



**VAI61..**

**VBI61..**

ACVATIX™

## 2-port and 3-port ball valves PN40

**VAI61..**  
**VBI61..**

with internally threaded connections

- Brass UNS C35330 (DZR) ball valve body
- DN 15...50
- $k_{vs}$  1...63 m<sup>3</sup>/h
- Internally threaded connections Rp as per ISO 7-1
- Angle of rotation 90°
- For use with rotary actuators GQD..9A, GMA..9E with spring-return and GDB..9E, GLB..9E without spring return
- Applications with auxiliary functions (e.g., switch, potentiometer, see p. 3) can also be combined with standard rotary actuators.

### Use

For use in heating, ventilating and air conditioning plants as a control or safety shutoff valve.

For closed circuits (avoid cavitation, see page 5).

## Type summary

Type	DN	$k_{vs}$ [m <sup>3</sup> /h]	$S_v$
2-port			
3-port			
VAI61.15-1	15	1.0	> 500
VAI61.15-1.6		1.6	
VAI61.15-2.5		2.5	
VAI61.15-4		4.0	
VAI61.15-6.3		6.3	
VAI61.15-10		10	
VAI61.20-4	20	4	
VAI61.20-6.3		6.3	
VAI61.20-10		10	
VAI61.25-6.3	25	6.3	
VAI61.25-10		10	
VAI61.25-16		16	
VAI61.32-10	32	10	
VAI61.32-16		16	
VAI61.32-25		25	
VAI61.40-16	40	16	
VAI61.40-25		25	
VAI61.40-40		40	
VAI61.50-25	50	25	
VAI61.50-40		40	
VAI61.50-63		63	

DN = nominal size

$k_{vs}$  = nominal flow rate of cold water (5...30 °C) through the fully open ball valve at a differential pressure of 100 kPa (1 bar)

$S_v$  = rangeability  $k_{vs} / k_{vr}$

$k_{vr}$  = smallest  $k_v$  value at which the flow characteristic tolerances can still be maintained at a differential pressure of 100 kPa (1 bar)

## Accessories

For thermal insulation, separate insulation covers are available.

Ball valve	Insulation cover	Ball valve	Insulation cover
VAI61.15..	ALI15VAI60/61	VBI61.15..	ALI15VBI60/61
VAI61.20..	ALI20VAI60/61	VBI61.20..	ALI20VBI61
VAI61.25..	ALI25VAI60/61	VBI61.25..	ALI25VBI60/61
VAI61.32..	ALI32VAI60/61	VBI61.32..	ALI32VBI60/61
VAI61.40..	ALI40VAI60/61	VBI61.40..	ALI40VBI60/61
VAI61.50..	ALI50VAI60/61	VBI61.50..	ALI50VBI60/61

## Equipment combinations

Type	Rotary actuators							
	GQD..9A		GDB..9E		GMA..9E		GLB..9E	
	$\Delta p_{max}$	$\Delta p_s$	$\Delta p_{max}$	$\Delta p_s$	$\Delta p_{max}$	$\Delta p_s$	$\Delta p_{max}$	$\Delta p_s$
Ball valve	[kPa]							
VAI61.15..	350	1'400	350	1'400	350	1'400	350	1'400
VAI61.20..								
VAI61.25..					350	1'000	350	1'000
VAI61.32-10					240	800	240	800
VAI61.32-16					350	800	350	800
VAI61.32-25					240	600	240	600
VAI61.40-16					350	600	350	600
VAI61.40-25					240	600	240	600
VAI61.40-40					350	600	350	600
VAI61.50-25					240	600	240	600
VAI61.50-40					350	600	350	600
VAI61.50-63					240	600	240	600

VBI61.15..	350		350		350		350	
VBI61.20..								
VBI61.25-10					240		240	
VBI61.32-16								
VBI61.40-25								
VBI61.50-40								
VBI61.50-63								

$\Delta p_{max}$  = maximum permissible differential pressure across ball valve's control path, valid for the entire actuating range of the motorized ball valve; for low noise operation, we recommend a maximum permissible differential pressure of 200 kPa

$\Delta p_s$  = maximum permissible differential pressure at which the motorized ball valve will close securely against the pressure (close off pressure)

## Rotary actuators for ball valves (overview)

Type / Stock no.	Actuator type	Operating voltage	Positioning		Spring return		Data Sheet
			signal	time	function	time	
GQD131.9A	Electro-motoric	AC/DC 24 V	3-position	30/15 s <sup>1)</sup>	Yes	15 s	N4659
GQD161.9A			DC 0...10 V				
GDB331.9E	Electro-motoric	AC 230 V	3-position	150 s			N4657
GDB131.9E		AC 24 V					
GDB161.9E			DC 0...10 V				
GMA131.9E	Electro-motoric	AC / DC 24 V	3- position	90/15 s <sup>1)</sup>	Yes	15 s	N4658
GMA161.9E			DC 0...10 V				
GLB331.9E	Electro-motoric	AC 230 V	3-position	150 s			N4657
GLB131.9E		AC 24 V					
GLB161.9E			DC 0...10 V				

<sup>1)</sup> open/close

## Ordering

When ordering please give material, article type, purchase order text and quantity.

Example:

Material	Article Type	Purchase Order (PO) text	Quantity
VAI61.25-16	VAI61.25-16	Ball valve inside threaded, 2-Port	2
GLB161.9E	GLB161.9E	Actuator for Ball valve, NSR	2

## Spare parts, Rev. no.

See overview, page 10.

## Delivery

Ball valves, rotary actuators and mounting sets are supplied in separate packaging and not assembled prior to delivery.

## Applications with auxiliary functions

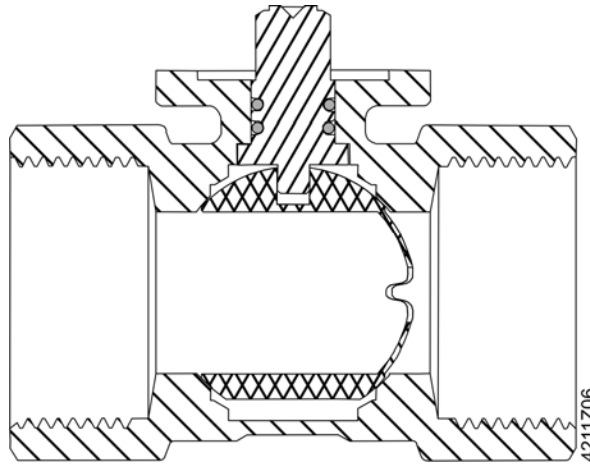
If a ball valve application requires a rotary actuator with auxiliary functions (for example switch or potentiometer), a standard actuator with a corresponding function can be used. In this case, a mounting set ASK77.. is required **in addition** to the rotary actuator.

For assembly please consult mounting instructions accordingly.

Rotary actuators	Option	Mounting set (order text)
<b>GMA..1E</b> (with spring-return)	Potentiometer, switches	<b>ASK77.2</b> Accessory Kit BV for GMAxx1.9E
<b>GDB..1E / GLB..1E</b> (without spring-return)	Potentiometer, switches	<b>ASK77.3</b> Accessory Kit BV for GDBxx1.9E
<b>GQD..1A</b> (with spring-return)	Switches	<b>ASK77.4</b> Accessory Kit for BV GQDxx1.9A

Note: GAP19../GNP19.. are not compatible with mounting set ASK77.2.

Ball valve cross-section

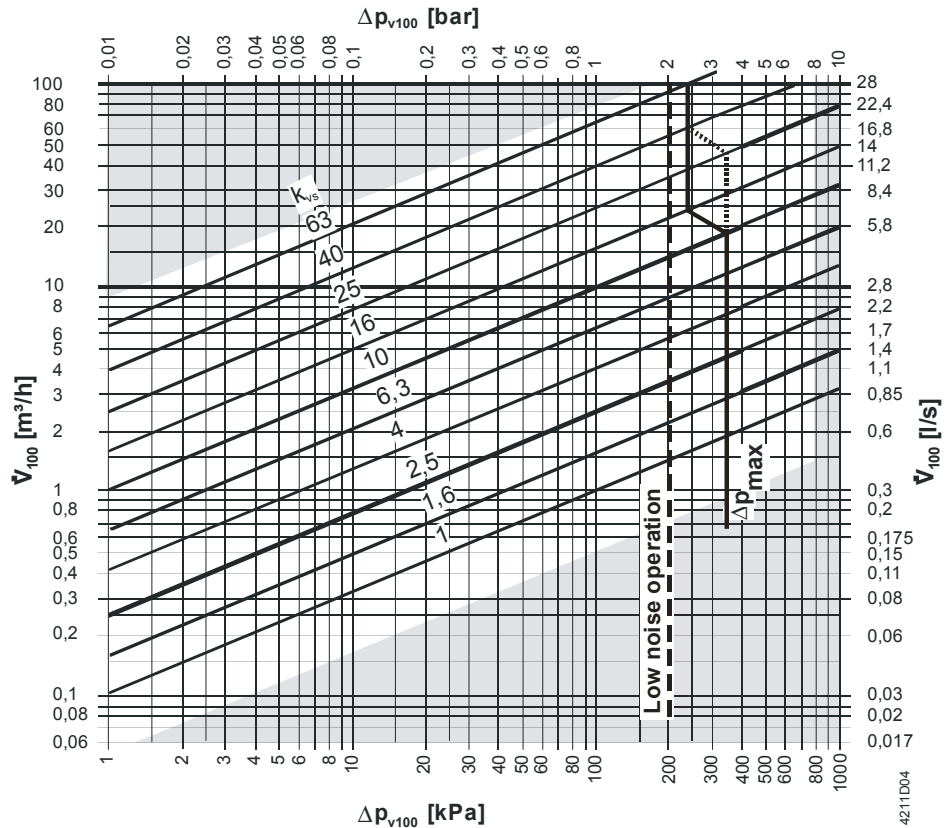


Ball with integrated control characteristic

Special PTFE seat ring design for low torque operation

Sizing

Flow diagram



-----  $\Delta p_{max}$  for VAI61.. and VBI61.. see table equipment combinations for details

$\Delta p_{max}$  = maximum permissible differential pressure across the ball valve, valid for the entire actuating range of the motorized ball valve; for low noise operation, we recommend a maximum permissible differential pressure of 200 kPa

$\Delta p_{v100}$  = differential pressure across the fully open ball valve and the ball valve's control path at a volumetric flow  $V_{100}$

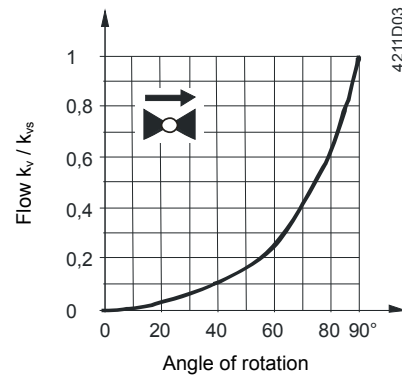
$\dot{V}_{100}$  = volumetric flow through the fully open ball valve

100 kPa = 1 bar  $\approx$  10 mWC

1 m<sup>3</sup>/h = 0.278 l/s water at 20 °C

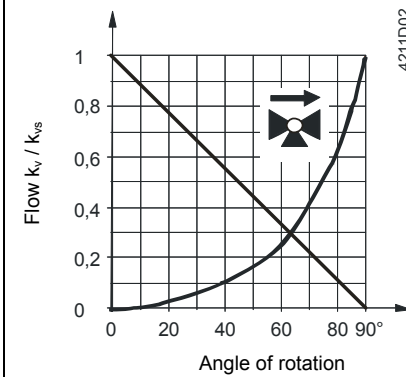
## Ball valve flow characteristic

### 2-port



0...100 %: → equal-percentage,  $n_{gr} = 3.9$   
as per VDI / VDE 2173

### 3-port

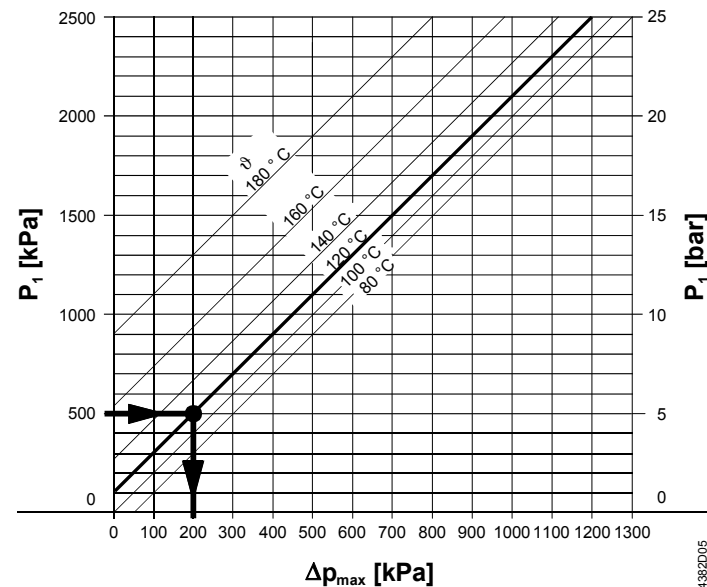


**Through-port** 0...100 %: → equal-percentage,  
 $n_{gr} = 3.9$  as per  
VDI / VDE 2173

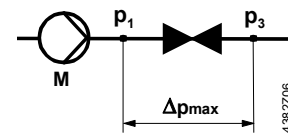
**Bypass** 0...100 %: → linear  
**VBI61.50-63** bypass approx. 62 %

## Cavitation

Cavitation accelerates wear on the ball and seat, and also results in undesirable noise. Cavitation can be avoided by not exceeding the differential pressure shown in the flow diagram on page 4, and by adhering to the static pressures shown below.



$\Delta p_{max}$  = differential pressure with ball valve almost closed at which cavitation can largely be avoided  
 $p_1$  = static pressure at ball valve inlet  
 $p_3$  = static pressure at ball valve outlet  
 M = pump  
 $\vartheta$  = water temperature



High temperature  
hot water example:

Pressure  $p_1$  at ball valve inlet: 500 kPa (5 bar)  
Water temperature: 120 °C

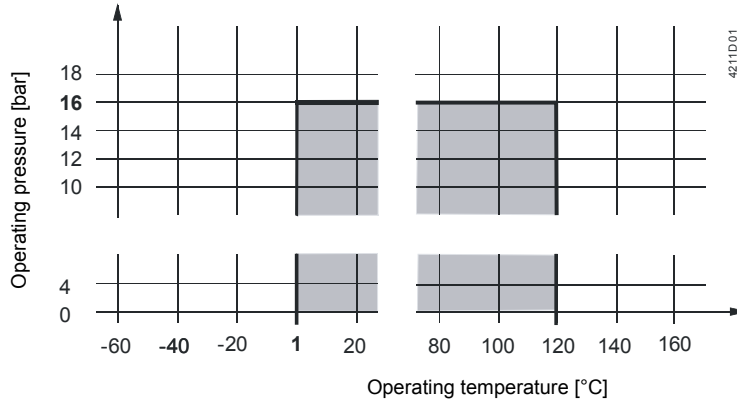
From the diagram above, it will be seen that with the ball valve almost closed, the maximum permissible differential pressure  $\Delta p_{max}$  is 200 kPa (2 bar).

Note on chilled water

To avoid cavitation in chilled water circuits, ensure sufficient counter-pressure at the ball valve's outlet, e.g. with an additional throttling ball valve downstream from

the ball valve. Select the maximum differential pressure across the ball valve according to the 80 °C curve in the flow diagram above.

**Operating pressure and temperature**  
Fluids



**Operating pressure and medium temperature as per ISO 7005**

Current local legislation must be observed.

**Notes**

**Engineering**

We recommend installation in the return pipe, as the temperatures in this pipe are lower for applications in heating systems, which extends the stem sealing gland's life.

Ensure cavitation-free flow (refer to page 5).

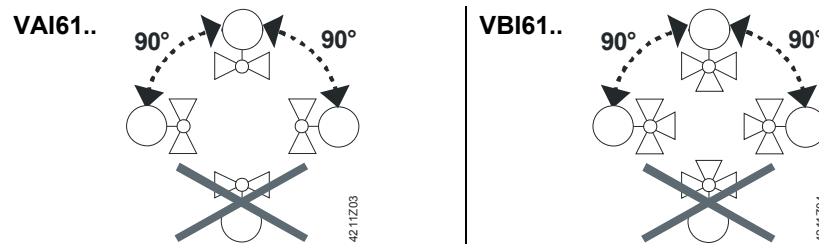
Always use a strainer upstream of the ball valve to increase the ball valve's functional safety.

**Mounting**

Ball valve and rotary actuator can easily be assembled on site. Neither special tools nor adjustments are required.

The ball valve is supplied with Mounting Instructions (VAI61.., VBI61..: 74 319 0647 0.

**Orientation**



**Direction of flow**

When mounting, pay attention to the ball valve's flow direction symbol.



**Commissioning**

**Commission the ball valve only if the rotary actuator has been mounted correctly.**

Ball valve stem moves counterclockwise: Ball valve opens = increasing flow  
Ball valve stem moves clockwise: Ball valve closes = decreasing flow

## Maintenance

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VAI61.. and VBI61.. ball valves are maintenance-free.

### Warning

When doing service work on the ball valve / rotary actuator:

- Deactivate the pump and turn off the power supply
- Close the shutoff ball valves
- Fully reduce the pressure in the piping system and allow pipes to completely cool down

If necessary, disconnect the electrical wires.

Before putting the ball valve into operation again, make sure the rotary actuator is correctly fitted.

### Disposal



Before disposal, the ball valve must be dismantled and separated into its various constituent materials.

Legislation may demand special handling of certain components, or it may be sensible from an ecological point of view.

**Current local legislation must be observed.**

### Warranty

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The technical data given for applications is valid only in conjunction with the Siemens rotary actuators listed under "Equipment combinations", page 2.

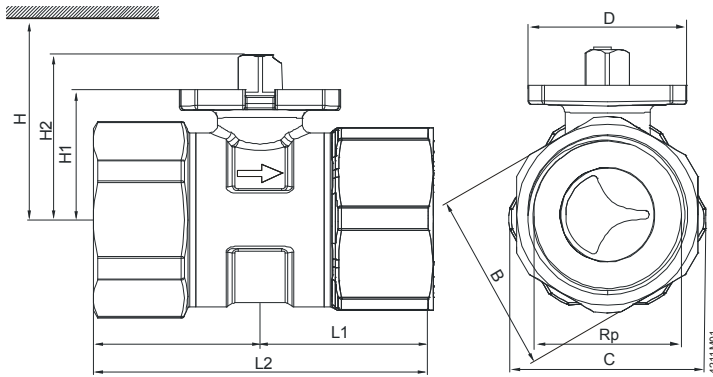
All terms of the warranty will be invalidated if rotary actuators of other manufacture are used.

## Technical data

	VAI61..	VBI61..	
<b>Functional data</b>	PN class	PN 40 as per ISO 7268	
	Operating pressure	To ISO 7005 within the permissible medium temperature range according to diagram on page 6	
	Ball valve characteristic		
	Through-port 0...100 %	equal-percentage; $n_{gl} = 3.9$ as per VDI / VDE 2173	equal-percentage; $n_{gl} = 3.9$ as per VDI / VDE 2173
	Bypass 0...100 %		linear
	Leakage rate		
	Through-port	0...0.0001 of $k_{vs}$ value	0...0.0001 of $k_{vs}$ value
	Bypass		< 0.01 of $k_{vs}$ value
	Permissible media	Cold water, chilled water, low temperature hot water, high temperature hot water, water with anti-freeze. Recommendation: water treatment to VDI 2035	
	Medium temperature	1...120 °C	
	Rangeability $S_v$	> 500	
	Angle of rotation	90 °	
	<b>Materials</b>	Ball valve body	Brass UNS C35330 (DZR)
Ball		Brass UNS C35330 (DZR), chromium-plated	
Stem		Brass UNS C35330 (DZR)	
Gland		EPDM O-rings	
<b>Dimensions / weight</b>	Refer to "Dimensions" below		
	Internally threaded connections	Rp as per ISO 7-1	
<b>Standards</b>	Pressure Equipment Directive	PED 97/23/EC	
	Pressure accessories	As per article 1, section 2.1.4	
	Fluid group 2	Without CE marking as per article 3, section 3 (sound engineering practice)	
	Environmental compatibility	ISO 14001 (Environment) ISO 9001 (Quality) SN 36350 (Environmentally compatible products) RL 2002/95/EC (RoHS)	

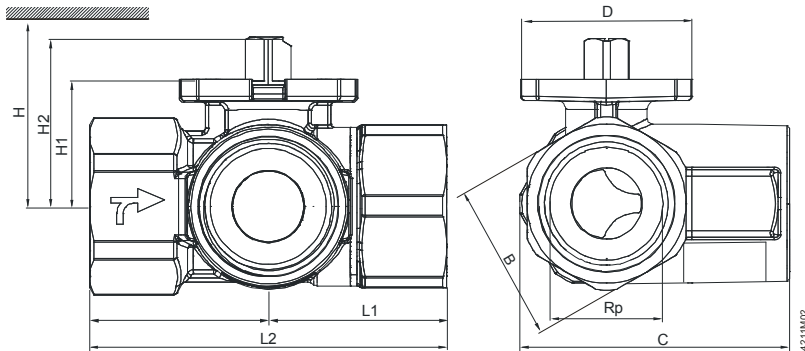


## Dimensions



- DN = Nominal size
- H = Total actuator height plus minimum distance to the wall or the ceiling for mounting, connection, operation, service, etc.
- H1 = Dimension from the pipe centre to install the actuator (upper edge)

Type	DN	B [mm]	C [mm]	D [mm]	Rp [Inch]	L1 [mm]	L2 [mm]	H1 [mm]	H2 [mm]	H				[kg]
										GQD..9A [mm]	GDB..9E [mm]	GMA..9E [mm]	GLB..9E [mm]	
VAI61.15..	15	26	31 <sup>1)</sup>	42	Rp ½	31	62	27.6	37.6	> 300	> 310	>300	>300	0.3
VAI61.20..	20	31	34	42	Rp ¾	33	68	27.6	37.6					0.35
VAI61.25..	25	39	42.5	42	Rp 1	38.5	77	30.5	40.5			>310	>310	0.5
VAI61.32..	32	48	52	42	Rp 1¼	44	88	34.3	44.3					0.7
VAI61.40..	40	55	61	42	Rp 1½	48.5	102	39.8	49.8			>320	>320	1.1
VAI61.50..	50	67	74	42	Rp 2	56.5	119	52.8	62.8			>335	>335	1.8



- DN = Nominal size
- H = Total actuator height plus minimum distance to the wall or the ceiling for mounting, connection, operation, service, etc.
- H1 = Dimension from the pipe centre to install the actuator (upper edge)

Type	DN	B [mm]	C [mm]	D [mm]	Rp [Inch]	L1 [mm]	L2 [mm]	H1 [mm]	H2 [mm]	H				[kg]
										GQD..9A [mm]	GDB..9E [mm]	GMA..9E [mm]	GLB..9E [mm]	
VBI61.15..	15	26	48.5 <sup>1)</sup>	42	Rp ½	33.5	67	24.2	33.7	> 300	> 310	>300	>300	0.29
VBI61.15-6.3			49.5 <sup>1)</sup>	42				27.6	37.6					0.305
VBI61.20..	20	31	52	42	Rp ¾	36	72	27.6	37.6					0.375
VBI61.25..	25	39	64.5	42	Rp 1	42.5	85	30.5	40.5			>310	>310	0.605
VBI61.32..	32	48	76.5	42	Rp 1¼	49.5	99	34.3	44.3					0.95
VBI61.40..	40	55	84.5	42	Rp 1½	55	110	39.8	49.8			>320	>320	1.365
VBI61.50..	50	67	102.5	42	Rp 2	65.5	131	52.8	62.8			>335	>335	2.215

<sup>1)</sup> Body larger than union nut

## Revision numbers

Product number	Valid from rev. no.	Product number	Valid from rev. no.
VAI61.15-1	..A		
VAI61.15-1.6	..A	VBI61.15-1.6	..A
VAI61.15-2.5	..A	VBI61.15-2.5	..A
VAI61.15-4	..A	VBI61.15-4	..A
VAI61.15-6.3	..A	VBI61.15-6.3	..A
VAI61.15-10	..A		
VAI61.20-4	..A	VBI61.20-4	..A
VAI61.20-6.3	..A	VBI61.20-6.3	..A
VAI61.20-10	..A	VBI61.20-10	..A
VAI61.25-6.3	..A		
VAI61.25-10	..A	VBI61.25-10	..A
VAI61.25-16	..A		
VAI61.32-10	..A		
VAI61.32-16	..A	VBI61.32-16	..A
VAI61.32-25	..A		
VAI61.40-16	..A		
VAI61.40-25	..A	VBI61.40-25	..A
VAI61.40-40	..A		
VAI61.50-25	..A		
VAI61.50-40	..A	VBI61.50-40	..A
VAI61.50-63	..A	VBI61.50-63	..A