Data sheet

Flow controller with integrated control valve (PN 16)

AHQM - return and flow mounting

Description

AHQM is a self-acting flow controller with integrated control valve primarily for use in district heating systems. The controller closes when set max. flow is exceeded.

AHQM controller can be combined with Danfoss electrical actuators AMV(E) and controlled by ECL electronic controllers.

The controller has a control valve with adjustable flow restrictor, connection neck for electrical actuator, and an actuator with one control diaphragm.

The controller can be installed in the flow and return pipeline.

Controllers are used together with Danfoss electrical actuators:
- AMV(E) 10
- AMV(E) 13 with spring return function
- AMV(E) 150

AHQM combined with AMV(E) 13 has been approved according to DIN EN 14597.

Main data:
- DN 15 - 32
- k_{vs} 0.8 - 6.3 m³/h
- PN 16
- Flow restrictor Δp:
  - 0.12 bar for DN 15 - 20
  - 0.14 bar for DN 25 - 32
- Temperature:
  - Circulation water / glycolic water up to 30%: 2 … 120 °C
- Connections:
  - Ext. thread (weld-on, thread and flange tailpieces)

Ordering

*Example 1 - **AHQM** controller:*
Flow controller with integrated control valve, DN 15, k_{vs} 1.6, PN 16, flow restrictor Δp 0.12 bar, t_{max} 120 °C, ext. thread

- *1× AHQM DN 15 controller*
  *Code No.: **003L3594***

Option:
- *1× Weld-on tailpieces*
  *Code No.: **003H6908***

Electrical actuator AMV(E) must be ordered separately.

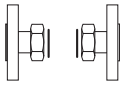
AHQM Controller

Picture	DN (mm)	k_{vs} (m³/h)	Connection		Code No.
	15	0.8	Cylindr. ext. thread acc. to ISO 228/1	G ¾ A	**003L3592** [1]
		1.25			**003L3593** [1]
		1.6			**003L3594** [1]
	20	2.5		G 1 A	**003L3595** [2]
	25	4.0		G 1¼ A	**003L3596** [3]
	32	6.3		G 1¾ A	**003L3597** [3]

[1] *The products can only be ordered in multiple packing containing 12 pieces each*
[2] *The products can only be ordered in multiple packing containing 8 pieces each*
[3] *The products can only be ordered in multiple packing containing 6 pieces each*

Ordering *(continuous)*

Accessories

Picture	Type designation	DN	Connection		Code No.
	Weld-on tailpieces	15	-		**003H6908**
		20			**003H6909**
		25			**003H6910**
		32			**003H6911**
	External thread tailpieces	15	Conical ext. thread acc. to EN 10226-1	R ½	**003H6902**
		20		R ¾	**003H6903**
		25		R 1	**003H6904**
		32		R 1¼	**003H6905**
	Flange tailpieces	15	Flanges PN 25, acc. to EN 1092-2		**003H6915**
		20			**003H6916**
		25			**003H6917**

Technical data

Valve

Nominal diameter	**DN**	**15**			**20**	**25**	**32**
k_{vs} value	m^3/h	0.8	1.25	1.6	2.5	4.0	6.3
Q_{min}	m^3/h	0.07	0.10	0.16	0.25	0.43	0.65
Q_{nom}*	m^3/h	0.32	0.55	0.78	1.20	2.20	3.40
Stroke	mm	5					
Control ratio		> 1:30					
Control characteristic		Linear					
Cavitation factor z **		≥ 0.6					
Leakage acc. to standard IEC 534		0.02				0.05	
Nominal pressure	PN	16					
Max. differential pressure	bar	4					
Medium		Circulation water / glycolic water up to 30%					
Medium pH		Min. 7, max. 10					
Medium temperature	°C	2 … 120					
Connections		External thread					
Materials							
Valve body /valve seat / valve cone		Dezincing free brass CuZn36Pb2As					
Sealing		EPDM					

* *At differental pressure across the controller $\Delta p_{AHQM} > 0.5$ bar*
** *$k_v / k_{vs} \leq 0.5$ at DN 25 and higher*

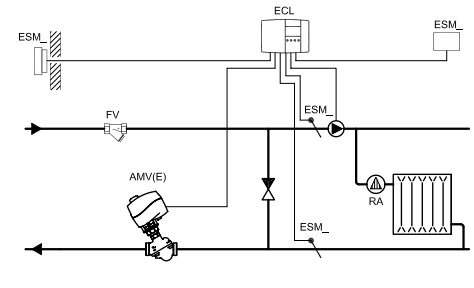
Actuator

Type	**DN**	**15**	**20**	**25**	**32**
Actuator size	cm^2	8.5	13.0	20.5	32.5
Nominal pressure	PN	10			
Flow restrictor differential pressure	bar	0.12		0.14	
Materials					
Housing*		Dezincing free brass CuZn36Pb2As			
Diaphragm		EPDM			

* *Actuator housing is part of valve body*

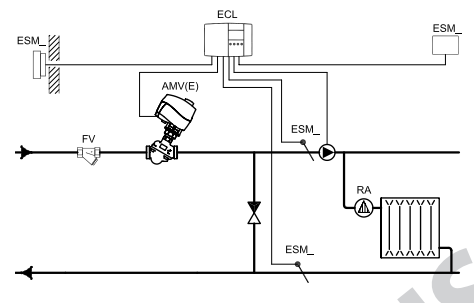
Application principles

- Return mounting



Direct-connected heating system *Indirectly connected heating system*

- Flow mounting

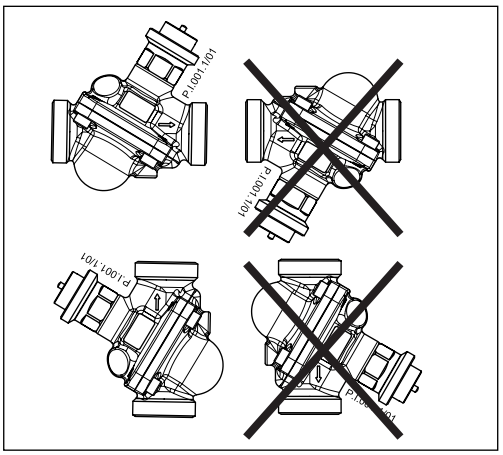


Direct-connected heating system *Indirectly connected heating system*

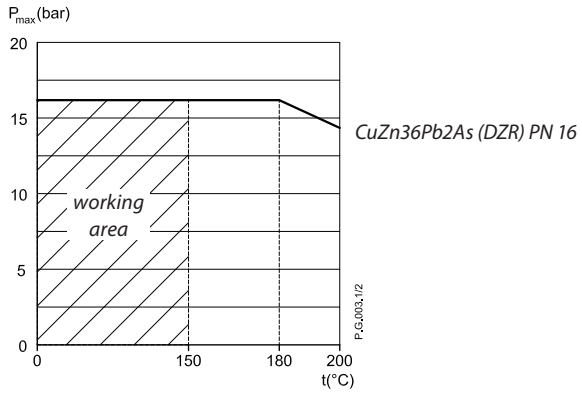
Installation positions

The controllers can be installed in horizontal or vertical pipes with (connection neck for) electrical actuator oriented upwards.

Electrical actuator
Note!
Installation positions for electrical actuator AMV(E) have to be observed as well. Please see relevant Data Sheet.



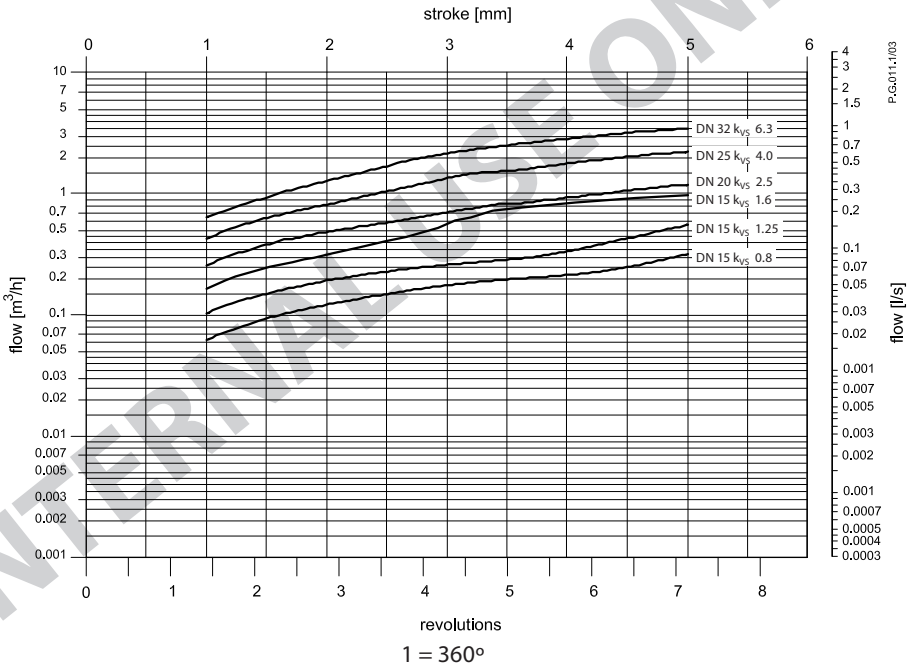
Pressure temperature diagram



Maximum allowed operating pressure as a function of medium temperature (according to EN 1092-3).

Flow diagram

Sizing and setting diagram
Relation between actual flow and number of revolutions on flow restictor. Values given are approximate.



Flow can be adjusted by turning flow restrictor screw counter-clockwise as shown in this diagram

Water flow shown at differential pressure across the controller from 0.5 bar (50 kPa) to 4 bar (400 kPa).

Sizing

- *Directly connected heating system*

Example 1
Motorised control valve (MCV) for mixing circuit in direct-connected heating systems requires differential pressure of 0.12 bar (12 kPa) and flow less than 600 l/h.

Given data:
Q_{max} = 0.6 m³/h (600 l/h)
Δp_{min} = 0.8 bar (80 kPa)
*$\Delta p_{circuit}$ = 0.1 bar (10 kPa)
Δp_{MCV} = 0.12 bar (12 kPa) selected

* Remark:
$\Delta p_{circuit}$ corresponds to the required pump pressure in the heating circuit and is not to be considered when sizing the AHQM

Note!
Available differential pressure across the controller must be min. 0.5 bar to ensure correct control function.

The total (available) pressure loss across the controller is:
$\Delta p_{AHQM,A} = \Delta p_{min}$
$\Delta p_{AHQM,A}$ = 0.8 bar (80 kPa)

Possible pipe pressure losses in tubes, shut-off fittings, heatmeters, etc. are not included.

Select controller from flow diagram, page 5, with the smallest possible k_{vs} value considering available flow ranges.

k_{vs} = 1.6 m³/h

The min. required differential pressure across the selected controller is calculated from the formula:

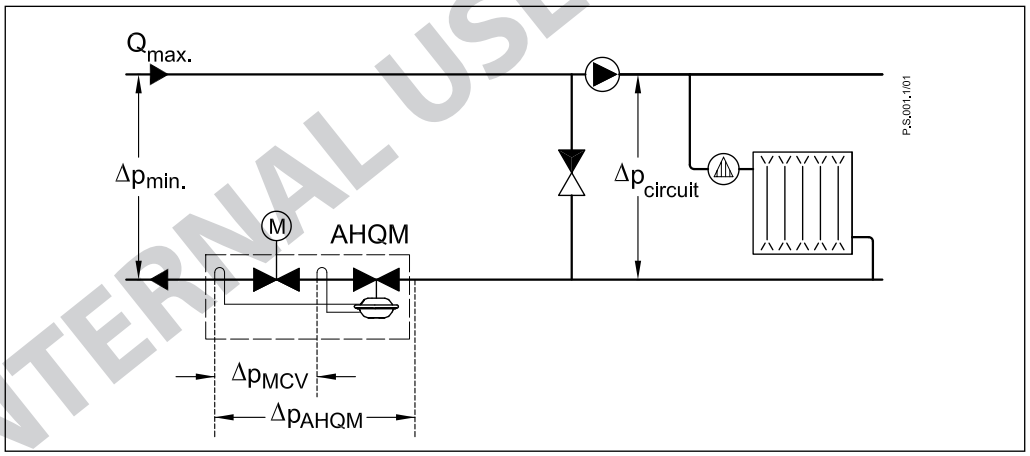
$$\Delta p_{AHQM,MIN} = \left(\frac{Q_{max.}}{k_{vs}}\right)^2 + \Delta p_{MCV} = \left(\frac{0.6}{1.6}\right)^2 + 0.12$$

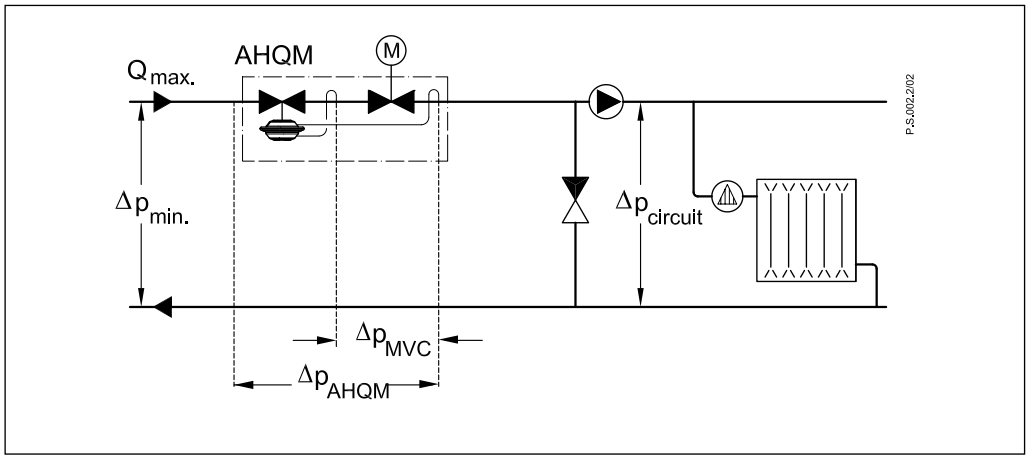
$\Delta p_{AHQM,MIN}$ = 0.26 bar (26 kPa)

$\Delta p_{AHQM,A} > \Delta p_{AHQM,MIN}$

0.8 bar > 0.26 bar

Solution:
The example selects AHQM DN 15, k_{vs} value 1.6, flow setting range 0.06 - 0.79 m³/h.





Sizing *(continuous)*

- *Indirectly connected heating system*

Example 2
Motorised control valve (MCV) for indirectly connected heating system control requires differential pressure of 0.14 (14 kPa) bar and flow less than 350 l/h.

Given data:
Q_{max} = 0.35 m³/h (350 l/h)
Δp_{min} = 0.8 bar (80 kPa)
$\Delta p_{exchanger}$ = 0.1 bar (10 kPa)
Δp_{MCV} = 0.14 bar (14 kPa) selected

Note!
Available differential pressure across the controller must be min. 0.5 bar to ensure correct control function.

The total (available) pressure loss across the controller is:
$\Delta p_{AHQM,A} = \Delta p_{min} - \Delta p_{exchanger} = 0.8 - 0.1$
$\Delta p_{AHQM,A} = 0.7$ bar (70 kPa)

Possible pipe pressure losses in tubes, shut-off fittings, heatmeters, etc. are not included.

Select controller from flow diagram, page 5, with the smallest possible k_{vs} value considering available flow ranges.

$k_{vs} = 1.25$ m³/h

The min. required differential pressure across the selected controller is calculated from the formula:

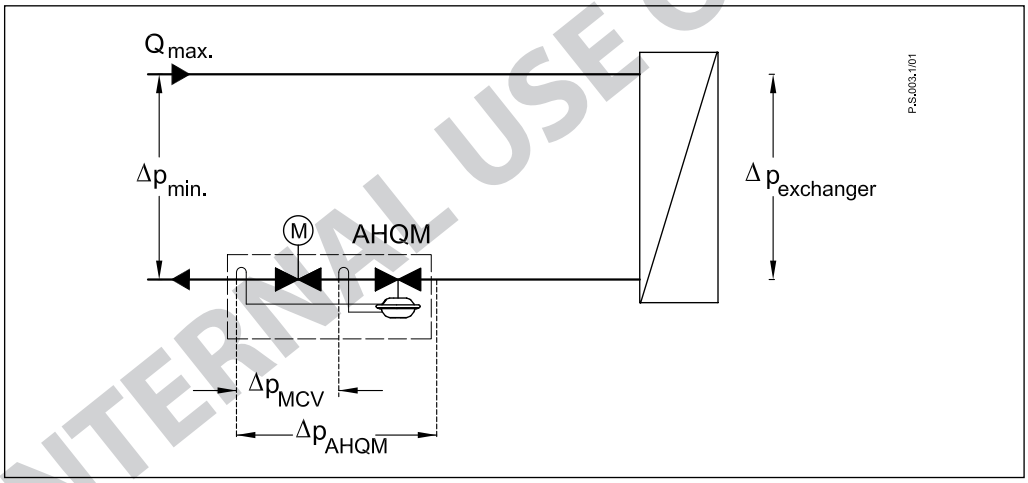
$$\Delta p_{AHQM,MIN} = \left(\frac{Q_{max.}}{k_{vs}}\right)^2 + \Delta p_{MCV} = \left(\frac{0.35}{1.25}\right)^2 + 0.12$$

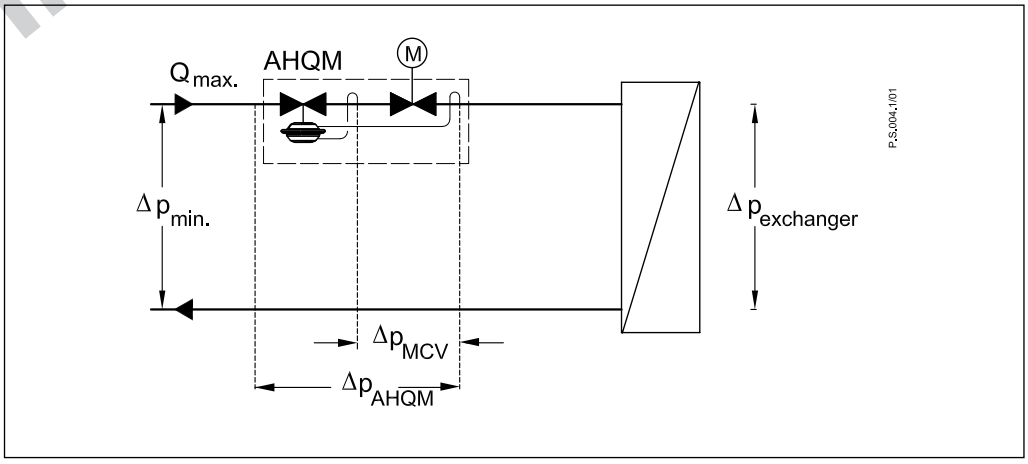
$\Delta p_{AHQM,MIN} = 0.2$ bar (20 kPa)

$\Delta p_{AHQM,A} > \Delta p_{AHQM,MIN}$

0.7 bar > 0.2 bar

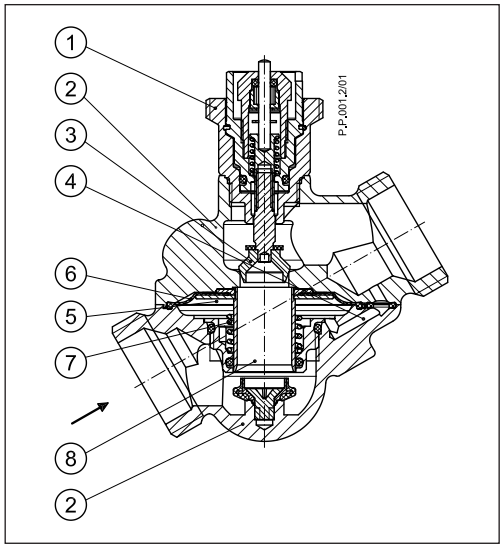
Solution:
The example selects AHQM DN 15, k_{vs} value 1.25, flow setting range 0.03 - 0.49 m³/h.





Design

1. Control valve insert
2. Valve body
3. Adjustable flow restrictor
4. Control drain
5. Actuator
6. Control diaphragm
7. Built-in spring for flow rate control
8. Control valve cone



Function

Flow controller with integrated control valve

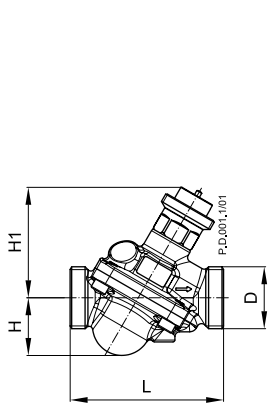
Flow volume causes the pressure drop across the adjustable flow restrictor. Resulting pressures are being transferred through control drains within valve body to the actuator chambers and act on control diaphragm. The flow restrictor diff. pressure is controlled and limited by means of built-in spring for flow rate control.

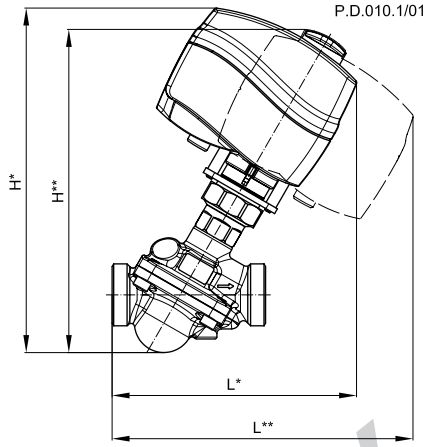
Additionally the electrical actuator will operate from zero to set max. flow according to the load.

Settings

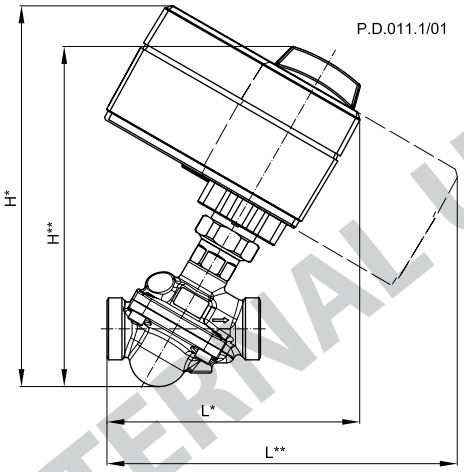
Flow setting
Flow setting is being done by the adjustment of the flow restrictor position. The adjustment can be performed on the basis of flow adjustment diagram (see relevant instructions) and/or by the means of heat meter.

Dimensions

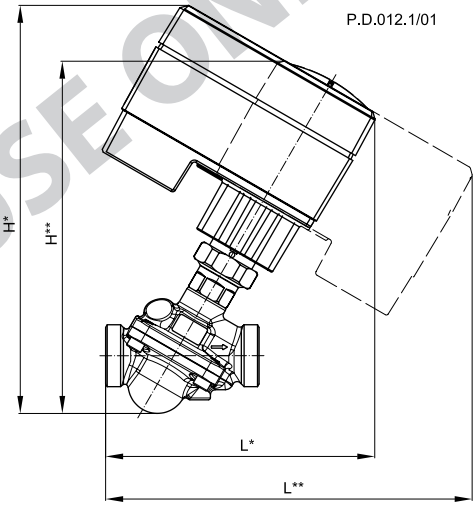




AMV(E) 150 + AHQM



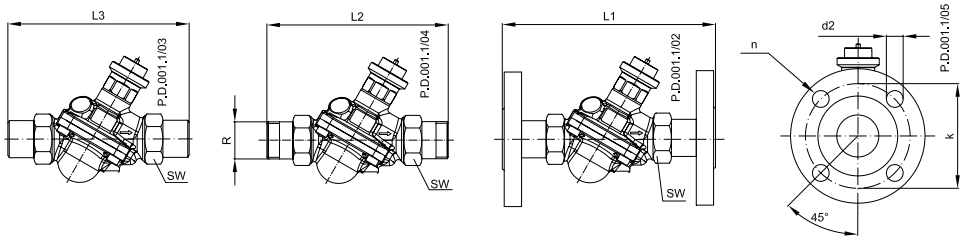
AMV(E) 10 + AHQM



AMV(E) 13 + AHQM

DN			15	20	25	32
L			65	82	104	130
L*	AMV(E) 150		125	132	148	167
	AMV(E) 10		137	137	153	172
	AMV(E) 13		147	147	164	183
L**	AMV(E) 150		152	160	178	198
	AMV(E) 10		178	186	204	224
	AMV(E) 13		188	196	214	234
H		mm	24	31	39	49
H1			57	59	72	84
H*	AMV(E) 150		178	184	206	226
	AMV(E) 10		195	201	223	245
	AMV(E) 13		210	216	238	260
H**	AMV(E) 150		168	178	196	216
	AMV(E) 10		174	184	202	222
	AMV(E) 13		180	190	208	228
D (ISO 228/1)			G ¾ A	G 1 A	G 1¼ A	G 1¾ A
Valve weight		kg	0.51	0.67	1.47	2.23

Dimensions *(continuous)*



DN		15	20	25	32
SW		32 (G ¾A)	41 (G 1A)	50 (G 1¼A)	63 (G 1¾A)
d		21	26	33	42
R [1]		½	¾	1	1 ¼
L1 [2]		130	150	160	-
L2	mm	131	144	160	177
L3		139	154	159	184
k		65	75	85	-
d_2		14	14	14	-
n		4	4	4	-

[1] *Conical ext. thread acc. to EN 10226-1*
[2] *Flanges PN 25, acc. to EN 1092-2*