

VR46../VR86.. series

COMPACT AUTOMATIC COMBINATION GAS CONTROLS

PRODUCT HANDBOOK



APPLICATION

The Compact Automatic has been specially developed for application in domestic central heating boilers, warm air furnaces or water heater gas appliances.

The Compact Automatic is used in a system context in conjunction with either a direct spark ignition (DSI), intermittent pilot (IP) or Hot Surface Ignition control module and associated devices to provide programmed safe light-up and supervision of the main burner of an appliance.

CONTENTS

General

Description	3
Feature	4

Technical

Specifications	5
Capacity	6
Capacity curve C90	8
Capacity curve C100	9
Capacity curve C110	10
Capacity curve C120	11
Capacity curve C130	12
Capacity curve C170	13
Capacity curve C200	14
Capacity curve C210	15
Capacity curve C220	16
Capacity curve C230	17
Capacity curve C240	18
Capacity curve C250	19
Capacity curve C260	20
Capacity curve C270	21
Capacity curve F20	22
Capacity curve F30	23
Capacity curve F40	24
Capacity curve F50	25
Electrical data low voltage	26
Electrical data line voltage	27
Performance characteristics	28
Dimensional drawing VR46../VR86..A/C, AB/CB	30
Dimensional drawing VR46../VR86..B/D	31
Dimensional drawing VR46../VR86..A/C, AA/CA, AB/CB, VA	32
Dimensional drawing VR46../VR86..E/T, EA/TA	33

Installation

Installation	34
Adjustments and final checkout	35
Construction and working principles	36

Various

Quality assurance statement	39
Approvals and standards	40
Ordering information	41

DESCRIPTION

Compact Automatic combination gas controls perform all the functions required to safely regulate gas flow to the pilot burner and the main burner of domestic central heating equipment, warm air furnaces, back boilers and water heaters.

Compact Automatic combination gas controls comprise a standard body to which a range of sub-assemblies are factory fitted to give various system options. This makes boiler system design much easier as technical specifications and unit dimensions are the same for all system options. Options include servo pressure regulation, throttle valve, (switchable) softlite, electrical high-low control and electrical or mechanical modulation for the complete range of control applications.

Compact Automatic combination gas controls are available in line or low voltage versions and in three capacity ratings for total system versatility. Customer specific voltage models are also offered

Compact Automatic combination gas control consist of a first direct electric on/off operator for opening the safety valve of class A or class B according to EN 161 and a second electric on/off servo operator valve for opening the main valve of class B, C or class D according to EN 161 and comply with the additional requirement of D' valves according to EN 297.

Compact Automatic combination gas controls are rated for gas families MFD Group A (G 110), MFD Group B (G 120), Natural H (G 20), Natural L (G 25) and LP (G 30).

All measurements are carried out under standard conditions, unless otherwise is indicated.

Standard conditions

- P_{inlet} 25 mbar nominal pressure, dry air of 20 °C
- $P_{ambient}$ 1013 mbar
- $T_{ambient}$ 20 °C
- Outlet orifice 2.8 mm
- Flow indication in m^3/h
- Recording of outlet pressure with a transducer connected to a $1/2"$ pipe with a length of 10 d with a short hose at 5 d.
- Nominal voltage
- Upright position, i.e. the position when the operators are on top.

FEATURES

General

- Specially designed for use with gas appliances with a DSI, HSI or IP system to light the main burner.
- Incorporates time proven design concepts assuring reliability.
- ON/OFF control of main burner by electric on/off operator and electric on/off servo operator.
- At inlet side an internal fine mesh screen is incorporated in the Compact Automatic. This screen is not intended to be removable for cleaning. When flanges are used, removable screens can be placed between the flanges and the Compact Automatic.
- Outlet screen (optional).
- Various closing force models are available: B + B, B + D, B + C, A + D and A + C.
- All adjustments are located on the top of the Compact Automatic.
- 9 mm outer diameter pressure tap at inlet and outlet side for checking and adjusting burner pressure.
- A wrench boss is incorporated at the inlet side of the Compact Automatic for pipe fitting.
- Compact Automatic mounting orientation may be within 90° in any direction from the electric on/off operator upright position.
- Two threaded mounting holes are at the bottom of the Compact Automatic for rigid attachment to the appliance.
- Main valve on/off servo operator with DIN faced electrical connection has two threaded holes at the top for mounting purposes (e.g. cover).
- High, medium and low capacity models are available.
- Main valve on/off servo operator employs DIN face electrical connection which are also suitable for AMP connections.
- The coil of the electric on/off operator is field replaceable and can also be positioned in other directions for better accessibility.

Gas connection options

- Inlet and outlet connections are straight through and threaded (standard model).

- Inlet and outlet connections can receive flanges.
- Side outlet options are available for both main and pilot gas.
- The pilot gas connection for using break away connectors for various O.D. tubing is located at the outlet end of the Compact Automatic (standard model).
- The pilot gas side outlet and special end outlet are suitable for manifold connections.
- High capacity model has straight through inlet and outlet with Ø 23 mm bore.

Electrical connection options

- Both top face and bottom face AMP electrical connection on electric on/off operator are available.
- Single plugs are available with cable and strain relief in several versions (IP 40)
- Separate plugs on first and second electric on/off operator are available (IP 40).
- IP 44 connection by means of two DIN connectors is possible.
- Quick connect 6,3 mm fastons on both coils can be applied in combination with single cover or separate covers with strain relief.
- Line voltage on/off servo operators are provided with a ground screw and washer.

Functional options

- Servo pressure regulator provides stable outlet pressure.
- Pressure feedback ensures constant burner pressure(optional).
- A throttle valve version is available, where unregulated valves may be employed.
- Softlite option to facilitate a smooth light up of burners.
- Switchable softlite option for changing over from one gas to another and vice versa.
- Electrical or mechanical modulation.
- Electrical High-Low control.
- Incorporated pilot filter (optional).
- Pilot outlet for IP system.
- Suitable for use with Gas/Air ratio components.

SPECIFICATIONS

NOTE: Specifications for electrical modulation, mechanical modulation, electrical high low, switchable softlite and other features are available on request.

Models

See model number chart on page 41

Pipe sizes

- Inlet and outlet 1/2" ISO 7/1 internal parallel pipe thread.
- Inlet 18,6 mm dia and outlet 1/2" ISO 7/1 internal parallel pipe thread
- Inlet 1/2" ISO 7/1 internal parallel pipe thread and outlet 18,6 mm dia
- Inlet and outlet Ø 23 mm bore (high capacity models only)
- Inlet and outlet can also be fitted with straight or elbow flanges.
- Side outlet (optional) can only be fitted with a flange.

Ambient temperature

VR46../VR86..xA: 0 ... 70 °C

VR46../VR86..x: 0 ... 60 °C

VR46../VR86..xB: 0 ... 60 °C

Pilot gas connection

Standard at end outlet:

M11 x 1 for 1/4", 6 mm or 4 mm O.D. tubing.

Special connection:

Incorporated in the side outlet.

Pressure feedback connection

The servo pressure regulator has an M5 thread connection for pressure feedback.

Enclosure

IP 40 with covers or plugs

IP 44 with DIN plugs according to DIN 43650

Dimensions

See Dimensional drawing

Maximum operating pressure

The P_{max} indication on the housing of the Compact Automatic is the maximum pressure at which it functions safely. However, the maximum operating pressure is limited by the pressure range of the pressure regulator concerned (see table 1.).

Table 1. Maximum operating pressure

Model	Pressure range (mbar)	Maximum operating pressure (mbar)
with regulation	2.5 ... 20	30
	3 ... 37*	45
	5 ... 50*	60
	10 ... 60*	100
without regulation	–	60
with throttle	–	60

* This type can also be used for non regulation mode in LP applications when pressure regulator adjustment screw is clockwise turned down until it stops.

Mounting holes

Two M5 mounting holes are located on the bottom of the Compact Automatic.

The four holes at inlet and outlet for mounting the flange on the Compact Automatic are provided with M5 thread with min. 6.5 mm full thread.

The four holes for mounting the flange to the side outlet are provided with M4 thread with minimum 6 mm full thread.

Two M4 threaded holes on DIN faced electrical on/off servo operator are also for mounting purposes.

Minimum regulation capacity

0.31 m³/h

Minimum adjustable capacity (throttle valve only)

0.6 m³/h air at ΔP of 20 mbar

Minimum differential pressure at 0,31 m³/h air

Model*	ΔP min (mbar)
VR4601/VR8601XA	1.8
VR4605/VR8605XA	1.8
VR4611/VR8611XA	3.9
VR4615/VR8615XA	3.9
VR4621/VR8621XA	3.9
VR4625/VR8625XA	3.9
VR4631/VR8631XA	1.8
VR4635/VR8635XA	1.8
VR4641/VR8641XA	3.9
VR4645/VR8645XA	3.9
VR4601/VR8601X	1.7
VR4605/VR8605X	1.7
VR4611/VR8611X	3.9
VR4615/VR8615X	3.9
VR4621/VR8621X	3.9
VR4625/VR8625X	3.9
VR4631/VR8631X	1.7
VR4635/VR8635X	1.7
VR4641/VR8641X	3.9
VR4645/VR8645X	3.9
VR4601/VR8601XB	1.7
VR4605/VR8605XB	1.7
VR4611/VR8611XB	3.9
VR4615/VR8615XB	3.9
VR4621/VR8621XB	3.9
VR4625/VR8625XB	3.9
VR4641/VR8641XB	3.9

* X = suffix letter

CAPACITY IN m³/h AIR AT PRESSURE DROP AS SHOWN.

SEE ALSO THE CORRESPONDING CAPACITY CURVES

	Safety valve			Main valve							
Model	Remark	Class	Seat (mm)	Class	Seat (mm)	Capacity curve number	ΔP (mbar)	Capacity (m ³ /h)	Inlet	Outlet	
										Straight	Side
VR460.XA VR860.XA	Standard	B	11	D	17	C110	2.5	1.95	1/2"	1/2"	
VR460.XA VR860.XA	Upgraded	B	17	D	17	C210*	3	2.7	1/2"	1/2"	
VR460.XA VR860.XA	Standard	B	11	D	17	C220*	2.5	1.4	1/2"		Flange
VR461.XA VR861.XA	Standard	B	11	C	17	C120	5	1.8	1/2"	1/2"	
VR461.XA VR861.XA	Upgraded	B	17	C	17	C230*	5	2.5	1/2"	1/2"	
VR462.XA VR862.XA	Standard	B	11	B	17	C240*	5	2	1/2"	1/2"	
VR462.XA VR862.XA	Upgraded	B	17	B	17	C250*	5	2.5	1/2"	1/2"	
VR463.XA VR863.XA	Standard	A	11	D	17	C110	2.5	1.95	1/2"	1/2"	
VR464.XA VR864.XA	Standard	A	11	C	17	C120	5	1.8	1/2"	1/2"	
VR461.VA VR861.VA	Standard	B	11	C	11	F40	10	4.1	1/2"	1/2"	
VR464.VA VR864.VA	Standard	A	11	C	11	F20	10	4.1	1/2"	1/2"	
VR461.V VR861.V	Standard	B	17	C	11	F30	10	5.1	1/2"	1/2"	
VR464.V VR864.V	Standard	A	17	C	11	F50	10	5.1	1/2"	1/2"	
VR460.X VR860.X	Standard	B	17	D	17	C90	3	3.1	1/2"	1/2"	
VR461.X VR861.X	Standard	B	17	C	17	C100	5	3	1/2"	1/2"	
VR462.X VR862.X	Standard	B	17	B	17	C260*	5	3	1/2"	1/2"	
VR463.X VR863.X	Standard	A	17	D	17	C90	3	3.1	1/2"	1/2"	
VR464.X VR864.X	Standard	A	17	C	17	C100	5	3	1/2"	1/2"	
VR460.XB VR860.XB	Standard	B	18.5	D	17	C130	3	4.2	23 mm	23 mm	
VR461.XB VR861.XB	Standard	B	18.5	C	17	C170	5	4.6	23 mm	23 mm	

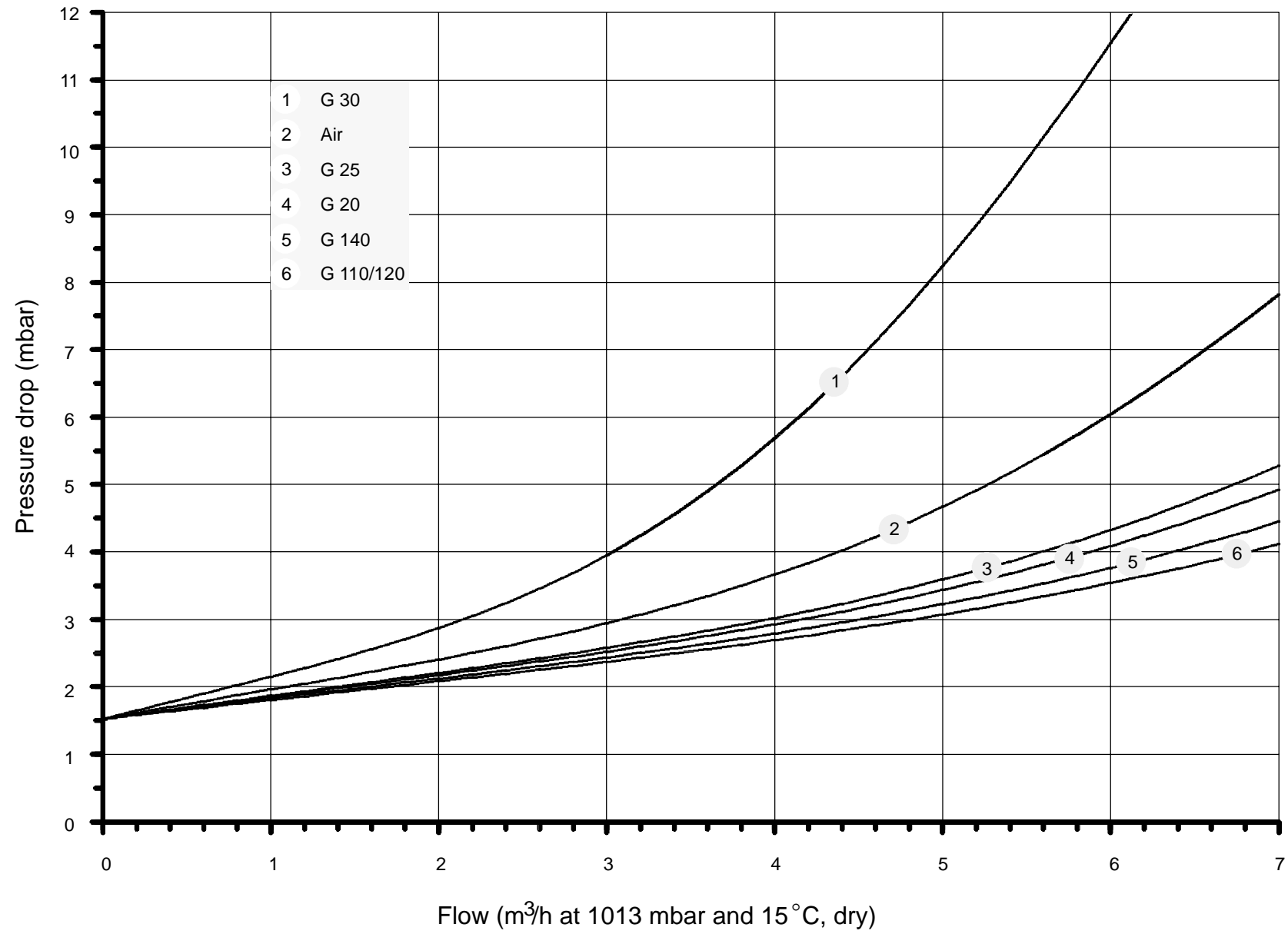
* Capacity curve to be specified

CAPACITY IN m³/h AIR AT PRESSURE DROP AS SHOWN.
SEE ALSO THE CORRESPONDING CAPACITY CURVES

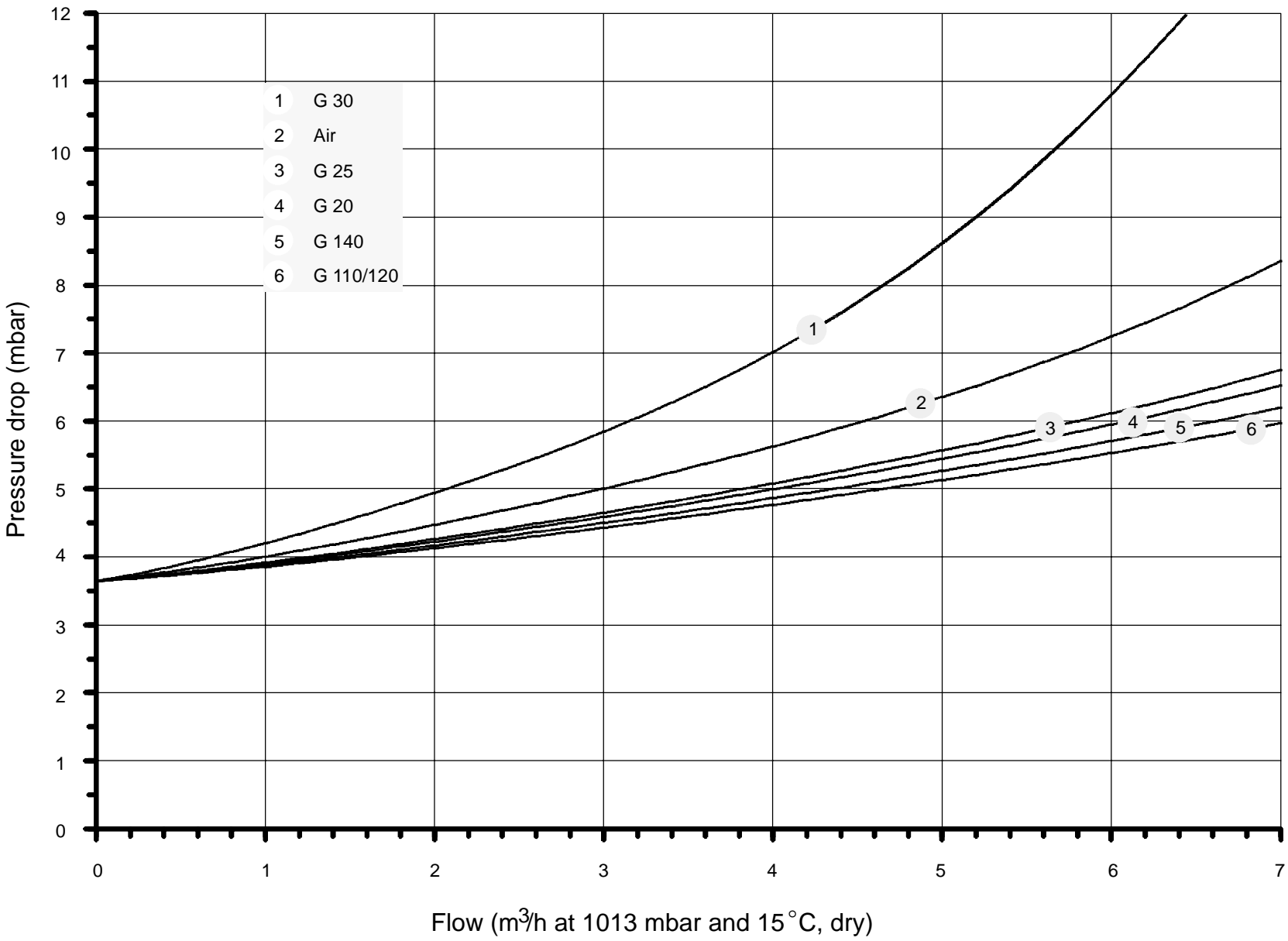
	Safety valve			Main valve							
Model	Remark	Class	Seat (mm)	Class	Seat (mm)	Capacity curve number	ΔP (mbar)	Capacity (m ³ /h)	Inlet	Outlet	
										Straight	Side
VR460.EB VR860.EB	Standard	B	18.5	D	17	C200	3	4.2	23 mm	23 mm	
VR460.TB VR860.TB	Standard	B	18.5	D	17	C200	3	4.2	23 mm	23 mm	
VR461.EB VR861.EB	Standard	B	18.5	C	17	C270*	5	4.0	23 mm	23 mm	
VR461.TB VR861.TB	Standard	B	18.5	C	17	C270*	5	4.0	23 mm	23 mm	

* Capacity curve to be specified

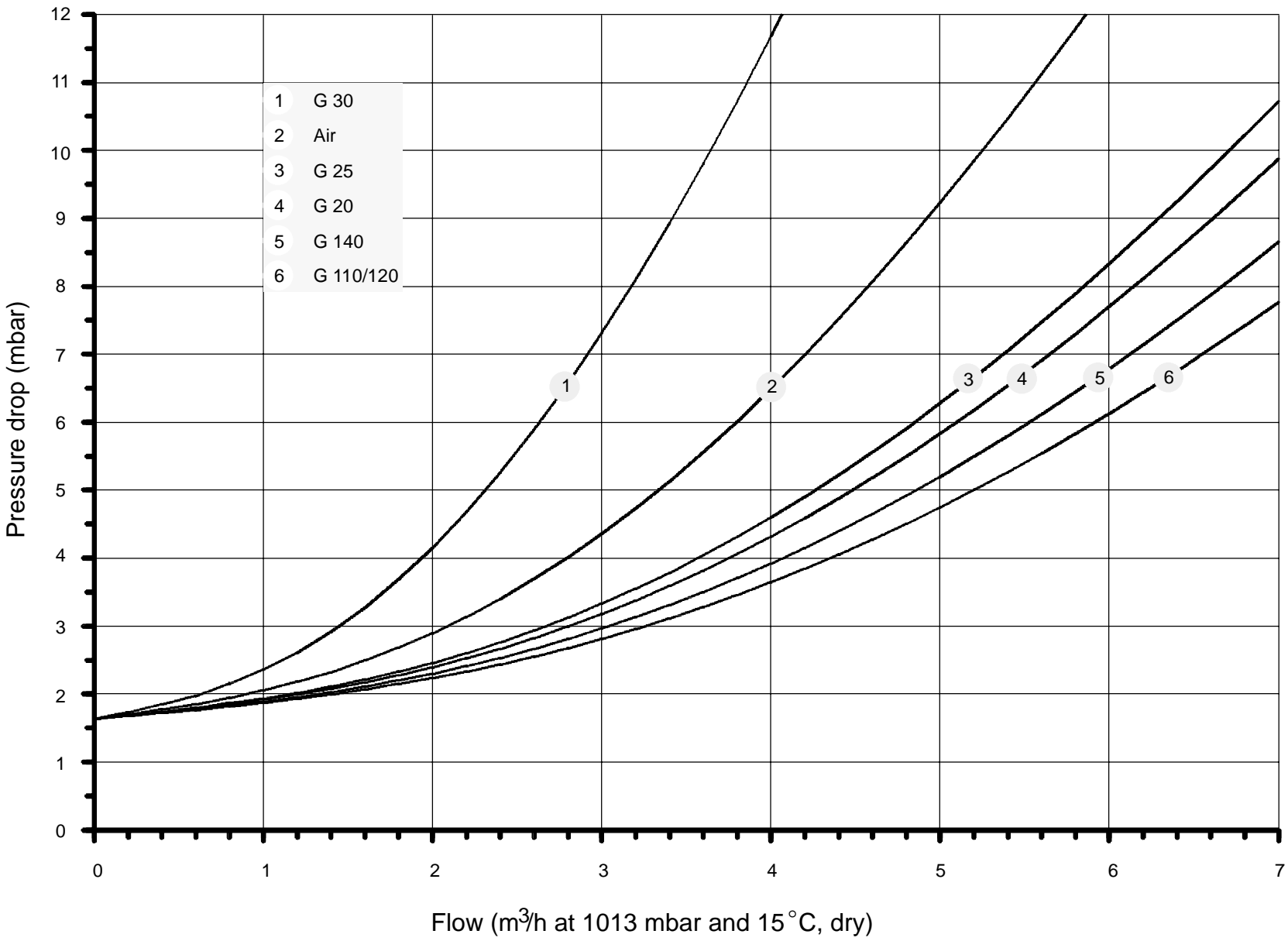
CAPACITY CURVE C90



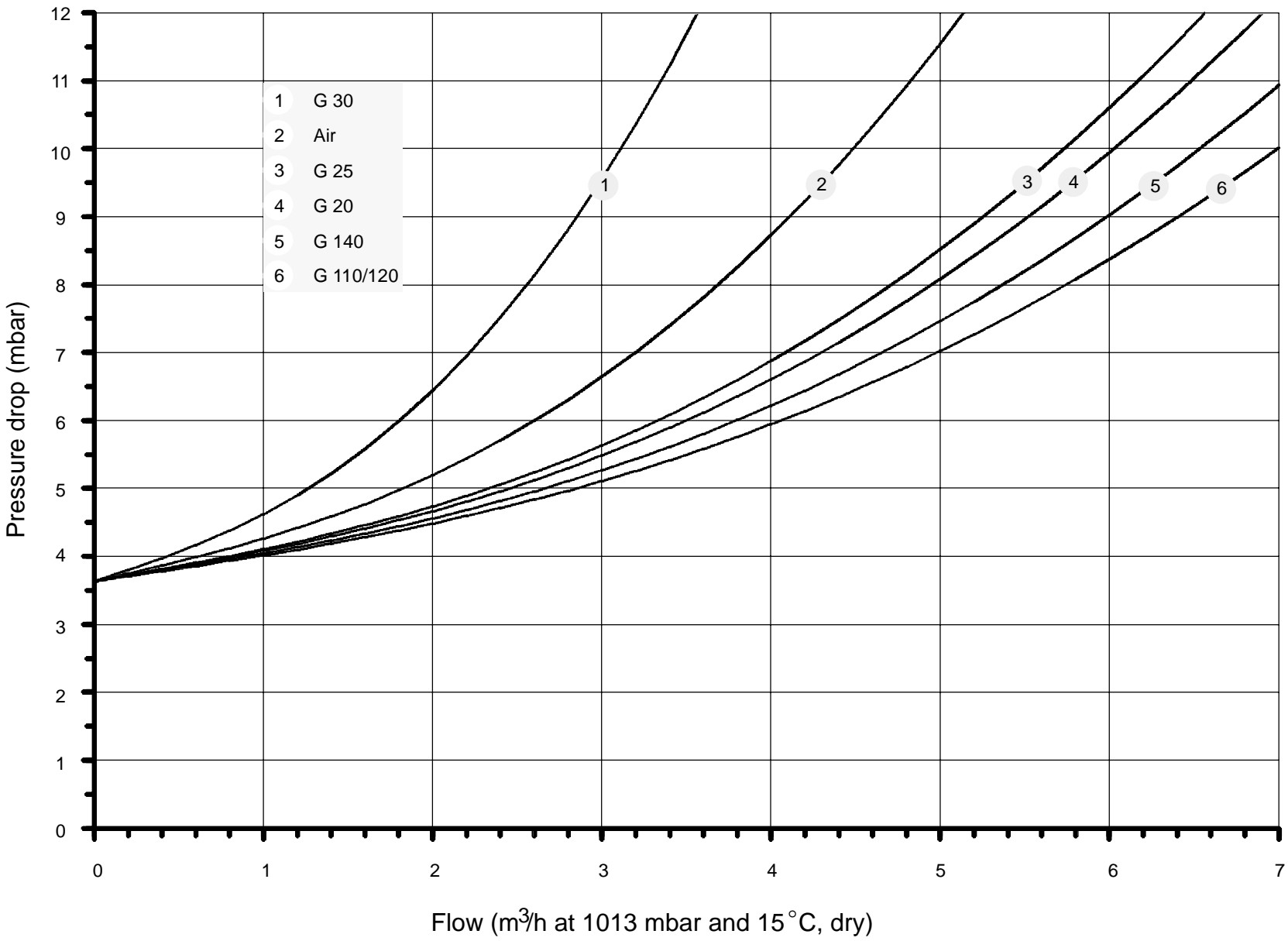
CAPACITY CURVE C100



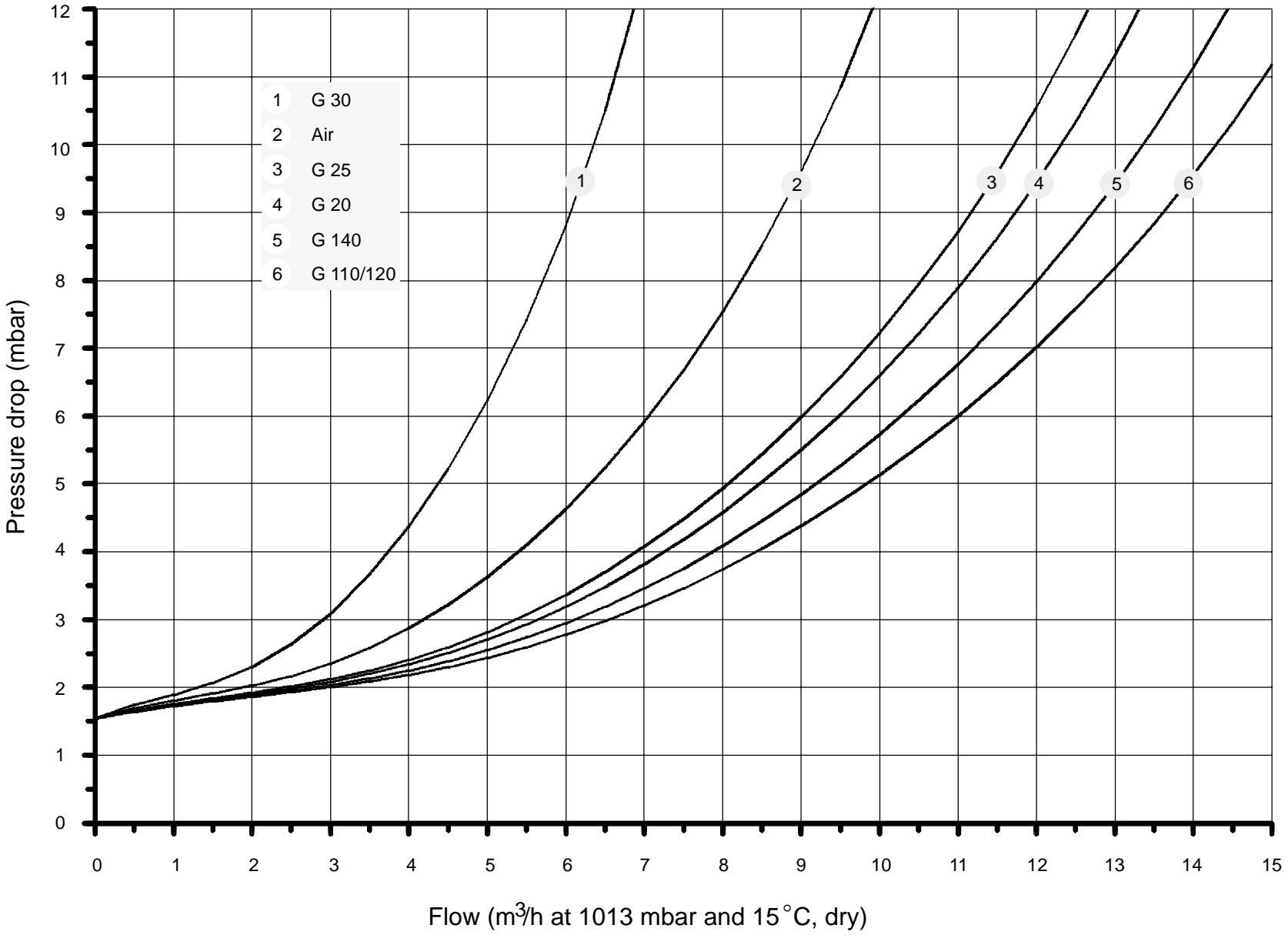
CAPACITY CURVE C110



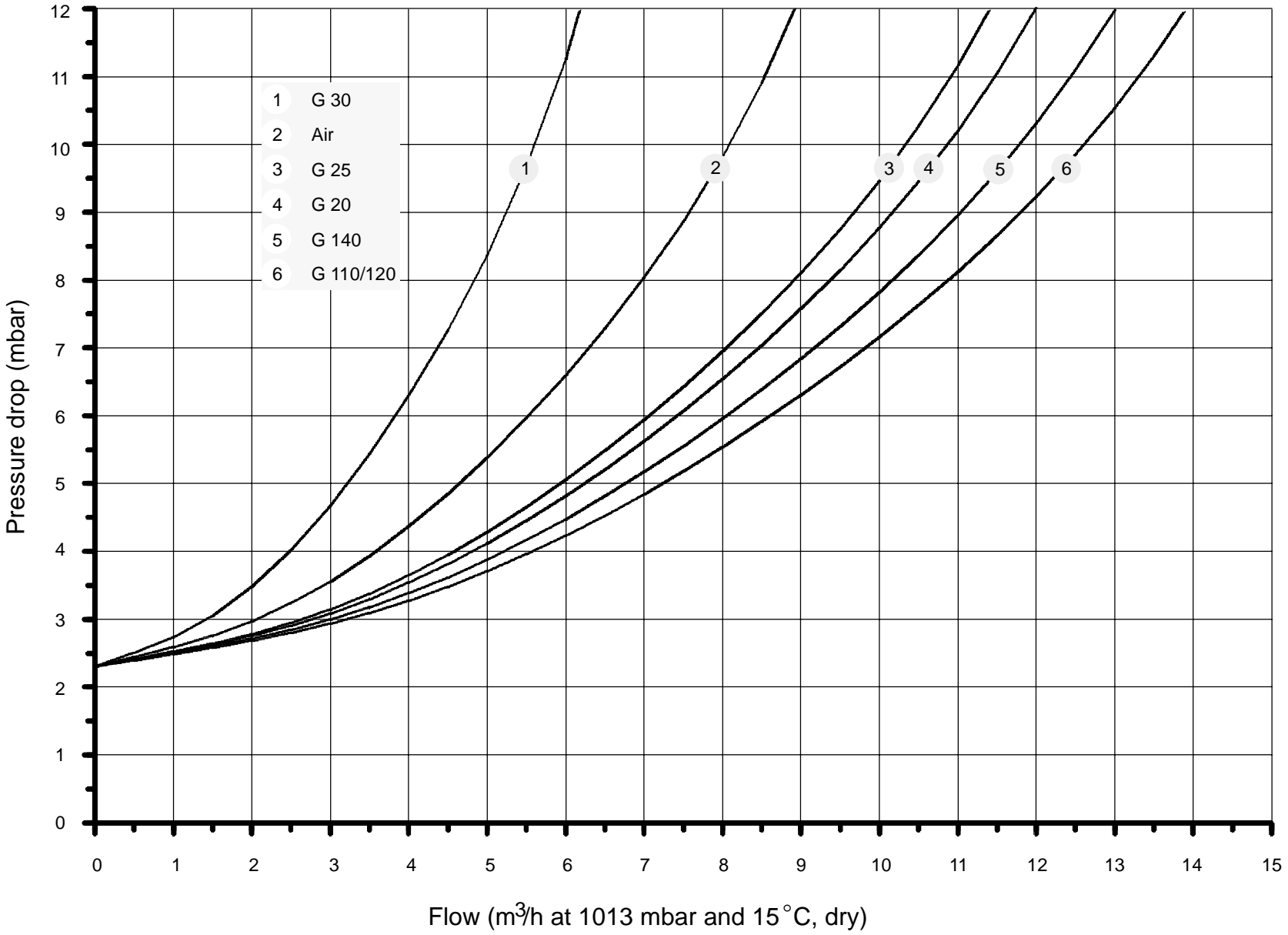
CAPACITY CURVE C120



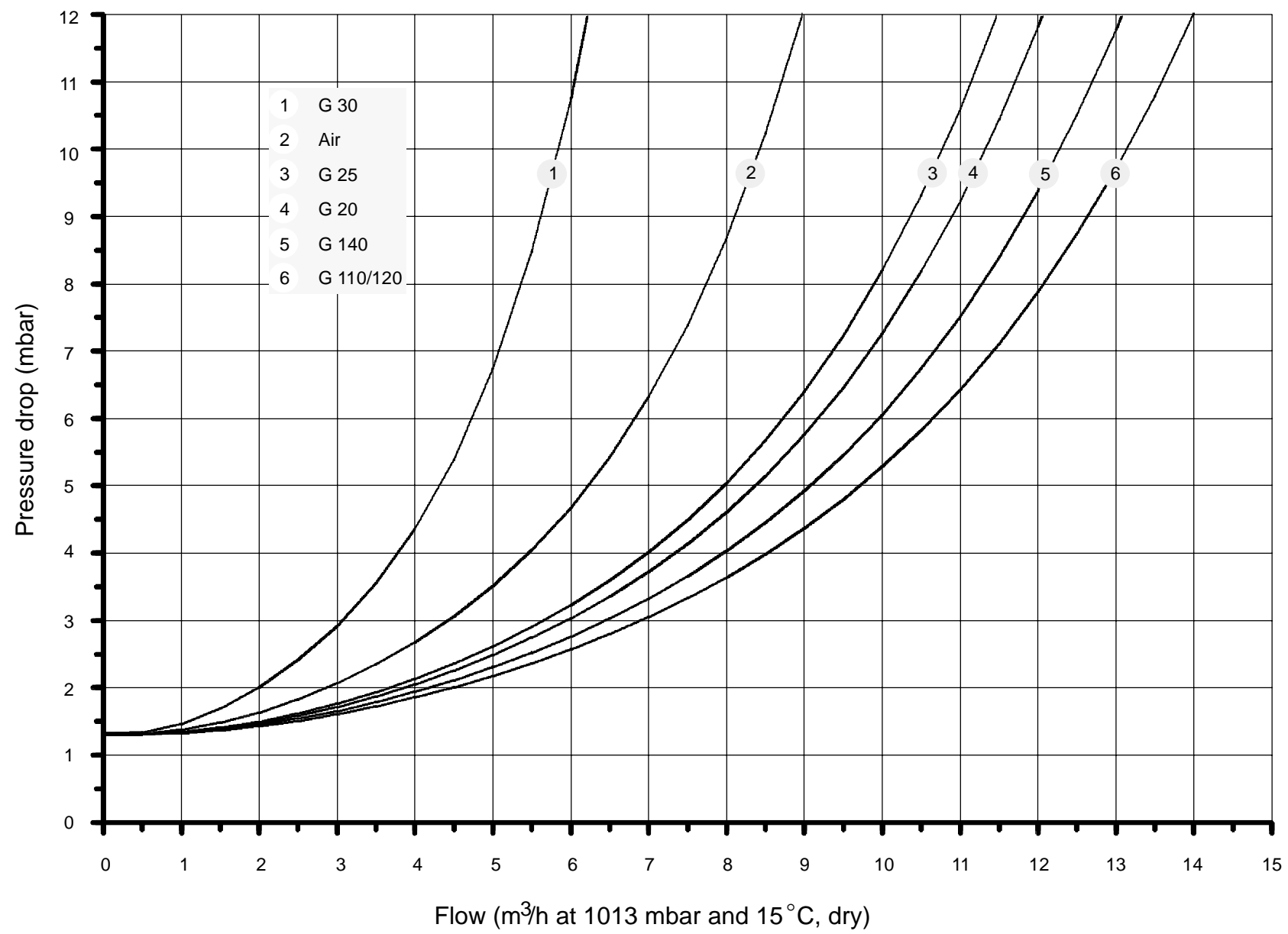
CAPACITY CURVE C130



CAPACITY CURVE C170



CAPACITY CURVE C200



CAPACITY CURVE C210

Capacity curve C210 to be specified

CAPACITY CURVE C220

Capacity curve C220 to be specified

CAPACITY CURVE C230

Capcity curve C230 to be specified

CAPACITY CURVE C240

Capacity curve C240 to be specified

CAPACITY CURVE C250

Capacity curve C250 to be specified

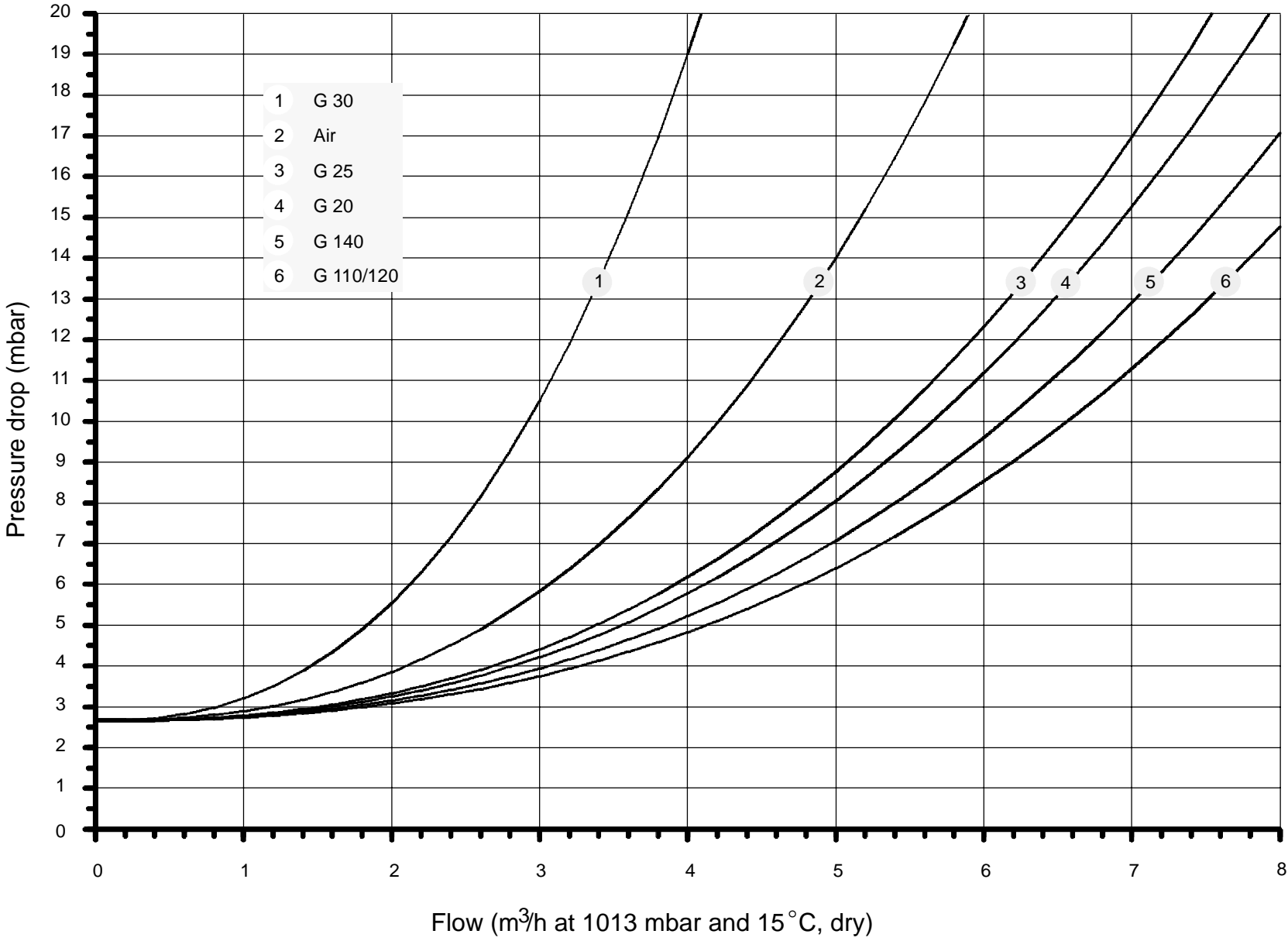
CAPACITY CURVE C260

Capcity curve C260 to be specified

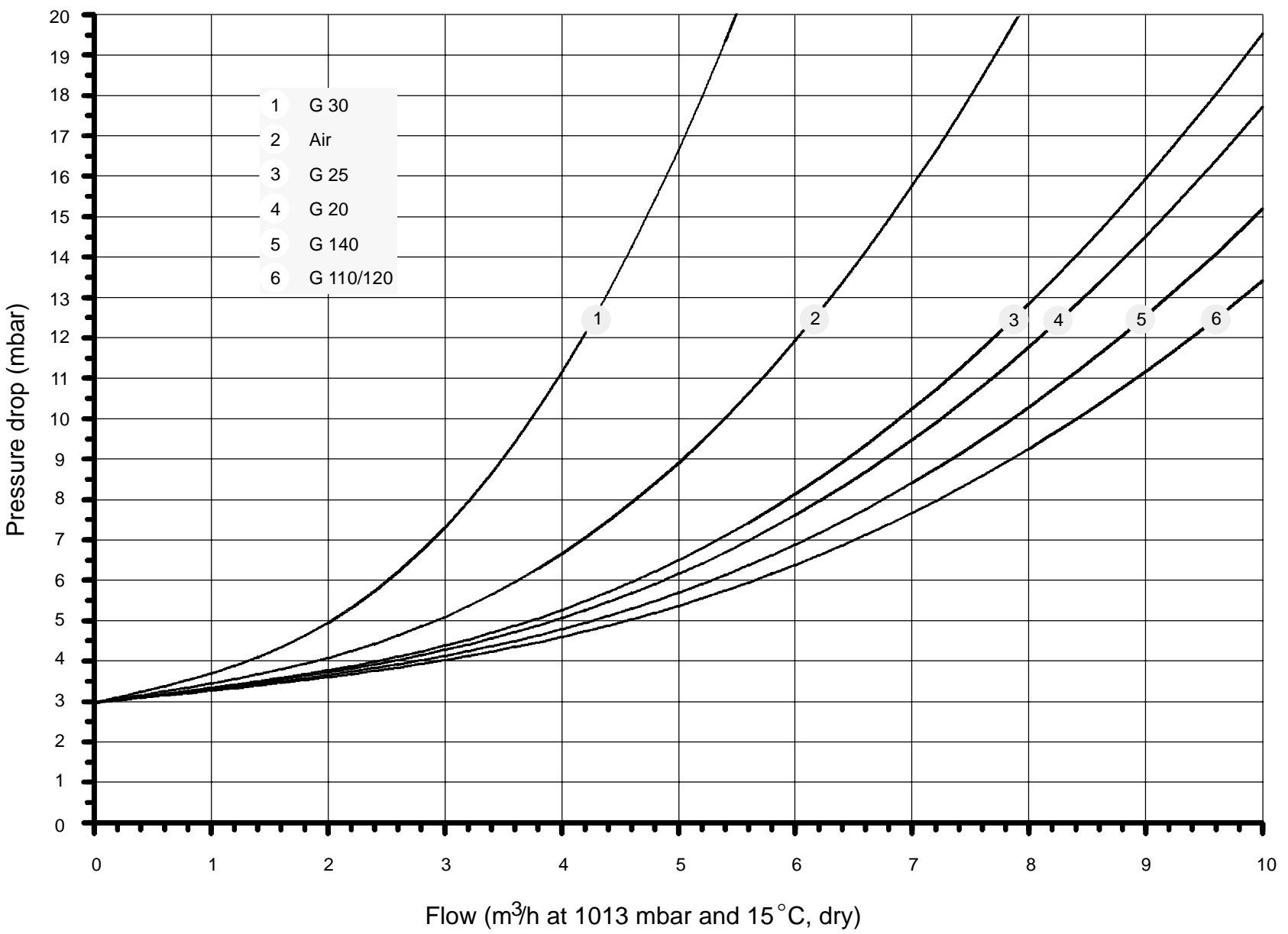
CAPACITY CURVE C270

Capacity curve C270 to be specified

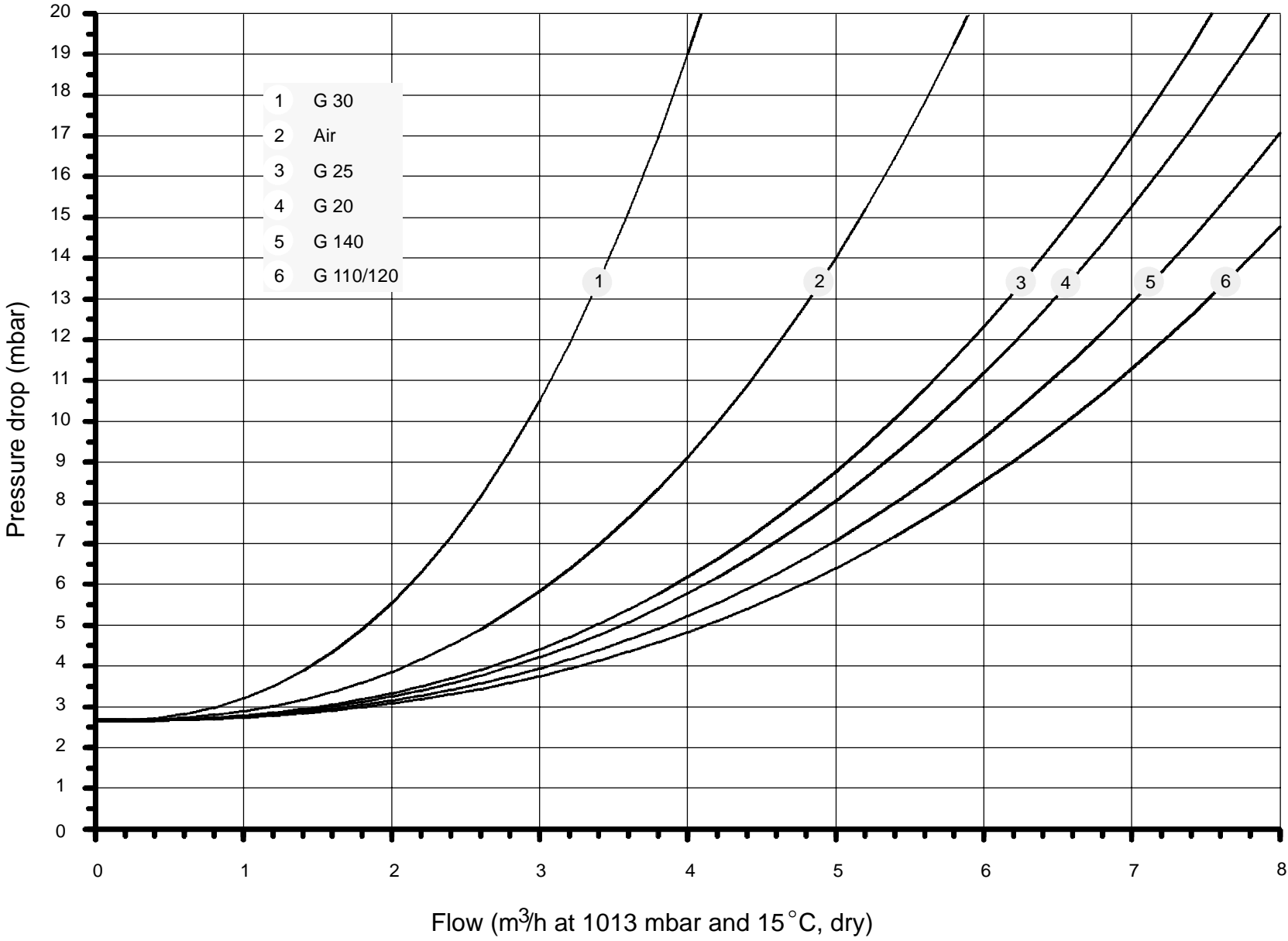
CAPACITY CURVE F20



CAPACITY CURVE F30



CAPACITY CURVE F40



CAPACITY CURVE F50

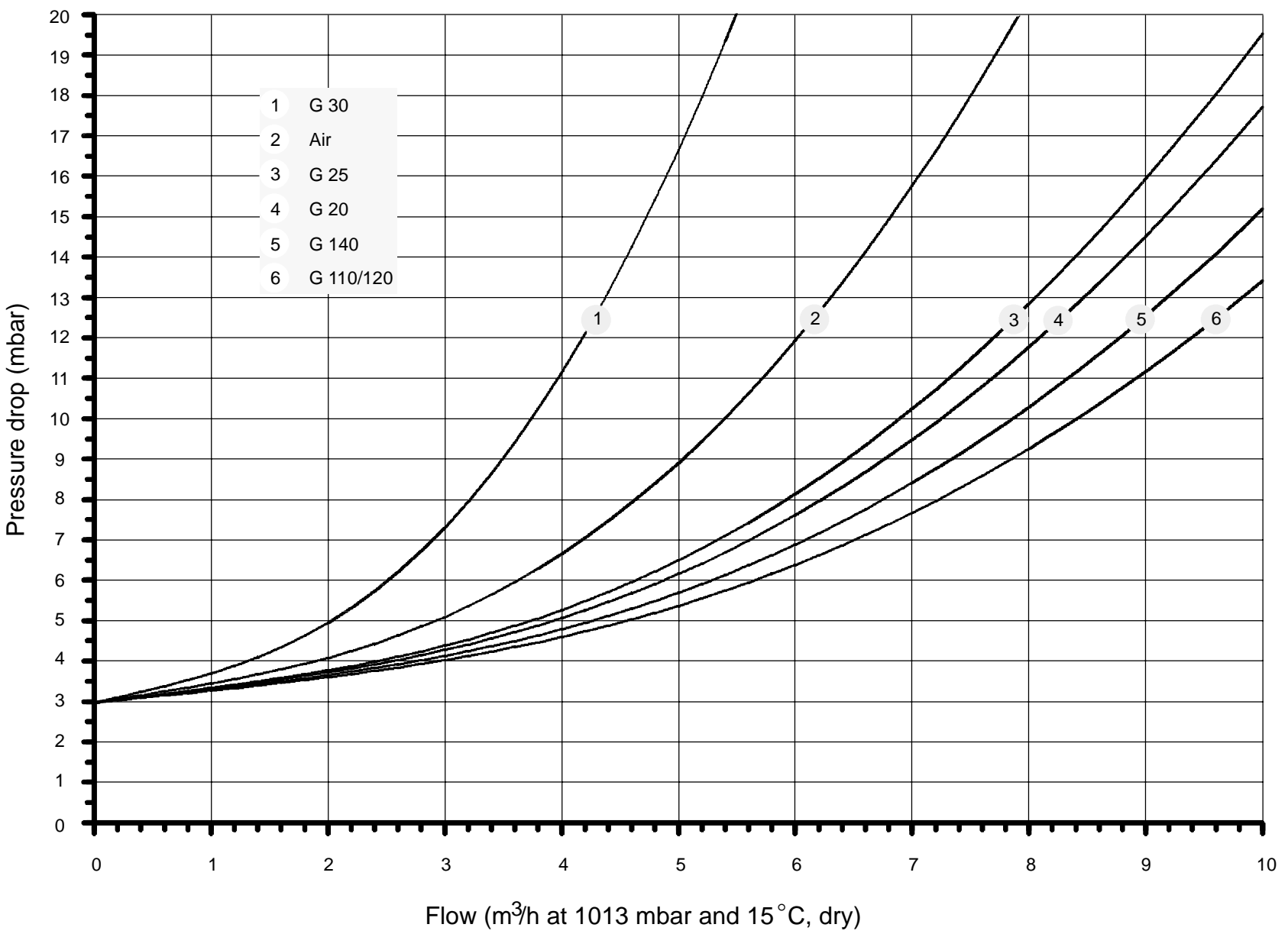


Table 2.

Model	Voltage (V)	Remark	Operable voltage (V)	First solenoid operator			Main valve operator		
				Current (A)		Nominal power consumption (W)	Current (A)		Nominal power consumption (W)
				Nominal	At 110%		Nominal	At 110%	
VR860.XA	24, 50 Hz	Standard	19.5 ... 27	0.28	0.4	3.5	0.211	0.242	3.8
VR862.XA	24, 50 Hz	Standard	19.5 ... 27	0.28	0.4	3.5	0.211	0.242	3.8
VR860.XA	24, 50 Hz	Upgraded	19.5 ... 27	0.42	0.54	4.8	0.211	0.242	3.8
VR860.XA	24, 50 Hz	Upgraded, low consumption	19.5 ... 27	0.42	0.54	4.8	0.121	0.139	2.1
VR860.XA	24, 60 Hz	Standard	19.5 ... 27	0.4	0.485	4.9	0.266	0.31	4.7
VR863.XA	24, 50 Hz	Valve class A+D, small coil	19.5 ... 27	0.42	0.54	4.8	0.211	0.242	3.8
VR864.XA	24, 50 Hz	Valve class A+C, small coil	19.5 ... 27	0.42	0.54	4.8	0.211	0.242	3.8
VR860.X	24, 50 Hz	Standard	19.5 ... 27	0.45	0.56	7	0.211	0.242	3.8
VR860.X	24, 60 Hz	Standard	19.5 ... 27	0.55	0.69	8.3	0.266	0.242	4.7
VR862.X	24, 50 Hz	Standard	19.5 ... 27	0.45	0.56	7	0.211	0.242	3.8
VR863.X	24, 50 Hz	Valve class A+D, large coil	19.5 ... 27	0.7	0.85	9.1	0.211	0.242	3.8
VR864.X	24, 50 Hz	Valve class A+C, large coil	19.5 ... 27	0.7	0.85	9.1	0.211	0.242	3.8
VR860.XB	24, 50 Hz	Standard	19.5 ... 27	0.07	0.85	9.1	0.211	0.242	3.8

Table 3.

Model	Voltage (V)	Remark	Operable voltage (V)	First solenoid operator			Main valve operator		
				Current (A)		Nominal power consumption (W)	Current (A)		Nominal power consumption (W)
				Nominal	At 110%		Nominal	At 110%	
VR460.XA	220/240, 50 Hz	Standard	187 ... 264	0.032/0.036	0.048	3.6/4.7	0.021/0.024	0.028	3.4/4.5
VR462.XA	220/240, 50 Hz	Standard	187 ... 264	0.032/0.036	0.048	3.6/4.7	0.021/0.024	0.028	3.4/4.5
VR460.XA	230, 50 Hz	Upgraded	196 ... 253	0.042	0.052	4.8	0.021/0.024	0.028	3.4/4.5
VR460.XA	220, 60 Hz	Standard	187 ... 242	0.045	0.055	4.9	0.021	0.025	3.5
VR463.XA	230, 50 Hz	Valve class A+D, small coil	196 ... 253	0.042	0.052	4.8	0.021/0.024	0.028	3.4/4.5
VR464.XA	230, 50 Hz	Valve class A+C, small coil	196 ... 253	0.042	0.052	4.8	0.021/0.024	0.028	3.4/4.5
VR460.X	220/240, 50 Hz	Standard	187 ... 264	0.05/0.06	0.075	6.5/8	0.021/0.024	0.028	3.4/4.5
VR460.X	220, 50 Hz	P _{max.} 130 mbar	187 ... 242	0.07	0.085	9.1	0.021/0.024	0.028	3.4/4.5
VR460.X	220, 60 Hz	Standard	187 ... 242	0.057	0.07	8.3	0.021	0.025	3.5
VR462.X	220/240, 50 Hz		187 ... 264	0.05/0.067	0.075	6.5/8	0.021/0.024	0.028	3.4/4.5
VR463.X	220, 50 Hz	Standard	187 ... 242	0.07	0.085	9.1	0.021/0.024	0.028	3.4/4.5
VR464.X	220, 50 Hz	Standard	187 ... 242	0.07	0.085	9.1	0.021/0.024	0.028	3.4/4.5
VR463.X	240, 50 Hz	Standard	204 ... 264	0.06	0.075	8	0.021/0.024	0.028	3.4/4.5
VR464.X	240, 50 Hz	Standard	204 ... 264	0.06	0.075	8	0.021/0.024	0.028	3.4/4.5
VR460.XB	220, 50 Hz	Standard	187 ... 242	0.07	0.085	9.1	0.021/0.024	0.028	3.4/4.5
VR460.XB	240, 50 Hz	Standard	204 ... 264	0.06	0.075	8	0.021/0.024	0.028	3.4/4.5

PERFORMANCE CHARACTERISTICS

Maximum allowable leakage

Each Compact Automatic has been factory tested to meet the following leakage requirements:

- outerwall: 50 cm³/h at test pressure of 150 mbar.
- safety valve: 40 cm³/h at test pressure of 8 and 150 mbar.
- main valve (plus operator inlet valve): 40 cm³/h at test pressure of 8 and 150 mbar.

Outlet pressure adjustment range capability

Natural/manuf. gas: 2.5 ... 20 mbar.

Natural/LP gas: 3 ... 37 mbar.

LP gas: 5 ... 50 mbar.

10 ... 60 mbar.

Pilot flow

Pilot flow capacity will not be less than 0.1 m³/h at 9 mbar pressure drop.

Bleed off/recovery time of servo system

The bleed off/ recovery time of the standard SOFTLITE system shall be within 15 seconds from operator de-energization.

For SOFTLITE system with switchable SOFTLITE adapter the bleed off/recovery time shall be within 30 seconds from operator de-energization.

High pressure test

In the "OFF" condition, the Compact Automatic will withstand 3 bar (air) inlet pressure without damage. Attempts to operate the Compact Automatic, while in this condition will not damage it.

Operable voltage range

The Compact Automatic will function satisfactory between 85% and 110% of the rated voltage. See table 2. and 3.

Valve closing characteristics

The Compact Automatic will close within 1 second from operator de-energization at an inlet pressure of 22.5 mbar and minimal 2.5 mbar pressure drop.

Main valve opening characteristics

Fast opening versions

Under conditions where the supply pressure is at least 2.5 mbar above the outlet pressure setting, the dead time shall be 1 s maximum except fast opening versions with 0.2 mm inlet orifice and upright position the dead time will be 2.5 s maximum.

Outlet pressure will reach 50% of the outlet pressure setting within 1 second from start of flow or 75% within 2 seconds. Full outlet pressure will be reached within 5 seconds.

Version without regulation or with throttle valve will reach full outlet pressure within 5 seconds.

SOFTLITE versions See table 5. page 29

At standard test conditions the adjusted outlet pressure will be reached between 5 and 20 seconds from start of flow (for LP gas between 4 and 10 seconds)

Oscillation

Maximum oscillation under all circumstances: ≤ 0.5 mbar.

Tap sensitivity of outlet pressure set point

For all gases the maximum deviation may be 1 mbar.

Repeatability of outlet pressure set point

For all gases the maximum deviation from set point is: ± 0.3 mbar or ± 3% of the set point value, whichever is the greatest.

Table 4. Total set point shift

Pressure range (mbar)	Tolerance
2.5 ... 20	6% of the set point value or 1 mbar whichever is the greatest
3 ... 37	6% of the set point value or 1.5 mbar whichever is the greatest
5 ... 50	6% of the set point value or 2.2 mbar whichever is the greatest
5 ... 50	6% of the set point value or 2.2 mbar whichever is the greatest
10 ... 60	6% of the set point value or 2.2 mbar whichever is the greatest

Design life

500.000 cycles for safety and main valve operator.
Cycle frequency max. 100 cycles /h.

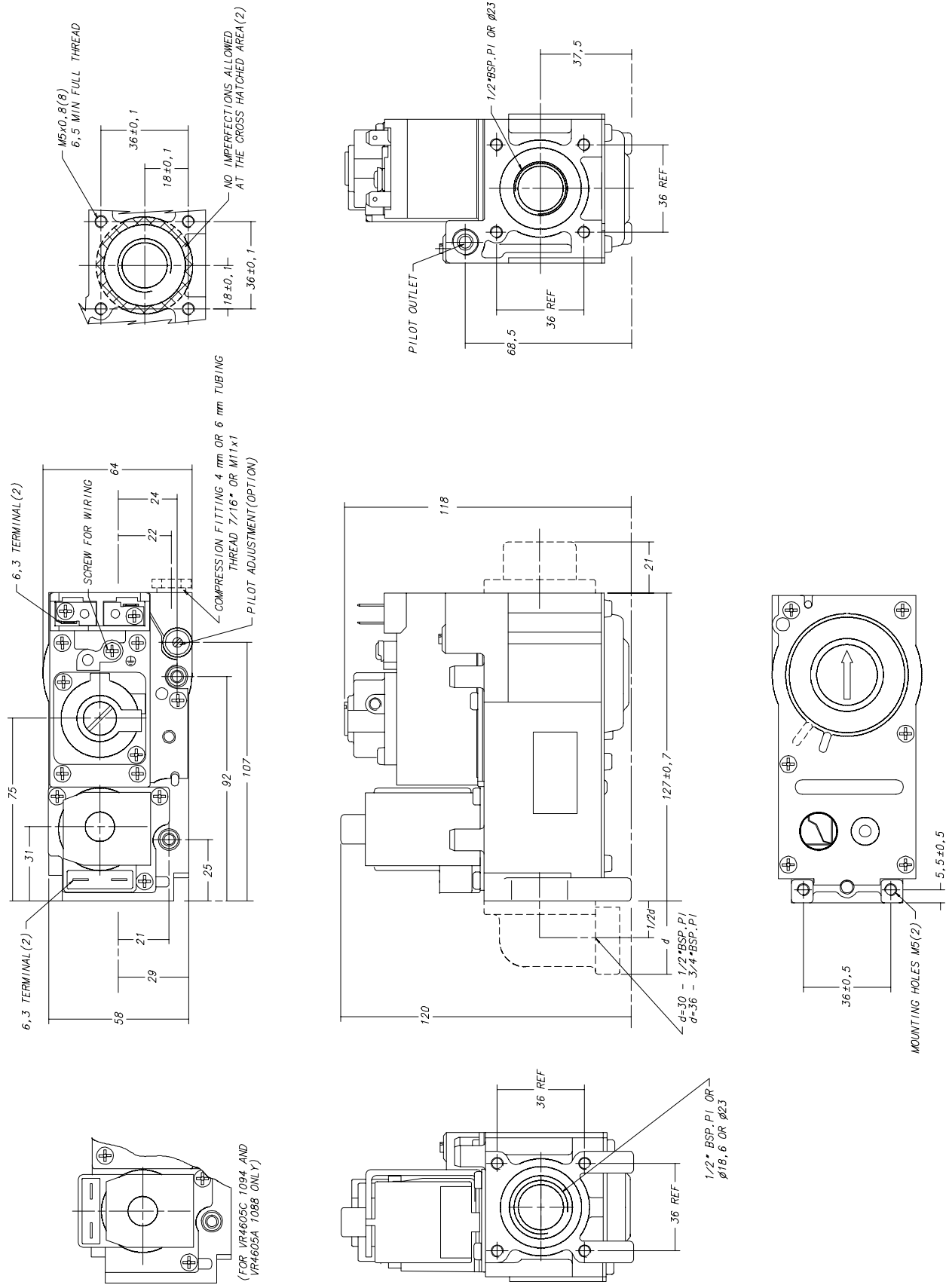
Table 5. Main valve (class D only) opening characteristics SOFTLITE versions

SOFTLITE number	Inlet pressure (mbar)	Kind of gas	Applicable for switchable softlite adapter	Dead time (s) max		Outlet pressure (mbar) 1.5 s after start of flow**
				Upright position	Horizontal position	
3 5 7 9 10	20	G 20/25	no	2.0*** 1.5 1.5 1.5 1.5	1.7 1.2 1.2 1.2 1.2	2.0 ... 4.0 2.5 ... 6.0 4.5 ... 7.5 6.5 ... 9.0 9.0 ... 15.0
3 5 7 9 10			yes	1.8*** 1.3 1.3 1.3 1.3	1.5 1.0 1.0 1.0 1.0	2.0 ... 3.5 3.0 ... 5.5 5.0 ... 7.0 7.0 ... 9.0 9.5 ... 15.0
5 7 9 10	37	G 30/31	no	2.5 1.8 1.8 1.8	1.8 1.5 1.5 1.5	1.0 ... 4.5 2.5 ... 6.5 4.5 ... 8.0 7.5 ... 14.5
5 7 9 10			yes	2.0 1.5 1.5 1.5	1.4 1.2 1.2 1.2	1.5 ... 4.0 3.0 ... 6.0 5.0 ... 7.5 8.0 ... 14.0
5 7 9 10	50	G 30/31	no	3.3 1.5 1.5 1.5	2.4 1.2 1.2 1.2	1.0 ... 4.5 2.5 ... 6.5 3.5 ... 8.0 6.5 ... 14.5
5 7 9 10			yes	2.5 1.3 1.3 1.3	1.8 1.0 1.0 1.0	1.5 ... 4.0 2.5 ... 5.5 4.0 ... 7.5 7.5 ... 14.0

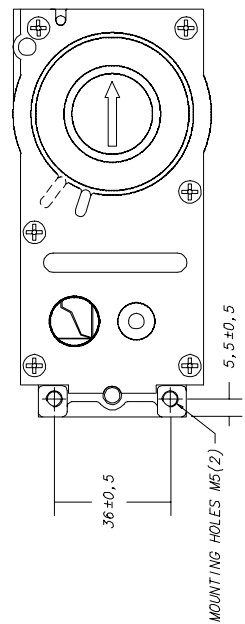
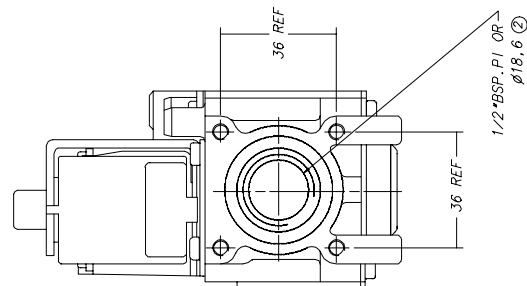
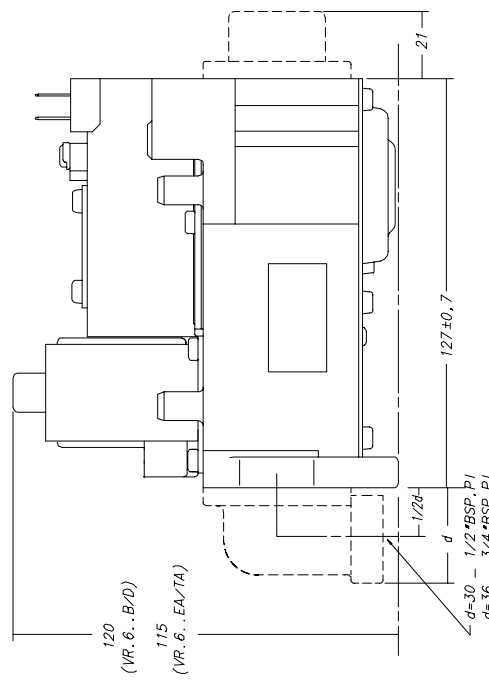
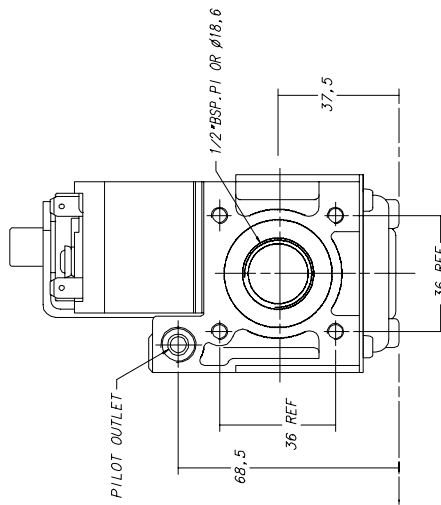
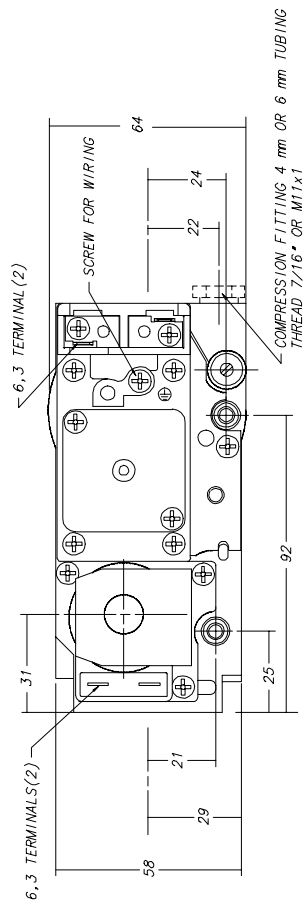
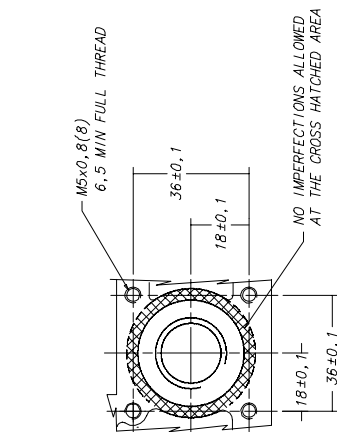
** For suffix T with throttle full open

*** In case of closed combustion chamber with negative pressure, deadtime is 1.5 s

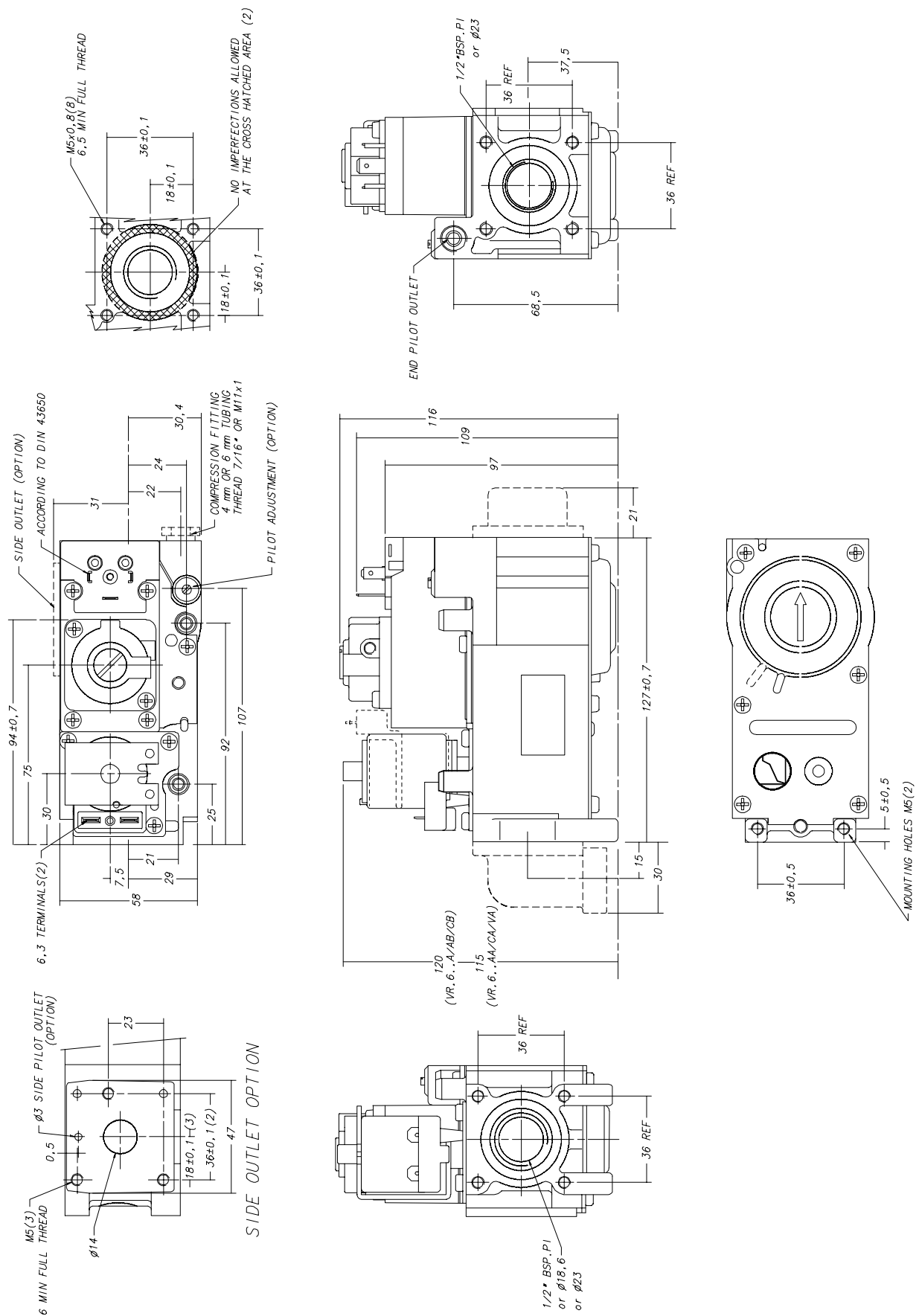
DIMENSIONAL DRAWING VR46../VR86..A/C, AB/CB



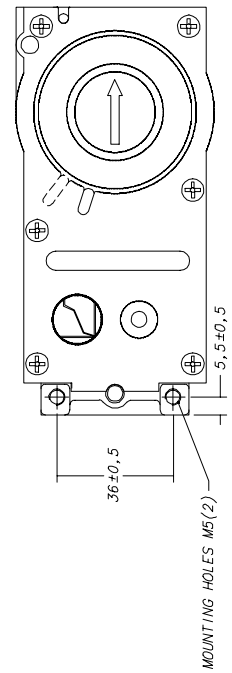
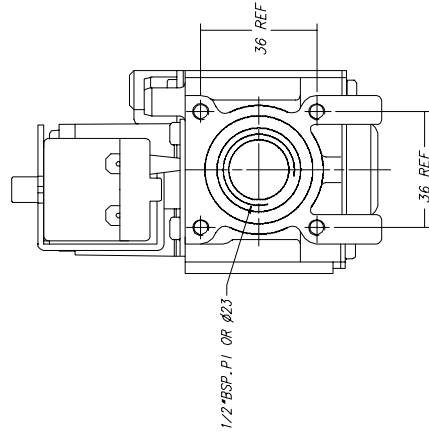
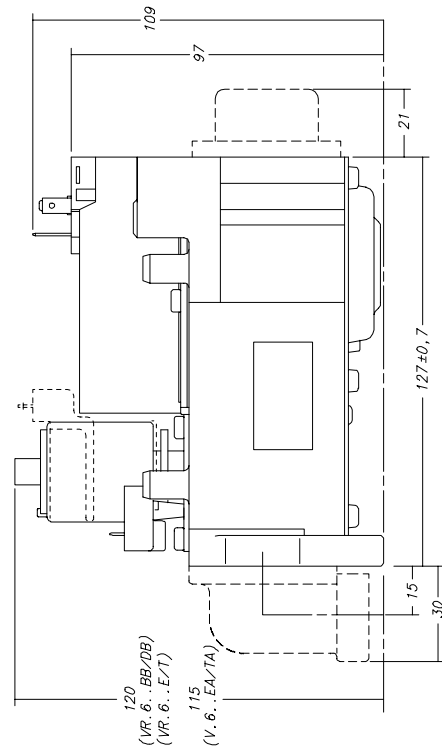
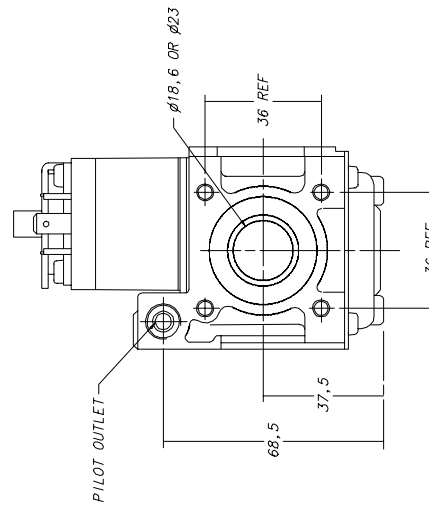
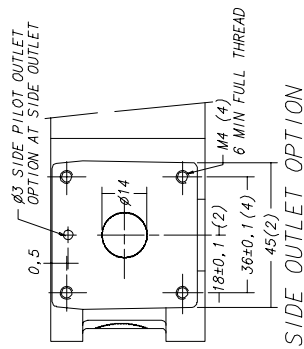
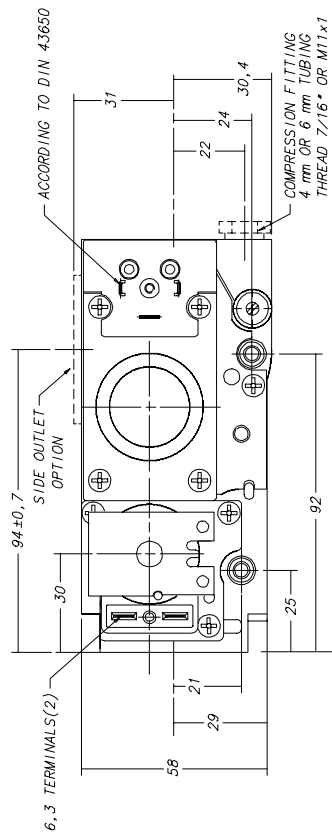
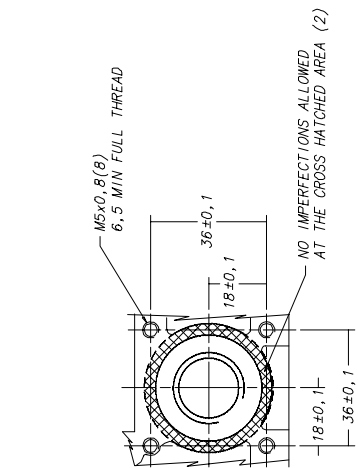
DIMENSIONAL DRAWING VR46../VR86..B/D



DIMENSIONAL DRAWING VR46../VR86../A/C, AA/CA, AB/CB,VA



DIMENSIONAL DRAWING VR46../VR86..E/T, EA/TA



INSTALLATION



WARNING

Take care that installer is a trained experienced service man.
Turn off gas supply before starting installation.
Disconnect power supply to prevent electrical shock and/or equipment damage.

Mounting position

The Compact Automatic can be mounted 0 to 90 degrees in any direction from the upright position (from the position when the operators are on top).

Main gas connection

- Take care that dirt cannot enter the Compact Automatic during handling.
- Use a sound taper fitting with thread according to ISO 7/1 (BS 21) or a piece of new, properly reamed pipe, free from swarf.
- Do not thread or tighten the pipe or pipe fitting too far (see table below). Otherwise valve distortion and malfunction could result.

Pipe size (inch)	Max. length of pipe thread (mm)
1/2	18.6

- Apply a moderate amount of good quality thread compound to the pipe or fitting only, leaving the two end threads bare. PTFE tape may be used as an alternative.
- Ensure the gas flows in the same direction as the arrow on the bottom of the Compact Automatic.

Pressure feedback connection



WARNING

To avoid decreasing of performance of pressure regulator by pinching off the pressure feedback tubing, it is to be recommended to use a metal tubing.

Pilot gas connection (if applicable) at outlet side

- Square off the end of tubing and remove burrs.
- Slip compression fitting over tubing.
- Insert tubing into Compact Automatic housing until it bottoms, slide fitting into place and turn finger tight.
- Use a wrench to tighten fitting about 1 1/2 turn beyond finger tight to shear of the olive. **Do not use jointing compound.**
- Connect other end of tubing to pilot burner according to the manufacturer's instructions.



CAUTION

Do not bend tubing at Compact Automatic after compression fitting has been tightened, as this may result in gas leakage at the connection.

Pilot gas connection (if applicable) at side outlet

The pilot outlet connection at the side is only applicable with a special flange.



WARNING

Tightness test after installation

Paint all pipe connections and gaskets with a strong soap and water solution.

Start the appliance and check for bubbles. If a leak is found in a pipe connection, remake the joint. A gasket leak can usually be stopped by tightening the mounting screws. Otherwise, replace the gasket.

Be careful not to clog bleed vent parts with solution residue. Remember bleed vent parts will discharge air during gas valve opening or closing giving false indication of leakage.

Electrical connection



CAUTION

Switch off power supply before making electrical connections.

Never jumper the terminals of low voltage Compact Automatic since this may burn out the room thermostat heat anticipator.

Take care that wiring is in accordance with local regulations.

Use lead wire which can withstand 105 °C ambient.

The electric on/off operator is provided with 6.3 mm quick connect terminals suitable for 6.3 mm receptacles (e.g. "Series 250" AMP fasteners).

The electric on/off servo operator is provided with both 6.3 mm terminals suitable for 6.3 mm receptacles (e.g. "Series 250" AMP fasteners) and screw terminals, or is provided with quick connect terminals suitable for 6.3 mm receptacles (e.g. "Series 250" AMP fasteners) or for a female connector according to DIN 43650.

Wiring

Follow the instructions supplied by the appliance manufacturer.

ADJUSTMENTS AND FINAL CHECKOUT



WARNING

Adjustments must be made by qualified persons only. If the appliance manufacturer supplies checkout and/or service and maintenance instructions carefully follow them. If these instructions are not provided then use the procedure outlined below.



CAUTION

To ensure a safe closing of the valves, it is essential that voltage over the terminals of both electric operators is reduced to 0 Volt.

Outlet pressure adjustment servo regulated versions (see page 30 or 32)

- Disconnect pressure feedback connection (if applicable)
- Energize both electric operators in order to have gas input to burner.
- Check gas input to the appliance using a clocking gas meter or alternatively a pressure gauge connected to the outlet pressure tap.
- Remove pressure regulator cap screw to expose pressure regulator adjustment screw.
- Slowly turn adjustment screw with a small screw driver until the burner pressure required is recorded on the pressure gauge.
Turn adjustment screw clockwise to increase or counter-clockwise to decrease gas pressure to the burner.

- For non-regulating mode (LP gas) turn adjustment screw clockwise until it stops.
- Replace pressure regulator cap screw.
- Connect pressure feedback connection (if applicable).

Outlet pressure adjustment throttle versions (see page NO TAG or 33)

- Energize both electric operators in order to have gas input to burner.
- Check input to the appliance using a clocking gas meter or alternatively a pressure gauge connected to the outlet pressure tap.
- Turn the flow adjustment screw with a screw driver either way until the burner pressure required is recorded on the pressure gauge.

Check of slow opening (SOFTLITE)

The SOFTLITE pressure is factory set.

Check burner performance at this pressure observing burner ignition and flame characteristics. Burner should ignite promptly and without flash back to orifice and all ports should remain lit. Cycle burner several times (wait 15 seconds between cycles to allow servo system to resume slow open action). Repeat check of slow opening after allowing the appliance to cool down.

Final checkout of the installation

Set appliance in operation after any adjustment and observe several complete cycles to ensure that all burner components function correctly.

CONSTRUCTION AND WORKING PRINCIPLES

Servo pressure regulation working. See fig. 1.

The Compact Automatic features the positive servo system, i.e. the main gas valve is closed by spring pressure in the normal shut down position and can only be opened when gas pressure is sufficient to overcome the spring force. This valuable built in safety feature ensures the main valve will automatically close in the event of power or gas supply failure.

The heart of the system is the servo pressure regulator which consists of a pressure relief valve integrated in a regulator diaphragm which is fitted above and controls the main valve.

When the direct on/off operator and servo on/off operator are energized, inlet gas flows through the servo orifice and through the open operator valve into the servo system and into the regulator. This servo gas moves the main valve diaphragm upwards enough to open the main valve. As soon as the main valve has opened, the outlet pressure generated by the Compact Automatic will be sensed by the regulator diaphragm via the feedback channel.

When the force operated by the pressure is greater than that preset by the adjustment screw, the regulator valve opens

relieving some of the working pressure. This reduces the force against the main valve spring allowing the main valve to close proportionately. Thus the main valve limits the outlet (or burner) pressure to the preset level.

As a result, outlet pressure is continuously maintained by comparing it to the preset pressure and adjusting the position of the main valve accordingly. This means that a constant outlet pressure is maintained regardless of inlet pressure variations.

At shut down, the small volume of working gas in the regulator and in the diaphragm chamber is dumped into the main outlet chamber.

A reference pressure feedback connection further regulates the outlet pressure by compensating for differences in the air pressure in the combustion chamber and at the valve.

If pressure regulation working is not needed, the regulator spring can be blocked by turning the adjustment screw down until it stops or the pressure regulation is removed. In these cases the full servo gas pressure opens the main valve as far as the pressure drop allows.

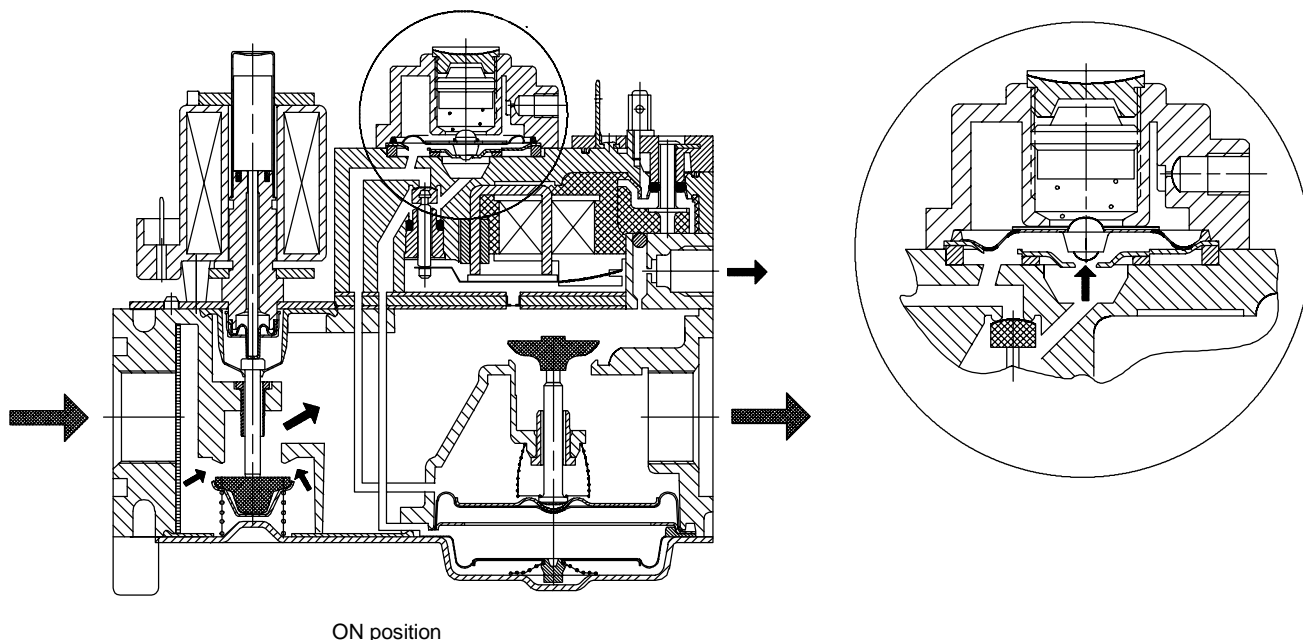


Fig. 1. Servo pressure regulator working

SOFTLITE working

Some burners function well using fast opening valve with the pressure build up as shown in fig. 1. However, other burner/appliance combinations need a means of improving their ignition characteristics by providing quieter ignition and reducing flame roll-out. The SOFTLITE mechanism achieves this by changing the profile of the outlet pressure curve as shown in fig. 2.

An extra diaphragm and spring are inserted below the main diaphragm. When the electric servo operator valve is opened, working gas enters the SOFTLITE module via the inlet orifice, and is fed into the space between the diaphragms. Working gas pressure rapidly increases to a preset level, partially opening the main valve (see fig. 3.).

As soon as it reaches the start level it overcomes the SOFTLITE spring pressure. The resultant move of the SOFTLITE diaphragm inhibits the increase of working gas pressure. Only when the SOFTLITE spring has been totally compressed does the working gas pressure increase rapidly once again until the full fire position is reached.

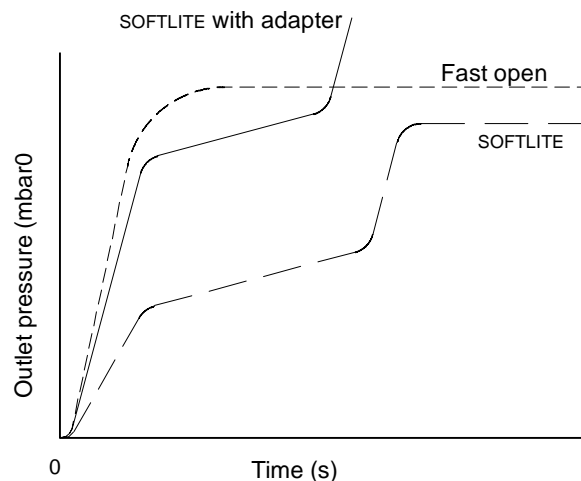


Fig. 2. Opening characteristics

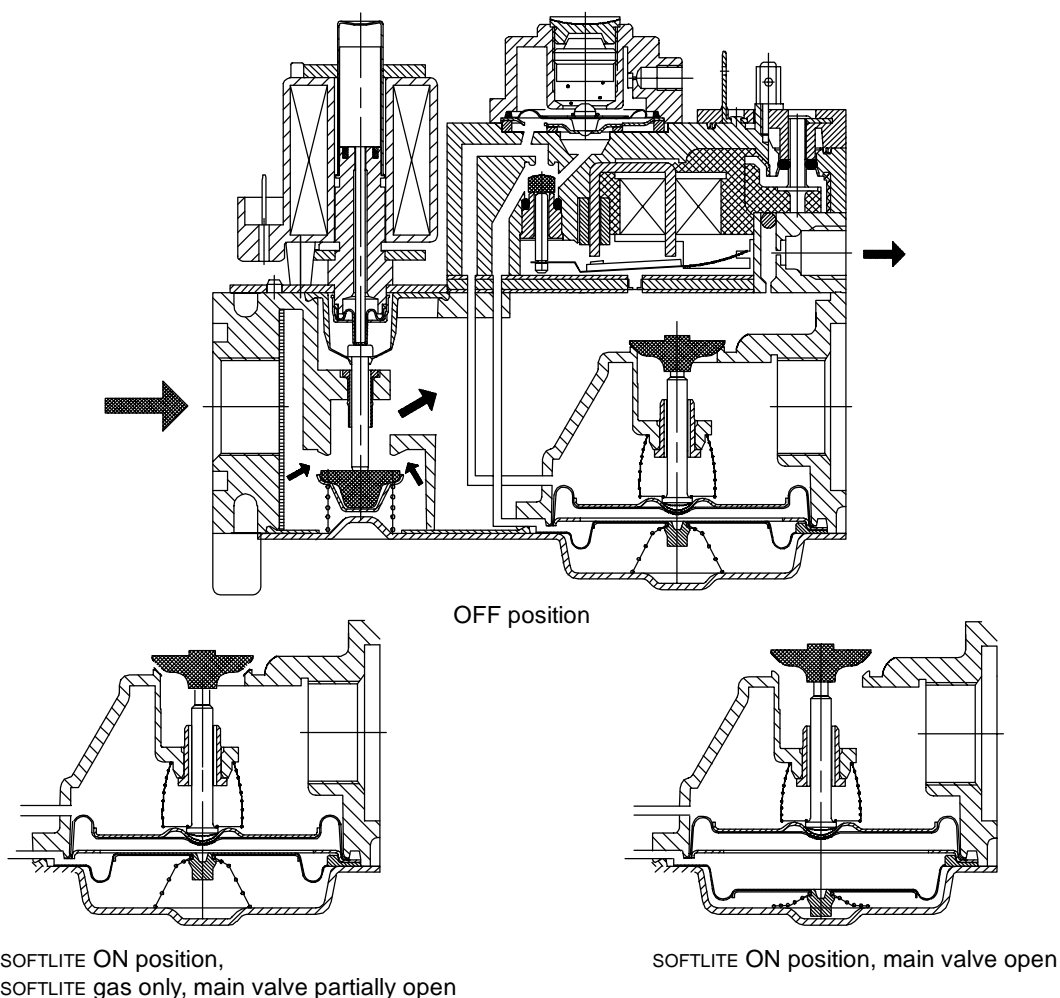


Fig. 3. Servo pressure regulation SOFTLITE models

Throttle valve working (see fig. 4.)

The throttle valve is situated after the main valve and can be adjusted by a screw. With the throttle the outlet pressure can be adjusted in relation to the inlet pressure.

The throttle screw has a rotation reduction of 4 : 1 to the throttle and can be fully rotated.

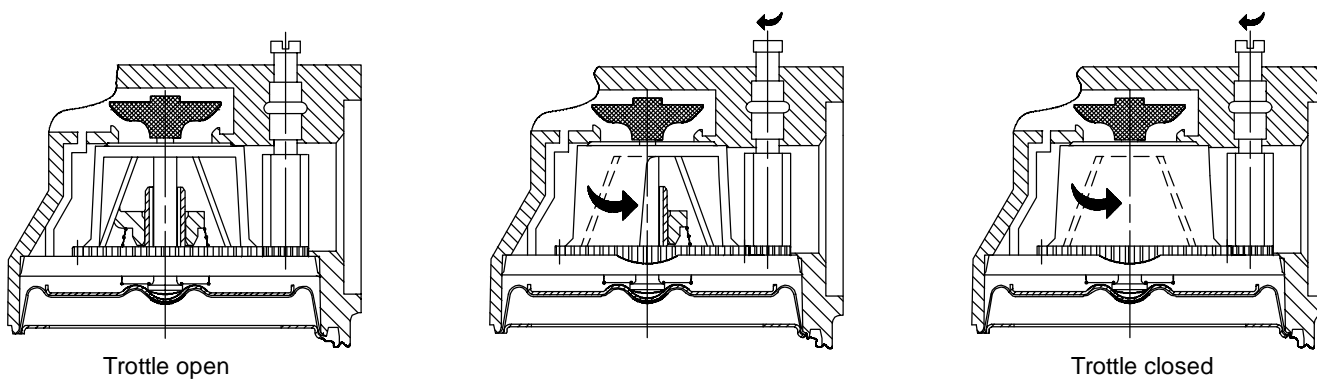


Fig. 4. Throttle adjustment

QUALITY ASSURANCE STATEMENT

Products are manufactured under an ISO 9001 (BS 5750/1 1987, part 1, EN 29001) based and certified Quality System. The quality system is described in the Honeywell Combustion Controls Center Quality Assurance Programme and its related operational procedures and instructions.

The quality system is approved by the British Standard Institution (BSI) against certificate number FM 6 and is reviewed twice a year by BSI.

The quality organisation is responsible for defining, maintaining, improving and verification of the quality systems in the field of design, production process and field quality service.

Assembly processes are guided by work instructions. Patrol inspections form part of the assembly processes.

At the end of the assembly phase, **all** gas controls are leakage and performance tested/adjusted.

Assembly inspection is performed by employees of the quality control department, using their own equipment.

All inspections (incoming and assembly) are performed by trained personnel and according inspection procedures.

STANDARDS AND APPROVALS

Standards

The Compact Automatic has been designed to meet the European Standards:

- EN 88: Pressure governors
- EN 161: Automatic shut-off valves
- EN 126: Multifunctional controls.

The safety shut off valve meets class A or B requirements depending on model number.

The servo operated main valve meets class D requirements in case of VR4601/VR8601 and VR4605/VR8605 and meets class C requirements in case of VR4615/VR8615.

According to bending stresses the Compact Automatic meets the highest requirements (group 2).

The pressure governor meets class B performance.

Regarding electric safety, the Compact Automatic can be used in appliances according to European Standard for household electrical requirements EN 60335 series.

The Compact Automatic also meets all Electro Magnetic Compatibility standards for non-industrial appliances.

Approvals

The Compact Automatic conforms with the following EC – Directives:

- Gas Appliance Directive (90/396/EEC)
- Low Voltage Directive (73/23/EEC)
- Electro Magnetic Compatibility Directive (89/336/EEC)

The fact that the Compact Automatic is certified to European standards EN 88, EN 161 and EN 126 means that the Compact Automatic meets more stringent requirements than laid down in the essential requirements stated in the directives and therefore meet the requirements in all EC and EFTA countries.

Details per O.S. number can be found in the Approvals List. In addition our controls have been certified by DIN-DVGW in Germany. The registration number specific for each O.S. number is mentioned on the label of the control.

ORDERING INFORMATION

When ordering specify:

- Model number of Compact Automatic required: see fig. 5.
- Inlet and outlet pipe sizes required: note pipe sizes determines capacity.
- The correct pilot burner for the installation concerned: refer to Honeywell ignition products guide EN0R-0038.
- Order numbers of replacement parts and accessories required, i.e. flanges, compression fittings: see replacement parts/accessories.

NOTE: Most models of valves, replacement parts and accessories will be available under "TRADELINE" label. Ask your wholesaler for details.

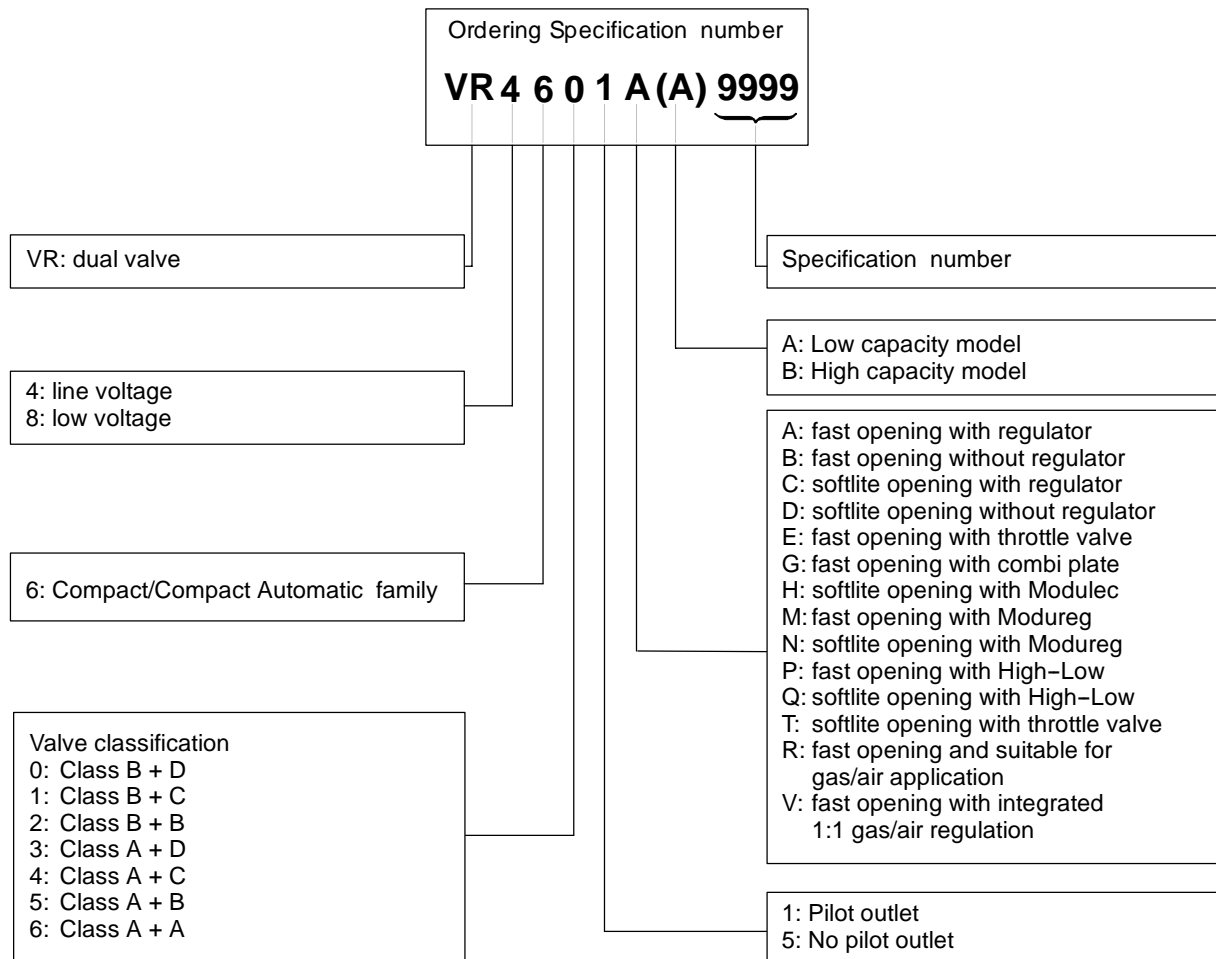


Fig. 5. Model number chart