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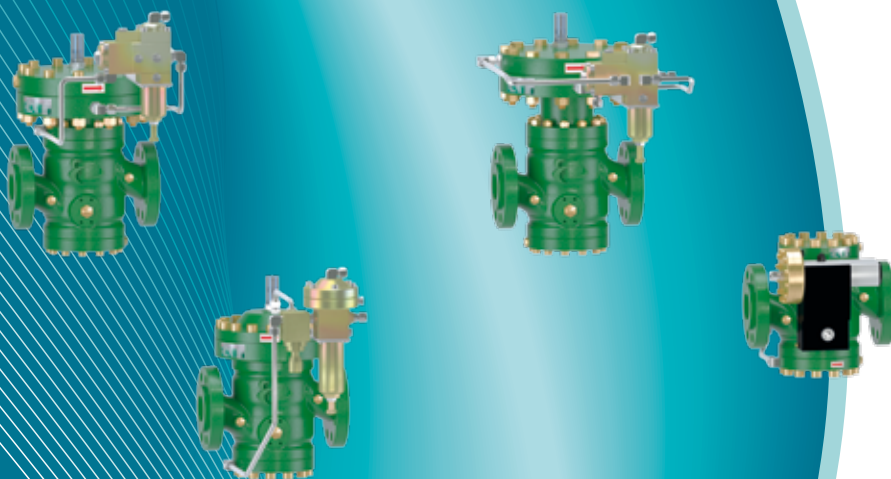


TA-956

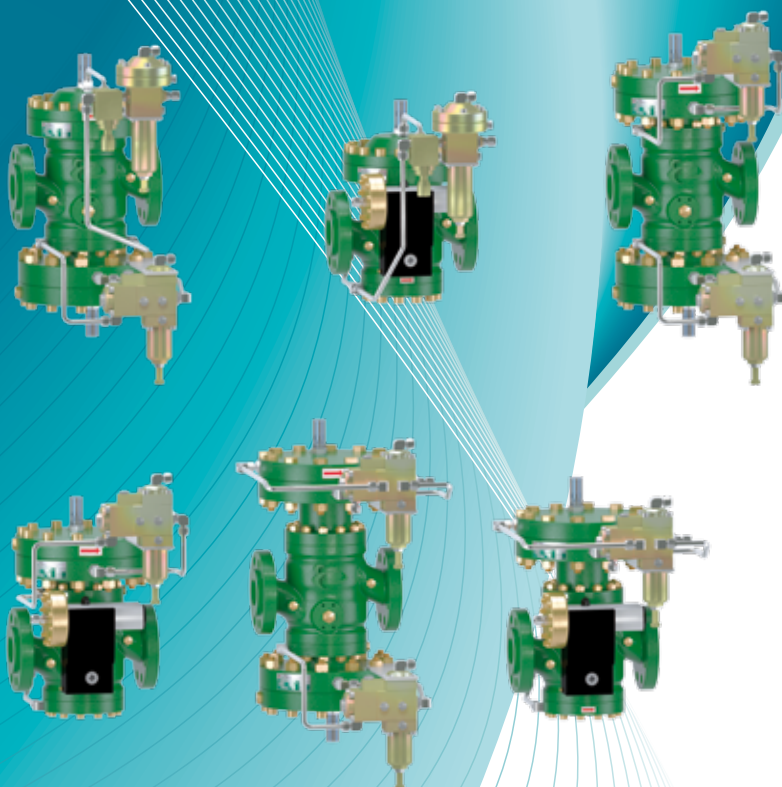
Triple function



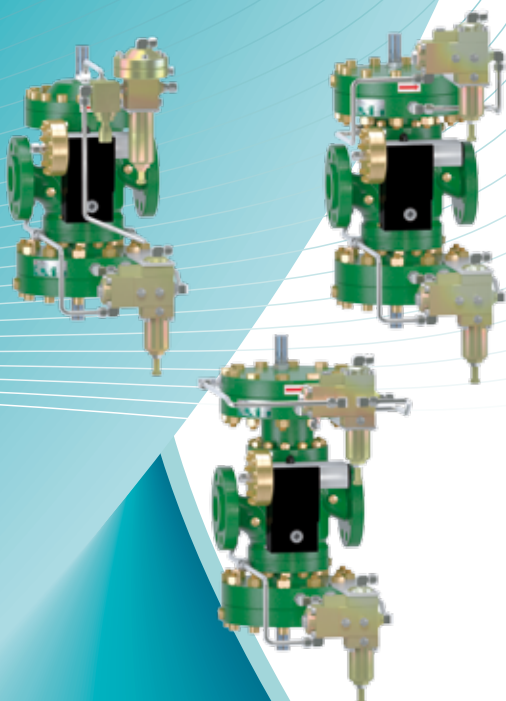
SINGLE FUNCTION



DOUBLE FUNCTION



TRIPLE FUNCTION



TA-956
Triple function

Product's range

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TA-956 FAMILY

The TA956 family of pressure regulators and SSV comprises single function units, double function and triple function units.

The modular design in which a single body is capable of accepting up to three separate functions with separate sensing lines, pilots actuators, internal control valves and seats is a peculiar characteristic of TA956 family.

This feature (of three optional integrated independent functions in one body) allows the best possible use of space due to an exceptionally compact configuration.

The modular design allows any installed units, to be updated or upgraded during the entire lifetime of the regulator as the operating requirements or any changes in customers specifications are modified.

TA956 pressure regulators are top entry design, this allow for ease and cost effective maintenance without dismantling regulator body from the line



APPLICATION

The modular design allows a wide variety of configurations to suit the most demanding applications in gas transmission, gas supply to industrial power plant, city gates, distribution utility systems, industry installations ,etc.

TA956 pressure regulators and SSV are designed to be used with non corrosive and filtered natural gas.

Upon request other gases and different process conditions may be acceptable with specific choice of materials.

TA956 DFO+FC+SSV, FC+FC+SSV, MFO+FC+SSV are Pilot operated triple function gas pressure regulators

with built in safety shutoff valve and with diaphragm or sleeve-piston type regulator operation (fail open or fail close types) suitable for high, medium, and low pressure applications.

TA956 pressure regulators are CE marked in accordance with the following standards:

- Pressure Equipment Directive (PED) 2014/68/EU
- DIN EN 334 (01 .07.2009)
- DIN EN 14382 (01.07.2009)

Product Identification Number: CE-0085CO0164



TA-956 FC & SSV DN200 ANSI 600
Customer: BEMCO Project: Marib, Yemen

TECHNICAL SPECIFICATIONS TA-956 TRIPLE FUNCTION

Max. inlet pressure pumax	100 bar			
Outlet pressure range Wd	0.005 to 74 bar			
Pressure difference between inlet and outlet	Δpmin= 0.5 bar; Δpmax= 100 bar			
Nominal diameter and CG value	1" (DN 25)		CG up to 580	
	2" (DN 50)		CG up to 2300	
	3" (DN 80)		CG up to 4700	
	4" (DN 100)		CG up to 8400	
	6" (DN 150)		CG up to 16600	
	8" (DN 200)		CG up to 28500	
	10" (DN 250)		CG up to 46000	
	12" (DN 300)		CG up to 66300	
Type of connection	Flanges ANSI 150, ANSI 300, ANSI 600 (PN 16,25,40,100 on request)			
Accuracy class and closing pressure category	up to 1% depending on size and pressure range			
	with Pilot	Outlet pressure range Wd	Accuracy class	Closing pressure category
	TA-989FC	41 ... 74 bar	AC 1 %	SG 5%
	TA-981FCHP	20 ... 60 bar	AC 1 %	SG 5%
	TA-981FC	0.8 ... 43 bar	AC up to 1%	SG up to 2.5%
	TA-981FCR	0.3 ... 1.2 bar	AC 20 %	SG 2.5%
	TA-982FC	0.005 ... 0.58 bar	AC 20 %	SG 2.5%
	TA-983 FO	7 ... 60 bar	AC 1 %	SG 5%
	TA-984 FO	0.8 ... 9.5 bar	AC up to 1%	SG 2.5%
	TA-985 FO	0.1 ... 1.2 bar	AC up to 10%	SG 2.5%
	TA-986 FO	0.005 ... 0.1 bar	AC 20 %	SG 2.5%
	TA-988 FO	41 ... 74 bar	AC 1%	SG 5%
	TA-987 FOHP	20 ... 60 bar	AC 1%	SG 5%
TA-987 FO	1 ... 33 bar	ACup to 1%	SG up to 2.5%	
Lock Up pressure category	SZ 2.5 %			
Operational temperature range	-20 °C to +60 °C (-40°C to +60°C available on request)			
Operation and strength according to	EN 334, EN 14382, PED 2014/68/EU, ANSI B16.5, ANSI B16.34			
CE mark according to PED	CE 0085			
EAC mark	EurAsian Conformity EAC			
SIL Safety integrity level	SIL 3 - TA-956 SSV (FC/DFO/MFO+SSV)			
EX protection	Since the device is not fitted with potential ignition sources of its own, it is not subject to ATEX 95 regulations (all used electronic accessories meet ATEX requirements).			
Pilots accessories	Pneumatic remote set point			
	Flow limitation with Client provided flow rate signal			

MATERIALS

Body	ASTM A216 WCB, (ASTM A352 LCC on request)
Diaphragm housing	ASTM A105, SAE1020, ASTM A216 WCB, (ASTM A352LCC or LF2 on request)
Covers	ASTM A105; SAE1020 (ASTM A352 LCC or LF2 on request)
Valve	ASTM A 182 F6 / A105 zinc pltd, (A 350 LF2 ENP on request)
Seat	ASTM A182 F6 Cl.2 + Bonded Nitrile Rubber
Diaphragms	Nitrile rubber with nylon fabric
Seals	Nitrile (NBR) or fluoroelastomer (FKM)
Pilot	Aluminium
SSV device	Steel, Brass, Alluminium

PILOTS 980 SPRING TABLE

PILOT	Pilot Spring			Pressure	
	Nr	Code	Color	Min. [bar]	Max. [bar]
TA-982FC	1521	0000000000431	Pink	0.005	0.013
TA-982FC	1522	0000000000432	Brown	0.012	0.030
TA-982FC	1523	0000000000433	Aluminium	0.028	0.055
TA-982FC	1524	0000000000434	Orange	0.040	0.085
TA-982FC	1501	0000000000403	White	0.069	0.180
TA-982FC	1502	0000000000404	Green	0.150	0.358
TA-982FC	1525	0000000000435	Lilac	0.350	0.580
TA-981FC-R	1501	0000000000403	White	0.300	1.200
TA-981FC	1502	0000000000404	Green	0.800	2.800
TA-981FC	1503	0000000000405	Yellow	1.500	7.000
TA-981FC	1504	0000000000406	L.Blue	4.000	14.000
TA-981FC	1505	0000000000406	Blue	8.000	20.000
TA-981FC	1506	0000000000416	Red	15.000	33.000
TA-981FC	1507	0000000000417	Black	22.000	43.000
TA-981FCHP	1514	0000000000424	Black	20.000	30.000
TA-981FCHP	1515	0000000000425	Pink	30.000	44.000
TA-981FCHP	1516	0000000000426	Brown	44.000	60.000
TA-989FC	1516	0000000000426	Brown	41.000	74.000
TA-983FO	1511	0000000000421	L.Blue	7.000	12.000
TA-983FO	1512	0000000000422	Blue	10.000	17.000
TA-983FO	1513	0000000000423	Red	15.000	25.000
TA-983FO	1514	0000000000424	Black	20.000	35.000
TA-983FO	1515	0000000000425	Pink	30.000	45.000
TA-983FO	1516	0000000000426	Brown	40.000	60.000
TA-984FO	1508	0000000000418	White	0.800	1.300
TA-984FO	1509	0000000000419	Green	1.200	2.100
TA-984FO	1510	0000000000420	Yellow	2.000	3.300
TA-984FO	1511	0000000000421	L.Blue	3.000	4.800
TA-984FO	1512	0000000000422	Blue	4.500	7.000
TA-984FO	1513	0000000000423	Red	6.000	9.500
TA-985FO	1501	0000000000403	White	0.100	0.310
TA-985FO	1502	0000000000404	Green	0.280	0.650
TA-985FO	1525	0000000000435	Lilac	0.640	1.040
TA-985FO	1504	0000000000406	L.Blue	0.800	1.200
TA-986FO	1521	0000000000431	Pink	0.005	0.013
TA-986FO	1522	0000000000432	Brown	0.012	0.030
TA-986FO	1523	0000000000433	Aluminium	0.028	0.055
TA-986FO	1524	0000000000434	Orange	0.040	0.085
TA-986FO	1501	0000000000403	White	0.069	0.100
TA-987FO	1508	0000000000418	White	1.000	3.200
TA-987FO	1509	0000000000419	Green	3.200	5.200
TA-987FO	1510	0000000000420	Yellow	5.200	8.200
TA-987FO	1511	0000000000421	L.Blue	8.200	17.000
TA-987FO	1512	0000000000422	Blue	12.000	25.000
TA-987FO	1513	0000000000423	Red	17.000	26.000
TA-987FO	1514	0000000000424	Black	25.000	33.000
TA-987FOHP	1514	0000000000424	Black	20.000	30.000
TA-987FOHP	1515	0000000000425	Pink	30.000	44.000
TA-987FOHP	1516	0000000000426	Brown	44.000	60.000
TA-988FO	1516	0000000000426	Brown	41.000	74.000

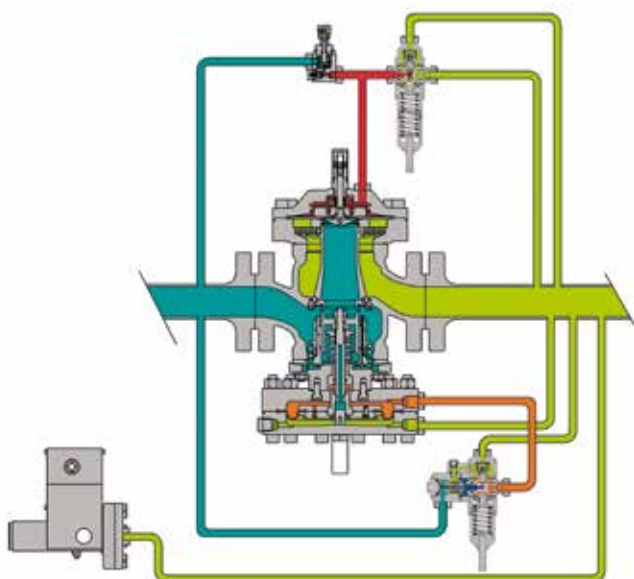
TA-956 TRIPLE FUNCTION OPERATING PRINCIPLES

The description of the operating principle of regulators FC, DFO, MFO and SSV can be found in the single function unit catalogues.

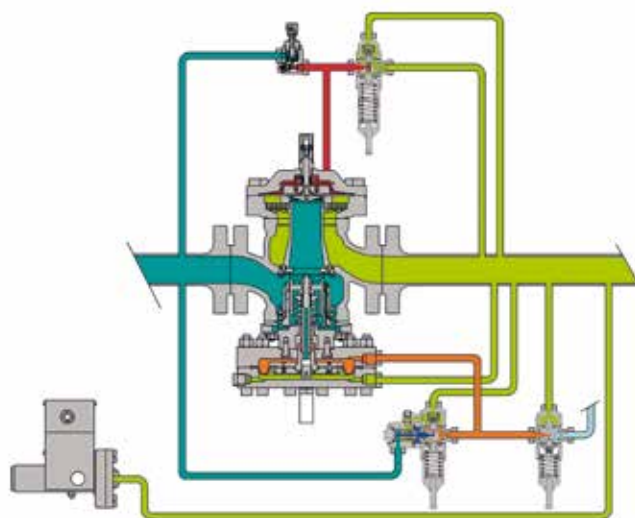
Here below are described the combinations in triple function.

TA-956 DFO+FC+SSV

This configuration utilises a fail open active regulator (diaphragm control type), a fail close Monitor (sleeve – piston type operation) and Safety Shutoff Valve.

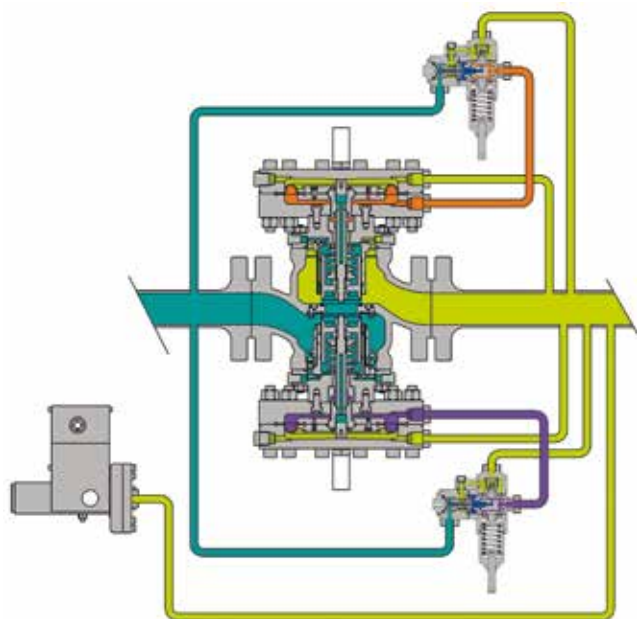


TA-956 DFO+FC+SSV+QEV



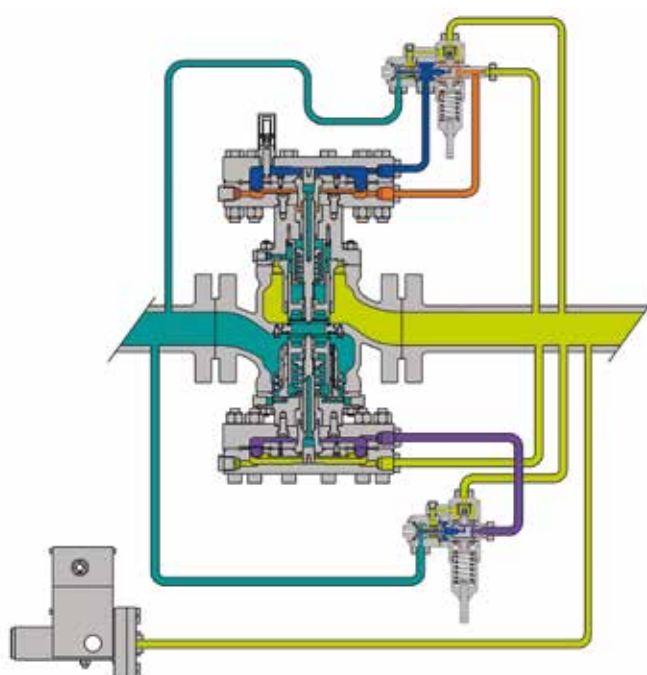
TA-956 FC+FC+SSV

This configuration utilises fail close active and monitor regulators (both are sleeve – piston type operation) and Safety Shutoff Valve.

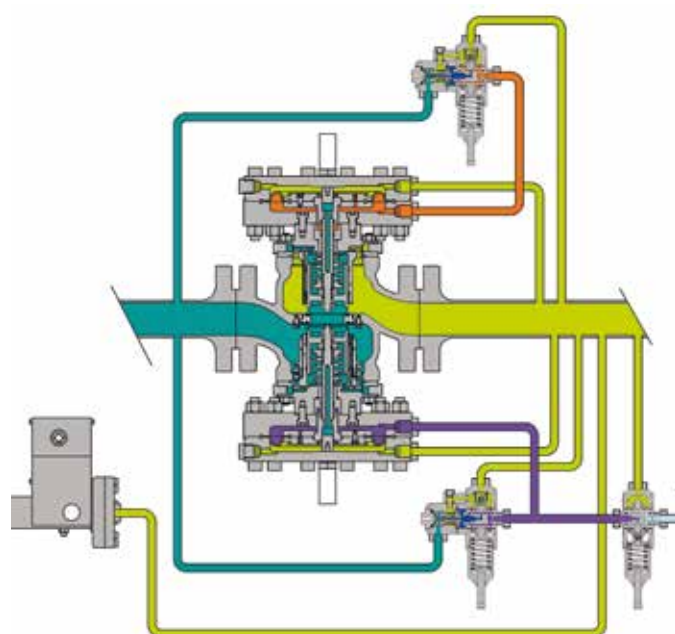


TA-956 MFO+FC+SSV

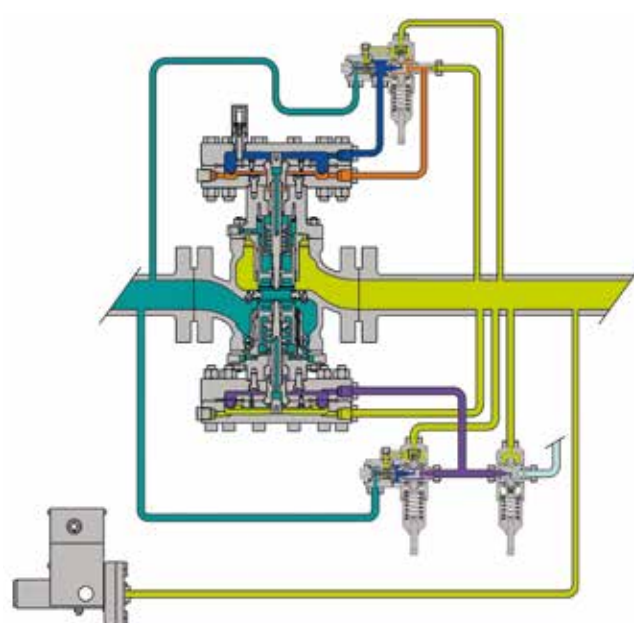
This configuration utilises fail open active and fail close monitor regulators (both are sleeve – piston type operation) and Safety Shutoff Valve.



TA-956 FC+FC+SSV+QEV

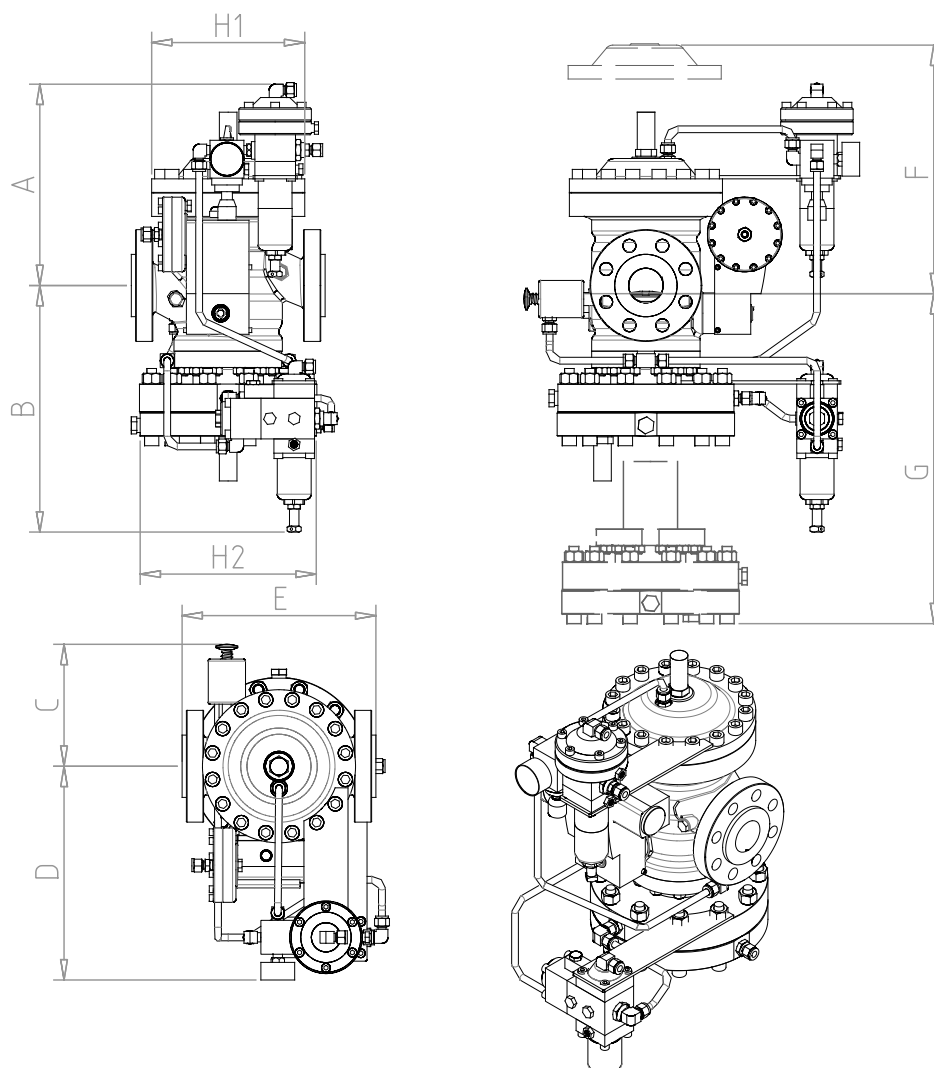


TA-956 MFO+FC+SSV+QEV



DIMENSIONS

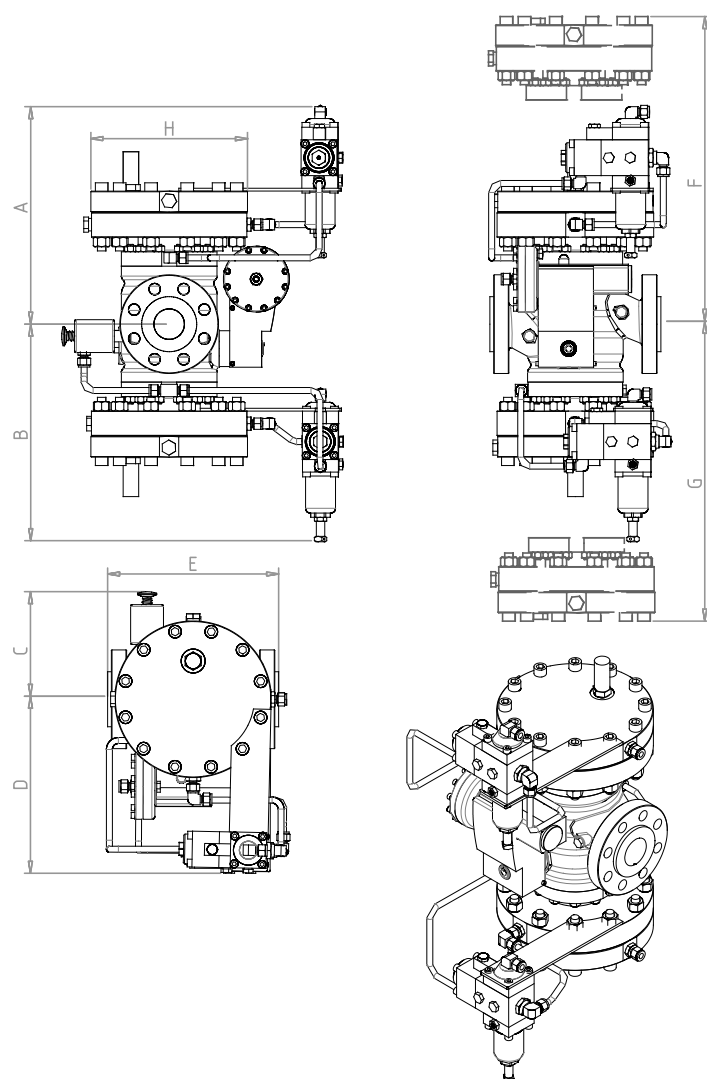
TA-956 DFO+FC+SSV



Note: Picture shows the configuration with flow from left to right (Right), opposite configuration (Left) available on request.

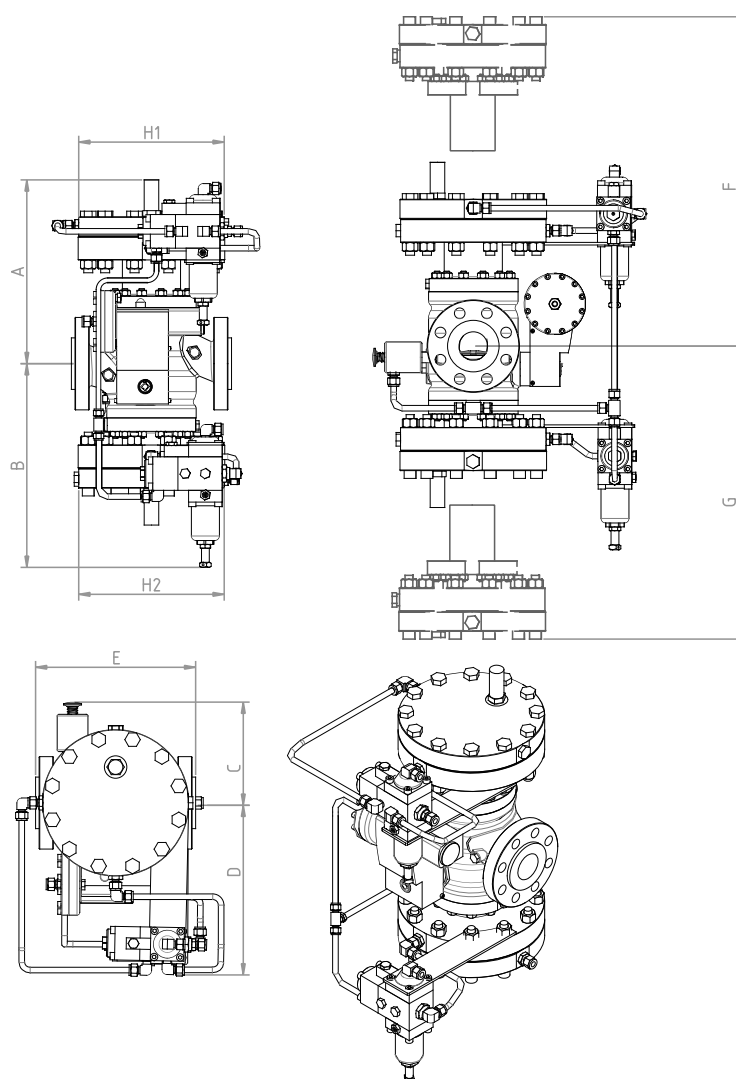
DIMENSIONS [mm] & WEIGHT [kg] TA-956 DFO+FC+SSV

DN	Class	A	B	C	D	H1	H2	E	F	G	WEIGHT
25 (1")	#150	270	360	180	330	180	345	184	310	380	67
	#300			190	310		205	197			71
	#600							210			72
50 (2")	#150	300	400	170	330	225	345	254	350	440	98
	#300			180	320		265	267			100
	#600							286			102
80 (3")	#150	335	430	280	440	270	545	298	400	520	180
	#300			230	350		335	318			162
	#600							337			163
100 (4")	#150	370	400	280	350	315	545	352	480	590	206
	#300		450	250			400	368			229
	#600							394			235
150 (6")	#150	485	530	270	430	405	530	451	650	800	391
	#300			300				473			489
	#600										508
200 (8")	#150	605	700	330	490	520	650	543	900	1100	846
	#300			340				568			1058
	#600							610			1095
250 (10")	#150	700	810	400	500	625	650	673	980	1200	2015
	#300							708			2315
	#600							752			2344



DIMENSIONS [mm] & WEIGHT [kg] TA-956 FC+FC+SSV

DN	Class	A	B	C	D	H	E	F	G	WEIGHT
25 (1")	#150	320	360	180	330	345	184	380	380	74
	#300			190	280	205	197			76
	#600			190	280	205	210			78
50 (2")	#150	370	400	170	330	345	254	440	440	113
	#300			180	290	265	267			117
	#600			180	290	265	286			120
80 (3")	#150	400	430	280	430	545	298	520	520	251
	#300	420		230	320	335	318			191
	#600	420		230	320	335	337			192
100 (4")	#150	435	400	280	320	545	352	590	590	282
	#300	455	450	250	370	400	368			302
	#600	455	450	250	370	400	394			309
150 (6")	#150	580	530	270	430	530	451	800	800	500
	#300			300			473			588
	#600			300			508			604
200 (8")	#150	750	700	330	490	650	543	1100	1100	1147
	#300			340			568			1361
	#600			340			610			1399
250 (10")	#150	860	810	400	490	650	673	1200	1200	2925
	#300						708			3220
	#600						752			3275



DIMENSIONS [mm] & WEIGHT [kg] TA-956 MFO+FC+SSV

DN	Class	A	B	C	D	H1	H2	E	F	G	WEIGHT
25 (1")	#150	360	360	180	330	205	345	184	410	380	75
	#300			190	280		205	197			77
	#600							210			79
50 (2")	#150	340	400	170	330	265	345	254	480	440	115
	#300			180	290		265	267			119
	#600							286			122
80 (3")	#150	400	430	280	430	335	545	298	550	520	254
	#300			230	320		335	318			194
	#600							337			195
100 (4")	#150	440	400	280	320	400	545	352	620	590	287
	#300		450	250	370		400	368			307
	#600							394			314
150 (6")	#150	590	530	270	430	530	530	451	850	800	508
	#300			300				473			596
	#600							508			612
200 (8")	#150	760	700	330	490	650	650	543	1200	1100	1157
	#300			340				568			1371
	#600							610			1409
250 (10")	#150	860	810	400	490	650	650	673	1280	1200	2937
	#300							708			3232
	#600							752			3291

TA-956 FC and MFO DN150 ANSI 600
Customer: Ivalsa Project in Sipco Bangkok, Thailand



TA-956 DFO+FC+SSV DN50 ANSI 300
Customer: Ecogas Project in Cordoba, Argentina

FEATURES

- Body specifically designed for high capacity with low noise generation;
- Completely self operated using the inlet gas pressure energy;
- Fully balanced control valve;
- Extremely high rangeability ;
- Suitable for high pressure reduction applications;
- Local position indicator with magnetic drive, no possibility of leakage to atmosphere;
- Available with internal silencer;
- Available with Open/Close limit switch suitable for classified area installation;
- Available with 4-20 mA position transmitter with magnetic drive suitable for classified area installation;
- Available in double and triple function configurations with built in monitor and/or SSV.

MONITOR USE

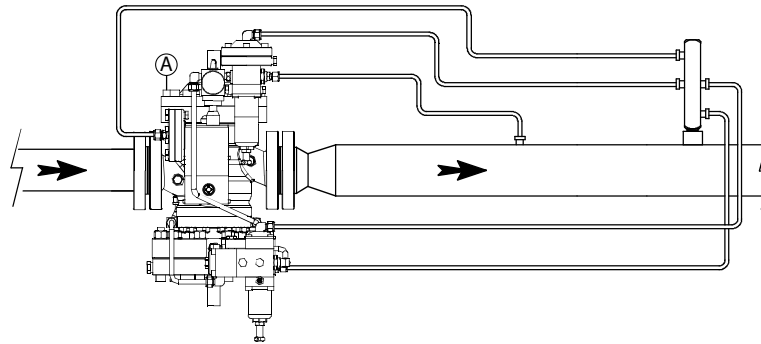
The TA956FC is classified as PED Category IV as a stand-alone safety accessory According to Pressure Equipment Directive (PED) 2014/68/EU. This means that a stand-alone TA956FC is capable not only of regulating downstream pressure, but also protecting downstream piping from high pressure.

When a 956FC pressure regulator is installed as a “Wide Open Monitor” it shall be equipped with a Quick Exhaust Valve (TA981QEV, TA982QEV) to retain the Category IV classification as safety accessory (to speed up the response when it comes into operation).

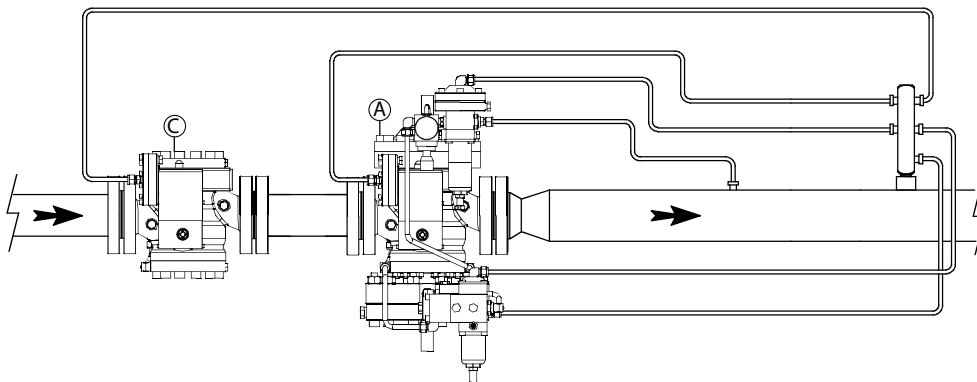
Use of the Quick Exhaust Valve is not necessary when the monitor configuration is of the “Operating Monitor” Type.



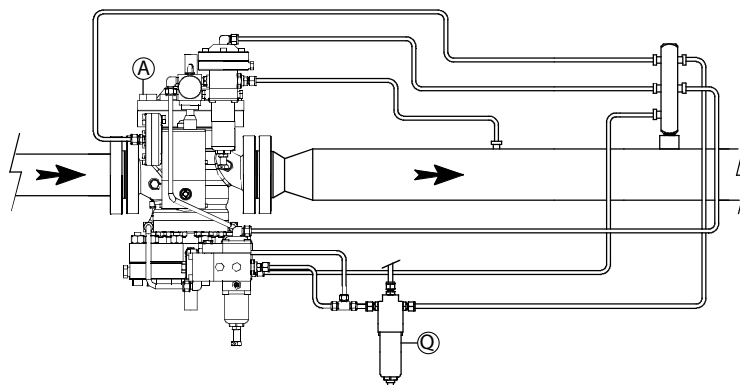
INSTALLATION SCHEMATICS



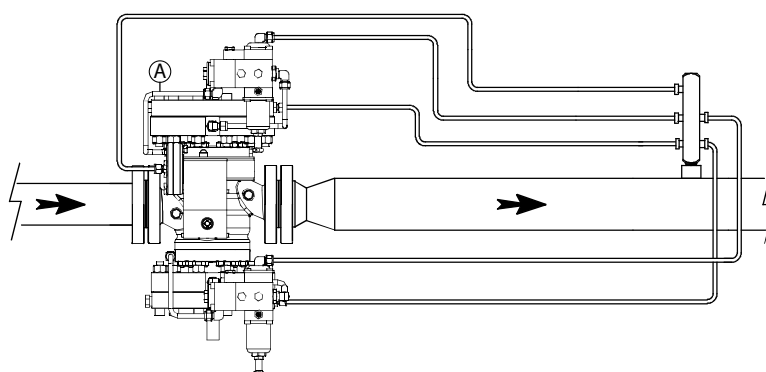
A - TA956 DFO+FC+SSV TRIPLE FUNCTION REGULATOR



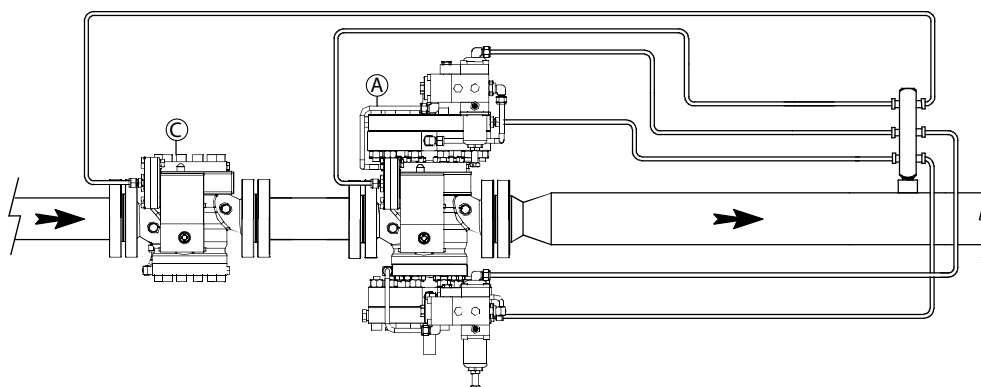
A - TA956 DFO+FC+SSV TRIPLE FUNCTION REGULATOR
C - TA956 SSV SAFETY SHUTOFF VALVE



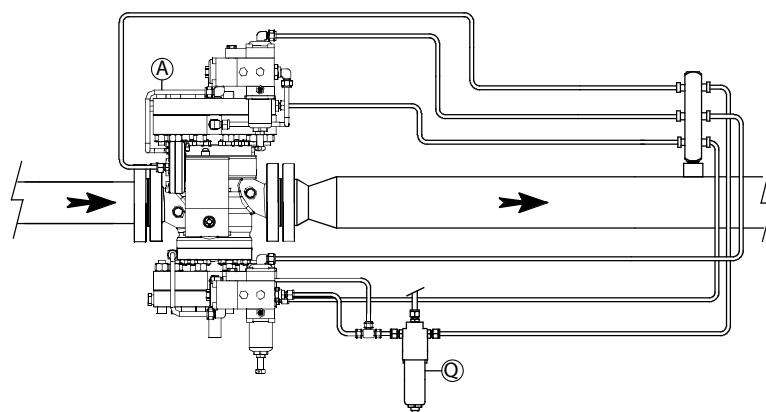
A - TA956 DFO+FC+SSV TRIPLE FUNCTION REGULATOR
Q - QUICK EXHAUST VALVE



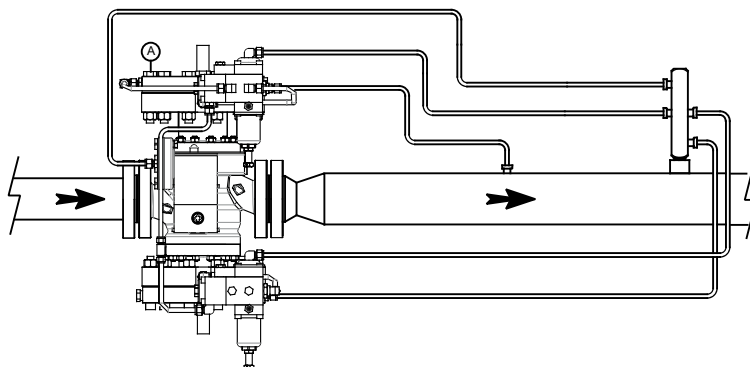
A - TA956 FC+FC+SSV TRIPLE FUNCTION REGULATOR



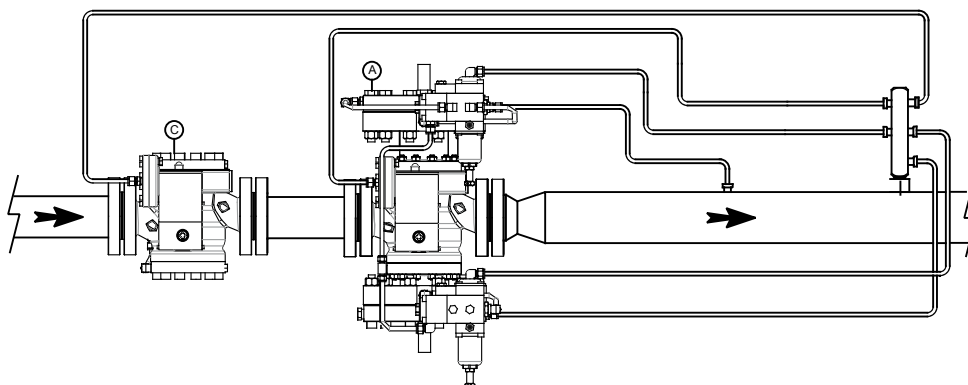
A - TA956 FC+FC+SSV TRIPLE FUNCTION REGULATOR
C - TA956 SSV SAFETY SHUTOFF VALVE



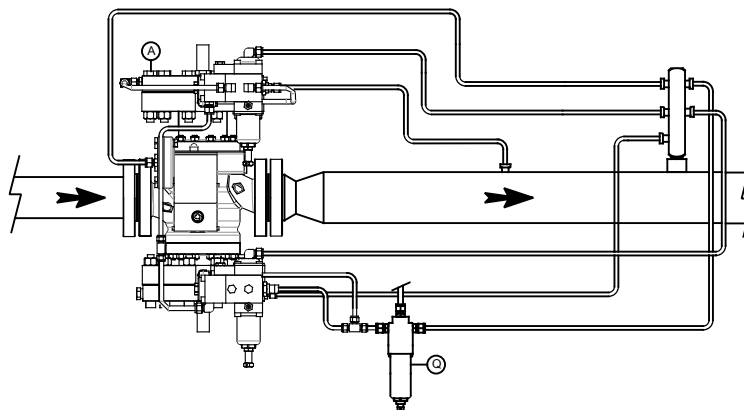
A - TA956 FC+FC+SSV TRIPLE FUNCTION REGULATOR
Q - QUICK EXHAUST VALVE



A - TA956 MFO+FC+SSV TRIPLE FUNCTION REGULATOR



A - TA956 MFO+FC+SSV TRIPLE FUNCTION REGULATOR
C - TA956 SSV SAFETY SHUTOFF VALVE



A - TA956 MFO+FC+SSV TRIPLE FUNCTION REGULATOR
Q - QUICK EXHAUST VALVE

TA-956 DFO+FC+SSV DN80 ANSI 600
Customer: EMGASUD Project in Buenos Aires, Argentina



Tranfer de Montevideo, Uruguay

SIZING

Sizing of gas pressure regulator involves establishing if the installed C_g is higher than the required C_g and if the outlet velocity of gas at regulator outlet flange is within the required limits.

The following units shall be used in the below formulas:

- Q = Flow Rate [Sm^3/h] (Reference conditions $T=15^\circ\text{C}$, $P=1$ barg)
- P_u = Upstream Pressure [bar g]
- P_d = Downstream (Controlled) Pressure [bar g]
- P_b = Atmospheric Pressure [bar]
- d = Gas Density Relative to Air
- t_u = Upstream Temperature [$^\circ\text{C}$]
- DN = Regulator Outlet Nominal Diameter [mm]
- v = Gas Velocity at Outlet Flange [m/s]
- ΔP = Pressure drop across SSV [bar]

According to the ratio of inlet to outlet pressure there are two cases using different formulas.

a) Sub Critical Flow Conditions

$$(P_u - P_d) \leq 0.5 (P_u + P_b)$$

Required C_g is calculated with the following formula.

$$C_g = \frac{Q}{13.57} \sqrt{\frac{d(t_u + 273)}{(P_d + P_b)(P_u - P_d)}}$$

b) Critical Flow Conditions

$$(P_u - P_d) > 0.5 (P_u + P_b)$$

Required C_g is calculated with the following formula.

$$C_g = \frac{2Q}{13.57 (P_u + P_b)} \sqrt{d(t_u + 273)}$$

CG TA-956 TRIPLE FUNCTION

Class	DN25	DN50	DN80	DN100	DN150	DN200	DN250	DN300
Cg jusqu'à	580	2300	4700	8400	16600	28500	46000	66300

In case of gases different from $d=0.61$ Natural Gas a correction factor F shall be used in the value of the Flow Rate Q used in the above formulas.

The Flow Rate to be used shall be $Q'=Q/F$.

F is taken from the following table.

Gas conversion table

Gas	Relative Density [d]	Coefficient [f]
Air	1	0.78
City Gas	0.44	1.17
Butane	2.01	0.55
Propane	1.53	0.63
Nitrogen	0.97	0.79
Carbon Dioxide	1.52	0.63
Hydrogen	0.07	3

Velocity of gas at regulator outlet flange shall be calculated using the following formula:

$$V = \frac{345.92 Q (1-0.002 P_d)}{DN^2(P_d+P_b)}$$

Allowable velocity:

Downstream Pressure P_d [bar g]	Maximum Allowable Velocity v [m/s]
1	250
3	230
5	200
10 and higher	150

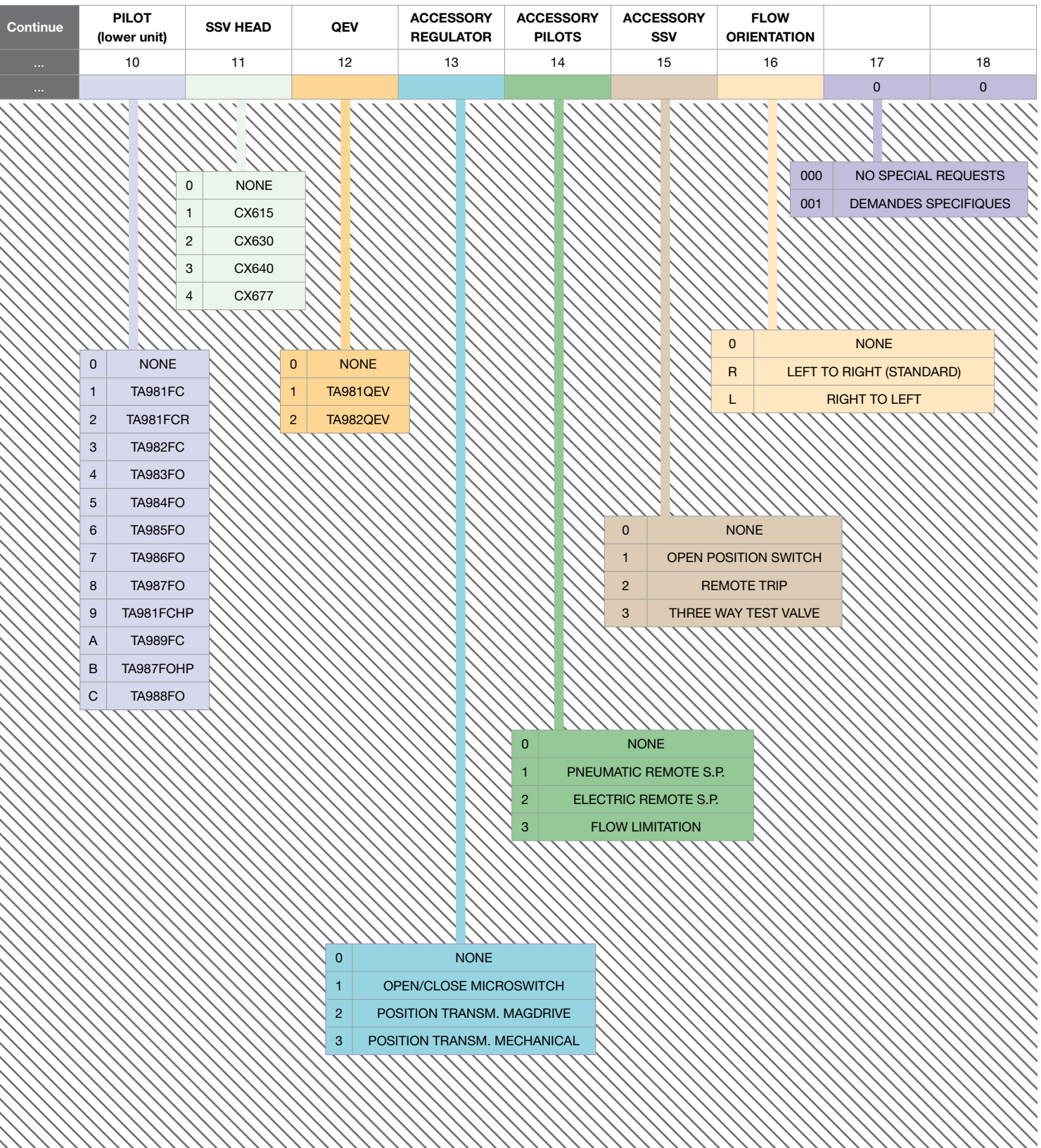
Interpolation may be used for intermediate values.

TA956 TRIPLE PART NUMBERING

Progressive Part Numbering

FIXED			MODEL	CLASS/ FLANGES	SIZE	MATERIALS	SILENCER	PILOT (upper unit)	Continue																																													
1	2	3	4	5	6	7	8	9	...																																													
9	5	6							...																																													
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