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北京朗润达科贸有限公司



美国 ALICAT ISMCS 系列 本安防爆高压型气体质量流量控制器

层流差压

量程 0.5 SCCM - 250 SLPM, 优于 1 % 的精度, 100 ms 快速响应

本安防爆



美国 ALICAT ISMCS 系列本安防爆气体质量流量控制器, ia 区域本安防爆 认证,可用于0区环境直接测控,无需额外的阀门配置;可用于快速准确 地测量并控制腐蚀性气体(如: NH3、H2S、SiH4等)的质量流量、体积流量、 压力,并显示气体温度。采用内部补偿型层流压差技术,使得大流量范围 下气体仍旧保持层流运动。内置的绝压和温度传感器充分补偿因压力和温 度引起的体积流量与质量流量间的差异,并对用户标准工况进行修正。具 有 NIST 可溯源校准证书。

产品特色

- ia 区域本安防爆认证,可用于 0 区环境直接测控,无需额外的阀门配置
- 内置湿度传感器(洗配)
- 多参数显示和输出:温度、压力、体积流量、质量流量,设定值,阀门 驱动百分比等
- IP66 防护
- 可选高精度: 优于 0.5%
- 可现场标定混合气体(至多5种成分),并存储20种混合气
- 标配阀门自整定和累积流量批次控制功能

行业应用

- 制氢
- 燃料电池
- 制药
- 石油化工
- 能源
- 碳捕集
- 气相色谱 / 氧气分析仪等

通讯/电源

数字输入 / 输出信号 串口 ASCII 码和 Modbus RTU via RS232 (默认); 可选出口 ASCII 码和 Modbus RTU via RS485

模拟输入 / 输出信号 4-20mA

数据刷新频率 数字信号 40 Hz@19200 波特率;

模拟信号: 1000 Hz

屏幕刷新频率 10 Hz

模拟信号精度 在基础误差上额外增加 ±0.1% 满量程误差

供电电压与电流 请查看说明书 DOC-MANUAL-IS-SAFEINSTALLATION

电气接口 DB15

性能指标

本安防爆认证 ATEX 和 IECEx: Ex ia IIC T4 Ga Tamb -20 ℃ ~ 70℃

北美: Class I, Div 1, Groups A-D T4, Ex ia Class I. Zone O. AEx\Ex ia IIC T4 Ga Tamb -20°C ~ 70°C

介质要求 洁净的、兼容的、非腐蚀性和腐蚀性气体

介质种类 内置 128 种气体,用户可现场编辑混合气体(至多 5 种成分) 并至多存储 20 种混合气

程 从 0-0.5 SCCM 到 0-250 SLPM 量程可控比(稳态) 1-100% 满量程(100:1)

质量流量普通精度 ± (0.8 % 读数 + 0.2 % 满量程)

质量流量高精度 ± (0.4 % 读数 + 0.2 % 满量程) (量程≥ 5 SCCM 可选

累计流量精度 流量精度之外增加 ±0.1% 读数额外误差

重 复 性 ±0.2% 满量程

质量流量零点和满量程温度漂移 ±0.02% 满量程 /℃(从 25℃开始) 质量流量零点和满量程压力漂移 ±(0.08% 读数 + 0.02% 满量程)/atm、

(从校准压力开始)

显 示 屏 LCD 单色显示屏(带背光)

显示方式。同时显示质量流量、体积流量、压力、温度、设定值、

阀门驱动百分比

传感器响应时间 < 1ms

显示响应时间: 10-4000ms (与流量相关)

控制响应时间(T63) 30-4000ms(与流量相关,用户可调)

阀门类型 常闭

预热时间 < 1s

工作温度 -20~70℃(环境和气体)

温度精度 ±0.75℃

工作湿度 0~95%, 无冷凝

内置湿度传感器精度(可选) ±1.8%RH@23℃(0-90%RH)

湿度漂移 ±0.05%RH/℃(0~60℃)

工作压力 11.5-160PSIA

压力精度 ±0.5% 满量程

压 200PSIA (静压); 75PSID (进出口差压) 耐

满量程压损 参考详细压损表 接液材质 主体和传感器: 316LSS

阀门材质: 303SS, 430FR SS

密封材质: FFKM

过程接口 NPT 内螺纹,详细规格参考压损表;其他过程接口请咨询;

安装方向 无要求

安装固定孔 4×6-32UNC 螺纹, 孔深 7.01mm

防护等级 IP66



尺寸/压损

满量程	满量程压损 (PSID/KPaD)	外形尺寸	过程接口	重量 Lb/kg
0.5-5sccm	1.0/6.9	8.00"H ×5.75"W ×1.50"D	M5×0.8mm 内螺纹	5.0/2.3
10sccm	1.5/10.3			
20sccm	2.0/13.8			
50sccm	1.0/6.9			
100sccm-1slpm	1.5/10.3		1/8"NPT 内螺纹	
2slpm	2.5/17.2			
5slpm	2.5/17.2		1/4"NPT 内螺纹	
10slpm	6.0/41.4			
20slpm	12.0/82.7			
50 slpm	6.0/41.4	8.60"H ×6.00"W ×1.50"D	1/4"NPT 内螺纹	
100 slpm	17.1/117.9		I/4 INFI 内縣以	6.0/2.7
250 slpm	81.9/564.7		1/2"NPT 内螺纹	

气体兼容表

	短名字	长名字	
0	Air	Air (Clean Dry)	
1	Ar	Argon	
2	CH ₄	Methane	
3	со	Carbon Monoxide	
4	CO ₂	Carbon Dioxide	
5	C ₂ H ₆	Ethane	
6	H ₂	Hydrogen	
7	He	Helium	
8	N ₂	Nitrogen	
9	N ₂ O	Nitrous Oxide	
10	Ne	Neon	
11	O ₂	Oxygen	
12	C₃H ₈	Propane	
13	nC ₄ H ₁₀	Normal Butane	
14	C ₂ H ₂	Acetylene	
15	C ₂ H ₄	Ethylene (Ethene)	
16	iC ₄ H ₁₀	Isobutane	
17	Kr	Krypton	
18	Xe	Xenon	
19	SF ₆	Sulfur Hexafluoride	
20	C-25	25% CO ₂ , 75% Ar	
21	C-10	10% CO ₂ , 90% Ar	
22	C-8	8% CO ₂ , 92% Ar	
23	C-2	2% CO ₂ , 98% Ar	
24	C-75	75% CO ₂ , 25% Ar	
25	He-25	25% He,75% Ar	
26	He-75	75% He, 25% Ar	
27	A1025	90% He, 7.5% Ar, 2.5% CO ₂	
28	Star29	Stargon CS (90% Ar, 8% CO ₂ , 2% O ₂)	
29	P-5	5% CH ₄ , 95% Ar	
30	NO	Nitric Oxide ①	
31	NF ₃	Nitrogen Tri luoride ①	
32	NH ₃	Ammonia ①	
33	Cl ₂	Chlorine ①	
34	H ₂ S	Hydrogen Sul ide ①	
35	SO ₂	Sulfur Dioxide ①	
36	C₃H ₆	Propylene ①	
80	1Buten	1-Butylene ①	
81	cButen	Cis-Butene (cis-2-Butene) 1	
82	iButen	Isobutene ①	
83	tButen	Trans-2-Butene ①	
84	cos	Carbonyl Sul ide ①	
85	DME	Dimethylether (C₂H₀O) ①	
86	SiH ₄	Silane ①	
100	R-11	Trichloro luoromethane (CCl₃F) ①	

101 R-115 Chloropenta luoroethane (C₂CIF₂) ① 102 R-116 Hexa luoroethane (C₂F₂) ① 103 R-124 Chlorotetra luoroethane (CȝCIF₂) ① 104 R-125 Pentafluoroethane (CF₂CIF₂) ① 105 R-134A Tetrafluoroethane (CF₂CIF₂) ① 106 R-14 Tetrafluoromethane (CF₂) ① 107 R-142b Tetrafluoroethane (CṛJ₂) ① 108 R-143a Trifluoroethane (CṛJ₂) ① 109 R-152a Difluoroethane (CṛJ₂) ① 110 R-22 Difluoromethane (CHṛJ₂) ① 111 R-23 Trifluoromethane (CHṛJ₂) ① 112 R-32 Difluoromethane (CHṛJ₂) ① 113 R-318 Octafluorocyclobutane (CṛJ₂) ① 114 R-404A 44% R-125, 4% R-134A, 52% R-143A ① 115 R-407C 23% R-32, 25% R-125 ① 116 R-410A 50% R-32, 50% R-125 ① 117 R-507A 50% R-125, 50% R-143A ① 140 C-15 15% CO₂, 85% Ar 141 C-20 20% CO₂, 80% Ar	#	短名字	长名字
103	101	R-115	Chloropenta luoroethane (C2ClF5) 1
104 R-125 Pentafluoroethane (CF,CHF,) ① 105 R-134A Tetrafluoroethane (CH,FCF,) ① 106 R-14 Tetrafluoromethane (CF, □) 107 R-142b Tetrafluoromethane (CF, □) 108 R-143a Trifluoroethane (C,H,F,) ① 109 R-152a Difluoroethane (C,H,F,) ① 110 R-22 Difluoromethane (CHF,) ① 111 R-23 Trifluoromethane (CHF,) ① 112 R-32 Difluoromethane (CH,F,) ① 113 R-318 Octafluorocyclobutane (C,F,F) ① 114 R-404A 44% R-125, 4% R-134A, 52% R-143A ① 115 R-407C 23 % R-32, 25% R-125, 52% R-125, 52% R-143A ① 116 R-410A 50% R-32, 50% R-125 ⑥ 117 R-507A 50% R-125, 50% R-143A ① 1140 C-15 15% CO ₂ , 85% Ar 141 C-20 20% CO ₂ , 80% Ar 142 C-50 50% CO ₂ , 50% Ar 143 He-50 50% CO ₂ , 50% Ar 144 He-90 90% He, 10% Ar 145	102	R-116	Hexa luoroethane (C ₂ F ₆) ①
104 R-125 Pentafluoroethane (CF,CHF,) ① 105 R-134A Tetrafluoroethane (CH,FCF,) ① 106 R-14 Tetrafluoromethane (CF, □) 107 R-142b Tetrafluoromethane (CF, □) 108 R-143a Trifluoroethane (C,H,F,) ① 109 R-152a Difluoroethane (C,H,F,) ① 110 R-22 Difluoromethane (CHF,) ① 111 R-23 Trifluoromethane (CHF,) ① 112 R-32 Difluoromethane (CH,F,) ① 113 R-318 Octafluorocyclobutane (C,F,F) ① 114 R-404A 44% R-125, 4% R-134A, 52% R-143A ① 115 R-407C 23 % R-32, 25% R-125, 52% R-125, 52% R-143A ① 116 R-410A 50% R-32, 50% R-125 ⑥ 117 R-507A 50% R-125, 50% R-143A ① 1140 C-15 15% CO ₂ , 85% Ar 141 C-20 20% CO ₂ , 80% Ar 142 C-50 50% CO ₂ , 50% Ar 143 He-50 50% CO ₂ , 50% Ar 144 He-90 90% He, 10% Ar 145	103	R-124	Chlorotetra luoroethane (C2HClF4) 1
106 R-14 Tetrafluoromethane (CF₄) ① 107 R-142b Tetrafluoromethane (CF₄) ① 108 R-143a Trifluoroethane (C,H₂F₂) ① 109 R-152a Difluoroethane (CH₃F₂) ① 110 R-22 Difluoromethane (CH₃F₂) ① 111 R-23 Trifluoromethane (CH₃F₂) ① 112 R-32 Difluoromethane (CH₃F₂) ① 113 R-318 Octafluorocyclobutane (C₄F₃) ① 114 R-404A 44% R-125, 4% R-134A, 52% R-134A, 52% R-143A ① 115 R-407C 23 % R-32, 25 % R-125, 52% R-125, 52% R-143A ① 116 R-410A 50% R-32, 50% R-125, 50% R-125, 52% R-125, 52% R-143A ① 117 R-507A 50% R-32, 50% R-125, 50% R-143A ① 140 C-15 15% CO₂, 85% Ar 141 C-20 20% CO₂, 80% Ar 141 C-20 20% CO₂, 80% Ar 141 C-20 20% CO₂, 80% Ar 142 C-50 50% CO₂, 50% Ar 144 He-90 90% He, 10% Ar 145 Bio15M 5% CH₄, 90% CO₂	104	R-125	
106 R-14 Tetrafluoromethane (CF₄) ① 107 R-142b Tetrafluoromethane (CF₄) ① 108 R-143a Trifluoroethane (C,H₂F₂) ① 109 R-152a Difluoroethane (CH₃F₂) ① 110 R-22 Difluoromethane (CH₃F₂) ① 111 R-23 Trifluoromethane (CH₃F₂) ① 112 R-32 Difluoromethane (CH₃F₂) ① 113 R-318 Octafluorocyclobutane (C₄F₃) ① 114 R-404A 44% R-125, 4% R-134A, 52% R-134A, 52% R-143A ① 115 R-407C 23 % R-32, 25 % R-125, 52% R-125, 52% R-143A ① 116 R-410A 50% R-32, 50% R-125, 50% R-125, 52% R-125, 52% R-143A ① 117 R-507A 50% R-32, 50% R-125, 50% R-143A ① 140 C-15 15% CO₂, 85% Ar 141 C-20 20% CO₂, 80% Ar 141 C-20 20% CO₂, 80% Ar 141 C-20 20% CO₂, 80% Ar 142 C-50 50% CO₂, 50% Ar 144 He-90 90% He, 10% Ar 145 Bio15M 5% CH₄, 90% CO₂	105	R-134A	Tetrafluoroethane (CH ₂ FCF ₃) 1
107 R-142b Tetrafluoromethane (CF₄) ① 108 R-143a Trifluoroethane (C,H₄F₃) ① 119 R-152a Difluoroethane (C,H₄F₃) ① 110 R-22 Difluoromethane (CH,F₃) ① 111 R-23 Trifluoromethane (CH¬f₂) ① 112 R-32 Difluoromethane (CH¬f₂) ① 113 R-318 Octafluorocyclobutane (C₄F₃) ① 114 R-404A 44% R-125, 4% R-134A, 52% R-143A ① 115 R-407C 23% R-32, 25% R-125, 52% R-125, 52% R-143A ② 116 R-410A 50% R-32, 50% R-125 ⑤ 117 R-507A 50% R-125, 50% R-143A ③ 140 C-15 15% CO₂, 85% Ar 141 C-20 20% CO₂, 80% Ar 142 C-50 50% CO₂, 50% Ar 143 He-50 50% CO₂, 50% Ar 144 He-90 90% He, 10% Ar 145 Bio5M 5% CH₄, 95% CO₂ 146 Bio10M 10% CH₄, 90% CO₂ 147 Bio15M 15% CH₄, 95% CO₂ 148 Bio25M 25% CH₄,	106	R-14	
108 R-143a Trifluoroethane (C,H,F₁) ① 109 R-152a Difluoroethane (C,H,F₁) ① 110 R-22 Difluoromonochloromethane (CHCIF₂) ① 111 R-23 Trifluoromethane (CHF₂) ① 112 R-32 Difluoroethane (CH₂F₂) ① 113 R-318 Octafluorocyclobutane (C,F₂) ② 114 R-404A 44% R-125, 4% R-134A, 52% R-143A ① 115 R-407C 23 % R-32, 25% R-125, 52% R-125, 52% R-143A ① 116 R-410A 50% R-32, 50% R-125 ① 117 R-507A 50% R-125, 50% R-143A ① 140 C-15 15% CO₂, 85% Ar 141 C-20 20% CO₂, 80% Ar 142 C-50 50% CO₂, 50% Ar 143 He-50 50% CO₂, 50% Ar 144 He-90 90% He, 10% Ar 145 Bio5M 5% CH₄, 95% CO₂ 146 Bio10M 10% CH₄, 80% CO₂ 147 Bio15M 15% CH₄, 85% CO₂ 148 Bio25M 25% CH₄, 75% CO₂ 150 Bio45M 45% CH₄,	107	R-142b	
109 R-152a Diffuoroethane (C,H,F₂) ① 110 R-22 Diffuoromonochloromethane (CHF₂) ① 111 R-23 Trifuoromethane (CHF₂) ① 112 R-32 Diffuoromethane (CHF₂) ① 113 R-318 Octafluorocyclobutane (C₄F₂) ① 114 R-404A 44% R-125, 4% R-134A, 52% R-143A ① 115 R-407C 23% R-32, 25% R-125, 52% R-125, 52% R-143A ① 116 R-410A 50% R-32, 50% R-125 ① 117 R-507A 50% R-125, 50% R-143A ① 140 C-15 15% CO₂, 85% Ar 141 C-20 20% CO₂, 80% Ar 142 C-50 50% CO₂, 50% Ar 144 He-90 90% He, 50% Ar 144 He-90 90% He, 10% Ar 145 Bio5M 5% CH₄, 95% CO₂ 146 Bio10M 10% CH₄, 90% CO₂ 147 Bio15M 15% CH₄, 80% CO₂ 148 Bio20M 20% CH₄, 80% CO₂ 150 Bio30M 30% CH₄, 70% CO₂ 151 Bio35M 35% CH₄, 65% CO₂	108	R-143a	
110 R-22 Diffuoromenochloromethane (CHCF₂) ① 111 R-23 Trifluoromethane (CHF₂) ① 112 R-32 Diffuoromethane (CHF₂) ① 113 R-318 Octafluorocyclobutane (C₄F₂) ① 114 R-404A 44% R-125, 4% R-134A, 52% R-134A, 52% R-143A ① 115 R-407C 23 % R-32, 25 % R-125, 52 % R-125, 52 % R-143A ① 116 R-410A 50% R-32, 50% R-125, 50% R-125, 52 % R-143A ① 117 R-507A 50% R-32, 50% R-125, 50% R-143A ① 140 C-15 15% CO₂, 85% Ar 141 C-20 20% CO₂, 85% Ar 142 C-50 50% CO₂, 50% Ar 143 He-50 50% He, 50% Ar 144 He-90 90% He, 10% Ar 145 Bio15M 5% CH₄, 99% CO₂ 146 Bio10M 10% CH₄, 90% CO₂ 147 Bio15M 15% CH₄, 85% CO₂ 148 Bio25M 25% CH₄, 75% CO₂ 150 Bio30M 30% CH₄, 70% CO₂ 151 Bio35M 35% CH₄, 55% CO₂ 152 Bio	109	R-152a	
111 R-23 Trifluoromethane (CHF₂) ① 112 R-32 Difluoromethane (CHF₂) ① 113 R-318 Octafluorocyclobutane (C₄F₂) ① 114 R-404A 44% R-125, 4% R-134A, 52% R-143A ① 115 R-407C 23 % R-32 , 25 % R-125 , 52 % R-143A ① 116 R-410A 50% R-32 , 50% R-125 ① 117 R-507A 50% R-125 , 50% R-143A ① 140 C-15 15% CO₂ , 85% Ar 141 C-20 20% CO₂ , 80% Ar 142 C-50 50% CO₂ , 50% Ar 143 He-50 50% He , 50% Ar 144 He-90 90% He , 10% Ar 145 Bio5M 5% CH₄ , 95% CO₂ 146 Bio10M 10% CH₄ , 85% CO₂ 148 Bio2M 25% CH₄ , 75% CO₂ 149 Bio25M 25% CH₄ , 75% CO₂ 150 Bio30M 30% CH₄ , 50% CO₂ 151 Bio35M 35% CH₄ , 65% CO₂ 152 Bio45M 45% CH₄ , 55% CO₂ 153 Bio45M 45% CH₄ , 55% CO₂ <tr< td=""><td>110</td><td>R-22</td><td></td></tr<>	110	R-22	
112 R-32 Difluoromethane (CH₂F₂) (1) 113 R-318 Octafluorocyclobutane (C₂F₂) (1) 114 R-404A 44% R-125, 4% R-134A, 52% R-143A (1) 115 R-407C 23 % R-32, 25 % R-125, 52% R-125, 52 % R-143A (1) 116 R-407A 50% R-32, 50% R-125, 50% R-125, 52 % R-143A (1) 117 R-507A 50% R-32, 50% R-143A (1) 140 C-15 15% CO₂, 85% Ar 141 C-20 20% CO₂, 85% Ar 142 C-50 50% CO₂, 50% Ar 143 He-50 50% He, 50% Ar 144 He-90 90% He, 10% Ar 145 Bio5M 5% CH₂, 95% CO₂ 146 Bio10M 10% CH₄, 90% CO₂ 147 Bio15M 15% CH₄, 85% CO₂ 148 Bio25M 25% CH₄, 75% CO₂ 150 Bio30M 30% CH₄, 80% CO₂ 151 Bio35M 35% CH₄, 70% CO₂ 152 Bio40M 40% CH₄, 50% CO₂ 153 Bio45M 45% CH₄, 55% CO₂ 154 Bio50M 55% CH₄, 45% CO			(CHClF ₂) 1
113 R-318 Octafluorocyclobutane (c₄F₀) ① 114 R-404A A4% R-125, 4% R-134A, 52% R-143A ① 115 R-407C 23% R-32, 25% R-125, 52% R-125, 52% R-143A ① 116 R-410A 50% R-32, 50% R-125, 50% R-125, 52% R-143A ① 117 R-507A 50% R-32, 50% R-125, 50% R-143A ① 140 C-15 15% CO₂, 85% Ar 141 C-20 20% CO₂, 80% Ar 142 C-50 50% CO₂, 50% Ar 143 He-50 50% He, 50% Ar 144 He-90 90% He, 10% Ar 145 Bio5M 5% CH₄, 95% CO₂ 147 Bio15M 15% CH₄, 95% CO₂ 148 Bio20M 20% CH₄, 85% CO₂ 149 Bio25M 25% CH₄, 75% CO₂ 150 Bio30M 30% CH₄, 75% CO₂ 151 Bio35M 35% CH₄, 75% CO₂ 152 Bio40M 40% CH₄, 55% CO₂ 153 Bio45M 45% CH₄, 75% CO₂ 154 Bio50M 50% CH₄, 50% CO₂ 155 Bio50M 50% CH₄, 45% CO₂ <	111	R-23	Trifluoromethane (CHF ₃) 1
114 R-404A 44% R-125, 4% R-134A, 52% R-143A ① 115 R-407C 23% R-32, 25% R-125, 52% R-143A ② 116 R-410A 50% R-32, 50% R-125 ⑤ 117 R-507A 50% R-32, 50% R-125 ⑥ 117 R-507A 50% R-125, 50% R-125 ⑥ 117 R-507A 50% R-125, 50% R-125 ⑥ 140 C-15 15% CO ₂ , 85% Ar 141 C-20 20% CO ₂ , 80% Ar 141 C-20 50% CO ₂ , 50% Ar 143 He-50 50% He, 50% Ar 144 He-90 90% He, 10% Ar 145 Bio5M 5% CH ₄ , 95% CO ₂ 146 Bio10M 10% CH ₄ , 90% CO ₂ 147 Bio15M 15% CH ₄ , 85% CO ₂ 148 Bio25M 25% CH ₄ , 75% CO ₂ 150 Bio30M 30% CH ₄ , 75% CO ₂ 151 Bio35M 35% CH ₄ , 75% CO ₂ 152 Bio40M 40% CH ₄ , 65% CO ₂ 153 Bio45M 45% CH ₄ , 55% CO ₂ 154 Bio50M 50% CH ₄ , 45% CO ₂	112	R-32	Difluoromethane (CH ₂ F ₂) ①
R-143A 0	113	R-318	Octafluorocyclobutane (C ₄ F ₈) ①
R-143A 1	114	R-404A	
116 R-410A 50% R-32, 50% R-125 ① 117 R-507A 50% R-125, 50% R-143A ① 140 C-15 15% CO2, 85% Ar 141 C-20 20% CO2, 80% Ar 142 C-50 50% CO2, 50% Ar 143 He-50 50% He, 50% Ar 144 He-90 90% He, 10% Ar 145 Bio5M 5% CH4, 90% CO2 147 Bio15M 15% CH4, 85% CO2 148 Bio20M 20% CH4, 80% CO2 149 Bio25M 25% CH4, 75% CO2 150 Bio30M 30% CH4, 70% CO2 151 Bio35M 35% CH4, 65% CO2 152 Bio40M 40% CH4, 60% CO2 153 Bio45M 45% CH4, 55% CO2 154 Bio50M 50% CH4, 45% CO2 155 Bio60M 60% CH4, 43% CO2 157 Bio65M 65% CH4, 35% CO2 158 Bio70M 70% CH4, 30% CO2 158 Bio70M 70% CH4, 30% CO2 159 Bio85M 80% CH4, 20% CO2	115	R-407C	
117	116	R-410A	
140 C-15 15% CO2, 85% Ar 141 C-20 20% CO2, 80% Ar 142 C-50 50% CO2, 50% Ar 143 He-50 50% CO2, 50% Ar 144 He-90 90% He, 10% Ar 145 BioSM 5% CH4, 95% CO2 146 Bio10M 10% CH4, 95% CO2 147 Bio15M 15% CH4, 85% CO2 148 Bio20M 20% CH4, 85% CO2 149 Bio25M 25% CH4, 75% CO2 150 Bio30M 30% CH4, 70% CO2 151 Bio35M 35% CH4, 65% CO2 152 Bio40M 40% CH4, 60% CO2 153 Bio45M 45% CH4, 55% CO2 154 Bio50M 50% CH4, 50% CO2 155 Bio50M 50% CH4, 45% CO2 156 Bio60M 60% CH4, 40% CO2 157 Bio65M 65% CH4, 35% CO2 158 Bio70M 70% CH4, 25% CO2 160 Bio80M 80% CH4, 25% CO2 161 Bio80M 80% CH4, 15% CO2	117	R-507A	
141	140	C-15	
142 C-50 50% CO2, 50% Ar 143 He-50 50% He, 50% Ar 144 He-90 90% He, 10% Ar 145 BioSM 5% CH4, 95% CO2 146 Bio10M 10% CH4, 90% CO2 147 Bio15M 15% CH4, 85% CO2 148 Bio20M 20% CH4, 80% CO2 149 Bio25M 25% CH4, 75% CO2 150 Bio30M 30% CH4, 70% CO2 151 Bio35M 35% CH4, 65% CO2 152 Bio45M 45% CH4, 55% CO2 153 Bio45M 45% CH4, 55% CO2 154 Bio50M 50% CH4, 50% CO2 155 Bio55M 55% CH4, 45% CO2 156 Bio60M 60% CH4, 40% CO2 157 Bio65M 65% CH4, 30% CO2 158 Bio70M 70% CH4, 25% CO2 159 Bio80M 80% CH4, 25% CO2 160 Bio80M 80% CH4, 25% CO2 161 Bio80M 80% CH4, 10% CO2 162 Bio90M 90% CH4, 10% CO2 <td>141</td> <td>C-20</td> <td></td>	141	C-20	
143 He-50 50% He, 50% Ar 144 He-90 90% He, 10% Ar 145 Bio5M 5% CH ₄ , 95% CO ₂ 146 Bio10M 10% CH ₄ , 90% CO ₂ 147 Bio15M 15% CH ₄ , 85% CO ₂ 148 Bio20M 20% CH ₄ , 80% CO ₂ 149 Bio25M 25% CH ₄ , 75% CO ₂ 150 Bio33M 30% CH ₄ , 70% CO ₂ 151 Bio35M 35% CH ₄ , 70% CO ₂ 152 Bio40M 40% CH ₄ , 60% CO ₂ 153 Bio45M 45% CH ₄ , 55% CO ₂ 154 Bio50M 50% CH ₄ , 55% CO ₂ 155 Bio55M 55% CH ₄ , 45% CO ₂ 156 Bio60M 60% CH ₄ , 40% CO ₂ 157 Bio65M 65% CH ₄ , 35% CO ₂ 158 Bio70M 70% CH ₄ , 30% CO ₂ 159 Bio75M 75% CH ₄ , 25% CO ₂ 160 Bio80M 80% CH ₄ , 15% CO ₂ 161 Bio85M 85% CH ₄ , 15% CO ₂ 162 Bio90M 90% CH ₄ , 10% CO ₂ <td< td=""><td>142</td><td>C-50</td><td></td></td<>	142	C-50	
144 He-90 90% He, 10% Ar 145 BioSM 5% CH ₄ , 95% CO ₂ 146 Bio10M 10% CH ₄ , 90% CO ₂ 147 Bio15M 15% CH ₄ , 80% CO ₂ 148 Bio20M 20% CH ₄ , 80% CO ₂ 149 Bio25M 25% CH ₄ , 75% CO ₂ 150 Bio30M 30% CH ₄ , 75% CO ₂ 151 Bio35M 35% CH ₄ , 65% CO ₂ 152 Bio40M 40% CH ₄ , 65% CO ₂ 153 Bio45M 45% CH ₄ , 55% CO ₂ 154 Bio50M 50% CH ₄ , 50% CO ₂ 155 Bio50M 55% CH ₄ , 45% CO ₂ 156 Bio60M 60% CH ₄ , 40% CO ₂ 157 Bio65M 65% CH ₄ , 35% CO ₂ 158 Bio70M 70% CH ₄ , 30% CO ₂ 159 Bio75M 75% CH ₄ , 25% CO ₂ 160 Bio80M 80% CH ₄ , 25% CO ₂ 161 Bio89M 80% CH ₄ , 10% CO ₂ 162 Bio90M 90% CH ₄ , 10% CO ₂ 163 Bio95M 95% CH ₄ , 5% CO ₂	143	He-50	i i
145 Bio5M 5% CH ₄ , 95% CO ₂ 146 Bio10M 10% CH ₄ , 95% CO ₂ 147 Bio15M 15% CH ₄ , 85% CO ₂ 148 Bio20M 20% CH ₄ , 85% CO ₂ 149 Bio25M 25% CH ₄ , 75% CO ₂ 150 Bio30M 30% CH ₄ , 75% CO ₂ 151 Bio35M 35% CH ₄ , 65% CO ₂ 152 Bio40M 40% CH ₄ , 65% CO ₂ 153 Bio45M 45% CH ₄ , 55% CO ₂ 154 Bio50M 50% CH ₄ , 50% CO ₂ 155 Bio50M 50% CH ₄ , 45% CO ₂ 156 Bio60M 60% CH ₄ , 40% CO ₂ 157 Bio65M 65% CH ₄ , 35% CO ₂ 158 Bio70M 70% CH ₄ , 30% CO ₂ 159 Bio80M 80% CH ₄ , 25% CO ₂ 160 Bio80M 80% CH ₄ , 15% CO ₂ 161 Bio80M 80% CH ₄ , 15% CO ₂ 162 Bio90M 90% CH ₄ , 10% CO ₂ 163 Bio95M 95% CH ₄ , 5% CO ₂ 164 EAN-32 32% O ₂ , 68% N ₂	144	He-90	
146 Bio10M 10% CH ₄ , 90% CO ₂ 147 Bio15M 15% CH ₄ , 85% CO ₂ 148 Bio20M 20% CH ₄ , 80% CO ₂ 149 Bio25M 25% CH ₄ , 75% CO ₂ 150 Bio30M 30% CH ₄ , 70% CO ₂ 151 Bio35M 35% CH ₄ , 65% CO ₂ 152 Bio45M 40% CH ₄ , 60% CO ₂ 153 Bio45M 45% CH ₄ , 55% CO ₂ 154 Bio50M 50% CH ₄ , 50% CO ₂ 156 Bio60M 60% CH ₄ , 40% CO ₂ 157 Bio65M 65% CH ₄ , 35% CO ₂ 158 Bio70M 70% CH ₄ , 30% CO ₂ 159 Bio55M 55% CH ₄ , 25% CO ₂ 160 Bio80M 80% CH ₄ , 20% CO ₂ 161 Bio85M 85% CH ₄ , 15% CO ₂ 162 Bio90M 90% CH ₄ , 10% CO ₂ 163 Bio95M 95% CH ₄ , 5% CO ₂ 164 EAN-36 36% O ₂ , 68% N ₂ 165 EAN-36 36% O ₂ , 60% N ₂	145	Bio5M	i
147 Bio15M 15% CH ₄ , 85% CO ₂ 148 Bio20M 20% CH ₄ , 80% CO ₂ 149 Bio25M 25% CH ₄ , 75% CO ₂ 150 Bio30M 30% CH ₄ , 75% CO ₂ 151 Bio35M 35% CH ₄ , 65% CO ₂ 152 Bio40M 40% CH ₄ , 60% CO ₂ 153 Bio45M 45% CH ₄ , 55% CO ₂ 154 Bio50M 50% CH ₄ , 50% CO ₂ 155 Bio55M 55% CH ₄ , 45% CO ₂ 156 Bio60M 60% CH ₄ , 40% CO ₂ 157 Bio65M 65% CH ₄ , 35% CO ₂ 158 Bio70M 70% CH ₄ , 30% CO ₂ 159 Bio75M 75% CH ₄ , 25% CO ₂ 160 Bio80M 80% CH ₄ , 15% CO ₂ 161 Bio85M 85% CH ₄ , 15% CO ₂ 162 Bio90M 90% CH ₄ , 10% CO ₂ 163 Bio95M 95% CH ₄ , 5% CO ₂ 164 EAN-36 36% O ₂ , 68% N ₂ 165 EAN-36 36% O ₂ , 60% N ₂	146	Bio10M	i
148 Bio 20M 20% CH ₄ , 80% CO ₂ 149 Bio 25M 25% CH ₄ , 75% CO ₂ 150 Bio 30M 30% CH ₄ , 70% CO ₂ 151 Bio 35M 35% CH ₄ , 65% CO ₂ 152 Bio 40M 40% CH ₄ , 60% CO ₂ 153 Bio 45M 45% CH ₄ , 55% CO ₂ 154 Bio 50M 50% CH ₄ , 50% CO ₂ 155 Bio 50M 60% CH ₄ , 45% CO ₂ 156 Bio 60M 60% CH ₄ , 45% CO ₂ 157 Bio 65M 65% CH ₄ , 35% CO ₂ 158 Bio 70M 70% CH ₄ , 30% CO ₂ 159 Bio 75M 75% CH ₄ , 25% CO ₂ 160 Bio 80M 80% CH ₄ , 25% CO ₂ 161 Bio 85M 85% CH ₄ , 15% CO ₂ 162 Bio 90M 90% CH ₄ , 10% CO ₂ 163 Bio 95M 95% CH ₄ , 5% CO ₂ 164 EAN -32 32% O ₂ , 68% N ₂ 165 EAN -36 36% O ₂ , 60% N ₂	147	Bio15M	
149 Bio25M 25% CH ₄ , 75% CO ₂ 150 Bio30M 30% CH ₄ , 70% CO ₂ 151 Bio35M 35% CH ₄ , 65% CO ₂ 152 Bio40M 40% CH ₄ , 65% CO ₂ 153 Bio45M 45% CH ₄ , 55% CO ₂ 154 Bio50M 50% CH ₄ , 50% CO ₂ 155 Bio50M 55% CH ₄ , 45% CO ₂ 156 Bio60M 60% CH ₄ , 40% CO ₂ 157 Bio65M 65% CH ₄ , 35% CO ₂ 158 Bio70M 70% CH ₄ , 30% CO ₂ 159 Bio80M 80% CH ₄ , 25% CO ₂ 160 Bio80M 80% CH ₄ , 20% CO ₂ 161 Bio85M 85% CH ₄ , 15% CO ₂ 162 Bio90M 90% CH ₄ , 10% CO ₂ 163 Bio95M 95% CH ₄ , 5% CO ₂ 164 EAN-32 32% O ₂ , 68% N ₂ 165 EAN-36 36% O ₂ , 60% N ₂	148	Bio20M	
150	149	Bio25M	
151 Bio35M 35% CH ₄ , 65% CO ₂ 152 Bio40M 40% CH ₄ , 60% CO ₂ 153 Bio45M 45% CH ₄ , 55% CO ₂ 154 Bio50M 50% CH ₄ , 50% CO ₂ 155 Bio55M 55% CH ₄ , 45% CO ₂ 156 Bio60M 60% CH ₄ , 40% CO ₂ 157 Bio65M 65% CH ₄ , 35% CO ₂ 158 Bio70M 70% CH ₄ , 30% CO ₂ 159 Bio75M 75% CH ₄ , 25% CO ₂ 160 Bio80M 80% CH ₄ , 25% CO ₂ 161 Bio85M 85% CH ₄ , 15% CO ₂ 162 Bio90M 90% CH ₄ , 10% CO ₂ 163 Bio95M 95% CH ₄ , 5% CO ₂ 164 EAN-32 32% O ₂ , 68% N ₂ 165 EAN-36 36% O ₂ , 60% N ₂ 166 EAN-40 40% O ₂ , 60% N ₂	150	Bio30M	
152 Bio40M 40% CH ₄ , 60% CO ₂ 153 Bio45M 45% CH ₄ , 55% CO ₂ 154 Bio50M 50% CH ₄ , 50% CO ₂ 155 Bio55M 55% CH ₄ , 45% CO ₂ 156 Bio60M 60% CH ₄ , 40% CO ₂ 157 Bio65M 65% CH ₄ , 35% CO ₂ 158 Bio70M 70% CH ₄ , 30% CO ₂ 159 Bio75M 75% CH ₄ , 25% CO ₂ 160 Bio80M 80% CH ₄ , 25% CO ₂ 161 Bio85M 85% CH ₄ , 15% CO ₂ 162 Bio90M 90% CH ₄ , 10% CO ₂ 163 Bio95M 95% CH ₄ , 5% CO ₂ 164 EAN-32 32% O ₂ , 68% N ₂ 165 EAN-36 36% O ₂ , 60% N ₂ 166 EAN-40 40% O ₂ , 60% N ₂	151	Bio35M	
153 Bio45M 45% CH ₄ , 55% CO ₂ 154 Bio50M 50% CH ₄ , 50% CO ₂ 155 Bio55M 55% CH ₄ , 45% CO ₂ 156 Bio60M 60% CH ₄ , 45% CO ₂ 157 Bio65M 65% CH ₄ , 35% CO ₂ 158 Bio70M 70% CH ₄ , 30% CO ₂ 159 Bio80M 80% CH ₄ , 20% CO ₂ 160 Bio80M 80% CH ₄ , 20% CO ₂ 161 Bio95M 95% CH ₄ , 15% CO ₂ 162 Bio90M 90% CH ₄ , 10% CO ₂ 163 Bio95M 95% CH ₄ , 5% CO ₂ 164 EAN-32 32% O ₂ , 68% N ₂ 165 EAN-36 36% O ₂ , 60% N ₂ 166 EAN-40 40% O ₂ , 60% N ₂	152	Bio40M	
154 Bio50M 50% CH ₄ , 50% CO ₂ 155 Bio55M 55% CH ₄ , 45% CO ₂ 156 Bio60M 60% CH ₄ , 40% CO ₂ 157 Bio65M 65% CH ₄ , 35% CO ₂ 158 Bio70M 70% CH ₄ , 30% CO ₂ 159 Bio75M 75% CH ₄ , 25% CO ₂ 160 Bio80M 80% CH ₄ , 20% CO ₂ 161 Bio85M 85% CH ₄ , 15% CO ₂ 162 Bio90M 90% CH ₄ , 10% CO ₂ 163 Bio95M 95% CH ₄ , 5% CO ₂ 164 EAN-32 32% O ₂ , 68% N ₂ 165 EAN-36 36% O ₂ , 60% N ₂ 166 EAN-40 40% O ₂ , 60% N ₂	153	Bio45M	
155 Bio55M 55% CH ₄ , 45% CO ₂ 156 Bio60M 60% CH ₄ , 40% CO ₂ 157 Bio65M 65% CH ₄ , 35% CO ₂ 158 Bio70M 70% CH ₄ , 30% CO ₂ 159 Bio75M 75% CH ₄ , 25% CO ₂ 160 Bio80M 80% CH ₄ , 20% CO ₂ 161 Bio85M 85% CH ₄ , 15% CO ₂ 162 Bio90M 90% CH ₄ , 10% CO ₂ 163 Bio95M 95% CH ₄ , 5% CO ₂ 164 EAN-32 32% O ₂ , 68% N ₂ 165 EAN-36 36% O ₂ , 60% N ₂ 166 EAN-40 40% O ₂ , 60% N ₂	154	Bio50M	
156	155	Bio55M	55% CH ₄ , 45% CO ₂
158 Bio 70M 70% CH ₄ , 30% CO ₂ 159 Bio 75M 75% CH ₄ , 25% CO ₂ 160 Bio 80M 80% CH ₄ , 20% CO ₂ 161 Bio 85M 85% CH ₄ , 15% CO ₂ 162 Bio 90M 90% CH ₄ , 10% CO ₂ 163 Bio 95M 95% CH ₄ , 5% CO ₂ 164 EAN-32 32% O ₂ , 68% N ₂ 165 EAN-36 36% O ₂ , 60% N ₂ 166 EAN-40 40% O ₂ , 60% N ₂	156	Bio60M	60% CH ₄ , 40% CO ₂
158 Bio 70M 70% CH ₄ , 30% CO ₂ 159 Bio 75M 75% CH ₄ , 25% CO ₂ 160 Bio 80M 80% CH ₄ , 20% CO ₂ 161 Bio 85M 85% CH ₄ , 15% CO ₂ 162 Bio 90M 90% CH ₄ , 10% CO ₂ 163 Bio 95M 95% CH ₄ , 5% CO ₂ 164 EAN-32 32% O ₂ , 68% N ₂ 165 EAN-36 36% O ₂ , 60% N ₂ 166 EAN-40 40% O ₂ , 60% N ₂	157	Bio65M	
159 Bio75M 75% CH ₄ , 25% CO ₂ 160 Bio80M 80% CH ₄ , 20% CO ₂ 161 Bio85M 85% CH ₄ , 15% CO ₂ 162 Bio90M 90% CH ₄ , 10% CO ₂ 163 Bio95M 95% CH ₄ , 5% CO ₂ 164 EAN-32 32% O ₂ , 68% N ₂ 165 EAN-36 36% O ₂ , 64% N ₂ 166 EAN-40 40% O ₂ , 60% N ₂	158	Bio70M	
160 Bio80M 80% CH ₄ , 20% CO ₂ 161 Bio85M 85% CH ₄ , 15% CO ₂ 162 Bio90M 90% CH ₄ , 10% CO ₂ 163 Bio95M 95% CH ₄ , 5% CO ₂ 164 EAN-32 32% O ₂ , 68% N ₂ 165 EAN-36 36% O ₂ , 60% N ₂ 166 EAN-40 40% O ₂ , 60% N ₂	-	Bio75M	
161 Bio85M 85% CH ₄ , 15% CO ₂ 162 Bio90M 90% CH ₄ , 10% CO ₂ 163 Bio95M 95% CH ₄ , 5% CO ₂ 164 EAN-32 32% O ₂ , 68% N ₂ 165 EAN-36 36% O ₂ , 60% N ₂ 166 EAN-40 40% O ₂ , 60% N ₂	160	Bio80M	
162 Bio90M 90% CH ₄ , 10% CO ₂ 163 Bio95M 95% CH ₄ , 5% CO ₂ 164 EAN-32 32% O ₂ , 68% N ₂ 165 EAN-36 36% O ₃ , 64% N ₂ 166 EAN-40 40% O ₂ , 60% N ₂	161	Bio85M	
163 Bio95M 95% CH4, 5% CO2 164 EAN-32 32% O2, 68% N2 165 EAN-36 36% O2, 64% N2 166 EAN-40 40% O2, 60% N2	162	Bio90M	
164 EAN-32 32% O ₂ , 68% N ₂ 165 EAN-36 36% O ₂ , 64% N ₂ 166 EAN-40 40% O ₂ , 60% N ₂	163	Bio95M	
165 EAN-36 36% O ₂ , 64% N ₂ 166 EAN-40 40% O ₂ , 60% N ₂	164	EAN-32	
166 EAN-40 40% O ₂ , 60% N ₂	165	EAN-36	
	166	EAN-40	
1 1 1 27 1 1 1	167	HeOx20	20% O ₂ , 80% He

#	短名字	长名字	
168	HeOx21	21% O ₂ , 79% He	
169	HeOx30	30% O ₂ , 70% He	
170	HeOx40	40% O ₂ , 60% He	
171	HeOx50	50% O ₂ , 50% He	
172	HeOx60	60% O ₂ , 40% He	
173	HeOx80	80% O ₂ , 20% He	
174	HeOx99	99% O ₂ , 1% He	
175	EA-40	Enriched Air-40% O ₂	
176	EA-60	Enriched Air-60% O ₂	
177	EA-80	Enriched Air-80% O ₂	
178	Metab	Metabolic Exhalant (16% O ₂ , 78.04% N ₂ , 5% CO ₂ , 0.96% Ar)	
179	LG-4.5	4.5% CO ₂ , 13.5% N ₂ , 82% He	
180	LG-6	6% CO ₂ , 14% N ₂ , 80% He	
181	LG-7	7% CO ₂ , 14% N ₂ , 79% He	
182	LG-9	9% CO ₂ , 15% N ₂ , 76% He	
183	HeNe-9	9% Ne, 91% He	
184	LG-9.4	9.4% CO ₂ , 19.25% N ₂ , 71.35% He	
185	SynG-1	40% H ₂ , 29% CO, 20% CO ₂ , 11% CH ₄	
186	SynG-2	64% H ₂ , 28% CO, 1% CO ₂ , 7% CH ₄	
187	SynG-3	70% H ₂ , 4% CO, 25% CO ₂ , 1% CH ₄	
188	SynG-4	83% H ₂ , 14% CO, 3% CH ₄	
189	NatG-1	93% CH ₄ , 3% C ₂ H ₆ , 1%C ₃ H ₈ , 2% N ₂ , 1%CO ₂	
190	NatG-2	95% CH ₄ , 3% C ₂ H ₆ , 1% N ₂ , 1% CO ₂	
191	NatG-3	95.2% CH ₄ , 2.5% C ₂ H ₆ , 0.2% C ₃ H ₈ , 0.1% C ₄ H ₁₀ , 1.3% N ₂ , 0.7% CO ₂	
192	CoalG	50% H ₂ , 35% CH ₄ , 10% CO, 5% C ₂ H ₄	
193	Endo	75% H ₂ , 25% N ₂	
194	ННО	66.67% H ₂ , 33.33% O ₂	
195	HD-5	LPG: 96.1% C ₃ H ₈ , 1.5% C ₂ H ₆ , 0.4% C ₃ H ₆ , 1.9% n-C ₄ H ₁₀	
196	HD-10	LPG: 85% C ₃ H ₈ , 10%C ₃ H ₆ , 5% n-C ₄ H ₁₀	
197	OCG-89	89% O ₂ , 7% N ₂ , 4% Ar	
198	OCG-93	93% O ₂ , 3% N ₂ , 4% Ar	
199	OCG-95	95% O ₂ , 1% N2, 4% Ar	
200	FG-1	2.5% O ₂ , 10.8% CO ₂ , 85.7% N ₂ , 1% Ar	
201	FG-2	2.9% O ₂ , 14% CO ₂ , 82.1% N ₂ , 1% Ar	
202	FG-3	3.7% O ₂ , 15% CO ₂ , 80.3% N ₂ , 1% Ar	
203	FG-4	7% O ₂ , 12% CO ₂ , 80% N ₂ , 1% Ar	
204	FG-5	10% O ₂ , 9.5% CO ₂ , 79.5% N ₂ , 1% Ar	
205	FG-6	13% O ₂ , 7% CO ₂ , 79% N ₂ , 1% Ar	
206	P-10	10% CH ₄ 90% Ar	
210	D-2	Deuterium	
	7.7.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1		

① 仅用于耐腐蚀型设备。

