Base Load Power Hub (BLPH)

PT, PDT, TT, LT RADAR

INSTRUMENT DATA SHEETS

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Rev.	Date	Description	Prepared	Reviewed	Approved

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Revision / Change Log

Rev.	Description
00	Issue for Review (IFR)
01	Accepted for Construction (AFC)
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36	Attachment: Wake Frequencies Calculation for Thermowells

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GENERAL	1	Tag Number						43-LT-001		
	2	Service						HYDROGEN VENT KO DRUM (V-43001)		
	3	P&ID Number						123A90-DDL-PR-PID-80029		
	4	Equipment Number		Line Number				V-43001	-	
	5	Area Classification						ATEX Zone2 - IIC (IIB+H2) T1		
	6	Mounting						REMOTE		
PROCESS CONDITIONS	7	Fluid		State				WATER	LIQUID	
	8	Pressure	Unit	Min.	Oper.	Max.			Atm (op.)	
	9	Temperature	Unit	Min.	Oper.	Max.			Amb. (op)	
	10	Design Pressure		Min.		Max.		3.5 barg		
	11	Design Temperature		Min.		Max.		-10 / + 80 °C		
	12	Lower Oper. S.G.		Lower Oper. Visc.				1	1 cP	
	13	Vacuum		Over Pressure				-		
	14	Ambient Temperature						Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.		
TRANSMITTER	15	Application						LEVEL MEASUREMENT		
	16	Type						Diaphragm		
	17	ATEX Certification		Ingress Protection				ATEX Ex II 2G Ex db IIC T5	IP66	
	18	Housing		Paint				SS AISI 316/316L	N/A	
	19	Power Supply						24 Vdc		
	20	Process Connection		Electrical Connection				2 x 1/4" NPT-F	2 x M20x1.5	
	21	Accuracy						0.07% of Nominal Range		
	22	Max. Static Pressure		Element Material				100 bar	SS AISI 316/316L Gold Plated	
	23	Fill Fluid						Dow Corning Siliconic Oil		
	24	Instrument Range		Min.		Max.		0 mbar	350 mbar	
	25	Calibration Range		Min.		Max.		0 mmH_2O	560 mmH_2O	
	26	Elevation		Suppression				-	-	
	27	Allow. Oper. Pressure		Allow. Oper. Temp.				Static Pressure 100 bar	85 °C	
	28	SIL Certification		PED Certification				-	Required	
DIAPHRAGM SEAL	29	Process Conn. & Rating		Diaphragm Material				-	-	
	30	Capillary Material		Fill Fluid				-	-	
	31	Housing Material		Allow.Oper.Temp.				-	-	
COMMUNICATION AND SOFTWARE	32	Communication Type		Signal Type				HART 6	4-20mA Loop Powered 24 Vdc	
	33	DD Revision		CFF Revision				-	-	
	34	Hart Descriptor		Hart Tag				-	-	
	35	Internal Diagnostics		Capacitance				-	-	
	36	Segment		Device Address				-	-	
	37	Device Class		Simulate				-	-	
	38	Nominal Current		Operating Voltage				-	-	
OPTIONS	39	Manifold Supplied		Manifold Rating				Required (5-valves)	6000 psi	
	40	Process Connection		Manifold Model				1/2" NPT-F	MAN5-D1	
	41	Integral Meter		Scale				Required	-	
	42	Lightning Protection		Hydrostatic Testing				-	Required	
	43	Mounting Brackets						Required		
	44	Barrier - Manufacturer / Model						-		
PURCHASE	45	Manufacturer						TERRANOVA SRL		
	46	Model						SST77B-H-9-D-2-3-0-0-4 + MAN5-D1		
	47	Purchase Order Number						4718_OS		

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GENERAL	1	Tag Number						43-LT-003			
	2	Service						HYDROGEN VENT (Q-43004)			
	3	P&ID Number						123A90-DDL-PR-PID-80029			
	4	Equipment Number		Line Number				Q-43004		-	
	5	Area Classification						ATEX Zone2 - IIC (IIB+H2) T1			
	6	Mounting						REMOTE			
PROCESS CONDITIONS	7	Fluid		State				Mono Ethylene Glyco (50%vol) + water		LIQUID	
	8	Pressure	Unit	Min.	Oper.	Max.				Atm (op.)	
	9	Temperature	Unit	Min.	Oper.	Max.				Amb. (op)	
	10	Design Pressure		Min.		Max.		3.5 barg			
	11	Design Temperature		Min.		Max.		-10 / + 80 °C			
	12	Lower Oper. S.G.		Lower Oper. Visc.				1.063		1 - 2 cP	
	13	Vacuum		Over Pressure				-			
	14	Ambient Temperature						Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.			
TRANSMITTER	15	Application						LEVEL MEASUREMENT			
	16	Type						Diaphragm			
	17	ATEX Certification		Ingress Protection				ATEX Ex II 2G Ex db IIC T5		IP66	
	18	Housing		Paint				SS AISI 316/316L		N/A	
	19	Power Supply						24 Vdc			
	20	Process Connection		Electrical Connection				2 x 1/4" NPT-F		2 x M20x1.5	
	21	Accuracy						0.07% of Nominal Range			
	22	Max. Static Pressure		Element Material				100 bar		SS AISI 316/316L Gold Plated	
	23	Wetted O - Ring Material		Fill Fluid				Dow Corning Siliconic Oil			
	24	Instrument Range		Min.		0 mbar		0 mbar		350 mbar	
	25	Calibration Range		Min.		0		0 mmH_2O		1000 mmH_2O	
	26	Elevation		Suppression				-		-	
	27	Allow.Oper. Pressure		Allow.Oper.Temp.				Static Pressure 100 bar		85 °C	
	28	SIL Certification		PED Certification				-		Required	
DIAPHRAGM SEAL	29	Process Conn. & Rating		Diaphragm Material				-		-	
	30	Capillary Material		Fill Fluid				-		-	
	31	Housing Material		Allow.Oper.Temp.				-		-	
COMMUNICATION AND SOFTWARE	32	Communication Type		Signal Type				HART 6		4-20mA Loop Powered 24 Vdc	
	33	D D Revision		CFF Revision				-		-	
	34	Hart Descriptor		Hart Tag				-		-	
	35	Internal Diagnostics		Capacitance				-		-	
	36	Segment		Device Address				-		-	
	37	Device Class		Simulate				-		-	
	38	Nominal Current		Operating Voltage				-		-	
OPTIONS	39	Manifold Supplied		Manifold Rating				Required (5-valves)		6000 psi	
	40	Process Connection		Manifold Model				1/2" NPT-F		MAN5-D1	
	41	Integral Meter		Scale				Required		-	
	42	Lightning Protection		Hydrostatic Testing				-		Required	
	43	Mounting Brackets						Required			
	44	Barrier - Manufacturer / Model						-			
PURCHASE	45	Manufacturer						TERRANOVA SRL			
	46	Model						SST77B-H-9-D-2-3-0-0-4 + MAN5-D1			
	47	Purchase Order Number						4718_OS			

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GENERAL	1	Tag Number			25-PT-001	
	2	Service			H2 FROM ELECTR. (A-20000) TO H2 STORAGE VESSELS	
	3	P&ID Number	Location		123A90-DDL-PR-PID-80013	1"-HY-007-03HSS-N
	4	Function			PRESSURE MEASUREMENT	
	5	Mounting			DIRECT ON-LINE	
	6	Area Classification			ATEX Zone2 - IIC (IIB+H2) T1	
	7	Ambient Temperature			Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.	
PROCESS CONDITIONS	8	Fluid			HYDROGEN	
	9	Pressure Des.	Oper.	[barg]	40	4(Min.) / 30(Max)
	10	Temperature Des.	Oper.	[°C]	-10 / + 80 °C	5(Min.) / 65(Max.)
	11	Oper. Spec. Gravity	Oper. Viscosity		-	-
	12	Flow Rate	Allowable Temp.		-	-
TRANSMITTER	13	Instrument Range Min.	Max.	[barg]	0	100
	14	Calibration Range Min.	Max.	[barg]	0	40
	15	Elevation	Suppression		-	-
	16	Element Type			Diaphragm	
	17	Element Material			SS AISI 316/316L GOLD PLATED	
	18	Body Material	Body Rating		SS AISI 316/316L	200 bar
	19	Process Connection			1/2" NPT-M	
	20	Wetted O-Rings Material			-	
	21	Fill Fluid			-	
	22	Bolts	Housing		Manifold/Instrument assembly	SS AISI 316/316L
	23	Paint			N/A	
	24	ATEX Certification	Ingress Protection		ATEX Ex II 2G Ex db IIC T5	IP66
	25	Process Connection	Electrical Connection		1/2" NPT-M	2 X M20X1.5
	26	Accuracy			0.07% of Nominal Range	
	27	SIL Certification	PED Certification		-	Required
DIAPHRAGM SEAL	28	Process Connection & Rating			-	
	29	Diaphragm Material	Housing Material		-	-
	30	Fill Fluid	Capillary Material		-	-
	31	Capillary Type	Capillary Length		-	-
	32	Flushing Connection			-	
OPTIONS	33	Integral Meter	Scale		Required	-
	34	Hydrostatic Testing	Cleaning		Required	-
	35	Mounting Brackets	Manifold Model No		Required	MAN2-R6
	36	Lightning Protection	Barrier Manuf./Model		-	-
COMMUNICATION AND SOFTWARE	37	Communication Type	Signal Type		HART 6	4-20mA Loop Powered 24 Vdc
	38	D D Revision	CFF Revision		-	-
	39	Device Tag	Hart Tag		-	-
	40	Internal Diagnostics	Capacitance		-	-
	41	Segment	Device Address		-	-
	42	Device Class	Simulate		-	-
	43	Nominal Current	Operating Voltage		-	-
PURCHASE	44	Manufacturer			TERRANOVA SRL	
	45	Model			SST76-H-7-L-2-9-2-1-4 + MAN2-R6	
	46	Purchase Order Number			4718_OS	

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GENERAL	1	Tag Number		25-PT-002	
	2	Service		H2 FROM ELECTR. (A-20000) TO H2 STORAGE VESSELS	
	3	P&ID Number	Location	123A90-DDL-PR-PID-80013	1"-HY-007-03HSS-N
	4	Function		PRESSURE MEASUREMENT	
	5	Mounting		DIRECT ON-LINE	
	6	Area Classification		ATEX Zone2 - IIC (IIB+H2) T1	
	7	Ambient Temperature		Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.	
PROCESS CONDITIONS	8	Fluid		HYDROGEN	
	9	Pressure Des.	Oper. [barg]	40	4(Min.) / 30(Max)
	10	Temperature Des.	Oper. [°C]	-10 / + 80 °C	5(Min.) / 65(Max.)
	11	Oper. Spec. Gravity	Oper. Viscosity	-	-
	12	Flow Rate	Allowable Temp.	-	-
TRANSMITTER	13	Instrument Range Min.	Max. [barg]	0	100
	14	Calibration Range Min.	Max. [barg]	0	40
	15	Elevation	Suppression	-	-
	16	Element Type		Diaphragm	
	17	Element Material		SS AISI 316/316L GOLD PLATED	
	18	Body Material	Body Rating	AISI 316 SS	200 bar
	19	Process Connection		1/2" NPT-M	
	20	Wetted O-Rings Material		-	
	21	Fill Fluid		-	
	22	Bolts	Housing	Manifold/Instrument assembly	SS AISI 316/316L
	23	Paint		N/A	
	24	ATEX Certification	Ingress Protection	ATEX Ex II 2G Ex db IIC T5	IP66
	25	Process Connection	Electrical Connection	1/2" NPT-M	2 X M20X1.5
	26	Accuracy		0.07% of Nominal Range	
	27	SIL Certification	PED Certification	SIL2	Required
DIAPHRAGM SEAL	28	Process Connection & Rating		-	
	29	Diaphragm Material	Housing Material	-	-
	30	Fill Fluid	Capillary Material	-	-
	31	Capillary Type	Capillary Length	-	-
	32	Flushing Connection		-	
OPTIONS	33	Integral Meter	Scale	Required	-
	34	Hydrostatic Testing	Cleaning	Required	-
	35	Mounting Brackets	Manifold Model No	Required	MAN2-R6
	36	Lightning Protection	Barrier Manuf./Model	-	-
COMMUNICATION AND SOFTWARE	37	Communication Type	Signal Type	HART 6	4-20mA Loop Powered 24 Vdc
	38	D D Revision	CFF Revision	-	-
	39	Device Tag	Hart Tag	-	-
	40	Internal Diagnostics	Capacitance	-	-
	41	Segment	Device Address	-	-
	42	Device Class	Simulate	-	-
	43	Nominal Current	Operating Voltage	-	-
PURCHASE	44	Manufacturer		TERRANOVA SRL	
	45	Model		SST76-H-7-L-2-9-2-1-4 + MAN2-R6	
	46	Purchase Order Number		4718_OS	

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GENERAL	1	Tag Number			25-PT-004	
	2	Service			HYDROGEN STORAGE VESSEL (V-25001A)	
	3	P&ID Number	Location		123A90-DDL-PR-PID-80015	V-25001A
	4	Function			PRESSURE MEASUREMENT	
	5	Mounting			DIRECT ON-LINE	
	6	Area Classification			ATEX Zone2 - IIC (IIB+H2) T1	
	7	Ambient Temperature			Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.	
PROCESS CONDITIONS	8	Fluid			HYDROGEN	
	9	Pressure Des.	Oper.	[barg]	40	30
	10	Temperature Des.	Oper.	[°C]	-10 / + 80 °C	Amb.
	11	Oper. Spec. Gravity	Oper. Viscosity		-	-
	12	Flow Rate	Allowable Temp.		-	-
TRANSMITTER	13	Instrument Range Min.	Max.	[barg]	0	100
	14	Calibration Range Min.	Max.	[barg]	0	40
	15	Elevation	Suppression		-	-
	16	Element Type			Diaphragm	
	17	Element Material			SS AISI 316/316L GOLD PLATED	
	18	Body Material	Body Rating		AISI 316 SS	200 bar
	19	Process Connection			1/2" NPT-M	
	20	Wetted O-Rings Material			-	
	21	Fill Fluid			-	
	22	Bolts	Housing		Manifold/Instrument assembly	SS AISI 316/316L
	23	Paint			N/A	
	24	ATEX Certification	Ingress Protection		ATEX Ex II 2G Ex db IIC T5	IP66
	25	Process Connection	Electrical Connection		1/2" NPT-M	2 X M20X1.5
	26	Accuracy			0.07% of Nominal Range	
	27	SIL Certification	PED Certification		SIL2	Required
DIAPHRAGM SEAL	28	Process Connection & Rating			-	
	29	Diaphragm Material	Housing Material		-	-
	30	Fill Fluid	Capillary Material		-	-
	31	Capillary Type	Capillary Length		-	-
	32	Flushing Connection			-	
OPTIONS	33	Integral Meter	Scale		Required	-
	34	Hydrostatic Testing	Cleaning		Required	-
	35	Mounting Brackets	Manifold Model No		Required	MAN2-R6
	36	Lightning Protection	Barrier Manuf./Model		-	-
COMMUNICATION AND SOFTWARE	37	Communication Type	Signal Type		HART 6	4-20mA Loop Powered 24 Vdc
	38	D D Revision	CFF Revision		-	-
	39	Device Tag	Hart Tag		-	-
	40	Internal Diagnostics	Capacitance		-	-
	41	Segment	Device Address		-	-
	42	Device Class	Simulate		-	-
	43	Nominal Current	Operating Voltage		-	-
PURCHASE	44	Manufacturer			TERRANOVA SRL	
	45	Model			SST76-H-7-L-2-9-2-1-4 + MAN2-R6	
	46	Purchase Order Number			4718_OS	

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GENERAL	1	Tag Number			25-PT-035	
	2	Service			HYDROGEN STORAGE VESSEL (V-25001A)	
	3	P&ID Number	Location		123A90-DDL-PR-PID-80015	V-25001A
	4	Function			PRESSURE MEASUREMENT	
	5	Mounting			DIRECT ON-LINE	
	6	Area Classification			ATEX Zone2 - IIC (IIB+H2) T1	
	7	Ambient Temperature			Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.	
PROCESS CONDITIONS	8	Fluid			HYDROGEN	
	9	Pressure Des.	Oper.	[barg]	40	30
	10	Temperature Des.	Oper.	[°C]	-10 / + 80 °C	Amb.
	11	Oper. Spec. Gravity	Oper. Viscosity		-	-
	12	Flow Rate	Allowable Temp.		-	-
TRANSMITTER	13	Instrument Range Min.	Max.	[barg]	0	100
	14	Calibration Range Min.	Max.	[barg]	0	40
	15	Elevation	Suppression		-	-
	16	Element Type			Diaphragm	
	17	Element Material			SS AISI 316/316L GOLD PLATED	
	18	Body Material	Body Rating		AISI 316 SS	200 bar
	19	Process Connection			1/2" NPT-M	
	20	Wetted O-Rings Material			-	
	21	Fill Fluid			-	
	22	Bolts	Housing		Manifold/Instrument assembly	SS AISI 316/316L
	23	Paint			N/A	
	24	ATEX Certification	Ingress Protection		ATEX Ex II 2G Ex db IIC T5	IP66
	25	Process Connection	Electrical Connection		1/2" NPT-M	2 X M20X1.5
	26	Accuracy			0.07% of Nominal Range	
	27	SIL Certification	PED Certification		-	Required
DIAPHRAGM SEAL	28	Process Connection & Rating			-	
	29	Diaphragm Material	Housing Material		-	-
	30	Fill Fluid	Capillary Material		-	-
	31	Capillary Type	Capillary Length		-	-
	32	Flushing Connection			-	
OPTIONS	33	Integral Meter	Scale		Required	-
	34	Hydrostatic Testing	Cleaning		Required	-
	35	Mounting Brackets	Manifold Model No		Required	MAN2-R6
	36	Lightning Protection	Barrier Manuf./Model		-	-
COMMUNICATION AND SOFTWARE	37	Communication Type	Signal Type		HART 6	4-20mA Loop Powered 24 Vdc
	38	D D Revision	CFF Revision		-	-
	39	Device Tag	Hart Tag		-	-
	40	Internal Diagnostics	Capacitance		-	-
	41	Segment	Device Address		-	-
	42	Device Class	Simulate		-	-
	43	Nominal Current	Operating Voltage		-	-
PURCHASE	44	Manufacturer			TERRANOVA SRL	
	45	Model			SST76-H-7-L-2-9-2-1-4 + MAN2-R6	
	46	Purchase Order Number			4718_OS	

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GENERAL	1	Tag Number			25-PT-006	
	2	Service			HYDROGEN STORAGE VESSEL (V-25001B)	
	3	P&ID Number	Location		123A90-DDL-PR-PID-80016	V-25001B
	4	Function			PRESSURE MEASUREMENT	
	5	Mounting			DIRECT ON-LINE	
	6	Area Classification			ATEX Zone2 - IIC (IIB+H2) T1	
	7	Ambient Temperature			Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.	
PROCESS CONDITIONS	8	Fluid			HYDROGEN	
	9	Pressure Des.	Oper.	[barg]	40	30
	10	Temperature Des.	Oper.	[°C]	-10 / + 80 °C	Amb.
	11	Oper. Spec. Gravity	Oper. Viscosity		-	-
	12	Flow Rate	Allowable Temp.		-	-
TRANSMITTER	13	Instrument Range Min.	Max.	[barg]	0	100
	14	Calibration Range Min.	Max.	[barg]	0	40
	15	Elevation	Suppression		-	-
	16	Element Type			Diaphragm	
	17	Element Material			SS AISI 316/316L GOLD PLATED	
	18	Body Material	Body Rating		AISI 316 SS	200 bar
	19	Process Connection			1/2" NPT-M	
	20	Wetted O-Rings Material			-	
	21	Fill Fluid			-	
	22	Bolts	Housing		Manifold/Instrument assembly	SS AISI 316/316L
	23	Paint			N/A	
	24	ATEX Certification	Ingress Protection		ATEX Ex II 2G Ex db IIC T5	IP66
	25	Process Connection	Electrical Connection		1/2" NPT-M	2 X M20X1.5
	26	Accuracy			0.07% of Nominal Range	
	27	SIL Certification	PED Certification		SIL2	Required
DIAPHRAGM SEAL	28	Process Connection & Rating			-	
	29	Diaphragm Material	Housing Material		-	-
	30	Fill Fluid	Capillary Material		-	-
	31	Capillary Type	Capillary Length		-	-
	32	Flushing Connection			-	
OPTIONS	33	Integral Meter	Scale		Required	-
	34	Hydrostatic Testing	Cleaning		Required	-
	35	Mounting Brackets	Manifold Model No		Required	MAN2-R6
	36	Lightning Protection	Barrier Manuf./Model		-	-
COMMUNICATION AND SOFTWARE	37	Communication Type	Signal Type		HART 6	4-20mA Loop Powered 24 Vdc
	38	D D Revision	CFF Revision		-	-
	39	Device Tag	Hart Tag		-	-
	40	Internal Diagnostics	Capacitance		-	-
	41	Segment	Device Address		-	-
	42	Device Class	Simulate		-	-
	43	Nominal Current	Operating Voltage		-	-
PURCHASE	44	Manufacturer			TERRANOVA SRL	
	45	Model			SST76-H-7-L-2-9-2-1-4 + MAN2-R6	
	46	Purchase Order Number			4718_OS	

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GENERAL	1	Tag Number			25-PT-037	
	2	Service			HYDROGEN STORAGE VESSEL (V-25001B)	
	3	P&ID Number	Location		123A90-DDL-PR-PID-80016	V-25001B
	4	Function			PRESSURE MEASUREMENT	
	5	Mounting			DIRECT ON-LINE	
	6	Area Classification			ATEX Zone2 - IIC (IIB+H2) T1	
	7	Ambient Temperature			Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.	
PROCESS CONDITIONS	8	Fluid			HYDROGEN	
	9	Pressure Des.	Oper.	[barg]	40	30
	10	Temperature Des.	Oper.	[°C]	-10 / + 80 °C	Amb.
	11	Oper. Spec. Gravity	Oper. Viscosity		-	-
	12	Flow Rate	Allowable Temp.		-	-
TRANSMITTER	13	Instrument Range Min.	Max.	[barg]	0	100
	14	Calibration Range Min.	Max.	[barg]	0	40
	15	Elevation	Suppression		-	-
	16	Element Type			Diaphragm	
	17	Element Material			SS AISI 316/316L GOLD PLATED	
	18	Body Material	Body Rating		AISI 316 SS	200 bar
	19	Process Connection			1/2" NPT-M	
	20	Wetted O-Rings Material			-	
	21	Fill Fluid			-	
	22	Bolts	Housing		Manifold/Instrument assembly	SS AISI 316/316L
	23	Paint			N/A	
	24	ATEX Certification	Ingress Protection		ATEX Ex II 2G Ex db IIC T5	IP66
	25	Process Connection	Electrical Connection		1/2" NPT-M	2 X M20X1.5
	26	Accuracy			0.07% of Nominal Range	
	27	SIL Certification	PED Certification		-	Required
DIAPHRAGM SEAL	28	Process Connection & Rating			-	
	29	Diaphragm Material	Housing Material		-	-
	30	Fill Fluid	Capillary Material		-	-
	31	Capillary Type	Capillary Length		-	-
	32	Flushing Connection			-	
OPTIONS	33	Integral Meter	Scale		Required	-
	34	Hydrostatic Testing	Cleaning		Required	-
	35	Mounting Brackets	Manifold Model No		Required	MAN2-R6
	36	Lightning Protection	Barrier Manuf./Model		-	-
COMMUNICATION AND SOFTWARE	37	Communication Type	Signal Type		HART 6	4-20mA Loop Powered 24 Vdc
	38	D D Revision	CFF Revision		-	-
	39	Device Tag	Hart Tag		-	-
	40	Internal Diagnostics	Capacitance		-	-
	41	Segment	Device Address		-	-
	42	Device Class	Simulate		-	-
	43	Nominal Current	Operating Voltage		-	-
PURCHASE	44	Manufacturer			TERRANOVA SRL	
	45	Model			SST76-H-7-L-2-9-2-1-4 + MAN2-R6	
	46	Purchase Order Number			4718_OS	

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GENERAL	1	Tag Number			25-PT-008	
	2	Service			HYDROGEN STORAGE VESSEL (V-25001C)	
	3	P&ID Number	Location		123A90-DDL-PR-PID-80017	V-25001C
	4	Function			PRESSURE MEASUREMENT	
	5	Mounting			DIRECT ON-LINE	
	6	Area Classification			ATEX Zone2 - IIC (IIB+H2) T1	
	7	Ambient Temperature			Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.	
PROCESS CONDITIONS	8	Fluid			HYDROGEN	
	9	Pressure Des.	Oper.	[barg]	40	30
	10	Temperature Des.	Oper.	[°C]	-10 / + 80 °C	Amb.
	11	Oper. Spec. Gravity	Oper. Viscosity		-	-
	12	Flow Rate	Allowable Temp.		-	-
TRANSMITTER	13	Instrument Range Min.	Max.	[barg]	0	100
	14	Calibration Range Min.	Max.	[barg]	0	40
	15	Elevation	Suppression		-	-
	16	Element Type			Diaphragm	
	17	Element Material			SS AISI 316/316L GOLD PLATED	
	18	Body Material	Body Rating		AISI 316 SS	200 bar
	19	Process Connection			1/2" NPT-M	
	20	Wetted O-Rings Material			-	
	21	Fill Fluid			-	
	22	Bolts	Housing		Manifold/Instrument assembly	SS AISI 316/316L
	23	Paint			N/A	
	24	ATEX Certification	Ingress Protection		ATEX Ex II 2G Ex db IIC T5	IP66
	25	Process Connection	Electrical Connection		1/2" NPT-M	2 X M20X1.5
	26	Accuracy			0.07% of Nominal Range	
	27	SIL Certification	PED Certification		SIL2	Required
DIAPHRAGM SEAL	28	Process Connection & Rating			-	
	29	Diaphragm Material	Housing Material		-	-
	30	Fill Fluid	Capillary Material		-	-
	31	Capillary Type	Capillary Length		-	-
	32	Flushing Connection			-	
OPTIONS	33	Integral Meter	Scale		Required	-
	34	Hydrostatic Testing	Cleaning		Required	-
	35	Mounting Brackets	Manifold Model No		Required	MAN2-R6
	36	Lightning Protection	Barrier Manuf./Model		-	-
COMMUNICATION AND SOFTWARE	37	Communication Type	Signal Type		HART 6	4-20mA Loop Powered 24 Vdc
	38	D D Revision	CFF Revision		-	-
	39	Device Tag	Hart Tag		-	-
	40	Internal Diagnostics	Capacitance		-	-
	41	Segment	Device Address		-	-
	42	Device Class	Simulate		-	-
	43	Nominal Current	Operating Voltage		-	-
PURCHASE	44	Manufacturer			TERRANOVA SRL	
	45	Model			SST76-H-7-L-2-9-2-1-4 + MAN2-R6	
	46	Purchase Order Number			4718_OS	

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GENERAL	1	Tag Number			25-PT-040	
	2	Service			HYDROGEN STORAGE VESSEL (V-25001C)	
	3	P&ID Number	Location		123A90-DDL-PR-PID-80017	V-25001C
	4	Function			PRESSURE MEASUREMENT	
	5	Mounting			DIRECT ON-LINE	
	6	Area Classification			ATEX Zone2 - IIC (IIB+H2) T1	
	7	Ambient Temperature			Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.	
PROCESS CONDITIONS	8	Fluid			HYDROGEN	
	9	Pressure Des.	Oper.	[barg]	40	30
	10	Temperature Des.	Oper.	[°C]	-10 / + 80 °C	Amb.
	11	Oper. Spec. Gravity	Oper. Viscosity		-	-
	12	Flow Rate	Allowable Temp.		-	-
TRANSMITTER	13	Instrument Range Min.	Max.	[barg]	0	100
	14	Calibration Range Min.	Max.	[barg]	0	40
	15	Elevation	Suppression		-	-
	16	Element Type			Diaphragm	
	17	Element Material			SS AISI 316/316L GOLD PLATED	
	18	Body Material	Body Rating		AISI 316 SS	200 bar
	19	Process Connection			1/2" NPT-M	
	20	Wetted O-Rings Material			-	
	21	Fill Fluid			-	
	22	Bolts	Housing		Manifold/Instrument assembly	SS AISI 316/316L
	23	Paint			N/A	
	24	ATEX Certification	Ingress Protection		ATEX Ex II 2G Ex db IIC T5	IP66
	25	Process Connection	Electrical Connection		1/2" NPT-M	2 X M20X1.5
	26	Accuracy			0.07% of Nominal Range	
	27	SIL Certification	PED Certification		-	Required
DIAPHRAGM SEAL	28	Process Connection & Rating			-	
	29	Diaphragm Material	Housing Material		-	-
	30	Fill Fluid	Capillary Material		-	-
	31	Capillary Type	Capillary Length		-	-
	32	Flushing Connection			-	
OPTIONS	33	Integral Meter	Scale		Required	-
	34	Hydrostatic Testing	Cleaning		Required	-
	35	Mounting Brackets	Manifold Model No		Required	MAN2-R6
	36	Lightning Protection	Barrier Manuf./Model		-	-
COMMUNICATION AND SOFTWARE	37	Communication Type	Signal Type		HART 6	4-20mA Loop Powered 24 Vdc
	38	D D Revision	CFF Revision		-	-
	39	Device Tag	Hart Tag		-	-
	40	Internal Diagnostics	Capacitance		-	-
	41	Segment	Device Address		-	-
	42	Device Class	Simulate		-	-
	43	Nominal Current	Operating Voltage		-	-
PURCHASE	44	Manufacturer			TERRANOVA SRL	
	45	Model			SST76-H-7-L-2-9-2-1-4 + MAN2-R6	
	46	Purchase Order Number			4718_OS	

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GENERAL	1	Tag Number			25-PT-009	
	2	Service			HYDROGEN STORAGE VESSEL (V-25001D)	
	3	P&ID Number	Location		123A90-DDL-PR-PID-80018	V-25001D
	4	Function			PRESSURE MEASUREMENT	
	5	Mounting			DIRECT ON-LINE	
	6	Area Classification			ATEX Zone2 - IIC (IIB+H2) T1	
	7	Ambient Temperature			Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.	
PROCESS CONDITIONS	8	Fluid			HYDROGEN	
	9	Pressure Des.	Oper.	[barg]	40	30
	10	Temperature Des.	Oper.	[°C]	-10 / + 80 °C	Amb.
	11	Oper. Spec. Gravity	Oper. Viscosity		-	-
	12	Flow Rate	Allowable Temp.		-	-
TRANSMITTER	13	Instrument Range Min.	Max.	[barg]	0	100
	14	Calibration Range Min.	Max.	[barg]	0	40
	15	Elevation	Suppression		-	-
	16	Element Type			Diaphragm	
	17	Element Material			SS AISI 316/316L GOLD PLATED	
	18	Body Material	Body Rating		AISI 316 SS	200 bar
	19	Process Connection			1/2" NPT-M	
	20	Wetted O-Rings Material			-	
	21	Fill Fluid			-	
	22	Bolts	Housing		Manifold/Instrument assembly	SS AISI 316/316L
	23	Paint			N/A	
	24	ATEX Certification	Ingress Protection		ATEX Ex II 2G Ex db IIC T5	IP66
	25	Process Connection	Electrical Connection		1/2" NPT-M	2 X M20X1.5
	26	Accuracy			0.07% of Nominal Range	
	27	SIL Certification	PED Certification		SIL2	Required
DIAPHRAGM SEAL	28	Process Connection & Rating			-	
	29	Diaphragm Material	Housing Material		-	-
	30	Fill Fluid	Capillary Material		-	-
	31	Capillary Type	Capillary Length		-	-
	32	Flushing Connection			-	
OPTIONS	33	Integral Meter	Scale		Required	-
	34	Hydrostatic Testing	Cleaning		Required	-
	35	Mounting Brackets	Manifold Model No		Required	MAN2-R6
	36	Lightning Protection	Barrier Manuf./Model		-	-
COMMUNICATION AND SOFTWARE	37	Communication Type	Signal Type		HART 6	4-20mA Loop Powered 24 Vdc
	38	D D Revision	CFF Revision		-	-
	39	Device Tag	Hart Tag		-	-
	40	Internal Diagnostics	Capacitance		-	-
	41	Segment	Device Address		-	-
	42	Device Class	Simulate		-	-
	43	Nominal Current	Operating Voltage		-	-
PURCHASE	44	Manufacturer			TERRANOVA SRL	
	45	Model			SST76-H-7-L-2-9-2-1-4 + MAN2-R6	
	46	Purchase Order Number			4718_OS	

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GENERAL	1	Tag Number			25-PT-043	
	2	Service			HYDROGEN STORAGE VESSEL (V-25001D)	
	3	P&ID Number	Location		123A90-DDL-PR-PID-80018	V-25001D
	4	Function			PRESSURE MEASUREMENT	
	5	Mounting			DIRECT ON-LINE	
	6	Area Classification			ATEX Zone2 - IIC (IIB+H2) T1	
	7	Ambient Temperature			Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.	
PROCESS CONDITIONS	8	Fluid			HYDROGEN	
	9	Pressure Des.	Oper.	[barg]	40	30
	10	Temperature Des.	Oper.	[°C]	-10 / + 80 °C	Amb.
	11	Oper. Spec. Gravity	Oper. Viscosity		-	-
	12	Flow Rate	Allowable Temp.		-	-
TRANSMITTER	13	Instrument Range Min.	Max.	[barg]	0	100
	14	Calibration Range Min.	Max.	[barg]	0	40
	15	Elevation	Suppression		-	-
	16	Element Type			Diaphragm	
	17	Element Material			SS AISI 316/316L GOLD PLATED	
	18	Body Material	Body Rating		AISI 316 SS	200 bar
	19	Process Connection			1/2" NPT-M	
	20	Wetted O-Rings Material			-	
	21	Fill Fluid			-	
	22	Bolts	Housing		Manifold/Instrument assembly	SS AISI 316/316L
	23	Paint			N/A	
	24	ATEX Certification	Ingress Protection		ATEX Ex II 2G Ex db IIC T5	IP66
	25	Process Connection	Electrical Connection		1/2" NPT-M	2 X M20X1.5
	26	Accuracy			0.07% of Nominal Range	
	27	SIL Certification	PED Certification		SIL2	Required
DIAPHRAGM SEAL	28	Process Connection & Rating			-	
	29	Diaphragm Material	Housing Material		-	-
	30	Fill Fluid	Capillary Material		-	-
	31	Capillary Type	Capillary Length		-	-
	32	Flushing Connection			-	
OPTIONS	33	Integral Meter	Scale		Required	-
	34	Hydrostatic Testing	Cleaning		Required	-
	35	Mounting Brackets	Manifold Model No		Required	MAN2-R6
	36	Lightning Protection	Barrier Manuf./Model		-	-
COMMUNICATION AND SOFTWARE	37	Communication Type	Signal Type		HART 6	4-20mA Loop Powered 24 Vdc
	38	D D Revision	CFF Revision		-	-
	39	Device Tag	Hart Tag		-	-
	40	Internal Diagnostics	Capacitance		-	-
	41	Segment	Device Address		-	-
	42	Device Class	Simulate		-	-
	43	Nominal Current	Operating Voltage		-	-
PURCHASE	44	Manufacturer			TERRANOVA SRL	
	45	Model			SST76-H-7-L-2-9-2-1-4 + MAN2-R6	
	46	Purchase Order Number			4718_OS	

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GENERAL	1	Tag Number			25-PT-011	
	2	Service			HYDROGEN STORAGE VESSEL (V-25001E)	
	3	P&ID Number	Location		123A90-DDL-PR-PID-80019	V-25001E
	4	Function			PRESSURE MEASUREMENT	
	5	Mounting			DIRECT ON-LINE	
	6	Area Classification			ATEX Zone2 - IIC (IIB+H2) T1	
	7	Ambient Temperature			Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.	
PROCESS CONDITIONS	8	Fluid			HYDROGEN	
	9	Pressure Des.	Oper.	[barg]	40	30
	10	Temperature Des.	Oper.	[°C]	-10 / + 80 °C	Amb.
	11	Oper. Spec. Gravity	Oper. Viscosity		-	-
	12	Flow Rate	Allowable Temp.		-	-
TRANSMITTER	13	Instrument Range Min.	Max.	[barg]	0	100
	14	Calibration Range Min.	Max.	[barg]	0	40
	15	Elevation	Suppression		-	-
	16	Element Type			Diaphragm	
	17	Element Material			SS AISI 316/316L GOLD PLATED	
	18	Body Material	Body Rating		AISI 316 SS	200 bar
	19	Process Connection			1/2" NPT-M	
	20	Wetted O-Rings Material			-	
	21	Fill Fluid			-	
	22	Bolts	Housing		Manifold/Instrument assembly	SS AISI 316/316L
	23	Paint			N/A	
	24	ATEX Certification	Ingress Protection		ATEX Ex II 2G Ex db IIC T5	IP66
	25	Process Connection	Electrical Connection		1/2" NPT-M	2 X M20X1.5
	26	Accuracy			0.07% of Nominal Range	
	27	SIL Certification	PED Certification		SIL2	Required
DIAPHRAGM SEAL	28	Process Connection & Rating			-	
	29	Diaphragm Material	Housing Material		-	-
	30	Fill Fluid	Capillary Material		-	-
	31	Capillary Type	Capillary Length		-	-
	32	Flushing Connection			-	
OPTIONS	33	Integral Meter	Scale		Required	-
	34	Hydrostatic Testing	Cleaning		Required	-
	35	Mounting Brackets	Manifold Model No		Required	MAN2-R6
	36	Lightning Protection	Barrier Manuf./Model		-	-
COMMUNICATION AND SOFTWARE	37	Communication Type	Signal Type		HART 6	4-20mA Loop Powered 24 Vdc
	38	D D Revision	CFF Revision		-	-
	39	Device Tag	Hart Tag		-	-
	40	Internal Diagnostics	Capacitance		-	-
	41	Segment	Device Address		-	-
	42	Device Class	Simulate		-	-
	43	Nominal Current	Operating Voltage		-	-
PURCHASE	44	Manufacturer			TERRANOVA SRL	
	45	Model			SST76-H-7-L-2-9-2-1-4 + MAN2-R6	
	46	Purchase Order Number			4718_OS	

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GENERAL	1	Tag Number			25-PT-046	
	2	Service			HYDROGEN STORAGE VESSEL (V-25001E)	
	3	P&ID Number	Location		123A90-DDL-PR-PID-80019	V-25001E
	4	Function			PRESSURE MEASUREMENT	
	5	Mounting			DIRECT ON-LINE	
	6	Area Classification			ATEX Zone2 - IIC (IIB+H2) T1	
	7	Ambient Temperature			Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.	
PROCESS CONDITIONS	8	Fluid			HYDROGEN	
	9	Pressure Des.	Oper.	[barg]	40	30
	10	Temperature Des.	Oper.	[°C]	-10 / + 80 °C	Amb.
	11	Oper. Spec. Gravity	Oper. Viscosity		-	-
	12	Flow Rate	Allowable Temp.		-	-
TRANSMITTER	13	Instrument Range Min.	Max.	[barg]	0	100
	14	Calibration Range Min.	Max.	[barg]	0	40
	15	Elevation	Suppression		-	-
	16	Element Type			Diaphragm	
	17	Element Material			SS AISI 316/316L GOLD PLATED	
	18	Body Material	Body Rating		AISI 316 SS	200 bar
	19	Process Connection			1/2" NPT-M	
	20	Wetted O-Rings Material			-	
	21	Fill Fluid			-	
	22	Bolts	Housing		Manifold/Instrument assembly	SS AISI 316/316L
	23	Paint			N/A	
	24	ATEX Certification	Ingress Protection		ATEX Ex II 2G Ex db IIC T5	IP66
	25	Process Connection	Electrical Connection		1/2" NPT-M	2 X M20X1.5
	26	Accuracy			0.07% of Nominal Range	
	27	SIL Certification	PED Certification		-	Required
DIAPHRAGM SEAL	28	Process Connection & Rating			-	
	29	Diaphragm Material	Housing Material		-	-
	30	Fill Fluid	Capillary Material		-	-
	31	Capillary Type	Capillary Length		-	-
	32	Flushing Connection			-	
OPTIONS	33	Integral Meter	Scale		Required	-
	34	Hydrostatic Testing	Cleaning		Required	-
	35	Mounting Brackets	Manifold Model No		Required	MAN2-R6
	36	Lightning Protection	Barrier Manuf./Model		-	-
COMMUNICATION AND SOFTWARE	37	Communication Type	Signal Type		HART 6	4-20mA Loop Powered 24 Vdc
	38	D D Revision	CFF Revision		-	-
	39	Device Tag	Hart Tag		-	-
	40	Internal Diagnostics	Capacitance		-	-
	41	Segment	Device Address		-	-
	42	Device Class	Simulate		-	-
	43	Nominal Current	Operating Voltage		-	-
PURCHASE	44	Manufacturer			TERRANOVA SRL	
	45	Model			SST76-H-7-L-2-9-2-1-4 + MAN2-R6	
	46	Purchase Order Number			4718_OS	

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GENERAL	1	Tag Number			25-PT-012	
	2	Service			HYDROGEN STORAGE VESSEL (V-25001F)	
	3	P&ID Number	Location		123A90-DDL-PR-PID-80020	V-25001F
	4	Function			PRESSURE MEASUREMENT	
	5	Mounting			DIRECT ON-LINE	
	6	Area Classification			ATEX Zone2 - IIC (IIB+H2) T1	
	7	Ambient Temperature			Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.	
PROCESS CONDITIONS	8	Fluid			HYDROGEN	
	9	Pressure Des.	Oper.	[barg]	40	30
	10	Temperature Des.	Oper.	[°C]	-10 / + 80 °C	Amb.
	11	Oper. Spec. Gravity	Oper. Viscosity		-	-
	12	Flow Rate	Allowable Temp.		-	-
TRANSMITTER	13	Instrument Range Min.	Max.	[barg]	0	100
	14	Calibration Range Min.	Max.	[barg]	0	40
	15	Elevation	Suppression		-	-
	16	Element Type			Diaphragm	
	17	Element Material			SS AISI 316/316L GOLD PLATED	
	18	Body Material	Body Rating		AISI 316 SS	200 bar
	19	Process Connection			1/2" NPT-M	
	20	Wetted O-Rings Material			-	
	21	Fill Fluid			-	
	22	Bolts	Housing		Manifold/Instrument assembly	SS AISI 316/316L
	23	Paint			N/A	
	24	ATEX Certification	Ingress Protection		ATEX Ex II 2G Ex db IIC T5	IP66
	25	Process Connection	Electrical Connection		1/2" NPT-M	2 X M20X1.5
	26	Accuracy			0.07% of Nominal Range	
	27	SIL Certification	PED Certification		SIL2	Required
DIAPHRAGM SEAL	28	Process Connection & Rating			-	
	29	Diaphragm Material	Housing Material		-	-
	30	Fill Fluid	Capillary Material		-	-
	31	Capillary Type	Capillary Length		-	-
	32	Flushing Connection			-	
OPTIONS	33	Integral Meter	Scale		Required	-
	34	Hydrostatic Testing	Cleaning		Required	-
	35	Mounting Brackets	Manifold Model No		Required	MAN2-R6
	36	Lightning Protection	Barrier Manuf./Model		-	-
COMMUNICATION AND SOFTWARE	37	Communication Type	Signal Type		HART 6	4-20mA Loop Powered 24 Vdc
	38	D D Revision	CFF Revision		-	-
	39	Device Tag	Hart Tag		-	-
	40	Internal Diagnostics	Capacitance		-	-
	41	Segment	Device Address		-	-
	42	Device Class	Simulate		-	-
	43	Nominal Current	Operating Voltage		-	-
PURCHASE	44	Manufacturer			TERRANOVA SRL	
	45	Model			SST76-H-7-L-2-9-2-1-4 + MAN2-R6	
	46	Purchase Order Number			4718_OS	

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GENERAL	1	Tag Number			25-PT-049	
	2	Service			HYDROGEN STORAGE VESSEL (V-25001F)	
	3	P&ID Number	Location		123A90-DDL-PR-PID-80020	V-25001F
	4	Function			PRESSURE MEASUREMENT	
	5	Mounting			DIRECT ON-LINE	
	6	Area Classification			ATEX Zone2 - IIC (IIB+H2) T1	
	7	Ambient Temperature			Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.	
PROCESS CONDITIONS	8	Fluid			HYDROGEN	
	9	Pressure Des.	Oper.	[barg]	40	30
	10	Temperature Des.	Oper.	[°C]	-10 / + 80 °C	Amb.
	11	Oper. Spec. Gravity	Oper. Viscosity		-	-
	12	Flow Rate	Allowable Temp.		-	-
TRANSMITTER	13	Instrument Range Min.	Max.	[barg]	0	100
	14	Calibration Range Min.	Max.	[barg]	0	40
	15	Elevation	Suppression		-	-
	16	Element Type			Diaphragm	
	17	Element Material			SS AISI 316/316L GOLD PLATED	
	18	Body Material	Body Rating		AISI 316 SS	200 bar
	19	Process Connection			1/2" NPT-M	
	20	Wetted O-Rings Material			-	
	21	Fill Fluid			-	
	22	Bolts	Housing		Manifold/Instrument assembly	SS AISI 316/316L
	23	Paint			N/A	
	24	ATEX Certification	Ingress Protection		ATEX Ex II 2G Ex db IIC T5	IP66
	25	Process Connection	Electrical Connection		1/2" NPT-M	2 X M20X1.5
	26	Accuracy			0.07% of Nominal Range	
	27	SIL Certification	PED Certification		-	Required
DIAPHRAGM SEAL	28	Process Connection & Rating			-	
	29	Diaphragm Material	Housing Material		-	-
	30	Fill Fluid	Capillary Material		-	-
	31	Capillary Type	Capillary Length		-	-
	32	Flushing Connection			-	
OPTIONS	33	Integral Meter	Scale		Required	-
	34	Hydrostatic Testing	Cleaning		Required	-
	35	Mounting Brackets	Manifold Model No		Required	MAN2-R6
	36	Lightning Protection	Barrier Manuf./Model		-	-
COMMUNICATION AND SOFTWARE	37	Communication Type	Signal Type		HART 6	4-20mA Loop Powered 24 Vdc
	38	D D Revision	CFF Revision		-	-
	39	Device Tag	Hart Tag		-	-
	40	Internal Diagnostics	Capacitance		-	-
	41	Segment	Device Address		-	-
	42	Device Class	Simulate		-	-
	43	Nominal Current	Operating Voltage		-	-
PURCHASE	44	Manufacturer			TERRANOVA SRL	
	45	Model			SST76-H-7-L-2-9-2-1-4 + MAN2-R6	
	46	Purchase Order Number			4718_OS	

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GENERAL	1	Tag Number		25-PT-055A	
	2	Service		HYDROGEN FROM STORAGE VESSEL HEADER TO FUEL CELL (A-80000)	
	3	P&ID Number	Location	123A90-DDL-PR-PID-80014	2"-HY-023-01HSS-N
	4	Function		PRESSURE MEASUREMENT	
	5	Mounting		DIRECT ON-LINE	
	6	Area Classification		ATEX Zone2 - IIC (IIB+H2) T1	
	7	Ambient Temperature		Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.	
PROCESS CONDITIONS	8	Fluid		HYDROGEN	
	9	Pressure Des.	Oper. [barg]	10	4(Min.) / 6.5(Max)
	10	Temperature Des.	Oper. [°C]	100	AMB
	11	Oper. Spec. Gravity	Oper. Viscosity	-	-
	12	Flow Rate	Allowable Temp.	-	-
TRANSMITTER	13	Instrument Range Min.	Max. [barg]	0	30
	14	Calibration Range Min.	Max. [barg]	0	10
	15	Elevation	Suppression	-	-
	16	Element Type		Diaphragm	
	17	Element Material		SS AISI 316/316L GOLD PLATED	
	18	Body Material	Body Rating	AISI 316 SS	150 bar
	19	Process Connection		1/2" NPT-M	
	20	Wetted O-Rings Material		-	
	21	Fill Fluid		-	
	22	Bolts	Housing	Manifold/Instrument assembly	SS AISI 316/316L
	23	Paint		N/A	
	24	ATEX Certification	Ingress Protection	ATEX Ex II 2G Ex db IIC T5	IP66
	25	Process Connection	Electrical Connection	1/2" NPT-M	2 X M20X1.5
	26	Accuracy		0.07% of Nominal Range	
	27	SIL Certification	PED Certification	-	Required
DIAPHRAGM SEAL	28	Process Connection & Rating		-	
	29	Diaphragm Material	Housing Material	-	-
	30	Fill Fluid	Capillary Material	-	-
	31	Capillary Type	Capillary Length	-	-
	32	Flushing Connection		-	
OPTIONS	33	Integral Meter	Scale	Required	-
	34	Hydrostatic Testing	Cleaning	Required	-
	35	Mounting Brackets	Manifold Model No	Required	MAN2-R6
	36	Lightning Protection	Barrier Manuf./Model	-	-
COMMUNICATION AND SOFTWARE	37	Communication Type	Signal Type	HART 6	4-20mA Loop Powered 24 Vdc
	38	D D Revision	CFF Revision	-	-
	39	Device Tag	Hart Tag	-	-
	40	Internal Diagnostics	Capacitance	-	-
	41	Segment	Device Address	-	-
	42	Device Class	Simulate	-	-
	43	Nominal Current	Operating Voltage	-	-
PURCHASE	44	Manufacturer		TERRANOVA SRL	
	45	Model		SST76-H-7-K-2-9-2-1-4 + MAN2-R6	
	46	Purchase Order Number		4718_OS	

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GENERAL	1	Tag Number		25-PT-055B	
	2	Service		HYDROGEN FROM STORAGE VESSEL HEADER TO FUEL CELL (A-80000)	
	3	P&ID Number	Location	123A90-DDL-PR-PID-80014	2"-HY-023-01HSS-N
	4	Function		PRESSURE MEASUREMENT	
	5	Mounting		DIRECT ON-LINE	
	6	Area Classification		ATEX Zone2 - IIC (IIB+H2) T1	
	7	Ambient Temperature		Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.	
PROCESS CONDITIONS	8	Fluid		HYDROGEN	
	9	Pressure Des.	Oper. [barg]	10	4(Min.) / 6.5(Max)
	10	Temperature Des.	Oper. [°C]	100	AMB
	11	Oper. Spec. Gravity	Oper. Viscosity	-	-
	12	Flow Rate	Allowable Temp.	-	-
TRANSMITTER	13	Instrument Range Min.	Max. [barg]	0	30
	14	Calibration Range Min.	Max. [barg]	0	10
	15	Elevation	Suppression	-	-
	16	Element Type		Diaphragm	
	17	Element Material		SS AISI 316/316L GOLD PLATED	
	18	Body Material	Body Rating	AISI 316 SS	150 bar
	19	Process Connection		1/2" NPT-M	
	20	Wetted O-Rings Material		-	
	21	Fill Fluid		-	
	22	Bolts	Housing	Manifold/Instrument assembly	SS AISI 316/316L
	23	Paint		N/A	
	24	ATEX Certification	Ingress Protection	ATEX Ex II 2G Ex db IIC T5	IP66
	25	Process Connection	Electrical Connection	1/2" NPT-M	2 X M20X1.5
	26	Accuracy		0.07% of Nominal Range	
	27	SIL Certification	PED Certification	-	Required
DIAPHRAGM SEAL	28	Process Connection & Rating		-	
	29	Diaphragm Material	Housing Material	-	-
	30	Fill Fluid	Capillary Material	-	-
	31	Capillary Type	Capillary Length	-	-
	32	Flushing Connection		-	
OPTIONS	33	Integral Meter	Scale	Required	-
	34	Hydrostatic Testing	Cleaning	Required	-
	35	Mounting Brackets	Manifold Model No	Required	MAN2-R6
	36	Lightning Protection	Barrier Manuf./Model	-	-
COMMUNICATION AND SOFTWARE	37	Communication Type	Signal Type	HART 6	4-20mA Loop Powered 24 Vdc
	38	D D Revision	CFF Revision	-	-
	39	Device Tag	Hart Tag	-	-
	40	Internal Diagnostics	Capacitance	-	-
	41	Segment	Device Address	-	-
	42	Device Class	Simulate	-	-
	43	Nominal Current	Operating Voltage	-	-
PURCHASE	44	Manufacturer		TERRANOVA SRL	
	45	Model		SST76-H-7-K-2-9-2-1-4 + MAN2-R6	
	46	Purchase Order Number		4718_OS	

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GENERAL	1	Tag Number			43-PT-001	
	2	Service			HYDROGEN VENT KO DRUM (V-43001)	
	3	P&ID Number	Location		123A90-DDL-PR-PID-80029	V-43001
	4	Function			PRESSURE MEASUREMENT	
	5	Mounting			DIRECT ON-LINE	
	6	Area Classification			ATEX Zone2 - IIC (IIB+H2) T1	
	7	Ambient Temperature			Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.	
PROCESS CONDITIONS	8	Fluid			HYDROGEN	
	9	Pressure Des.	Oper.	[barg]	3.5	Atm
	10	Temperature Des.	Oper.	[°C]	-10 / + 80	Amb.
	11	Oper. Spec. Gravity	Oper. Viscosity		-	-
	12	Flow Rate	Allowable Temp.		-	-
TRANSMITTER	13	Instrument Range Min.	Max.	[barg]	0	5
	14	Calibration Range Min.	Max.	[barg]	0	3.5
	15	Elevation	Suppression		-	-
	16	Element Type			Diaphragm	
	17	Element Material			SS AISI 316/316L GOLD PLATED	
	18	Body Material	Body Rating		AISI 316 SS	50 bar
	19	Process Connection			1/2" NPT-M	
	20	Wetted O-Rings Material			-	
	21	Fill Fluid			-	
	22	Bolts	Housing		Manifold/Instrument assembly	SS AISI 316/316L
	23	Paint			N/A	
	24	ATEX Certification	Ingress Protection		ATEX Ex II 2G Ex db IIC T5	IP66
	25	Process Connection	Electrical Connection		1/2" NPT-M	2 X M20X1.5
	26	Accuracy			0.07% of Nominal Range	
	27	SIL Certification	PED Certification		-	Required
DIAPHRAGM SEAL	28	Process Connection & Rating			-	
	29	Diaphragm Material	Housing Material		-	-
	30	Fill Fluid	Capillary Material		-	-
	31	Capillary Type	Capillary Length		-	-
	32	Flushing Connection			-	
OPTIONS	33	Integral Meter	Scale		Required	-
	34	Hydrostatic Testing	Cleaning		Required	-
	35	Mounting Brackets	Manifold Model No		Required	MAN2-R6
	36	Lightning Protection	Barrier Manuf./Model		-	-
COMMUNICATION AND SOFTWARE	37	Communication Type	Signal Type		HART 6	4-20mA Loop Powered 24 Vdc
	38	D D Revision	CFF Revision		-	-
	39	Device Tag	Hart Tag		-	-
	40	Internal Diagnostics	Capacitance		-	-
	41	Segment	Device Address		-	-
	42	Device Class	Simulate		-	-
	43	Nominal Current	Operating Voltage		-	-
PURCHASE	44	Manufacturer			TERRANOVA SRL	
	45	Model			SST76-H-7-G-2-9-2-1-4 + MAN2-R6	
	46	Purchase Order Number			4718_OS	

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GENERAL	1	Tag Number			50-PT-001	
	2	Service			SEA WATER FROM PUMP P-50001A TO SEA WATER TREAT.	
	3	P&ID Number	Location		123A90-DDL-PR-PID-80021	1-1/2"-SWS-031-01SD-E
	4	Function			PRESSURE MEASUREMENT	
	5	Mounting			DIRECT ON-LINE	
	6	Area Classification			ATEX Zone2 - IIC (IIB+H2) T1	
	7	Ambient Temperature			Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.	
PROCESS CONDITIONS	8	Fluid			SEA WATER	
	9	Pressure Des.	Oper. [barg]		17.7	15
	10	Temperature Des.	Oper. [°C]		100	+1.3 / +20.2
	11	Oper. Spec. Gravity	Oper. Viscosity		-	-
	12	Flow Rate	Allowable Temp.		-	-
TRANSMITTER	13	Instrument Range Min.	Max. [barg]		0	30
	14	Calibration Range Min.	Max. [barg]		0	18
	15	Elevation	Suppression		-	-
	16	Element Type			Diaphragm	
	17	Element Material			MONEL 400	
	18	Body Material	Body Rating		AISI 316 SS	20 bar
	19	Process Connection			-	
	20	Wetted O-Rings Material			-	
	21	Fill Fluid			-	
	22	Bolts	Housing		-	SS AISI 316/316L
	23	Paint			N/A	
	24	ATEX Certification	Ingress Protection		ATEX Ex II 2G Ex db IIC T5	IP66
	25	Process Connection	Electrical Connection		Inner Diaphragm Seal	2 X M20X1.5
	26	Accuracy			0.07% of Nominal Range	
	27	SIL Certification	PED Certification		-	Required
DIAPHRAGM SEAL	28	Process Connection & Rating			2"	150# RF
	29	Diaphragm Material	Housing Material		MONEL 400	SS AISI 316/316L
	30	Fill Fluid	Capillary Material		Siliconic Oil	S.S. Capillary
	31	Capillary Type	Capillary Length		Required in Option	3 m
	32	Flushing Connection			-	
OPTIONS	33	Integral Meter	Scale		Required	-
	34	Hydrostatic Testing	Cleaning		Required	-
	35	Mounting Brackets	Manifold Model No		Required	N/A
	36	Lightning Protection	Barrier Manuf./Model		-	-
COMMUNICATION AND SOFTWARE	37	Communication Type	Signal Type		HART 6	4-20mA Loop Powered 24 Vdc
	38	D D Revision	CFF Revision		-	-
	39	Device Tag	Hart Tag		-	-
	40	Internal Diagnostics	Capacitance		-	-
	41	Segment	Device Address		-	-
	42	Device Class	Simulate		-	-
	43	Nominal Current	Operating Voltage		-	-
PURCHASE	44	Manufacturer			TERRANOVA SRL	
	45	Model			SST76-H-7-K-2-9-2-1-4 + SEA03 + CAP-2-03	
	46	Purchase Order Number			4718_OS	

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GENERAL	1	Tag Number		50-PT-002	
	2	Service		SEA WATER FROM PUMP P-50001B TO SEA WATER TREAT.	
	3	P&ID Number	Location	123A90-DDL-PR-PID-80021	1-1/2"-SWS-033-01SD-E
	4	Function		PRESSURE MEASUREMENT	
	5	Mounting		DIRECT ON-LINE	
	6	Area Classification		ATEX Zone2 - IIC (IIB+H2) T1	
	7	Ambient Temperature		Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.	
PROCESS CONDITIONS	8	Fluid		SEA WATER	
	9	Pressure Des.	Oper. [barg]	17.7	15
	10	Temperature Des.	Oper. [°C]	100	+1.3 / +20.2
	11	Oper. Spec. Gravity	Oper. Viscosity	-	-
	12	Flow Rate	Allowable Temp.	-	-
TRANSMITTER	13	Instrument Range Min.	Max. [barg]	0	30
	14	Calibration Range Min.	Max. [barg]	0	18
	15	Elevation	Suppression	-	-
	16	Element Type		Diaphragm	
	17	Element Material		MONEL 400	
	18	Body Material	Body Rating	AISI 316 SS	20 bar
	19	Process Connection		-	
	20	Wetted O-Rings Material		-	
	21	Fill Fluid		-	
	22	Bolts	Housing	-	SS AISI 316/316L
	23	Paint		N/A	
	24	ATEX Certification	Ingress Protection	ATEX Ex II 2G Ex db IIC T5	IP66
	25	Process Connection	Electrical Connection	Inner Diaphragm Seal	2 X M20X1.5
	26	Accuracy		0.07% of Nominal Range	
	27	SIL Certification	PED Certification	-	Required
DIAPHRAGM SEAL	28	Process Connection & Rating		2"	150# RF
	29	Diaphragm Material	Housing Material	MONEL 400	SS AISI 316/316L
	30	Fill Fluid	Capillary Material	Siliconic Oil	S.S. Capillary
	31	Capillary Type	Capillary Length	Required in Option	3 m
	32	Flushing Connection		-	
OPTIONS	33	Integral Meter	Scale	Required	-
	34	Hydrostatic Testing	Cleaning	Required	-
	35	Mounting Brackets	Manifold Model No	Required	N/A
	36	Lightning Protection	Barrier Manuf./Model	-	-
COMMUNICATION AND SOFTWARE	37	Communication Type	Signal Type	HART 6	4-20mA Loop Powered 24 Vdc
	38	D D Revision	CFF Revision	-	-
	39	Device Tag	Hart Tag	-	-
	40	Internal Diagnostics	Capacitance	-	-
	41	Segment	Device Address	-	-
	42	Device Class	Simulate	-	-
	43	Nominal Current	Operating Voltage	-	-
PURCHASE	44	Manufacturer		TERRANOVA SRL	
	45	Model		SST76-H-7-K-2-9-2-1-4 + SEA03 + CAP-2-03	
	46	Purchase Order Number		4718_OS	

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GENERAL	1	Tag Number		50-PT-014	
	2	Service		WASTE WATER FROM HEADER TO BRINE DISCHARGE CAISSON (B-50014)	
	3	P&ID Number	Location	123A90-DDL-PR-PID-80025	1-1/2"-WW-073-01CS-H
	4	Function		PRESSURE MEASUREMENT	
	5	Mounting		DIRECT ON-LINE	
	6	Area Classification		ATEX Zone2 - IIC (IIB+H2) T1	
	7	Ambient Temperature		Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.	
PROCESS CONDITIONS	8	Fluid		WASTE WATER	
	9	Pressure Des.	Oper. [barg]	17.7	ATM
	10	Temperature Des.	Oper. [°C]	100	AMB
	11	Oper. Spec. Gravity	Oper. Viscosity	-	-
	12	Flow Rate	Allowable Temp.	-	-
TRANSMITTER	13	Instrument Range Min.	Max. [barg]	0	30
	14	Calibration Range Min.	Max. [barg]	0	18
	15	Elevation	Suppression	-	-
	16	Element Type		Diaphragm	
	17	Element Material		SS AISI 316/316L	
	18	Body Material	Body Rating	AISI 316 SS	20 bar
	19	Process Connection		1/2" NPT-M	
	20	Wetted O-Rings Material		-	
	21	Fill Fluid		-	
	22	Bolts	Housing	Manifold/Instrument assembly	SS AISI 316/316L
	23	Paint		N/A	
	24	ATEX Certification	Ingress Protection	ATEX Ex II 2G Ex db IIC T5	IP66
	25	Process Connection	Electrical Connection	1/2" NPT-M	2 X M20X1.5
	26	Accuracy		0.07% of Nominal Range	
	27	SIL Certification	PED Certification	-	Required
DIAPHRAGM SEAL	28	Process Connection & Rating		-	
	29	Diaphragm Material	Housing Material	-	-
	30	Fill Fluid	Capillary Material	-	-
	31	Capillary Type	Capillary Length	-	-
	32	Flushing Connection		-	
OPTIONS	33	Integral Meter	Scale	Required	-
	34	Hydrostatic Testing	Cleaning	Required	-
	35	Mounting Brackets	Manifold Model No	Required	MAN2-R6
	36	Lightning Protection	Barrier Manuf./Model	-	-
COMMUNICATION AND SOFTWARE	37	Communication Type	Signal Type	HART 6	4-20mA Loop Powered 24 Vdc
	38	D D Revision	CFF Revision	-	-
	39	Device Tag	Hart Tag	-	-
	40	Internal Diagnostics	Capacitance	-	-
	41	Segment	Device Address	-	-
	42	Device Class	Simulate	-	-
	43	Nominal Current	Operating Voltage	-	-
PURCHASE	44	Manufacturer		TERRANOVA SRL	
	45	Model		SST76-H-7-K-2-0-2-1-4 + MAN2-R6	
	46	Purchase Order Number		4718_OS	

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GENERAL	1	Tag Number		63-PT-003	
	2	Service		IA FROM PACKAGE A-63000 TO AIR DISTR.HEADER	
	3	P&ID Number	Location	123A90-DDL-PR-PID-80027	1-1/2"-IA-108-01SS-N
	4	Function		PRESSURE MEASUREMENT	
	5	Mounting		DIRECT ON-LINE	
	6	Area Classification		ATEX Zone2 - IIC (IIB+H2) T1	
	7	Ambient Temperature		Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.	
PROCESS CONDITIONS	8	Fluid		INSTRUMENT AIR	
	9	Pressure Des.	Oper. [barg]	11	4(Min.) / 10(Max)
	10	Temperature Des.	Oper. [°C]	100	AMB
	11	Oper. Spec. Gravity	Oper. Viscosity	-	-
	12	Flow Rate	Allowable Temp.	-	-
TRANSMITTER	13	Instrument Range Min.	Max. [barg]	0	30
	14	Calibration Range Min.	Max. [barg]	0	11
	15	Elevation	Suppression	-	-
	16	Element Type		Diaphragm	
	17	Element Material		SS AISI 316/316L	
	18	Body Material	Body Rating	AISI 316 SS	150 bar
	19	Process Connection		1/2" NPT-M	
	20	Wetted O-Rings Material		-	
	21	Fill Fluid		-	
	22	Bolts	Housing	Manifold/Instrument assembly	SS AISI 316/316L
	23	Paint		N/A	
	24	ATEX Certification	Ingress Protection	ATEX Ex II 2G Ex db IIC T5	IP66
	25	Process Connection	Electrical Connection	1/2" NPT-M	2 X M20X1.5
	26	Accuracy		0.07% of Nominal Range	
	27	SIL Certification	PED Certification	-	Required
DIAPHRAGM SEAL	28	Process Connection & Rating		-	
	29	Diaphragm Material	Housing Material	-	-
	30	Fill Fluid	Capillary Material	-	-
	31	Capillary Type	Capillary Length	-	-
	32	Flushing Connection		-	
OPTIONS	33	Integral Meter	Scale	Required	-
	34	Hydrostatic Testing	Cleaning	Required	-
	35	Mounting Brackets	Manifold Model No	Required	MAN2-R6
	36	Lightning Protection	Barrier Manuf./Model	-	-
COMMUNICATION AND SOFTWARE	37	Communication Type	Signal Type	HART 6	4-20mA Loop Powered 24 Vdc
	38	D D Revision	CFF Revision	-	-
	39	Device Tag	Hart Tag	-	-
	40	Internal Diagnostics	Capacitance	-	-
	41	Segment	Device Address	-	-
	42	Device Class	Simulate	-	-
	43	Nominal Current	Operating Voltage	-	-
PURCHASE	44	Manufacturer		TERRANOVA SRL	
	45	Model		SST76-H-7-K-2-0-2-1-4 + MAN2-R6	
	46	Purchase Order Number		4718_OS	

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GENERAL	1	Tag Number			63-PT-004	
	2	Service			IA FROM PACKAGE A-63000 TO AIR DISTR.HEADER	
	3	P&ID Number	Location		123A90-DDL-PR-PID-80027	1-1/2"-IA-108-01SS-N
	4	Function			PRESSURE MEASUREMENT	
	5	Mounting			DIRECT ON-LINE	
	6	Area Classification			ATEX Zone2 - IIC (IIB+H2) T1	
	7	Ambient Temperature			Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.	
PROCESS CONDITIONS	8	Fluid			INSTRUMENT AIR	
	9	Pressure Des.	Oper.	[barg]	11	4(Min.) / 10(Max)
	10	Temperature Des.	Oper.	[°C]	100	AMB
	11	Oper. Spec. Gravity	Oper. Viscosity		-	-
	12	Flow Rate	Allowable Temp.		-	-
TRANSMITTER	13	Instrument Range Min.	Max.	[barg]	0	30
	14	Calibration Range Min.	Max.	[barg]	0	11
	15	Elevation	Suppression		-	-
	16	Element Type			Diaphragm	
	17	Element Material			SS AISI 316/316L	
	18	Body Material	Body Rating		AISI 316 SS	150 bar
	19	Process Connection			1/2" NPT-M	
	20	Wetted O-Rings Material			-	
	21	Fill Fluid			-	
	22	Bolts	Housing		Manifold/Instrument assembly	SS AISI 316/316L
	23	Paint			N/A	
	24	ATEX Certification	Ingress Protection		ATEX Ex II 2G Ex db IIC T5	IP66
	25	Process Connection	Electrical Connection		1/2" NPT-M	2 X M20X1.5
	26	Accuracy			0.07% of Nominal Range	
	27	SIL Certification	PED Certification		SIL2	Required
DIAPHRAGM SEAL	28	Process Connection & Rating			-	
	29	Diaphragm Material	Housing Material		-	-
	30	Fill Fluid	Capillary Material		-	-
	31	Capillary Type	Capillary Length		-	-
	32	Flushing Connection			-	
OPTIONS	33	Integral Meter	Scale		Required	-
	34	Hydrostatic Testing	Cleaning		Required	-
	35	Mounting Brackets	Manifold Model No		Required	MAN2-R6
	36	Lightning Protection	Barrier Manuf./Model		-	-
COMMUNICATION AND SOFTWARE	37	Communication Type	Signal Type		HART 6	4-20mA Loop Powered 24 Vdc
	38	D D Revision	CFF Revision		-	-
	39	Device Tag	Hart Tag		-	-
	40	Internal Diagnostics	Capacitance		-	-
	41	Segment	Device Address		-	-
	42	Device Class	Simulate		-	-
	43	Nominal Current	Operating Voltage		-	-
PURCHASE	44	Manufacturer			TERRANOVA SRL	
	45	Model			SST76-H-7-K-2-0-2-1-4 + MAN2-R6	
	46	Purchase Order Number			4718_OS	

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GENERAL	1	Tag Number			64-PT-031A	
	2	Service			NITROGEN FROM A-64000 TO NITROGEN DISTRIBUTION HEADER	
	3	P&ID Number	Location		123A90-DDL-PR-PID-80027	1"-N-100-01CS-N
	4	Function			PRESSURE MEASUREMENT	
	5	Mounting			DIRECT ON-LINE	
	6	Area Classification			ATEX Zone2 - IIC (IIB+H2) T1	
	7	Ambient Temperature			Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.	
PROCESS CONDITIONS	8	Fluid			NITROGEN	
	9	Pressure Des.	Oper. [barg]		10	7(Max.)
	10	Temperature Des.	Oper. [°C]		100	AMB
	11	Oper. Spec. Gravity	Oper. Viscosity		-	-
	12	Flow Rate	Allowable Temp.		-	-
TRANSMITTER	13	Instrument Range Min.	Max. [barg]		0	30
	14	Calibration Range Min.	Max. [barg]		0	10
	15	Elevation	Suppression		-	-
	16	Element Type			Diaphragm	
	17	Element Material			SS AISI 316/316L	
	18	Body Material	Body Rating		AISI 316 SS	150 bar
	19	Process Connection			1/2" NPT-M	
	20	Wetted O-Rings Material			-	
	21	Fill Fluid			-	
	22	Bolts	Housing		Manifold/Instrument assembly	SS AISI 316/316L
	23	Paint			N/A	
	24	ATEX Certification	Ingress Protection		ATEX Ex II 2G Ex db IIC T5	IP66
	25	Process Connection	Electrical Connection		1/2" NPT-M	2 X M20X1.5
	26	Accuracy			0.07% of Nominal Range	
	27	SIL Certification	PED Certification		-	Required
DIAPHRAGM SEAL	28	Process Connection & Rating			-	
	29	Diaphragm Material	Housing Material		-	-
	30	Fill Fluid	Capillary Material		-	-
	31	Capillary Type	Capillary Length		-	-
	32	Flushing Connection			-	
OPTIONS	33	Integral Meter	Scale		Required	-
	34	Hydrostatic Testing	Cleaning		Required	-
	35	Mounting Brackets	Manifold Model No		Required	MAN2-R6
	36	Lightning Protection	Barrier Manuf./Model		-	-
COMMUNICATION AND SOFTWARE	37	Communication Type	Signal Type		HART 6	4-20mA Loop Powered 24 Vdc
	38	D D Revision	CFF Revision		-	-
	39	Device Tag	Hart Tag		-	-
	40	Internal Diagnostics	Capacitance		-	-
	41	Segment	Device Address		-	-
	42	Device Class	Simulate		-	-
	43	Nominal Current	Operating Voltage		-	-
PURCHASE	44	Manufacturer			TERRANOVA SRL	
	45	Model			SST76-H-7-K-2-0-2-1-4 + MAN2-R6	
	46	Purchase Order Number			4718_OS	

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GENERAL	1	Tag Number		64-PT-031B	
	2	Service		NITROGEN FROM U-64000 TO NITROGEN DISTRIBUTION HEADER	
	3	P&ID Number	Location	123A90-DDL-PR-PID-80027	1"-N-100-01CS-N
	4	Function		PRESSURE MEASUREMENT	
	5	Mounting		DIRECT ON-LINE	
	6	Area Classification		ATEX Zone2 - IIC (IIB+H2) T1	
	7	Ambient Temperature		Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.	
PROCESS CONDITIONS	8	Fluid		NITROGEN	
	9	Pressure Des.	Oper. [barg]	10	7(Max.)
	10	Temperature Des.	Oper. [°C]	100	AMB
	11	Oper. Spec. Gravity	Oper. Viscosity	-	-
	12	Flow Rate	Allowable Temp.	-	-
TRANSMITTER	13	Instrument Range Min.	Max. [barg]	0	30
	14	Calibration Range Min.	Max. [barg]	0	10
	15	Elevation	Suppression	-	-
	16	Element Type		Diaphragm	
	17	Element Material		SS AISI 316/316L	
	18	Body Material	Body Rating	AISI 316 SS	150 bar
	19	Process Connection		1/2" NPT-M	
	20	Wetted O-Rings Material		-	
	21	Fill Fluid		-	
	22	Bolts	Housing	Manifold/Instrument assembly	SS AISI 316/316L
	23	Paint		N/A	
	24	ATEX Certification	Ingress Protection	ATEX Ex II 2G Ex db IIC T5	IP66
	25	Process Connection	Electrical Connection	1/2" NPT-M	2 X M20X1.5
	26	Accuracy		0.07% of Nominal Range	
	27	SIL Certification	PED Certification	-	Required
DIAPHRAGM SEAL	28	Process Connection & Rating		-	
	29	Diaphragm Material	Housing Material	-	-
	30	Fill Fluid	Capillary Material	-	-
	31	Capillary Type	Capillary Length	-	-
	32	Flushing Connection		-	
OPTIONS	33	Integral Meter	Scale	Required	-
	34	Hydrostatic Testing	Cleaning	Required	-
	35	Mounting Brackets	Manifold Model No	Required	MAN2-R6
	36	Lightning Protection	Barrier Manuf./Model	-	-
COMMUNICATION AND SOFTWARE	37	Communication Type	Signal Type	HART 6	4-20mA Loop Powered 24 Vdc
	38	D D Revision	CFF Revision	-	-
	39	Device Tag	Hart Tag	-	-
	40	Internal Diagnostics	Capacitance	-	-
	41	Segment	Device Address	-	-
	42	Device Class	Simulate	-	-
	43	Nominal Current	Operating Voltage	-	-
PURCHASE	44	Manufacturer		TERRANOVA SRL	
	45	Model		SST76-H-7-K-2-0-2-1-4 + MAN2-R6	
	46	Purchase Order Number		4718_OS	

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GENERAL	1	Tag Number		64-PT-002	
	2	Service		NITROGEN FROM U-64000 TO NITROGEN DISTRIBUTION HEADER	
	3	P&ID Number	Location	123A90-DDL-PR-PID-80027	1"-N-100-01CS-N
	4	Function		PRESSURE MEASUREMENT	
	5	Mounting		DIRECT ON-LINE	
	6	Area Classification		ATEX Zone2 - IIC (IIB+H2) T1	
	7	Ambient Temperature		Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.	
PROCESS CONDITIONS	8	Fluid		NITROGEN	
	9	Pressure Des.	Oper. [barg]	10	7(Max.)
	10	Temperature Des.	Oper. [°C]	100	AMB
	11	Oper. Spec. Gravity	Oper. Viscosity	-	-
	12	Flow Rate	Allowable Temp.	-	-
TRANSMITTER	13	Instrument Range Min.	Max. [barg]	0	30
	14	Calibration Range Min.	Max. [barg]	0	10
	15	Elevation	Suppression	-	-
	16	Element Type		Diaphragm	
	17	Element Material		SS AISI 316/316L	
	18	Body Material	Body Rating	AISI 316 SS	150 bar
	19	Process Connection		1/2" NPT-M	
	20	Wetted O-Rings Material		-	
	21	Fill Fluid		-	
	22	Bolts	Housing	Manifold/Instrument assembly	SS AISI 316/316L
	23	Paint		N/A	
	24	ATEX Certification	Ingress Protection	ATEX Ex II 2G Ex db IIC T5	IP66
	25	Process Connection	Electrical Connection	1/2" NPT-M	2 X M20X1.5
	26	Accuracy		0.07% of Nominal Range	
	27	SIL Certification	PED Certification	SIL2	Required
DIAPHRAGM SEAL	28	Process Connection & Rating		-	
	29	Diaphragm Material	Housing Material	-	-
	30	Fill Fluid	Capillary Material	-	-
	31	Capillary Type	Capillary Length	-	-
	32	Flushing Connection		-	
OPTIONS	33	Integral Meter	Scale	Required	-
	34	Hydrostatic Testing	Cleaning	Required	-
	35	Mounting Brackets	Manifold Model No	Required	MAN2-R6
	36	Lightning Protection	Barrier Manuf./Model	-	-
COMMUNICATION AND SOFTWARE	37	Communication Type	Signal Type	HART 6	4-20mA Loop Powered 24 Vdc
	38	D D Revision	CFF Revision	-	-
	39	Device Tag	Hart Tag	-	-
	40	Internal Diagnostics	Capacitance	-	-
	41	Segment	Device Address	-	-
	42	Device Class	Simulate	-	-
	43	Nominal Current	Operating Voltage	-	-
PURCHASE	44	Manufacturer		TERRANOVA SRL	
	45	Model		SST76-H-7-K-2-0-2-1-4 + MAN2-R6	
	46	Purchase Order Number		4718_OS	

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GENERAL	1	Tag Number			80-PT-002	
	2	Service			H2 FROM STORAGE VESSEL TO FUEL CELL (A-80000)	
	3	P&ID Number	Location		123A90-DDL-PR-PID-80012	2"-HY-023-01HSS-N
	4	Function			PRESSURE MEASUREMENT	
	5	Mounting			DIRECT ON-LINE	
	6	Area Classification			ATEX Zone2 - IIC (IIB+H2) T1	
	7	Ambient Temperature			Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.	
PROCESS CONDITIONS	8	Fluid			HYDROGEN	
	9	Pressure Des.	Oper.	[barg]	10	4(Min.)/6.5(Max.)
	10	Temperature Des.	Oper.	[°C]	100	AMB
	11	Oper. Spec. Gravity	Oper. Viscosity		-	-
	12	Flow Rate	Allowable Temp.		-	-
TRANSMITTER	13	Instrument Range Min.	Max.	[barg]	0	30
	14	Calibration Range Min.	Max.	[barg]	0	10
	15	Elevation	Suppression		-	-
	16	Element Type			Diaphragm	
	17	Element Material			SS AISI 316/316L GOLD PLATED	
	18	Body Material	Body Rating		AISI 316 SS	150 bar
	19	Process Connection			1/2" NPT-M	
	20	Wetted O-Rings Material			-	
	21	Fill Fluid			-	
	22	Bolts	Housing		Manifold/Instrument assembly	SS AISI 316/316L
	23	Paint			N/A	
	24	ATEX Certification	Ingress Protection		ATEX Ex II 2G Ex db IIC T5	IP66
	25	Process Connection	Electrical Connection		1/2" NPT-M	2 X M20X1.5
	26	Accuracy			0.07% of Nominal Range	
	27	SIL Certification	PED Certification		SIL2	Required
DIAPHRAGM SEAL	28	Process Connection & Rating			-	
	29	Diaphragm Material	Housing Material		-	-
	30	Fill Fluid	Capillary Material		-	-
	31	Capillary Type	Capillary Length		-	-
	32	Flushing Connection			-	
OPTIONS	33	Integral Meter	Scale		Required	-
	34	Hydrostatic Testing	Cleaning		Required	-
	35	Mounting Brackets	Manifold Model No		Required	MAN2-R6
	36	Lightning Protection	Barrier Manuf./Model		-	-
COMMUNICATION AND SOFTWARE	37	Communication Type	Signal Type		HART 6	4-20mA Loop Powered 24 Vdc
	38	D D Revision	CFF Revision		-	-
	39	Device Tag	Hart Tag		-	-
	40	Internal Diagnostics	Capacitance		-	-
	41	Segment	Device Address		-	-
	42	Device Class	Simulate		-	-
	43	Nominal Current	Operating Voltage		-	-
PURCHASE	44	Manufacturer			TERRANOVA SRL	
	45	Model			SST76-H-7-K-2-0-2-1-4 + MAN2-R6	
	46	Purchase Order Number			4718_OS	

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GENERAL	1	Tag Number					50-TT-001 / 50-TE-001 / 50-TW-001			
	2	Service					SEA WATER LIFT PUMP(B-50013A&B) DISCHARGE			
	3	P&ID Number	Area Classification				123A90-DDL-PR-PID-80022		ATEX Zone2-IIC(IIB+H2) T1	
PIPE LINE	4	Line Number	Equipment Numbrer				1-1/2"-SWS-035-01SD-E		-	
	5	Line Size	Schedule				4"		3.05 Thk (mm)	
	6	Pipe Material	Pipe Insulation				ASTM A790 UNS S32760		ELECTRICALLY HEAT TRACED	
PROCESS CONDITIONS	7	Fluid	Phase				SEA WATER SUPPLY		LIQUID	
	8	Temperature	Min.	Oper.	Max.		1.3 °C	-	20.2 °C	
	9	Pressure	Min.	Oper.	Max.			5 barg		
	10	Design Temperature	Min.		Max.		-29 °C		100 °C	
	11	Design Pressure	Min.		Max.		7.6 barg			
	12	Vibrations					ASME PTC 19.3			
	13	Erosion	Corrosion				-		-	
	14	Flow Rate Max.	Velocity Max.				2500 kg/h		0.08 m/s	
	15	Density					1000 kg/m^3			
	16	Viscosity					1 cP			
	17	Ambient Temperature					Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.			
ELEMENT	18	T/C	Type				-			
	19		Epoxy.	Ground		Unground	-	-	-	
	20		Sheath Material							
	21	RTD	Type				RTD, 3 wire PT100			
	22		Sensor Material			Insulator Material	Platinum		MgO	
	23		Tollerance Class			Resistance	Class A according IEC 60751		100 Ω at 0°C/138.5 at 100°C	
	24	Single/Duplex/Other	2/3/4 Wire				Single		3 Wire	
	25	Diameter	Length				6 mm		to be assembled with TWE	
TRANSMITTER	26	Type	Mounting				4-20 mA - HART/Smart		Integral, head mounted	
	27	Input	Head Material				-		N/A	
	28	ATEX Certification	Ingress Protection				ATEX Ex II 2G Ex db IIC T5		IP-66	
	29	Housing	Painting				SS AISI 316/316L		N/A	
	30	Power Supply	Load Resistance				24 Vdc		220 ÷ 640 Ω (for HART)	
	31	Electrical Connection	Input		Output		-		2 X M20X1.5	
	32	Accuracy					As Per IEC 60751 Class A			
	33	Linearization					As Per IEC 60751 Class A			
	34	Instrument Range	Min.		Max.		-50 °C		450 °C	
	35	Calibration Range	Min.		Max.		0 °C		50 °C	
	36	SIL Certification					-			
	37	PED Certification					Required			
COMMUNICATION AND SOFTWARE	38	Communication Type	Signal Type				HART 6		4-20mA Loop Powered24 Vdc	
	39	D D Revision	CFF Revision				-		-	
	40	Hart Descriptor	Hart Tag				-		-	
	41	Internal Diagnostics	Capacitance				-		-	
	42	Segment	Device Address				-		-	
	43	Device Class	Simulate				-		-	
	44	Nominal Current	Operating Volage				-		-	
WELL	45	Process Connection	Rating				1-1/2" Flanged		150# RF ASME B31.3	
	46	Material	Type				ASTM A182 F53/F55		Tapered Type	
	47	Construction Type	Internal Connection				Barstock Tapered		1/2" NPT-F	
	48	Immersion Length ("U")	Head Length ("T")				220 mm		70 mm	
	49	Treatments	Finish				-		-	
	50	Tip Thickness	Bore Diameter				7 mm		6.5 mm	
	51	Insertion Diam. Min.	Max.				28 mm		18 mm	
PURCHASE	52	Manufacturer					TERRANOVA SRL			
	53	Model					SST72-TH-1-C-9-1-B-4-3 + TWE			
	54	Purchase Order Number					4718_OS			

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GENERAL	1	Tag Number					50-TT-002 / 50-TE-002 / 50-TW-002		
	2	Service					WASTE WATER FROM HEADER TO BRINE DISCHARGE CAISSON (B-50014)		
	3	P&ID Number	Area Classification				123A90-DDL-PR-PID-80025	ATEX Zone2-IIC(IIB+H2) T1	
PIPE LINE	4	Line Number	Equipment Numbrer				1-1/2"-WW-073-01CS-H	-	
	5	Line Size	Schedule				4"	6.02 Thk (mm)	
	6	Pipe Material	Pipe Insulation				ASTM A350 LF2	ELECTRICALLY HEAT TRACED	
PROCESS CONDITIONS	7	Fluid	Phase				SEA WATER SUPPLY	LIQUID	
	8	Temperature	Min.	Oper.	Max.			AMB	
	9	Pressure	Min.	Oper.	Max.			ATM	
	10	Design Temperature	Min.		Max.		-46 °C	100 °C	
	11	Design Pressure	Min.		Max.		3.5 barg		
	12	Vibrations					ASME PTC 19.3		
	13	Erosion	Corrosion				-	-	
	14	Flow Rate Max.	Velocity Max.				10000 kg/h	0.34 m/s	
	15	Density					1000 kg/m^3		
	16	Viscosity					1 cP		
	17	Ambient Temperature					Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.		
ELEMENT	18	T/C	Type				-		
	19		Epoxy.	Ground		Unground	-	-	-
	20		Sheath Material						
	21	RTD	Type				RTD, 3 wire PT100		
	22		Sensor Material			Insulator Material	Platinum	MgO	
	23		Tollerance Class			Resistance	Class A according IEC 60751	100 Ω at 0°C/138.5 at 100°C	
	24	Single/Duplex/Other	2/3/4 Wire				Single	3 Wire	
	25	Diameter	Length				6 mm	to be assembled with TWE	
TRANSMITTER	26	Type	Mounting				4-20 mA - HART/Smart	Integral, head mounted	
	27	Input	Head Material				-	N/A	
	28	ATEX Certification	Ingress Protection				ATEX Ex II 2G Ex db IIC T5	IP-66	
	29	Housing	Painting				SS AISI 316/316L	N/A	
	30	Power Supply	Load Resistance				24 Vdc	220 ÷ 640 Ω (for HART)	
	31	Electrical Connection	Input		Output		-	2 X M20X1.5	
	32	Accuracy					As Per IEC 60751 Class A		
	33	Linearization					As Per IEC 60751 Class A		
	34	Instrument Range	Min.		Max.		-50 °C	450 °C	
	35	Calibration Range	Min.		Max.		0 °C	80 °C	
	36	SIL Certification					-		
	37	PED Certification					Required		
COMMUNICATION AND SOFTWARE	38	Communication Type	Signal Type				HART 6	4-20mA Loop Powered24 Vdc	
	39	D D Revision	CFF Revision				-	-	
	40	Hart Descriptor	Hart Tag				-	-	
	41	Internal Diagnostics	Capacitance				-	-	
	42	Segment	Device Address				-	-	
	43	Device Class	Simulate				-	-	
	44	Nominal Current	Operating Volage				-	-	
WELL	45	Process Connection	Rating				1-1/2" Flanged	150# RF ASME B31.3	
	46	Material	Type				SS AISI 316/316L	Tapered Type	
	47	Construction Type	Internal Connection				Barstock Tapered	1/2" NPT-F	
	48	Immersion Length ("U")	Head Length ("T")				220 mm	70 mm	
	49	Treatments	Finish				-	-	
	50	Tip Thickness	Bore Diameter				7 mm	6.5 mm	
	51	Insertion Diam. Min.	Max.				28 mm	18 mm	
PURCHASE	52	Manufacturer					TERRANOVA SRL		
	53	Model					SST72-TH-1-C-9-1-B-4-3 + TWE		
	54	Purchase Order Number					4718_OS		

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REFERENCE DOCUMENTS:

1. Project Datasheets 123A90-DDL-IN-DS-40039;
2. General Arrangement Drawings (including Thermowell Calculations) 1724000979-IN-DA-00003.

GENERAL NOTES:

1. Material test certificates MTCs shall be provided by Manufacturer for all valves, tubing & fittings. MTCs shall include EN 10204 3.1 certification for all metallic materials;
2. PED 2014/68/EU Pressure Equipment Directive 2014/68/EU shall apply;
3. The SS nameplate shall indicate the tag number, manufacture name, model number, serial number, size, rating and other items as required;
4. Gold plating (5 μ m - 30 μ m) of the diaphragm or ceramic sensor shall be used in hydrogen service above a hydrogen partial pressure of 35 bara (500 psia);
5. Transmitters shall be equipped with local span and zero capability for convenient re-ranging of the transmitter at site;
6. Pressure instruments operating high pressure alarms shall have upscale element burnout. Those on low pressure alarms shall fail to down scale position;
7. Each Thermowell will be provided with hydrotest certificates (included in material certificates 3.1).

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GENERAL	1	Tag Number					55-LIT-001			
	2	Service					WASTE WATER TANK (T-55001)			
	3	P&ID Number					123A90-DDL-PR-PID-80026			
	4	Equipment Number		Vessel Trim Number			T-55001		1"-WW-200-01CS-H	
	5	Area Classification					ATEX Zone2 - IIC (IIB+H2) T1			
PROCESS CONDITIONS	6	Fluid					WASTE WATER			
	7	Pressure	Unit	Min.	Oper.	Max.	barg		ATM	
	8	Temperature	Unit	Min.	Oper.	Max.	°C	5	AMB	35
	9	Ambient Temperature		Min.		Max.	-8.4		25	
	10	Design Pressure		Min.		Max.			ATM	
	11	Design Temperature		Min.		Max.			80	
	12	Density (Liquid)					1000			
	13	Oper. Vapour Density					N/A			
	14	Viscosity					1			
	15	Fluid Dielectric Constant					80.2 @20°C			
BODY / GAUGE	16	Body or Gauge Material					AISI 316			
	17	Rating					#150			
	18	Connection Size & Type					FLANGED 3" 150# RF1, TOP MOUNTED			
	19	Cooling Extension					-			
	20	Stilling Well Required					-			
ANTENNA	21	Type					NON CONTACTING RADAR			
	22	Material					SS 316			
	23	Insertion Depth		Diameter			31 mm		72 mm	
	24	Operating Frequency					26 GHz			
	25	Distance (Adapter Plate to Tank Bottom)					High of Tank = 4660 mm			
TRANSMITTER	26	Function					LEVEL MEASUREMENT			
	27	Output		Power Supply			4-20mA		24 Vdc (Loop powered)	
	28	Calibration Range Min.		Max.			0 mm		4660 mm	
	29	Nominal Range Min.		Max.			0 mm		5000 mm	
	30	Mounting					DIRECT ON LINE			
	31	Certification		Ingress Protection			Ex-d IIC (IIB+H2) T1		IP66	
	32	Electrical Class		Electrical Connection			-		2 x M20	
	33	Accuracy		Repeatability			Better then +/-0.5% of SPAN		< 0.25% of SPAN	
COMMUNICATION AND SOFTWARE	34	Communication Type		Signal Type			Conventional + Hart		4-20mA Loop powered	
	35	DD Revision		CFF Revision			-		-	
	36	Device Tag		Hart Tag			-		-	
	37	Internal Diagnostics		Capacitance			-		-	
	38	Segment		Device Address			-		-	
	39	Device Class		Simulate			-		-	
	40	Nominal Current		Operating Voltage			-		-	
OPTIONS	41	Interface Card					-			
	42	Cable (Antenna to Transmitter)					-			
	43	Integral Meter					Digital LCD indicator			
PURCHASE	44	Manufacturer					TERRANOVA SRL			
	45	Model					KRG-E-P3-R01-N-L-D08-F79-N00-N-D-V-81-A-R2-Z6			
	46	Purchase Order Number					4718_OS			

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ATTACHMENT:
WAKE FREQUENCIES CALCULATION for THERMOWELLS

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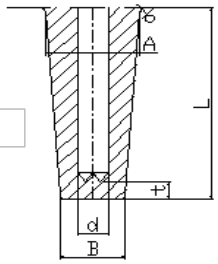
TERRANOVA / SPRIANO / Valcom / MEC-RELA	CUSTOMER	ROSETTI MARINO
	SPRIANO JOB No.	4718_OS
	TECHNICIAN	M. ZANI

THERMOWELL STRESS AND VIBRATION ANALISYS ACCORDING TO ASME PTC 19.3 TW-2016 "Thermowell Test Codes"

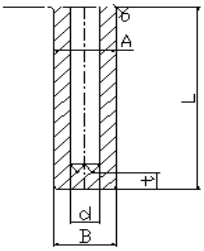
TAG	50-TT-001 / 50-TE-001 / 50-TW-001	FLUID/STATE
		LIQUID

THERMOWELL DETAIL / REFERENCE DRAWING

TAPERED TW



STRAIGHT TW



PROCESS CONDITIONS

FLOW RATE	Qm	-	m3/h	INTERNAL DIAMETER OF PIPE	I.D.	-	mm

FLUID PROPERTIES

FLUID OPERATING PRESSURE	P	17,7	barg
		256,65	psig
FLUID OPERATING TEMPERATURE	T	100,0	°C
		212	°F
FLUID OPERATING DENSITY	ρ	1000	kg/m^3
		62,430	lb/ft^3
FLUID OPERATING VISCOSITY	μ	1,0000	cP
		0	lb/(ft.sec)
FLOW AVERAGE VELOCITY	v	0,080	m/s
		0,3	ft/s
TYPE OF THERMOWELL		TAPERED	
TYPE OF MANUFACTURING		WELDED THEN MACHINED	

THERMOWELL DIMENSIONS

ROOT DIAMETER	A	28	mm
		1,102362	inch
TIP DIAMETER	B	18	mm
		0,708661	inch
FILLET RADIUS AT BASE	b	3	mm
		0,11811	inch
BORE DIAMETER	d	6,5	mm
		0,255906	inch
UNSUPPORTED LENGTH	L	220	mm
		8,661417	inch
MINIMUM WALL THICKNESS	t	7	mm
		0,275591	inch

THERMOWELL MATERIAL PROPERTIES

THERMOWELL MATERIAL		SUPERDUPLEX	
YOUNG MODULUS @T	E(T)	26911200	psi
REF YOUNG MODULUS	E_{ref}	28300000	psi
MAX ALLOWABLE STRESS	S	37714	psi
FATIGUE ENDURANCE LIMIT	S_f	9100	psi
MATERIAL DENSITY	ρ_m	0,289	lb/in^3
SENSOR MASS DENSITY	ρ_s	169	lb/ft^3

REYNOLDS/STROUAL NUMBER CALCULATIONS

MATERIAL CLASS		B	
REYNOLDS NUMBER	Re	1440	/
STROUAL NUMBER	N_s	0,212952	/

FORCE COEFFICIENTS

CONVENTIONAL DRAG COEFFICIENT	C_D	1,4
OSCILLATING DRAG COEFFICIENT	C_d	0,1
OSCILLATING LIFT PRESSURE COEFFICIENT	Cl	1

THERMOWELL SHAPE FACTORS

B/A	0,6429	d/D_a	0,2826	d/A	0,2321	b/A	0,1071		
D_a/L	0,1045	A/L	0,1273	A/b		d/B	0,3611		

FREQUENCY ANALYSIS CALCULATION

AVERAGE THERMOWELL OD	D_a	0,9055118	inch	NATURAL FREQUENCY OF TW (approximate value)	fa	336	Hz
SECOND MOMENT OF INERTIA	I	0,0328	inch^4	FREQUENCY CORRECTION FACTOR	H_f	1,461	/
MASS PER UNIT LENGTH OF THERMOWELL	m	0,1712	lb/inch	FLUID MASS CORRECTION FACTOR	$H_{a,f}$	0,9375	/
DUMPING FACTOR	ξ	0,0005	/	SENSOR MASS CORRECTION FACTOR	$H_{a,s}$	0,9853	/
SCRUTON NUMBER	N_{SC}	0,034	/	NATURAL FREQUENCY OF TW (EXACT value)	f_n	454	Hz
STROUHAL FREQUENCY CALCULATION	f_s	0,95	Hz	CORRECTION FACTOR FOR	H_C	0,9424	/
MOUNTED TW FREQUENCY LIMIT	0,4fcn	171,2	Hz	NATURAL FREQUENCY OF TW (SITU EXACT value)	f^c_n	428	Hz
FREQUENCY ANALYSIS		fs<0,4fcn		FREQUENCY ANALYSIS RESULT	PASS		

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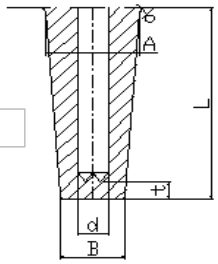
TERRANOVA / SPRIANO / Valcom / MEC-RELA	CUSTOMER	ROSETTI MARINO
	SPRIANO JOB No.	4718_OS
	TECHNICIAN	M. ZANI

THERMOWELL STRESS AND VIBRATION ANALISYS ACCORDING TO ASME PTC 19.3 TW-2016 "Thermowell Test Codes"

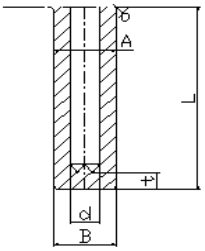
TAG	50-TT-002 / 50-TE-002 / 50-TW-002	FLUID/STATE
		LIQUID

THERMOWELL DETAIL / REFERENCE DRAWING

TAPERED TW



STRAIGHT TW



PROCESS CONDITIONS

FLOW RATE	Qm	-	m3/h	INTERNAL DIAMETER OF PIPE	I.D.	-	mm

FLUID PROPERTIES

FLUID OPERATING PRESSURE	P	17,7	barg
		256,65	psig
FLUID OPERATING TEMPERATURE	T	100,0	°C
		212	°F
FLUID OPERATING DENSITY	ρ	1000	kg/m^3
		62,430	lb/ft^3
FLUID OPERATING VISCOSITY	μ	1,0000	cP
		0	lb/(ft.sec)
FLOW AVERAGE VELOCITY	v	0,340	m/s
		1,1	ft/s
TYPE OF THERMOWELL		TAPERED	
TYPE OF MANUFACTURING		WELDED THEN MACHINED	

THERMOWELL DIMENSIONS

ROOT DIAMETER	A	28	mm
		1,102362	inch
TIP DIAMETER	B	18	mm
		0,708661	inch
FILLET RADIUS AT BASE	b	3	mm
		0,11811	inch
BORE DIAMETER	d	6,5	mm
		0,255906	inch
UNSUPPORTED LENGTH	L	220	mm
		8,661417	inch
MINIMUM WALL THICKNESS	t	7	mm
		0,275591	inch

THERMOWELL MATERIAL PROPERTIES

THERMOWELL MATERIAL		SS 316/316L	
YOUNG MODULUS @T	E(T)	27569053	psi
REF YOUNG MODULUS	E_{ref}	28300000	psi
MAX ALLOWABLE STRESS	S	18915	psi
FATIGUE ENDURANCE LIMIT	S_f	9100	psi
MATERIAL DENSITY	ρ_m	0,285	lb/in^3
SENSOR MASS DENSITY	ρ_s	169	lb/ft^3

REYNOLDS/STROUAL NUMBER CALCULATIONS

MATERIAL CLASS		B	
REYNOLDS NUMBER	Re	6119	/
STROUAL NUMBER	N_s	0,204669	/

FORCE COEFFICIENTS

CONVENTIONAL DRAG COEFFICIENT	C_D	1,4
OSCILLATING DRAG COEFFICIENT	C_d	0,1
OSCILLATING LIFT PRESSURE COEFFICIENT	Cl	1

THERMOWELL SHAPE FACTORS

B/A	0,6429	d/D_a	0,2826	d/A	0,2321	b/A	0,1071		
D_a/L	0,1045	A/L	0,1273	A/b		d/B	0,3611		

FREQUENCY ANALYSIS CALCULATION

AVERAGE THERMOWELL OD	D_a	0,9055118	inch	NATURAL FREQUENCY OF TW (approximate value)	fa	339	Hz
SECOND MOMENT OF INERTIA	I	0,0328	inch^4	FREQUENCY CORRECTION FACTOR	H_f	1,461	/
MASS PER UNIT LENGTH OF THERMOWELL	m	0,1690	lb/inch	FLUID MASS CORRECTION FACTOR	$H_{a,f}$	0,9367	/
DUMPING FACTOR	ξ	0,0005	/	SENSOR MASS CORRECTION FACTOR	$H_{a,s}$	0,9851	/
SCRUTON NUMBER	N_{SC}	0,034	/	NATURAL FREQUENCY OF TW (EXACT value)	f_n	457	Hz
STROUHAL FREQUENCY CALCULATION	f_s	3,86	Hz	CORRECTION FACTOR FOR	H_C	0,9424	/
MOUNTED TW FREQUENCY LIMIT	0,4fcn	172,1	Hz	NATURAL FREQUENCY OF TW (SITU EXACT value)	f^c_n	430	Hz
FREQUENCY ANALYSIS		fs<0,4fcn		FREQUENCY ANALYSIS RESULT	PASS		

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