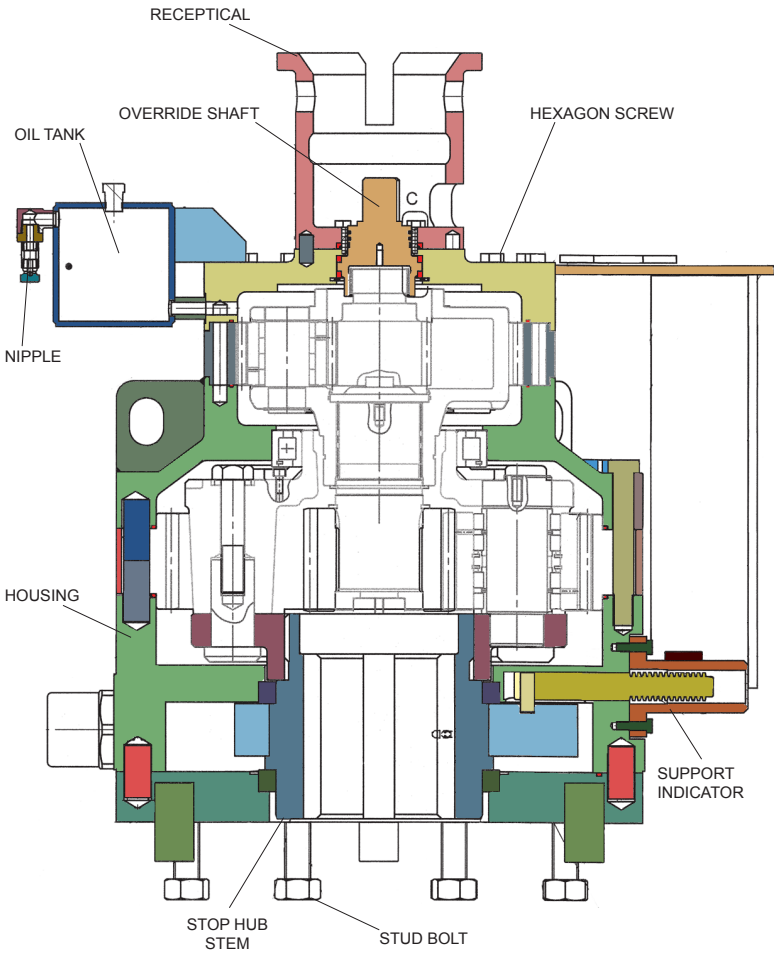
15.4 SM Levels (SNDP Array)

16 Valves

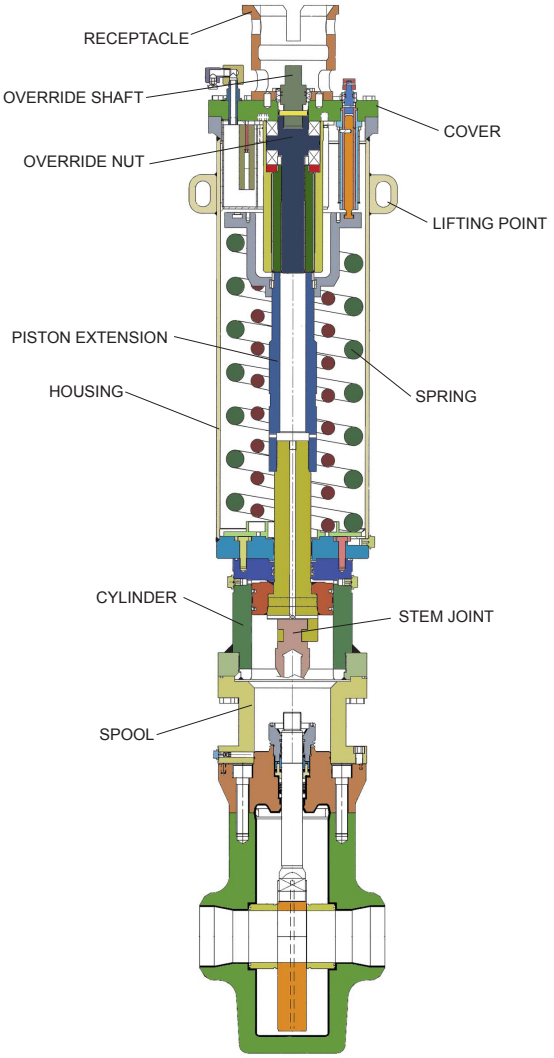




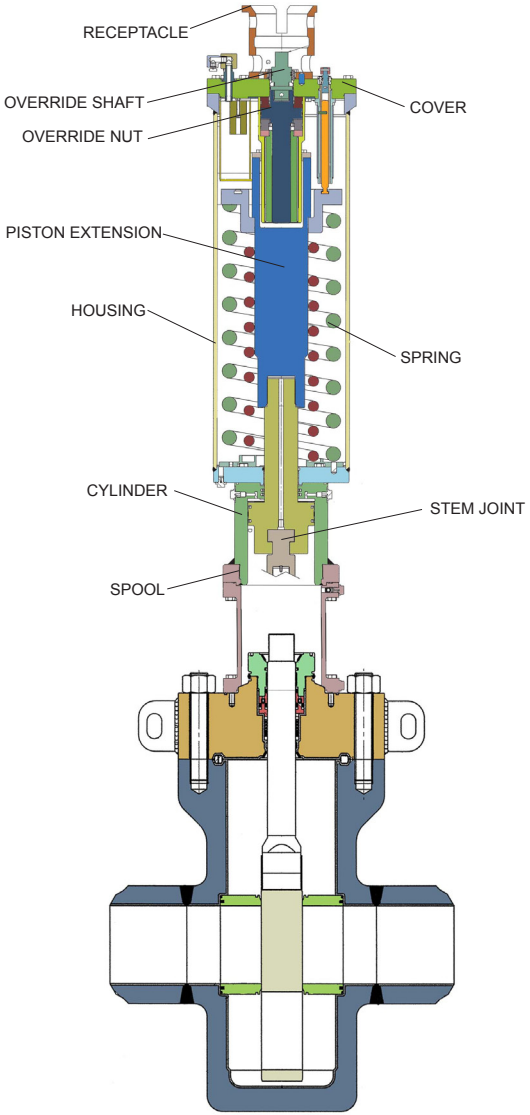
16.1 Oligocene 10” Manifold Ball Valve



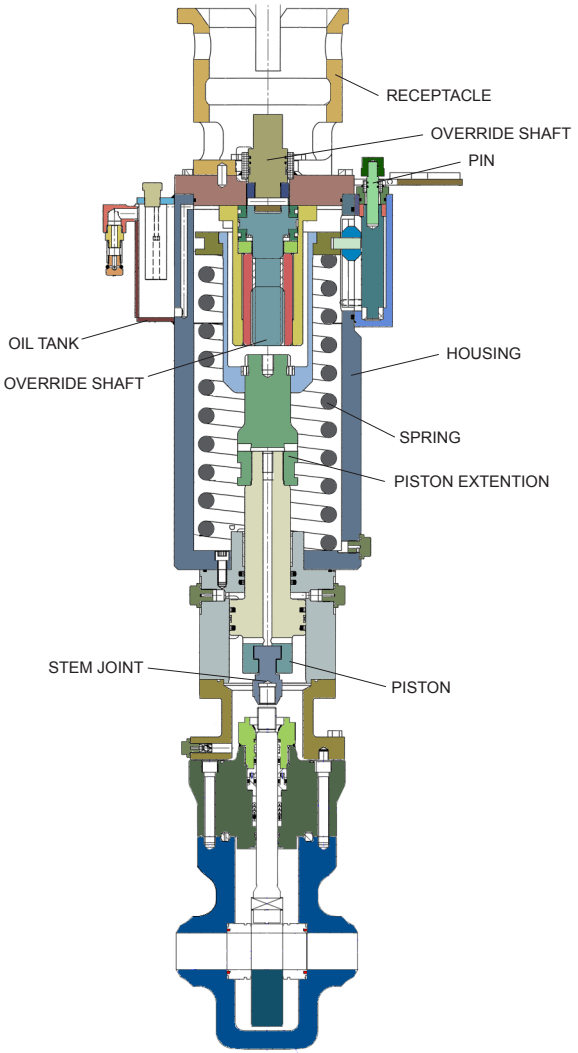
16.2 8” ROV Ball Valve Gear



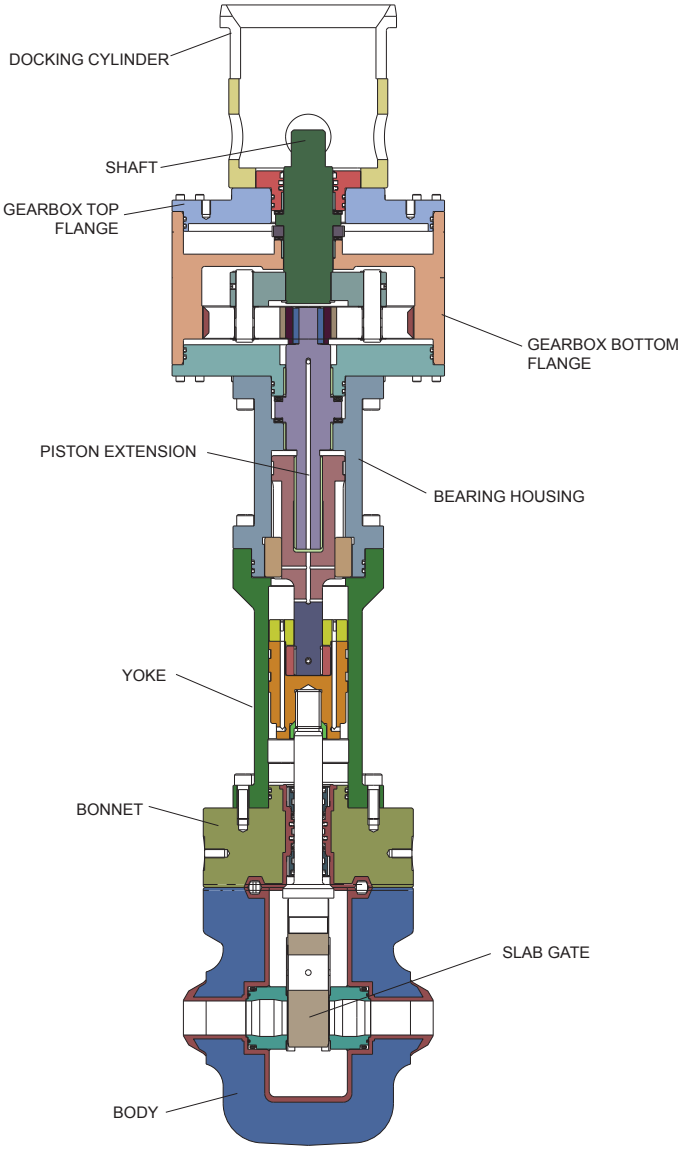
16.3 5 1/8” FSC Valve Actuator



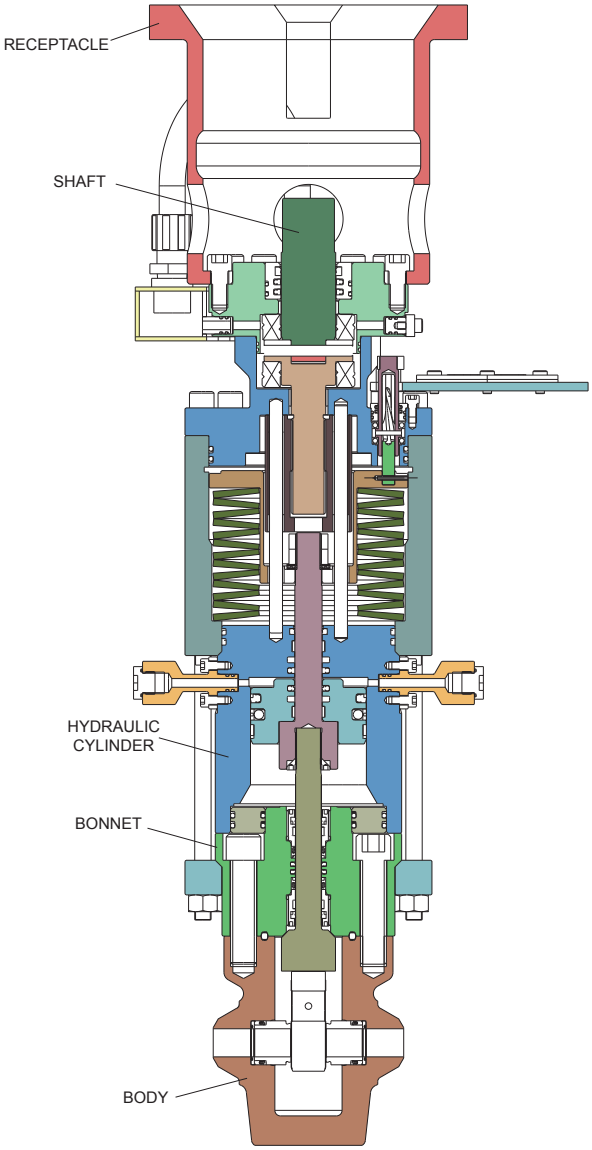
16.4 6” FSO Valve



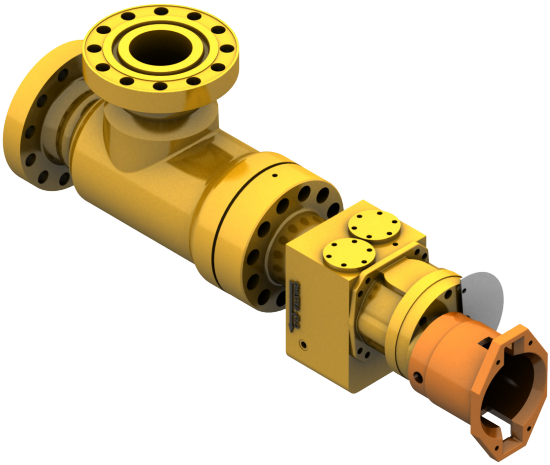
16.5 2 1/16” FSC Valve

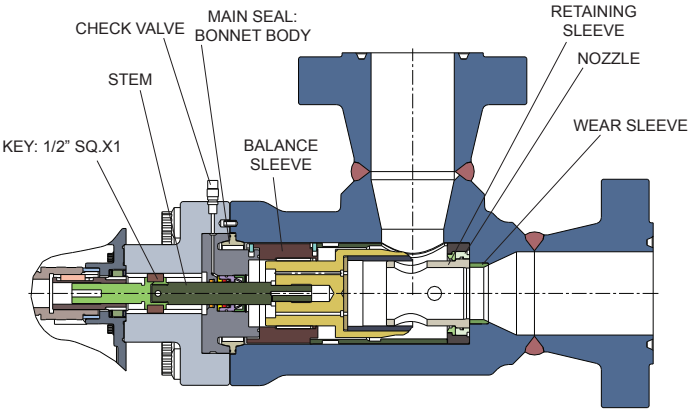


16.6 2 1/16” ROV Op. Valve

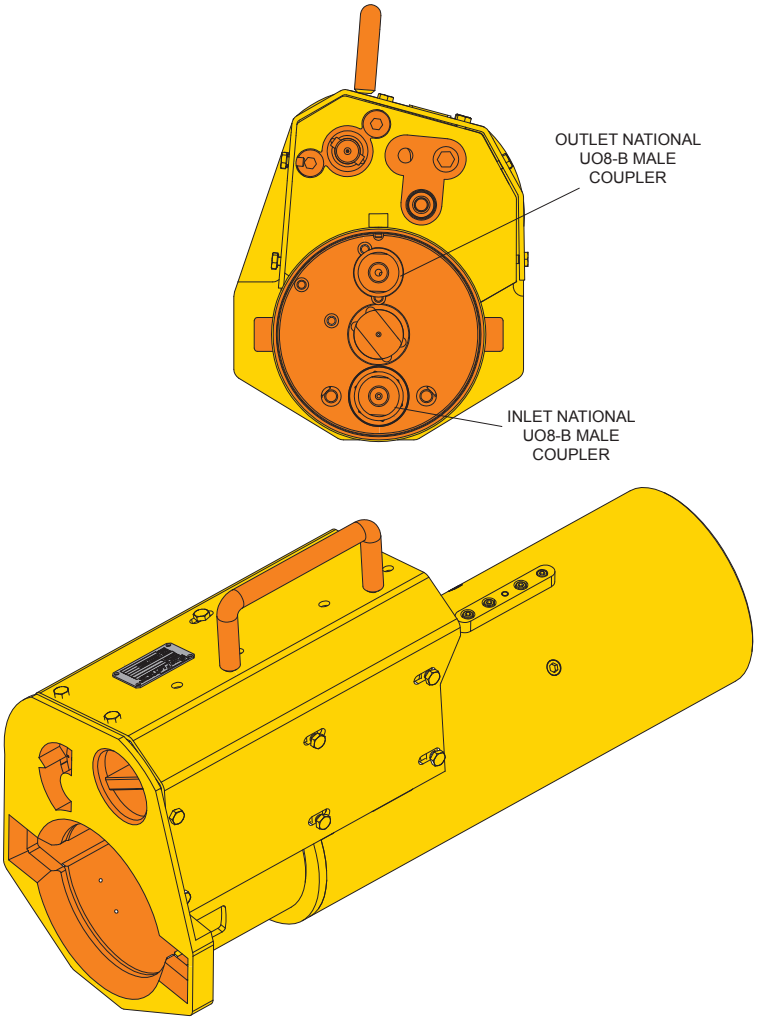


16.7 1” FSC Valve

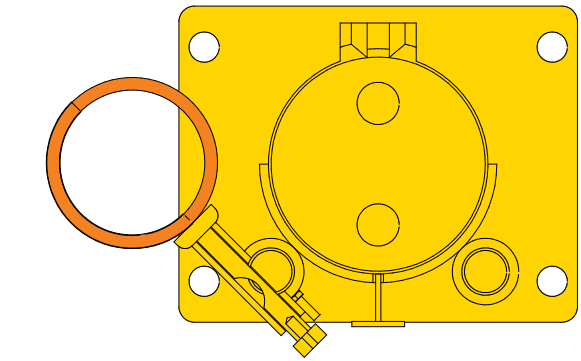


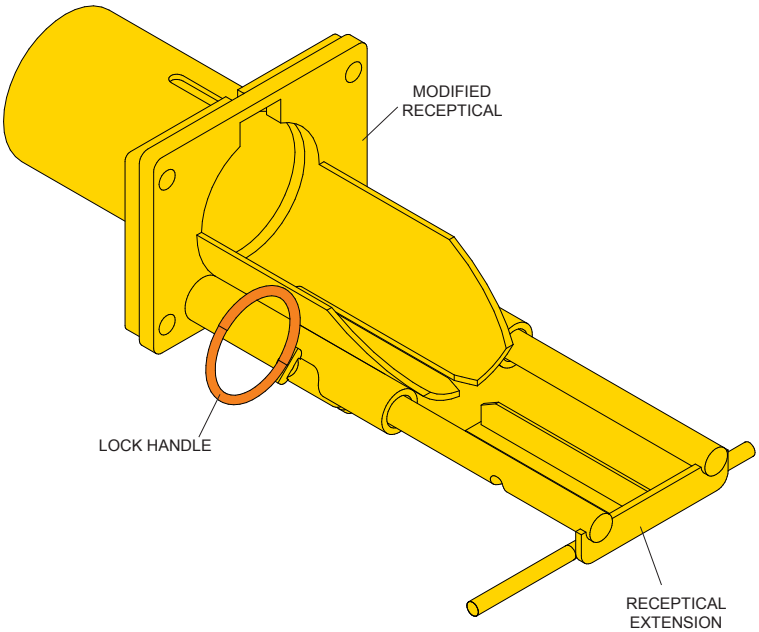


16.8 5 1/8" ROV Choke

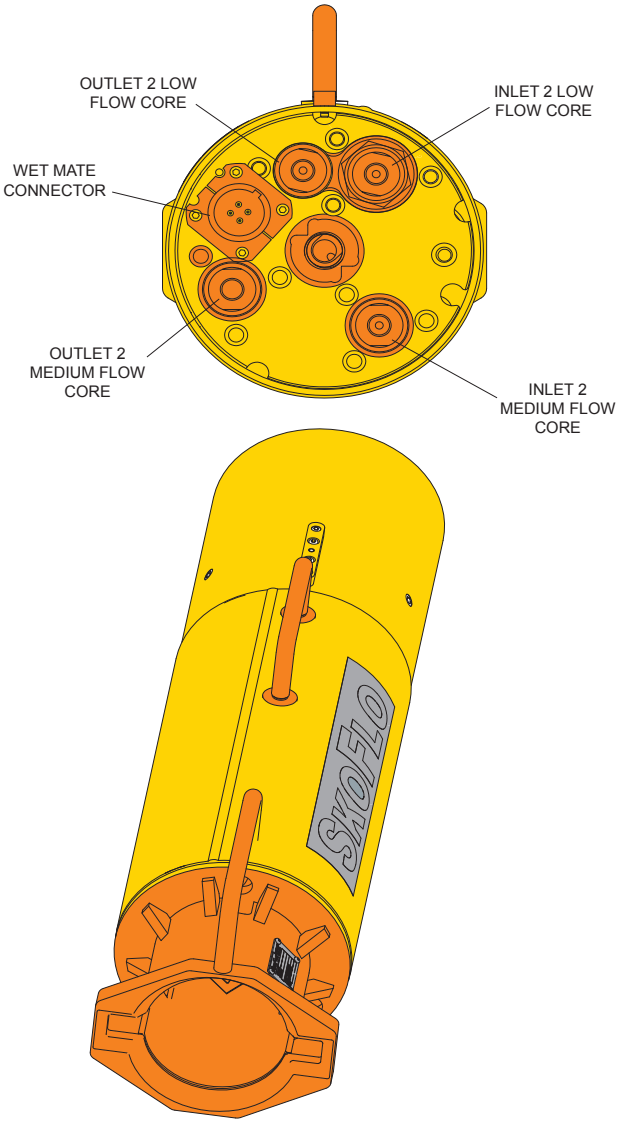


16.9 CITV, Valve, Singel Core

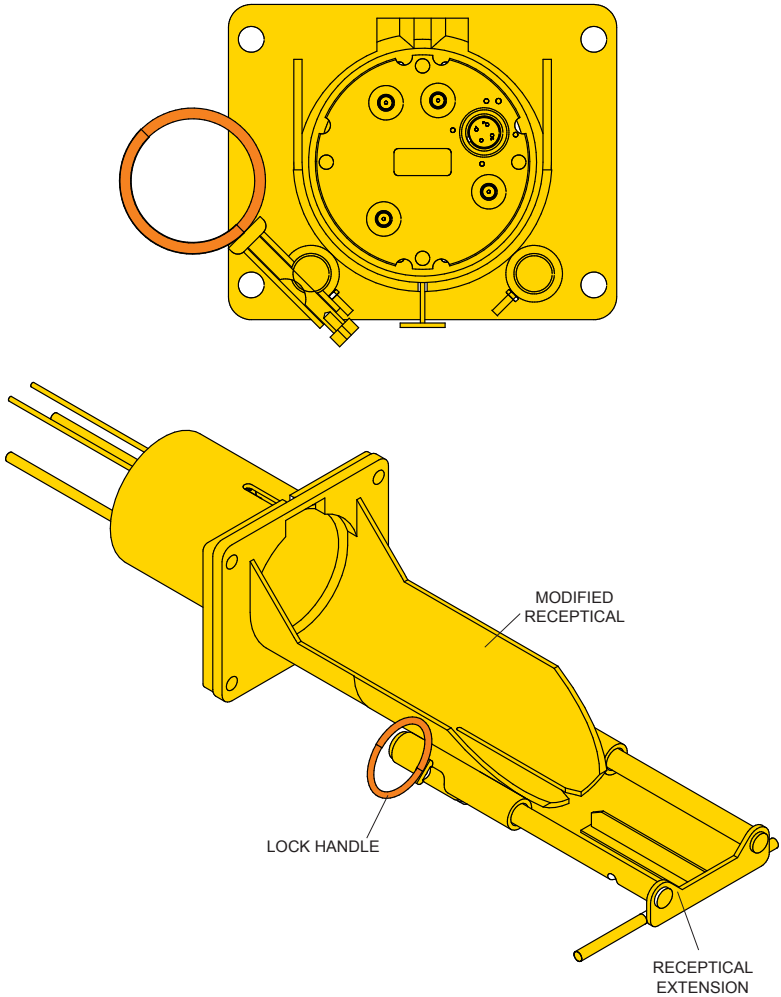




16.9.1 CITV, Modified Receptical, Singel Core



16.10 CITV, Modified Receptical, Dual Core



16.10.1 CITV, Modified Receptical, Dual Core

Valve Nr	Line Function	Material Nr	S/N For IMF 1	S/N For IMF 2	S/N For IMF3	Description	Ref. TDS/PDS	Torque Tool Setting (Nm)	Max Input Torque (Nm)	Turns
V01	Multiphase to Inlet Module	P6000042041	11224240-002	11224240-005	11224240-007	OEM Ball Valve 10" ROV OPR.	PDS60021752	1800	2700	4
V02	Bypass Multiphase	P6000042041	11224240-001	11224240-004	11224240-008	OEM Ball Valve 10" ROV OPR.	PDS60021752	1800	2700	4
V03	Liquid to FPSO	P6000042041	11224240-003	11224240-006	11224241-001	OEM Ball Valve 10" ROV OPR.	PDS60021752	1800	2700	4

16.11 Table, Intermediate Frame, Valve incl. torque values

Valve Nr	Line Function	Material	S/N For IM 1	S/N For IM 2	S/N For IM3	Description	Ref.	ROV	Torque Tool	Max Input	Turns	Remarks
		Number					TDS/PDS	Class	Setting (Nm)	Torque (Nm)		
V09	Cylinder control	P6000017582	-	-	-	OEM Ball Valve 3/8" ROV. OPR.	PDS60014024	4	50	120	1/4	Retract Cylinder
V10	Cylinder control	P6000017582	-	-	-	OEM Ball Valve 3/8" ROV. OPR.	PDS60014025	4	50	120	1/4	Extend Cylinder
V11	Mul-tiphase Inlet	P6000042049	11228891-001	11228891-002	11228891-003	OEM Ball Valve 10" FSC W/ROV Override	PDS60023084	4	1800	2700	72,5	
V12	Mul-tiphase Bypass	P6000041816	111110992-001	111110992-002	111110992-003	OEM Ball Valve 5 1/8" FSC W/ROV Override	PDS60023086	4	1800	2700	50	
V13	Mul-tiphase Bypass	P6000044958	P4-4057	P4-4058	P4-4059	OEM Choke 4". ROV. OPR.	59835-D02-01	4	315	813	20	Preset Position

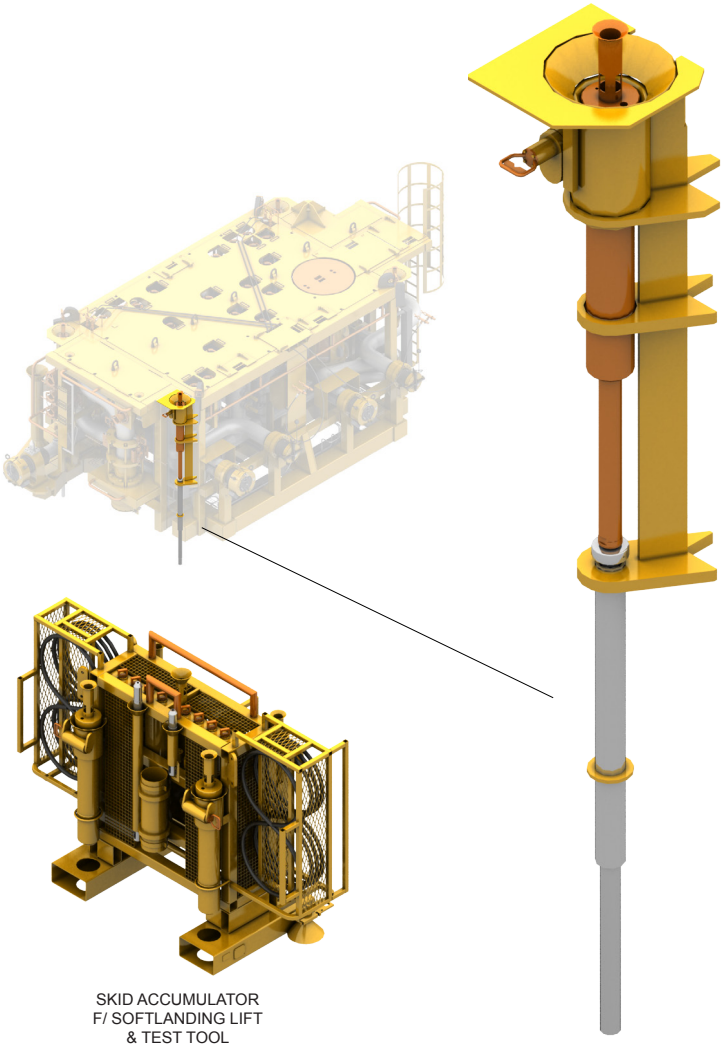
Table, Seperation Module, Valve incl. torque values

Valve Nr	Line Function	Material Nr	S/N For SM 1	S/N For SM 2	S/N For SM 3	Description	Ref. TDS/PDS	Torque Tool Setting (Nm)	Max Input Torque (Nm)	Turns	Torque Tool P/N
V29	Sand Flush-ing Arr.	P6000029817	111105548 -002	111105548 -007	111105548 -015	OEM Gate Valve 2 1/6" ROV OPR.	PDS60026629	330	500	6,5	100035992
V30	Multiphase Inlet	P6000042050	111227408-004	111227408 -003	111227408 -006	OEM Ball Valve 10" ROV OPR.	PDS60021755	1800	2700	4	100035992
V31	Gas Prod. To Manifold	P6000042062	111230083-001	111230083 -002	111230083 -003	OEM Ball Valve 8" ROV OPR.	PDS60023092	1800	2700	4	100035992
V32	Liquid To Manifold	P6000042050	111227408-001	111227408 -002	111227408 -005	OEM Ball Valve 10" ROV OPR.	PDS60021755	1800	2700	4	100035992
V33	Recycle From Manifold	P6000043670	111218428-001	111218163 -002	111328163 -001	OEM Gate Valve 6" ROV OPR.	PDS60023255	1800	2700	56	100035992
V34	Service Line Top	P6000029817	111105548-005	111105548 -006	111105548 -014	OEM Gate Valve 2 1/6" ROV OPR.	PDS60026629	330	500	6.5	100035992
V35	Service Line Top	P6000029817	111105548-004	111105548 -010	111105548 -013	OEM Gate Valve 2 1/6" ROV OPR.	PDS60026629	330	500	6.5	100035992
V36	Service Line Bottom	P6000029817	111105548-003	111105548 -008	111105548 -012	OEM Gate Valve 2 1/6" ROV OPR.	PDS60026629	330	500	6.5	100035992
V37	Service Line Bottom	P6000029817	111105548-001	111105548 -009	111105548 -011	OEM Gate Valve 2 1/6" ROV OPR.	PDS60026629	330	500	6.5	100035992
V38	Service Line Top	P6000020851	-	-	-	OEM Ball Valve 3/8" ROV OPR.	PDS60017323	50	120	1/4	100035992
V39	Service Line Bottom	P6000020851	-	-	-	OEM Ball Valve 3/8" ROV OPR.	PDS60017323	50	120	1/4	N/A

Valve nr	Line Function MM	Material nr	Description	Ref.TDS/PDS	ROV Class	Torque Tool	Max Input	Turns
						Setting (Nm)	Torque (Nm)	
V41	LIQ. From Separator	P6000042053	OEM Ball Valve 8"ID ROV OPR.	PDS60023088	4	1800	2700	3,4
V42	LIQ. From Separator	P6000042053	OEM Ball Valve 8"ID ROV OPR.	PDS60023088	4	1800	2700	3,4
V43	LIQ. From Pump A	P6000042669	OEM Gate Valve 6"ID FSC	PDS60023089	4	1800	2700	58,83
V44	LIQ. From Pump B	P6000042669	OEM Gate Valve 6"ID FSC	PDS60023089	4	1800	2700	58,83
V46	LIQ. Recycle from Pump A	P6000042210	OEM Gate Valve 6"ID FSO	PDS60021753	4	1800	2700	58,83
V47	LIQ. Recycle from Pump B	P6000042210	OEM Gate Valve 6"ID FSO	PDS60021753	4	1800	2700	58,83
V48	Gas Export 2 (AFT)	P6000042210	OEM Gate Valve 6"ID FSO	PDS60021753	4	1800	2700	58,83
V49	Gas Export 1 (FORE)	P6000042210	OEM Gate Valve 6"ID FSO	PDS60021753	4	1800	2700	58,83
V50	Gas Cross Over Line, ROV OP.Valve	P6000028146	OEM Gate Valve 2 1/16" ROV OPR.	PDS60023309	4	330	500	6,5
V51	Gas Cross Over Line, FSC Valve	P6000032856	OEM Gate Valve 2 1/16" FSC	PDS60024992	4	330	500	21,7
V52	LIQ. Riser Drainage	P6000028146	OEM Gate Valve 2 1/16" ROV OPR.	PDS60023309	4	330	500	6,5
V53	Methanol Pump A	P6000053096	OEM Gate Valve 1" FSC	PDS60045926	4	153	300	12,5
V54	Methanol Pump B	P6000053096	OEM Gate Valve 1" FSC	PDS60045926	4	153	300	12,5
V55	Methanol Inlet Module	P6000053096	OEM Gate Valve 1" FSC	PDS60045926	4	153	300	12,5
V56	Methanol Gas Header AFT	P6000044442	CITV. Dual Core. LF/MF. EL. OP.	-	4	-	-	
V57	Methanol Gas Header AFT	P6000053096	OEM Gate Valve 1" FSC	PDS60045926	4	153	300	12,5
V58	Methanol Gas Header FORE	P6000044442	CITV. Dual Core. LF/MF. EL. OP.	-	4	-	-	
V59	Methanol Gas Header FORE	P6000053096	OEM Gate Valve 1" FSC	PDS60045926	4	153	300	12,5
V60	Acetic Acid Inlet Module	P6000044443	CITV. Dual Core. LF/MF. ROV. OP.	-	4	-	-	
V61	Acetic Acid Inlet Module	P6000053096	OEM Gate Valve 1" FSC	PDS60045926	4	153	300	12,5
V62	Anti Foam Module	P6000044442	CITV. Dual Core. LF/MF. EL. OP.	-	4	-	-	
V63	Anti Foam Module	P6000053096	OEM Gate Valve 1" FSC	PDS60045926	4	153	300	12,5
V64	Scale Inhibitor Inlet Module	P6000044442	CITV. Dual Core. LF/MF. EL. OP.	-	4	-	-	
V65	Scale Inhibitor Inlet Module	P6000053096	OEM Gate Valve 1" FSC	PDS60045926	4	153	300	12,5

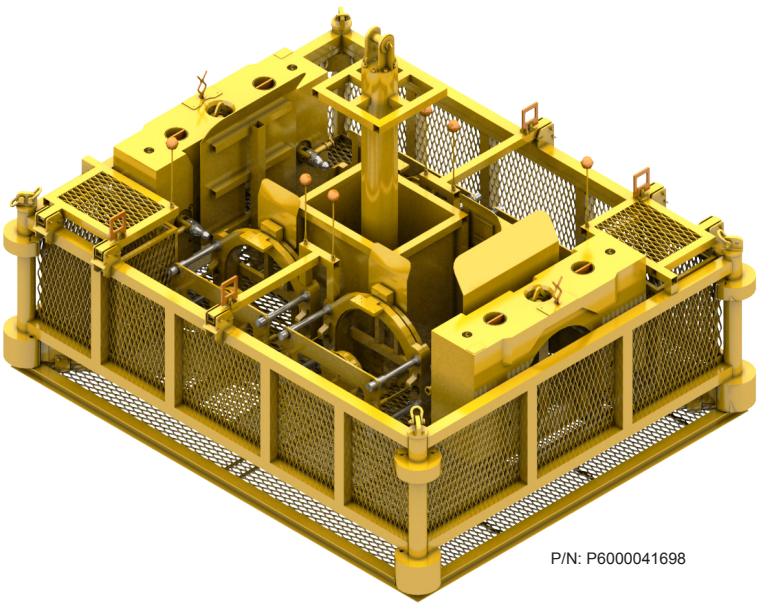
Table, Pump Module, Valve incl. torque values

Valve Name	Line Function	ROV Interface	Torque Tool Setting (Nm)	Max Input Torque (Nm)	Turns
V-1-1	WO Barrier Return Valve	Paddle	50	400	1/4
V-1-2	WO Barrier Supply Valve	Paddle	50	400	1/4
V-1-3	Barrier Supply Valve	Paddle	50	400	1/4
V-1-4	Barrier Pressure Indicator Valve	Paddle	50	400	1/4
BS	Barrier Stab/Umbilical Supply Line For Barrier Oil	Fishtail	40	160	11,5
BX	Barrier X/Workover refill-flushing supply line for barrier oil	Fishtail	40	160	11,5
BR	Barier Return/Workover return line for barrier	Fishtail	40	160	11,5



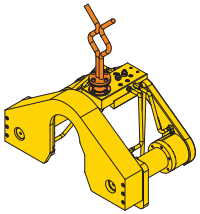
SKID ACCUMULATOR
F/ SOFTLANDING LIFT
& TEST TOOL
P/N: P6000046828

17.1 Soft Landing Actuation Skid (SLAS)

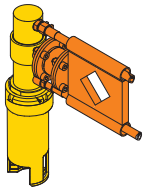


P/N: P6000041698

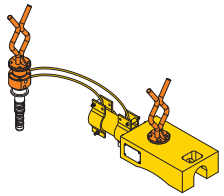
17.2 Tool Basket Assy



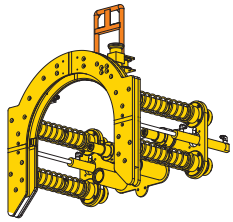
HP CAP MSRT
KC4-12
100042210



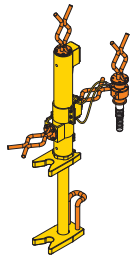
SECONDARY
RELEASE TOOL,
VECON
100033788



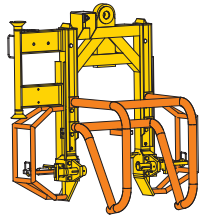
OVERRIDE JACK STABCON
1.4 INSULATED/UNINSULATED,
TERMINATION HEAD LOCKING
MECHANISM
P6000041644



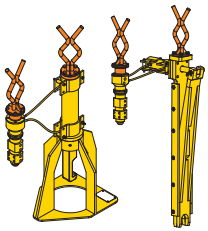
SEAL REPLACEMENT TOOL
KC4.4-12 STABCON 1.4
INSULATED UNISULATED
OUTBOARD, MULTIBORE
P6000041643



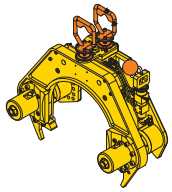
OVERRIDE JACK
PLM/YOKE, ASSY
100008621



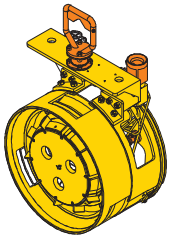
RUNNING TOOL, TERMINATION
HEAD, ASSY, LIFTING YOKE,
STABCON 1.2 INSULATED/
UNINSULATED
P6000041717



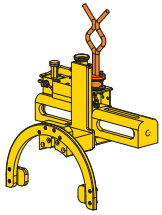
OVERRIDE JACK,
CAT FLYING
INTERF., ASSY
100012241



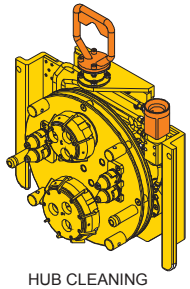
CAP REMOVAL
TOOL KC4.4-12
P6000041655



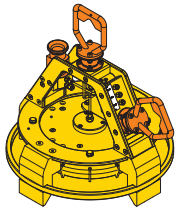
MONOBORE HCT
OUTBOARD KC4-12
100052247



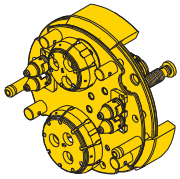
CLAMP RMOVAL
KC4-10 FLOW-
LINE100047108



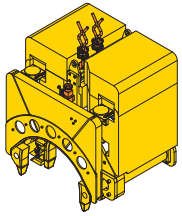
HUB CLEANING
KC4.2-12
P6000048148



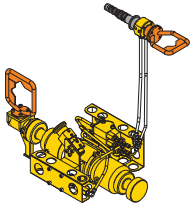
HUB CLEANING
KC4-12 MODE
VERTICAL
P6000017762



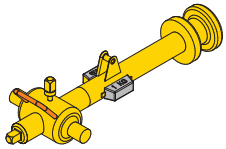
HCT & SRT KC4.2-12 INB
P6000050274



COLL CON ACUATION
KC4.2-12
P6000047952

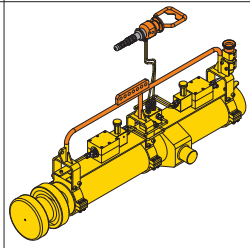


OVERRIDE CONN.
HYDRAULIC
P6000017768



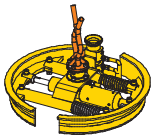
SEPERATION MODULE
LOCKING ROD
P6000054607

CONTINGENCY
RELEASE HOOK
P6000025541

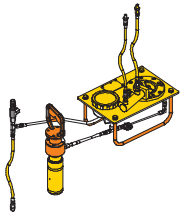


SKIDDING CYLINDER
P6000017760

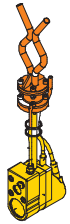
17.3 ROV Tools Scope of Supply



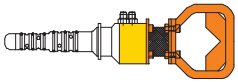
SEAL REPLACEMENT, WELLHWEAD
P6000011921



EXTERNAL SEAL TEST KIT
P6000039162

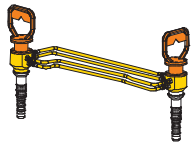


HUB INSPECTION CAMERA
P6000046966

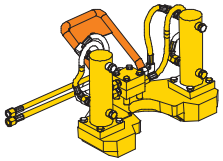


STAB 4L
P6000067293

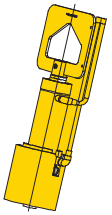
STAB 6L
P6000067294



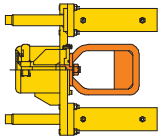
STAB 4L 3M LONG JUMPER, 345 BAR
P6000067535



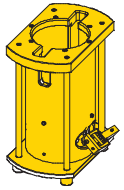
OVERRIDE JACK, KC4-3
P6000034203



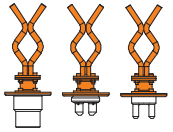
SCM OVERRIDE TOOL
100029631



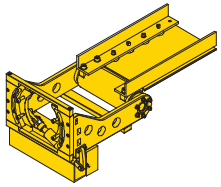
MQC OVERRIDE JACK
7604322



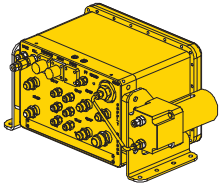
TORQUE TOOL, GEAR BOX TEST JIG
P6000015062



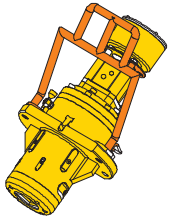
TORQUE ADAPTER KIT
100012558



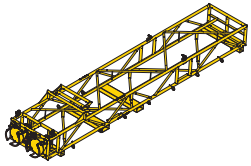
FLYING LEAD ORIENTATION TOOL
100036811



REMOTE CONTROL UNIT FOR TORQUE TOOL
100035993



TORQUE TOOL
100035992



DETECTOR DEPLOYMENT BASKET
P6000049858

Module Name	P/N FMC	CPY Nr	CPY Schematic Nr
FBS	P6000039126	AO-040-SS-400-160050	
IMF	P6000039319	AO-040-SS-400-160053	AO-040-SS-400-160049
IM	P6000039119	AO-040-SS-400-160049	AO-040-SS-400-160096
SM	P6000039112	AO-040-SS-400-160119	AO-040-SS-400-160118
MM	P6000039106	AO-040-SS-400-160077	AO-040-SS-400-160076
PM	P6000041864	AO-040-SS-403-160040	AO-040-SS-400-160139
Dummy PUMP	P6000044067	AO-040-SS-403-160263	AO-040-SS-400-160190
UTH	P6000041080	AO-040-SS-400-160100	AO-040-SS-400-160099

Industriell Dokumentasjon as May 2011

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