

AIR LIQUIDE <small>TM</small>				Specification Pressure Transmitter				TAG - No.: FT20003			
Air Liquide AGS GmbH				Project: ASU No. 9 KOSICE				Project-No.: K70101			
<input type="checkbox"/> Pressure <input checked="" type="checkbox"/> Difference press.				Designation: HP-GAN TO CUSTOMER				Page: of:			
								Combination with Tag-No.:			

Rev.							Rev.				
	1	Line - No.	100 N-20008-AA40C1					54	Manufacturer	ENDRESS + HAUSER	
	2	Equipment-No.						55	Type	DELTABAR-S PMD75	
	3	DN	100	PN	40	Material	St37		56	Order-No.	
	4	Flanges	DIN EN 1092-1		Gasket	Form B1			57	Order addition	
	5	Taps			Material				58		
	6	Medium	GAN				1	59	Range	500 mbar	
	7	State	<input type="checkbox"/> liquid <input checked="" type="checkbox"/> gaseous <input type="checkbox"/> vaporous				2	60	Adjusted span	0...200 mbar	
	8	Operation case	case 1	case 2	case 3				61	Output signal	4...20 mA
	9	Flow	Nm³/h	3500				62	Wiring	<input checked="" type="checkbox"/> 2-wire <input type="checkbox"/> 4-wire	
	10	P ₁ (abs.)	bar	21				63	Characteristic	<input checked="" type="checkbox"/> linear <input type="checkbox"/> inverse <input type="checkbox"/> sq. root	
	11	Temperature t ₁	°C	20				64	Accuracy of range (20°C)	<input type="checkbox"/> ±0.1% <input checked="" type="checkbox"/> ±0.2% <input type="checkbox"/> ±0.075%	
	12	Ambient temp.	°C	-25...+35°C				65	Allow. ambient temp.	-40...+80°C	
	13	Process connection	Oval flange (fastening 7/16-20 UNF)					66	Aux. energy	11...36 V	
	14		and 1/4-18 NPT female					67	El. connection		
	15	Design pressure	160 barg					68	Cable gland	M 20	
	16	Overpressure limit						69	Digital transmitter	<input checked="" type="checkbox"/> HART-protocol	
	17	Allow. medium temp.	-40...+60°C					70	Explosion Proof	<input checked="" type="checkbox"/> without <input type="checkbox"/> EEx ib IIC T4/T6	
	18	Material connection	316 SST					71		<input type="checkbox"/> FM Explosion Proof Approval	
	19	Material diaphragm	316 SST					72	Operating instruction	<input type="checkbox"/> German <input checked="" type="checkbox"/> English <input type="checkbox"/> French	
	20	Material O-ring						73	Quantity per type	4-fold	
	21	Material casing	Aluminium					74			
	22	Liquid filling	Inert					75	<input checked="" type="checkbox"/> Bracket f. panel mount. <input type="checkbox"/> Bracket + bow f. pipe mounting		
	23	Kind of sensor	Metal cell					76	<input checked="" type="checkbox"/> Stainless steel <input type="checkbox"/> Steel, galvanized		
	24	Enclosure Class	IP65 / NEMA 4x					77	<input type="checkbox"/> Indicator		
	25							78	<input type="checkbox"/> digital <input type="checkbox"/> analog Scale:		
	26							79	<input type="checkbox"/> Transient protection		
	27	Plus-side	DN	PN	Material				80	<input type="checkbox"/> Material certificate EN 10204 -3.1B	
	28	Flanges			Gasket				81	<input checked="" type="checkbox"/> Cleaned, oil and grease free for oxygen service	
	29	Type	<input type="checkbox"/> Flat diaphr. <input type="checkbox"/> Tubus, mm					82	<input type="checkbox"/> Packed acc. MG-cert. 06271		
	30	Mounting	<input type="checkbox"/> top <input type="checkbox"/> bottom					83	<input type="checkbox"/> PTB calibration certificate		
	31		<input type="checkbox"/> at pressure sensor					84	<input type="checkbox"/> Conformity certificate		
	32	Capillary length						85	<input checked="" type="checkbox"/> Marking with TAG-number		
	33	Minus-side	DN	PN	Material				86		
	34	Flanges			Gasket				87		
	35	Type	<input type="checkbox"/> Flat diaphr. <input type="checkbox"/> Tubus, mm					88			
	36	Mounting	<input type="checkbox"/> top <input type="checkbox"/> bottom					89			
	37							90			
	38	Capillary length						91			
	39	Liquid filling						92			
	40	PVC-coating	<input type="checkbox"/> no <input type="checkbox"/> yes					93			
	41	Ex-protection	<input type="checkbox"/> no <input type="checkbox"/> "Zone 0"					93			
	42							94			
	43	<div style="display: flex; justify-content: space-between;"> <div style="width: 40%;"> <p>2 24.08.2005 Möller Eichler Span</p> <p>1 01.12.2004 Möller Eichler Range</p> <p>0 04.11.2004 Möller Eichler Initial Version</p> </div> <div style="width: 40%;"> <p>Rev. Date Name Checked Change</p> </div> </div>									
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		Specification Pressure Transmitter				TAG - No.: FT20013 Project-No.: K70101	
		Air Liquide AGS GmbH				Project: ASU No. 9 KOSICE Page: of:	
<input type="checkbox"/> Pressure <input checked="" type="checkbox"/> Difference press.		Designation: HP-GOX TO CUSTOMER				Combination with Tag-No.:	

Rev.								Rev.				
	1	Line - No.	250 O-20006-ZB40C1					54	Manufacturer	Endress + Hauser		
	2	Equipment-No.						55	Type	DELTABAR-S PMD75		
	3	DN	250	PN	40	Material	SST		56	Order-No.		
	4	Flanges	DIN EN 1092-1		Gasket	Form B1			57	Order addition		
	5	Taps			Material				58			
	6	Medium	GOX (oxygen)				1	59	Range	500 mbar		
	7						2	60	Adjusted span	0...300 mbar		
	8	State	<input type="checkbox"/> liquid <input checked="" type="checkbox"/> gaseous <input type="checkbox"/> vaporous					61	Output signal	4...20 mA		
	9	Operation case	case 1	case 2	case 3			62	Wiring	<input checked="" type="checkbox"/> 2-wire <input type="checkbox"/> 4-wire		
	10	Flow	Nm³/h	11000	20000	25000			63	Characteristic	<input checked="" type="checkbox"/> linear <input type="checkbox"/> inverse <input type="checkbox"/> sq. root	
	11	P ₁ (abs.)	bar	28	28	28			64	Accuracy of	<input type="checkbox"/> ±0.1% <input checked="" type="checkbox"/> ±0.2% <input type="checkbox"/> ±0.075%	
	12	Temperature t ₁	°C	23,1	20	19,4			65	range (20°C)		
	13	Ambient temp.	°C	-25...+35°C					66	Allow. ambient temp.	-40...+80°C	
	14	Process connection	Oval flange (fastening 7/16-20 UNF)					67	Aux. energy	11...36 V		
	15		and 1/4-18 NPT female					68	El. connection			
	16	Design pressure	160 barg					69	Cable gland	M 20		
	17	Overpressure limit						70	Digital transmitter	<input checked="" type="checkbox"/> HART-protocol		
	18	Allow. medium temp.	-40...+60°C					71	Explosion Proof	<input checked="" type="checkbox"/> without <input type="checkbox"/> EEx ib IIC T4/T6 <input type="checkbox"/> FM Explosion Proof Approval		
	19	Material connection	316 SST					72	Operating instruction	<input type="checkbox"/> German <input checked="" type="checkbox"/> English <input type="checkbox"/> French		
	20	Material diaphragm	316 SST					73	Quantity per type	4-fold		
	21	Material O-ring						74				
	22	Material casing	Aluminium					75				
	23	Liquid filling	Inert					76	<input checked="" type="checkbox"/> Bracket f. panel mount.	<input type="checkbox"/> Bracket + bow f. pipe mounting		
	24	Kind of sensor	Metal cell					77	<input checked="" type="checkbox"/> Stainless steel	<input type="checkbox"/> Steel, galvanized		
	25	Enclosure Class	IP65 / NEMA 4x					78	<input type="checkbox"/> Indicator			
	26							79	<input type="checkbox"/> digital <input type="checkbox"/> analog	Scale:		
	27	<input type="checkbox"/>	DN		PN		Material		80	<input type="checkbox"/> Transient protection		
	28	Flanges			Gasket				81			
	29	Type	<input type="checkbox"/> Flat diaphr. <input type="checkbox"/> Tubus, mm					82				
	30	Mounting	<input type="checkbox"/> top <input type="checkbox"/> bottom <input type="checkbox"/> at pressure sensor					83				
	31							84				
	32	Capillary length						85	<input type="checkbox"/> Material certificate EN 10204 -3.1B			
	33	DN		PN		Material		86	<input checked="" type="checkbox"/> Cleaned, oil and grease free for oxygen service			
	34	Flanges			Gasket			87	<input type="checkbox"/> Packed acc. MG-cert. 06271			
	35	Type	<input type="checkbox"/> Flat diaphr. <input type="checkbox"/> Tubus, mm				88	<input type="checkbox"/> PTB calibration certificate				
	36	Mounting	<input type="checkbox"/> top <input type="checkbox"/> bottom				89	<input type="checkbox"/> Conformity certificate				
	37						90	<input checked="" type="checkbox"/> Marking with TAG-number				
	38	Capillary length					91					
	39	Liquid filling					92					
	40	PVC-coating	<input type="checkbox"/> no <input type="checkbox"/> yes				93					
	41	Ex-protection	<input type="checkbox"/> no <input type="checkbox"/> "Zone 0"				93					
	42						94					
	43	<div style="display: flex; justify-content: space-between;"> <div style="width: 15%;"> Remarks </div> <div style="width: 85%;"> (Empty space for remarks) </div> </div>										
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	53											
	2	24.08.2005	Möller	Eichler	Span							
	1	01.12.2004	Möller	Eichler	Range							
	0	04.11.2004	Möller	Eichler	Initial Version							
Rev.	Date	Name	Checked	Change	Rev.	Date	Name	Checked	Change			

AIR LIQUIDE <small>TM</small>				Specification Pressure Transmitter				TAG - No.: FT70041			
Air Liquide AGS GmbH				Project: ASU No. 9 KOSICE				Project-No.: K70101			
<input type="checkbox"/> Pressure <input checked="" type="checkbox"/> Difference press.				Designation: MP-GAN TO CUSTOMER				Page: of:			
Combination with Tag-No.:											

Rev.								Rev.				
		Line - No.	350 N-75005-AA25C1						54	Manufacturer	Endress + Hauser	
		Equipment-No.							55	Type	DELTABAR-S PMD75	
		DN	350	PN	25	Material	St37			56	Order-No.	
		Flanges	DIN EN 1092-1		Gasket	Form B1				57	Order addition	
		Taps			Material					58		
		Medium	GAN						59	Range	500 mbar	
		State	<input type="checkbox"/> liquid <input checked="" type="checkbox"/> gaseous <input type="checkbox"/> vaporous				1		60	Adjusted span	0...150 mbar	
		Operation case	case 1	case 2	case 3				61	Output signal	4...20 mA	
		Flow	Nm³/h	16000	20000	29500				62	Wiring	<input checked="" type="checkbox"/> 2-wire <input type="checkbox"/> 4-wire
		P ₁ (abs.)	bar	7	7	7,3				63	Characteristic	<input checked="" type="checkbox"/> linear <input type="checkbox"/> inverse <input type="checkbox"/> sq. root
		Temperature t ₁	°C	15	15	26				64	Accuracy of range (20 °C)	<input type="checkbox"/> ±0.1% <input checked="" type="checkbox"/> ±0.2% <input type="checkbox"/> ±0.075%
		Ambient temp.	°C	-25...+35 °C						65	Allow. ambient temp.	-40...+80 °C
		Process connection	Oval flange (fastening 7/16-20 UNF)						66	Aux. energy	11...36 V	
			and 1/4-18 NPT female						67	El. connection		
		Design pressure	160 barg						68	Cable gland	M 20	
		Overpressure limit							69	Digital transmitter	<input checked="" type="checkbox"/> HART-protocol	
		Allow. medium temp.	-40...+60 °C						70	Explosion Proof	<input checked="" type="checkbox"/> without <input type="checkbox"/> EEx ib IIC T4/T6 <input type="checkbox"/> FM Explosion Proof Approval	
		Material connection	316 SST						71	Operating instruction	<input type="checkbox"/> German <input checked="" type="checkbox"/> English <input type="checkbox"/> French	
		Material diaphragm	316 SST						72	Quantity per type	4-fold	
		Material O-ring							73			
		Material casing	Aluminium						74			
		Liquid filling	Inert						75			
		Kind of sensor	Metal cell						76	<input checked="" type="checkbox"/> Bracket f. panel mount. <input type="checkbox"/> Bracket + bow f. pipe mounting		
		Enclosure Class	IP65 / NEMA 4x						77	<input checked="" type="checkbox"/> Stainless steel <input type="checkbox"/> Steel, galvanized		
									78	<input type="checkbox"/> Indicator		
									79	<input type="checkbox"/> digital <input type="checkbox"/> analog Scale:		
									80	<input type="checkbox"/> Transient protection		
									81			
									82			
									83			
									84	<input type="checkbox"/> Material certificate EN 10204 -3.1B		
									85	<input checked="" type="checkbox"/> Cleaned, oil and grease free for oxygen service		
									86	<input type="checkbox"/> Packed acc. MG-cert. 06271		
									87	<input type="checkbox"/> PTB calibration certificate		
									88	<input type="checkbox"/> Conformity certificate		
									89	<input checked="" type="checkbox"/> Marking with TAG-number		
									90			
									91			
									92			
									93			
									94			

Rev.		Date	Name	Checked	Change	Rev.		Date	Name	Checked	Change
		01.12.2004	Möller	Eichler	Range						
		04.11.2004	Möller	Eichler	Initial Version						

		Specification Pressure Transmitter				TAG - No.: LT48020	
		Project: ASU No. 9 KOSICE				Project-No.: K70101	
Air Liquide AGS GmbH		Designation: HP-LAR TANK B48001				Page: of:	
<input type="checkbox"/> Pressure <input checked="" type="checkbox"/> Difference press.						Combination with Tag-No.:	


Rev.								Rev.			
		Line - No.							54	Manufacturer	Endress + Hauser
		Equipment-No.	B48001						55	Type	DELTABAR-S PMD75
	Location	DN	PN	Material					56	Order-No.	
		Flanges			Gasket				57	Order addition	
		Taps			Material				58		
		Medium	LAR (argon)						59	Range	3000 mbar
									60	Adjusted span	39,82...1680,49 mbar
	Service conditions	State	<input checked="" type="checkbox"/> liquid <input type="checkbox"/> gaseous <input type="checkbox"/> vaporous						61	Output signal	4...20 mA
		Operation case	case 1	case 2	case 3				62	Wiring	<input checked="" type="checkbox"/> 2-wire <input type="checkbox"/> 4-wire
		Flow	Nm³/h						63	Characteristic	<input checked="" type="checkbox"/> linear <input type="checkbox"/> inverse <input type="checkbox"/> sq. root
		P ₁ (abs.)	bar	22	22	22			64	Accuracy of	<input type="checkbox"/> ±0.1% <input checked="" type="checkbox"/> ±0.2% <input type="checkbox"/> ±0.075%
		Temperature t ₁	°C	-141,4	-141,4	-141,4			65	range (20°C)	
		Ambient temp.	°C	-25...+35°C					66	Allow. ambient temp.	-40...+80°C
	Medium contacted parts	Process connection	Oval flange (fastening 7/16-20 UNF)						67	Aux. energy	11...36 V
			and 1/4-18 NPT female						68	El. connection	
		Design pressure	160 barg						69	Cable gland	M 20
		Overpressure limit							70	Digital transmitter	<input checked="" type="checkbox"/> HART-protocol
		Allow. medium temp.	-40...+60°C						71		
		Material connection	316 SST						72	Explosion Proof	<input checked="" type="checkbox"/> without <input type="checkbox"/> EEx ib IIC T4/T6
		Material diaphragm	316 SST						73		<input type="checkbox"/> FM Explosion Proof Approval
		Material O-ring							74	Operating instruction	<input type="checkbox"/> German <input checked="" type="checkbox"/> English <input type="checkbox"/> French
		Material casing	Aluminium						75	Quantity per type	4-fold
			Liquid filling	Inert						76	
		Kind of sensor	Metal cell						77		
		Enclosure Class	IP65 / NEMA 4x						78		
									79		
	Pressure sensor	Plus-side	DN	PN	Material				80	Accessories	<input checked="" type="checkbox"/> Bracket f. panel mount. <input type="checkbox"/> Bracket + bow f. pipe mounting
		Flanges			Gasket				81		<input checked="" type="checkbox"/> Stainless steel <input type="checkbox"/> Steel, galvanized
		Type	<input type="checkbox"/> Flat diaphr. <input type="checkbox"/> Tubus, mm						82		<input type="checkbox"/> Indicator
		Mounting	<input type="checkbox"/> top <input type="checkbox"/> bottom						83		<input type="checkbox"/> digital <input type="checkbox"/> analog Scale:
		Capillary length							84		<input type="checkbox"/> Transient protection
		Minus-side	DN	PN	Material				86	Certificates	<input type="checkbox"/> Material certificate EN 10204 -3.1B
	Flanges			Gasket				87	<input checked="" type="checkbox"/> Cleaned, oil and grease free for oxygen service		
	Type	<input type="checkbox"/> Flat diaphr. <input type="checkbox"/> Tubus, mm						88	<input type="checkbox"/> Packed acc. MG-cert. 06271		
	Mounting	<input type="checkbox"/> top <input type="checkbox"/> bottom						89	<input type="checkbox"/> PTB calibration certificate		
	Capillary length							90	<input type="checkbox"/> Conformity certificate		
		Liquid filling							91		<input checked="" type="checkbox"/> Marking with TAG-number
		PVC-coating	<input type="checkbox"/> no <input type="checkbox"/> yes						92		
		Ex-protection	<input type="checkbox"/> no <input type="checkbox"/> "Zone 0"						93		
									94		
	Remarks										

1	25.10.2004	Möller	Eichler	DP range					
0	20.09.2004	Möller	Eichler	Initial Version					
Rev.	Date	Name	Checked	Change	Rev.	Date	Name	Checked	Change

AIR LIQUIDE <small>TM</small>				Specification Pressure Transmitter				TAG - No.: LT62005			
Air Liquide AGS GmbH				Project: ASU No. 9 KOSICE				Project-No.: K70101			
<input type="checkbox"/> Pressure <input checked="" type="checkbox"/> Difference press.				Designation: LOX TANK B62001				Page: of:			
								Combination with Tag-No.:			

Rev.							Rev.			
	1	Line - No.					54		Manufacturer	Endress + Hauser
	2	Equipment-No.	B62001				55		Type	DELTABAR-S PMD75
	3	DN		PN		Material	56		Order-No.	
	4	Flanges				Gasket	57		Order addition	
	5	Taps				Material	58			
	6	Medium	LOX (oxygen)				59		Range	3000 mbar
	7						60		Adjusted span	4,757...1697,298 mbar
	8	State	<input checked="" type="checkbox"/> liquid <input type="checkbox"/> gaseous <input type="checkbox"/> vaporous				61		Output signal	4...20 mA
	9	Operation case	case 1	case 2	case 3		62		Wiring	<input checked="" type="checkbox"/> 2-wire <input type="checkbox"/> 4-wire
	10	Flow	Nm³/h				63		Characteristic	<input checked="" type="checkbox"/> linear <input type="checkbox"/> inverse <input type="checkbox"/> sq. root
	11	P ₁ (abs.)	bar	1,1	1,1	1,1	64		Accuracy of	<input type="checkbox"/> ±0.1% <input checked="" type="checkbox"/> ±0.2% <input type="checkbox"/> ±0.075%
	12	Temperature t ₁	°C	-182,7	-182,7	-182,7	65		range (20°C)	
	13	Ambient temp.	°C	-25...+35°C			66		Allow. ambient temp.	-40...+80°C
	14	Process connection	Oval flange (fastening 7/16-20 UNF)				67		Aux. energy	11...36 V
	15		and 1/4-18 NPT female				68		El. connection	
	16	Design pressure	160 barg				69		Cable gland	M 20
	17	Overpressure limit					70		Digital transmitter	<input checked="" type="checkbox"/> HART-protocol
	18	Allow. medium temp.	-40...+60°C				71			
	19	Material connection	316 SST				72		Explosion Proof	<input checked="" type="checkbox"/> without <input type="checkbox"/> EEx ib IIC T4/T6
	20	Material diaphragm	316 SST				73			<input type="checkbox"/> FM Explosion Proof Approval
	21	Material O-ring					74		Operating instruction	<input type="checkbox"/> German <input checked="" type="checkbox"/> English <input type="checkbox"/> French
	22	Material casing	Aluminium				75		Quantity per type	4-fold
	23	Liquid filling	Inert				76			
	24	Kind of sensor	Metal cell				77		<input checked="" type="checkbox"/> Bracket f. panel mount. <input type="checkbox"/> Bracket + bow f. pipe mounting	
	25	Enclosure Class	IP65 / NEMA 4x				78		<input checked="" type="checkbox"/> Stainless steel <input type="checkbox"/> Steel, galvanized	
	26						79		<input type="checkbox"/> Indicator	
	27						80		<input type="checkbox"/> digital <input type="checkbox"/> analog Scale:	
	28	Plus-side	DN		PN		81		<input type="checkbox"/> Transient protection	
	29	Flanges				Gasket	82			
	30	Type	<input type="checkbox"/> Flat diaphr. <input type="checkbox"/> Tubus, mm				83			
	31	Mounting	<input type="checkbox"/> top <input type="checkbox"/> bottom				84			
	32		<input type="checkbox"/> at pressure sensor				85			
	33	Capillary length					86		<input type="checkbox"/> Material certificate EN 10204 -3.1B	
	34	Minus-side	DN		PN		87		<input checked="" type="checkbox"/> Cleaned, oil and grease free for oxygen service	
	35	Flanges				Gasket	88		<input type="checkbox"/> Packed acc. MG-cert. 06271	
	36	Type	<input type="checkbox"/> Flat diaphr. <input type="checkbox"/> Tubus, mm				89		<input type="checkbox"/> PTB calibration certificate	
	37	Mounting	<input type="checkbox"/> top <input type="checkbox"/> bottom				90		<input type="checkbox"/> Conformity certificate	
	38						91		<input checked="" type="checkbox"/> Marking with TAG-number	
	39	Capillary length					92			
	40	Liquid filling					93			
	41	PVC-coating	<input type="checkbox"/> no <input type="checkbox"/> yes				94			
	42	Ex-protection	<input type="checkbox"/> no <input type="checkbox"/> "Zone 0"							
	43									
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	46									
	47									
	48									
	49									
	50									
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	52									
	53									

Rev.	Date	Name	Checked	Change	Rev.	Date	Name	Checked	Change
1	25.10.2004	Möller	Eichler	DP range					
0	20.09.2004	Möller	Eichler	Initial Version					

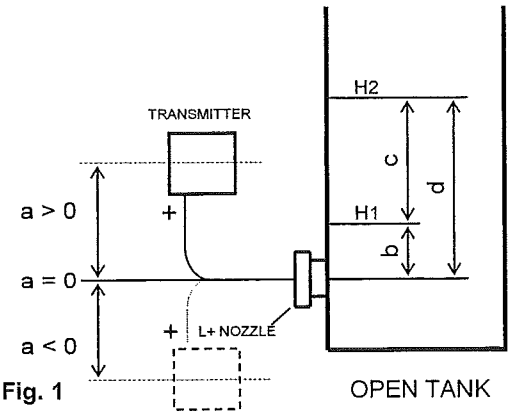
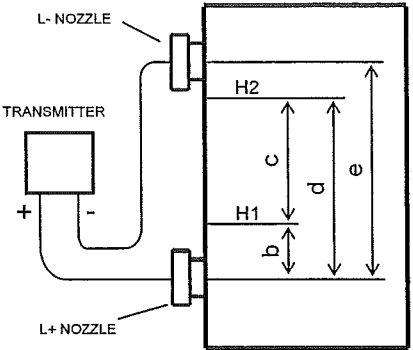
	Specification Pressure Transmitter	TAG - No.: LT62005 Project No.: K70101 Page: of:
Air Liquide AGS GmbH	Project: ASU No. 9 KOSICE	
	Designation: LOX TANK B62001	

SERVICE <u>LOX</u>	GAS ABOVE LIQUID <u>GOX</u>
Temperature $T = -182,75 \text{ }^{\circ}\text{C}$ Service Density $\rho_M = 1139,6 \text{ kg/m}^3$	Temperature $T = -182,75 \text{ }^{\circ}\text{C}$ Pressure (abs.) $P = 1,038 \text{ bar}$ Gas Density $\rho_G = 4,58 \text{ kg/m}^3$
FILLING OF CAPILLARY TUBES/ MEASURING TUBES <u>GOX</u>	
Ambient Temperature $T_U = 15 \text{ }^{\circ}\text{C}$ Filling Density $\rho_F = 1,39 \text{ kg/m}^3$	

TANK DISTANCES			
Distance between L+-Nozzle and Transmitter (see fig. 1)	$a =$	mm	From L+ Nozzle to 0% Level H1 $b = 0 \text{ mm}$
Distance between L+ and L- Nozzle (see fig. 2)	$e =$	15206 mm	From L+ Nozzle to 100% Level H2 $d = 15206 \text{ mm}$
			From H1 to H2 $c = 15206 \text{ mm}$

CALCULATION ACCORDING TO	
○ Fig. 1	● Fig. 2

$P_{H1} = \left(\frac{\rho_M}{\text{kg/m}^3} \cdot \frac{b}{\text{mm}} - \frac{\rho_F}{\text{kg/m}^3} \cdot \frac{a}{\text{mm}} \right) \cdot 9,81 \cdot 10^{-5} \text{ mbar}$ $P_{H2} = \left(\frac{\rho_M}{\text{kg/m}^3} \cdot \frac{d}{\text{mm}} - \frac{\rho_F}{\text{kg/m}^3} \cdot \frac{a}{\text{mm}} \right) \cdot 9,81 \cdot 10^{-5} \text{ mbar}$ <p>Diff. Press. 0% $P_{H1} =$ mbar</p> <p>Diff. Press. 100% $P_{H2} =$ mbar</p> <p>Span $P_{H2-H1} =$ mbar</p>	$P_{H1} = \left(\frac{\rho_M}{\text{kg/m}^3} \cdot \frac{b}{\text{mm}} + \frac{\rho_G}{\text{kg/m}^3} \cdot \frac{(e-b)}{\text{mm}} - \frac{\rho_F}{\text{kg/m}^3} \cdot \frac{e}{\text{mm}} \right) \cdot 9,81 \cdot 10^{-5} \text{ mbar}$ $P_{H2} = \left(\frac{\rho_M}{\text{kg/m}^3} \cdot \frac{d}{\text{mm}} + \frac{\rho_G}{\text{kg/m}^3} \cdot \frac{(e-d)}{\text{mm}} - \frac{\rho_F}{\text{kg/m}^3} \cdot \frac{e}{\text{mm}} \right) \cdot 9,81 \cdot 10^{-5} \text{ mbar}$ <p>Diff. Press. 0% $P_{H1} = 4,757 \text{ mbar}$</p> <p>Diff. Press. 100% $P_{H2} = 1697,298 \text{ mbar}$</p> <p>Span $P_{H2-H1} = 1692,541 \text{ mbar}$</p>
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 <p>Fig. 1 OPEN TANK</p>	 <p>Fig. 2 CLOSED TANK</p>
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REMARKS									
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0	18.10.2004	Möller	Eichler	Initial Version					
Rev.	Date	Name	Checked	Change	Rev.	Date	Name	Checked	Change

AIR LIQUIDE <small>TM</small>				Specification Pressure Transmitter				TAG - No.: LT62006			
Air Liquide AGS GmbH				Project: ASU No. 9 KOSICE				Project-No.: K70101			
<input type="checkbox"/> Pressure <input checked="" type="checkbox"/> Difference press.				Designation: OVERFLOW LOX TANK B62001				Page: of:			
								Combination with Tag-No.:			

Rev.		Line - No.	Equipment-No.	B62001	Rev.		Manufacturer	Endress + Hauser
	Location	DN	PN	Material			Type	DELTABAR-S PMD75
		Flanges		Gasket			Order-No.	
		Taps		Material			Order addition	
	Service conditions	Medium	LOX (oxygen)				Range	500 mbar
		State	<input checked="" type="checkbox"/> liquid <input type="checkbox"/> gaseous <input type="checkbox"/> vaporous				Adjusted span	0,476...169,774 mbar
		Operation case	case 1	case 2	case 3		Output signal	4...20 mA
		Flow	Nm³/h				Wiring	<input checked="" type="checkbox"/> 2-wire <input type="checkbox"/> 4-wire
		P ₁ (abs.)	bar	1,1	1,1	1,1	Characteristic	<input checked="" type="checkbox"/> linear <input type="checkbox"/> inverse <input type="checkbox"/> sq. root
	Order data	Temperature t ₁	°C	-182,7	-182,7	-182,7	Accuracy of range (20 °C)	<input type="checkbox"/> ±0.1% <input checked="" type="checkbox"/> ±0.2% <input type="checkbox"/> ±0.075%
		Ambient temp.	°C	-25...+35°C			Allow. ambient temp.	-40...+80 °C
		Process connection	Oval flange (fastening 7/16-20 UNF)				Aux. energy	11...36 V
			and 1/4-18 NPT female				El. connection	
		Design pressure	160 barg				Cable gland	M 20
	Medium contacted parts	Overpressure limit					Digital transmitter	<input checked="" type="checkbox"/> HART-protocol
		Allow. medium temp.	-40...+60 °C					
		Material connection	316 SST				Explosion Proof	<input checked="" type="checkbox"/> without <input type="checkbox"/> EEx ib IIC T4/T6 <input type="checkbox"/> FM Explosion Proof Approval
		Material diaphragm	316 SST				Operating instruction	<input type="checkbox"/> German <input checked="" type="checkbox"/> English <input type="checkbox"/> French
		Material O-ring					Quantity per type	4-fold
	Accessories	Material casing	Aluminium					
		Liquid filling	Inert				<input checked="" type="checkbox"/> Bracket f. panel mount. <input type="checkbox"/> Bracket + bow f. pipe mounting <input checked="" type="checkbox"/> Stainless steel <input type="checkbox"/> Steel, galvanized	
		Kind of sensor	Metal cell				<input type="checkbox"/> Indicator <input type="checkbox"/> digital <input type="checkbox"/> analog Scale:	
		Enclosure Class	IP65 / NEMA 4x				<input type="checkbox"/> Transient protection	
	Pressure sensor	DN	PN	Material			<input type="checkbox"/> Material certificate EN 10204 -3.1B <input checked="" type="checkbox"/> Cleaned, oil and grease free for oxygen service	
		Flanges		Gasket			<input type="checkbox"/> Packed acc. MG-cert. 06271 <input type="checkbox"/> PTB calibration certificate	
		Type	<input type="checkbox"/> Flat diaphr. <input type="checkbox"/> Tubus, mm				<input type="checkbox"/> Conformity certificate <input checked="" type="checkbox"/> Marking with TAG-number	
		Mounting	<input type="checkbox"/> top <input type="checkbox"/> bottom <input type="checkbox"/> at pressure sensor					
		Capillary length						
	Certificates	DN	PN	Material				
		Flanges		Gasket				
		Type	<input type="checkbox"/> Flat diaphr. <input type="checkbox"/> Tubus, mm					
		Mounting	<input type="checkbox"/> top <input type="checkbox"/> bottom					
		Capillary length						
	Remarks	Liquid filling						
		PVC-coating	<input type="checkbox"/> no <input type="checkbox"/> yes					
		Ex-protection	<input type="checkbox"/> no <input type="checkbox"/> "Zone 0"					

1	25.10.2004	Möller	Eichler	DP range					
0	20.09.2004	Möller	Eichler	Initial Version					
Rev.	Date	Name	Checked	Change	Rev.	Date	Name	Checked	Change

**AIR LIQUIDE****Specification**
Pressure TransmitterTAG - No.: **LT62006**Project No.: **K70101**

Air Liquide AGS GmbH

Project: **ASU No. 9 KOSICE**

Page: of:

Designation: **OVERFLOW LOX TANK B62001****SERVICE** LOXTemperature $T = -182,75$ °C
Service Density $\rho_M = 1139,6$ kg/m³**FILLING OF CAPILLARY TUBES/
MEASURING TUBES**GOXAmbient Temperature $T_U = 15$ °C
Filling Density $\rho_F = 1,39$ kg/m³**GAS ABOVE LIQUID**GOXTemperature $T = -182,75$ °C
Pressure (abs.) $P = 1,038$ bar
Gas Density $\rho_G = 4,58$ kg/m³**TANK DISTANCES**

Distance between L+-Nozzle and Transmitter

(see fig. 1) $a =$ mm

Distance between L+ and L- Nozzle

(see fig. 2) $e = 1521$ mmFrom L+ Nozzle to 0% Level H1 $b = 0$ mmFrom L+ Nozzle to 100% Level H2 $d = 1521$ mmFrom H1 to H2 $c = 1521$ mm**CALCULATION ACCORDING TO**

○ Fig. 1

$$P_{H1} = \left(\frac{\rho_M}{\text{kg/m}^3} \cdot \frac{b}{\text{mm}} - \frac{\rho_F}{\text{kg/m}^3} \cdot \frac{a}{\text{mm}} \right) \cdot 9,81 \cdot 10^{-5} \text{ mbar}$$

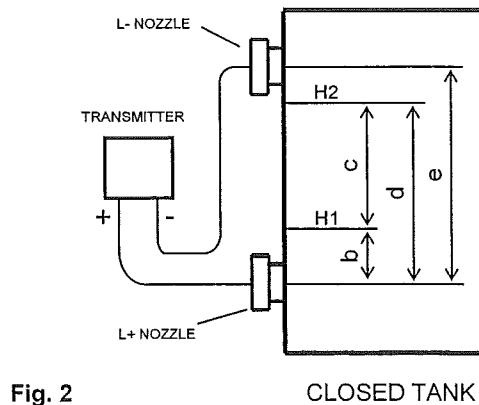
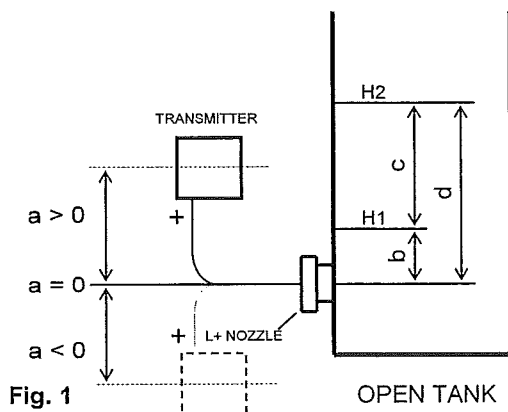
$$P_{H2} = \left(\frac{\rho_M}{\text{kg/m}^3} \cdot \frac{d}{\text{mm}} - \frac{\rho_F}{\text{kg/m}^3} \cdot \frac{a}{\text{mm}} \right) \cdot 9,81 \cdot 10^{-5} \text{ mbar}$$

Diff. Press. 0% $P_{H1} =$ mbarDiff. Press. 100% $P_{H2} =$ mbarSpan $P_{H2-H1} =$ mbar

● Fig. 2

$$P_{H1} = \left(\frac{\rho_M}{\text{kg/m}^3} \cdot \frac{b}{\text{mm}} + \frac{\rho_G}{\text{kg/m}^3} \cdot \frac{(e-b)}{\text{mm}} - \frac{\rho_F}{\text{kg/m}^3} \cdot \frac{e}{\text{mm}} \right) \cdot 9,81 \cdot 10^{-5} \text{ mbar}$$

$$P_{H2} = \left(\frac{\rho_M}{\text{kg/m}^3} \cdot \frac{d}{\text{mm}} + \frac{\rho_G}{\text{kg/m}^3} \cdot \frac{(e-d)}{\text{mm}} - \frac{\rho_F}{\text{kg/m}^3} \cdot \frac{e}{\text{mm}} \right) \cdot 9,81 \cdot 10^{-5} \text{ mbar}$$

Diff. Press. 0% $P_{H1} = 0,476$ mbarDiff. Press. 100% $P_{H2} = 169,774$ mbarSpan $P_{H2-H1} = 169,299$ mbar**REMARKS**

0	18.10.2004	Möller	Eichler	Initial Version					
Rev.	Date	Name	Checked	Change	Rev.	Date	Name	Checked	Change



AIR LIQUIDE

Specification Pressure Transmitter

TAG - No.: **LT72005**

Project No.: **K70101**

Air Liquide AGS GmbH

Project: **ASU No. 9 KOSICE**

Page: of:

Designation:

LIN TANK B62001

SERVICE LIN

GAS ABOVE LIQUID

GAN

Temperature
Service Density

$T = -195,6 \text{ } ^\circ\text{C}$
 $\rho_M = 802,9 \text{ kg/m}^3$

Temperature
Pressure (abs.)
Gas Density

$T = -195,6 \text{ } ^\circ\text{C}$
 $P = 1,038 \text{ bar}$
 $\rho_G = 4,73 \text{ kg/m}^3$

**FILLING OF CAPILLARY TUBES/
MEASURING TUBES**

GAN

Ambient Temperature
Filling Density

$T_U = 15 \text{ } ^\circ\text{C}$
 $\rho_F = 1,21 \text{ kg/m}^3$

TANK DISTANCES

Distance between L+-Nozzle and Transmitter
(see fig. 1)

$a = 0 \text{ mm}$

From L+ Nozzle to 0% Level H1

$b = 0 \text{ mm}$

Distance between L+ and L- Nozzle
(see fig. 2)

$e = 18480 \text{ mm}$

From L+ Nozzle to 100% Level H2

$d = 18480 \text{ mm}$

From H1 to H2

$c = 18480 \text{ mm}$

CALCULATION ACCORDING TO

○ **Fig. 1**

● **Fig. 2**

$$P_{H1} = \left(\frac{\rho_M}{\text{kg/m}^3} \cdot \frac{b}{\text{mm}} - \frac{\rho_F}{\text{kg/m}^3} \cdot \frac{a}{\text{mm}} \right) \cdot 9,81 \cdot 10^{-5} \text{ mbar}$$

$$P_{H2} = \left(\frac{\rho_M}{\text{kg/m}^3} \cdot \frac{d}{\text{mm}} - \frac{\rho_F}{\text{kg/m}^3} \cdot \frac{a}{\text{mm}} \right) \cdot 9,81 \cdot 10^{-5} \text{ mbar}$$

Diff. Press. 0% $P_{H1} = \text{ mbar}$

Diff. Press. 100% $P_{H2} = \text{ mbar}$

Span $P_{H2-H1} = \text{ mbar}$

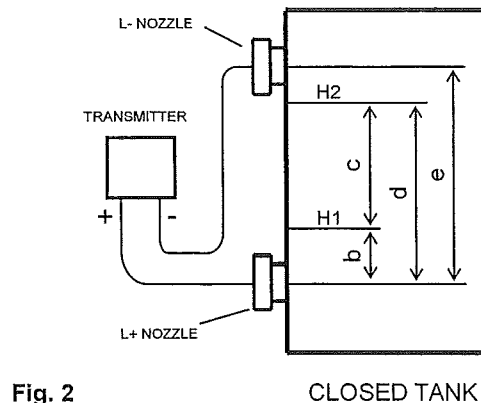
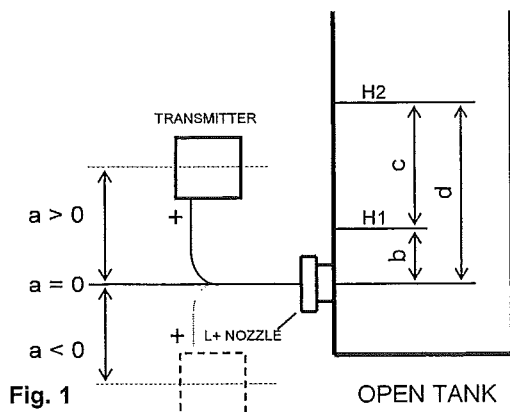
$$P_{H1} = \left(\frac{\rho_M}{\text{kg/m}^3} \cdot \frac{b}{\text{mm}} + \frac{\rho_G}{\text{kg/m}^3} \cdot \frac{(e-b)}{\text{mm}} - \frac{\rho_F}{\text{kg/m}^3} \cdot \frac{e}{\text{mm}} \right) \cdot 9,81 \cdot 10^{-5} \text{ mbar}$$

$$P_{H2} = \left(\frac{\rho_M}{\text{kg/m}^3} \cdot \frac{d}{\text{mm}} + \frac{\rho_G}{\text{kg/m}^3} \cdot \frac{(e-d)}{\text{mm}} - \frac{\rho_F}{\text{kg/m}^3} \cdot \frac{e}{\text{mm}} \right) \cdot 9,81 \cdot 10^{-5} \text{ mbar}$$

Diff. Press. 0% $P_{H1} = 6,379 \text{ mbar}$

Diff. Press. 100% $P_{H2} = 1452,878 \text{ mbar}$


Span $P_{H2-H1} = 1446,499 \text{ mbar}$



REMARKS

0	18.10.2004	Möller	Eichler	Initial Version					
Rev.	Date	Name	Checked	Change	Rev.	Date	Name	Checked	Change

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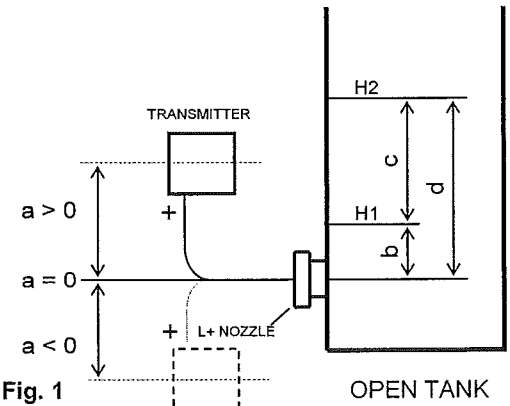
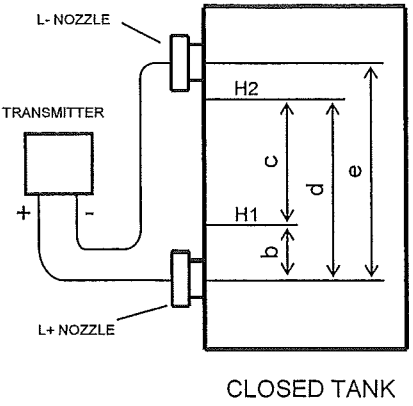
	Specification Pressure Transmitter	TAG - No.: LT72006 Project No.: K70101 Page: of:
Air Liquide AGS GmbH	Project: ASU No. 9 KOSICE	
	Designation: OVERFLOW LIN TANK B62001	

SERVICE <u>LIN</u>	GAS ABOVE LIQUID <u>GAN</u>
Temperature T = -195,6 °C Service Density ρ _M = 802,9 kg/m ³	Temperature T = -195,6 °C Pressure (abs.) P = 1,038 bar Gas Density ρ _G = 4,73 kg/m ³
FILLING OF CAPILLARY TUBES/ MEASURING TUBES <u>GAN</u>	
Ambient Temperature T _U = 15 °C Filling Density ρ _F = 1,21 kg/m ³	

TANK DISTANCES			
Distance between L+-Nozzle and Transmitter (see fig. 1)	a =	mm	From L+ Nozzle to 0% Level H1 b = 0 mm
Distance between L+ and L- Nozzle (see fig. 2)	e = 1848	mm	From L+ Nozzle to 100% Level H2 d = 1848 mm
			From H1 to H2 c = 1848 mm

CALCULATION ACCORDING TO	
○ Fig. 1	◎ Fig. 2

$P_{H1} = \left(\frac{\rho_M}{kg/m^3} \cdot \frac{b}{mm} - \frac{\rho_F}{kg/m^3} \cdot \frac{a}{mm} \right) \cdot 9,81 \cdot 10^{-5} mbar$ $P_{H2} = \left(\frac{\rho_M}{kg/m^3} \cdot \frac{d}{mm} - \frac{\rho_F}{kg/m^3} \cdot \frac{a}{mm} \right) \cdot 9,81 \cdot 10^{-5} mbar$ <p>Diff. Press. 0% P_{H1} = mbar</p> <p>Diff. Press. 100% P_{H2} = mbar</p> <p>Span P_{H2-H1} = mbar</p>	$P_{H1} = \left(\frac{\rho_M}{kg/m^3} \cdot \frac{b}{mm} + \frac{\rho_G}{kg/m^3} \cdot \frac{(e-b)}{mm} - \frac{\rho_F}{kg/m^3} \cdot \frac{e}{mm} \right) \cdot 9,81 \cdot 10^{-5} mbar$ $P_{H2} = \left(\frac{\rho_M}{kg/m^3} \cdot \frac{d}{mm} + \frac{\rho_G}{kg/m^3} \cdot \frac{(e-d)}{mm} - \frac{\rho_F}{kg/m^3} \cdot \frac{e}{mm} \right) \cdot 9,81 \cdot 10^{-5} mbar$ <p>Diff. Press. 0% P_{H1} = 0,638 mbar</p> <p>Diff. Press. 100% P_{H2} = 145,288 mbar</p> <p>Span P_{H2-H1} = 144,650 mbar</p>
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 <p>Fig. 1 OPEN TANK</p>	 <p>Fig. 2 CLOSED TANK</p>
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REMARKS									
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0	18.10.2004	Möller	Eichler	Initial Version					
Rev.	Date	Name	Checked	Change	Rev.	Date	Name	Checked	Change

AIR LIQUIDE <small>TM</small>				Specification Pressure Transmitter				TAG - No.: LT73007			
Air Liquide AGS GmbH				Project: ASU No. 9 KOSICE				Project-No.: K70101			
<input type="checkbox"/> Pressure <input checked="" type="checkbox"/> Difference press.				Designation: MP-LIN TANK B73001				Page: of:			
								Combination with Tag-No.:			

Rev.							Rev.					
	1	Location	Line - No.					54	Manufacturer		Endress + Hauser	
	2		Equipment-No.		B73001			55	Type		DELTABAR-S PMD75	
	3		DN	PN	Material			56	Order-No.			
	4		Flanges		Gasket			57	Order addition			
	5		Taps		Material			58				
	6	Service conditions	Medium		LIN (nitrogen)			59	Range		3000 mbar	
	7							60	Adjusted span		16,25...452,4 mbar	
	8		State		<input checked="" type="checkbox"/> liquid <input type="checkbox"/> gaseous <input type="checkbox"/> vaporous			61	Output signal		4...20 mA	
	9		Operation case		case 1	case 2	case 3		62	Wiring		<input checked="" type="checkbox"/> 2-wire <input type="checkbox"/> 4-wire
	10		Flow	Nm³/h					63	Characteristic		<input checked="" type="checkbox"/> linear <input type="checkbox"/> inverse <input type="checkbox"/> sq. root
	11		P ₁ (abs.)	bar	8	8	8		64	Accuracy of		<input type="checkbox"/> ±0.1% <input checked="" type="checkbox"/> ±0.2% <input type="checkbox"/> ±0.075%
	12		Temperature t ₁	°C	-172,3	-172,3	-172,3		65	range (20 °C)		
	13		Ambient temp.	°C	-25...+35 °C				66	Allow. ambient temp.		-40...+80 °C
	14	Medium contacted parts	Process connection		Oval flange (fastening 7/16-20 UNF)			67	Aux. energy		11...36 V	
	15				and 1/4-18 NPT female			68	El. connection			
	16		Design pressure		160 barg			69	Cable gland		M 20	
	17		Overpressure limit					70	Digital transmitter		<input checked="" type="checkbox"/> HART-protocol	
	18		Allow. medium temp.		-40...+60 °C			71				
	19		Material connection		316 SST			72	Explosion Proof		<input checked="" type="checkbox"/> without <input type="checkbox"/> EEx ib IIC T4/T6 <input type="checkbox"/> FM Explosion Proof Approval	
	20		Material diaphragm		316 SST			73	Operating instruction		<input type="checkbox"/> German <input checked="" type="checkbox"/> English <input type="checkbox"/> French	
	21		Material O-ring					74	Quantity per type		4-fold	
	22		Material casing		Aluminium			75				
	23		Liquid filling		Inert			76	<input checked="" type="checkbox"/> Bracket f. panel mount. <input type="checkbox"/> Bracket + bow f. pipe mounting			
	24	Kind of sensor		Metal cell			77	<input checked="" type="checkbox"/> Stainless steel <input type="checkbox"/> Steel, galvanized				
	25	Enclosure Class		IP65 / NEMA 4x			78	<input type="checkbox"/> Indicator				
	26						79	<input type="checkbox"/> digital <input type="checkbox"/> analog Scale:				
	27	Pressure sensor	Plus-side	DN	PN	Material			80	<input type="checkbox"/> Transient protection		
	28			Flanges		Gasket			81			
	29			Type	<input type="checkbox"/> Flat diaphr. <input type="checkbox"/> Tubus, mm				82			
	30			Mounting	<input type="checkbox"/> top <input type="checkbox"/> bottom				83			
	31			<input type="checkbox"/> at pressure sensor				84				
	32		Capillary length					85				
	33		Minus-side	DN	PN	Material			86	<input type="checkbox"/> Material certificate EN 10204 -3.1B		
	34			Flanges		Gasket			87	<input checked="" type="checkbox"/> Cleaned, oil and grease free for oxygen service		
	35			Type	<input type="checkbox"/> Flat diaphr. <input type="checkbox"/> Tubus, mm				88	<input type="checkbox"/> Packed acc. MG-cert. 06271		
	36			Mounting	<input type="checkbox"/> top <input type="checkbox"/> bottom				89	<input type="checkbox"/> PTB calibration certificate		
	37	<input type="checkbox"/> at pressure sensor				90	<input type="checkbox"/> Conformity certificate					
	38	Capillary length					91	<input checked="" type="checkbox"/> Marking with TAG-number				
	39	Liquid filling					92					
	40	PVC-coating	<input type="checkbox"/> no <input type="checkbox"/> yes				93					
	41	Ex-protection	<input type="checkbox"/> no <input type="checkbox"/> "Zone 0"				93					
	42						94					
	43	Remarks										
	44											
	45											
	46											
	47											
	48											
	49											
	50											
	51											
	51											
	52											
	53											

1	25.10.2004	Möller	Eichler	DP range				
0	20.09.2004	Möller	Eichler	Initial Version				
Rev.	Date	Name	Checked	Change	Rev.	Date	Name	Checked Change

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