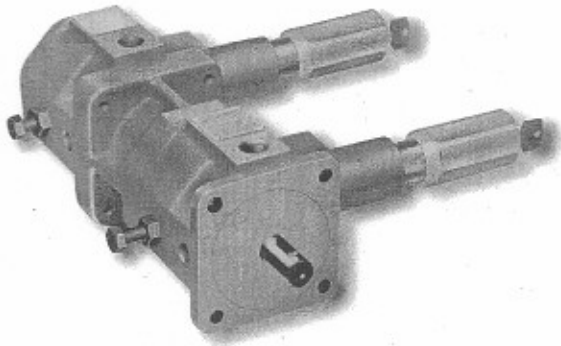


Variable Displacement Vane Pumps

VVA 10/20/40, 20 series and VVA 80, 10 series single and multiple pumps



Basic Characteristics

Types Single and multiple pumps
(Multiples can include fixed displacement sections)

Displacement
(variable sections) 10 to 83 cm³/r
Speed range 800 to 1800 r/min
Max. operating pressure . up to 100 bar

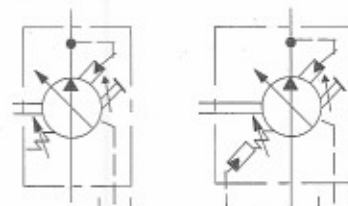
General Description

VVA pumps are pressure compensated variable displacement vane pumps having separate adjustments for pressure compensation and maximum displacement. Pressure compensator options include single and dual adjustable pressure designs.

Modular design enables the user to build multiple pumps (max. of three pump sections) quickly from individual pump sections and adaptor kits containing all the necessary parts. Multiple pumps can contain pump sections of the VVA type only or a mix of VVA and Vickers vane pumps.

Functional Symbols

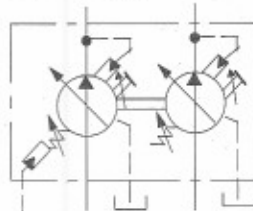
Single pumps



VVA pump with 'C' compensator

VVA pump with 'CD' compensator

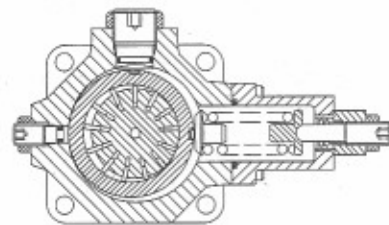
Multiple pumps, typical



VVA double pumps with 'CD' and 'C' compensator sections

Sectional Illustration

Transverse section through 'C' compensator, 20 design example



Model Code

Single pumps or VVA sections of multiple pumps.

VVA** (*) * - C(D) * * W-*0

1
2
3
4
5
6
7

1 Geometric displacement, max.

10 = 10 cm³/r 40 = 43 cm³/r
20 = 19 cm³/r 80 = 83 cm³/r

2 Pump section, multiple pumps

VVA**(F)R models

F = Shaft-end section of all models or VVA-type center section of triple pumps

Omit for single pumps and VVA-type rear-end sections of multiple pumps.

VVA**(*)P models

F = Shaft-end section

M = VVA-type center section of triple pumps

E = VVA-type rear-end section of multiple pumps

Omit for single pumps

3 Mounting flange/port type combinations

Code	Mounting flange Δ	Port type	Option for:
R	\blacktriangle	G(BSPF)	VVA10, 20,40 and 80
	\blacktriangle	NPT	VVA10
P \blacklozenge	SAE 'B'	UNF/SAE	VVA20
	SAE 'C'	O-ring	VVA40
	SAE 'D'		VVA80

Δ 4-bolt square

\blacktriangle See 'Installation dimensions' section

\blacklozenge Recommended for exports to USA and USA-influenced markets

4 Control Type

C = Pressure compensator

CD = Dual pressure compensator

5 Pressure compensator adjustment ranges

For VVA 10, 20 and 40 pumps

A = 12-25 bar

B = 20-40 bar

C = 30-63 bar

D = 50-100 bar

For VVA 80 pumps

A = 10-35 bar

B = 20-70 bar

6 Pressure compensator adjustment method

W = Screw with locknut

K = Micrometer knob with keylock (Option for type C compensators only)

7 Design number

20 series for VVA 10, 20 and 40 models

10 series for VVA 80 models

Subject to change. Installation dimensions remain unaltered for design numbers *0 to *9 inclusive.

Multiple pumps, complete

See 'Multiple pumps' section.

Operating Data

• Pressure, displacement and speed limits

Pressure limits

Variable displacement pump or sections

Inlet port -0,2 bar to + 1,0 bar

Outlet port:

VVA 10/20/40 100 bar max. contin.

VVA 80 70 bar max. contin.

Pilot pressure port ('CD' compensators):

VVA 10/20/40 100 bar max. contin.

VVA 80 70 bar max. contin.

Drain port 1,0 bar max.

Fixed displacement section(s) of multiple pumps

See leaflet of appropriate pump as listed in the 'Multiple pumps' section.

Note that max. pressure for an application may be limited by the torque capacity of the variable pump section(s); see 'Drive shaft rotation and load limits' section on next page.

Geometric displacement

For variable pumps and sections, see 'Model code' above. For any fixed displacement sections of multiple pumps, refer to 'Technical information' leaflet V-108.

Speed limits

All models 800 to 1800 r/min.

• Performance data

Typical characteristics at 1450 r/min, 50°C oil temperature, 24 cSt oil viscosity.

• Control data

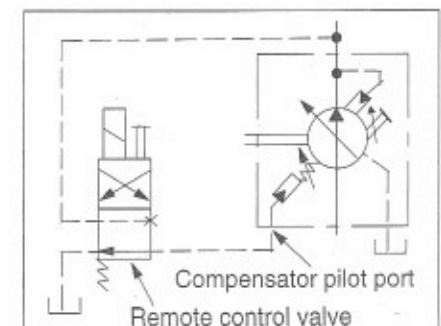
For variable displacement pumps or sections.

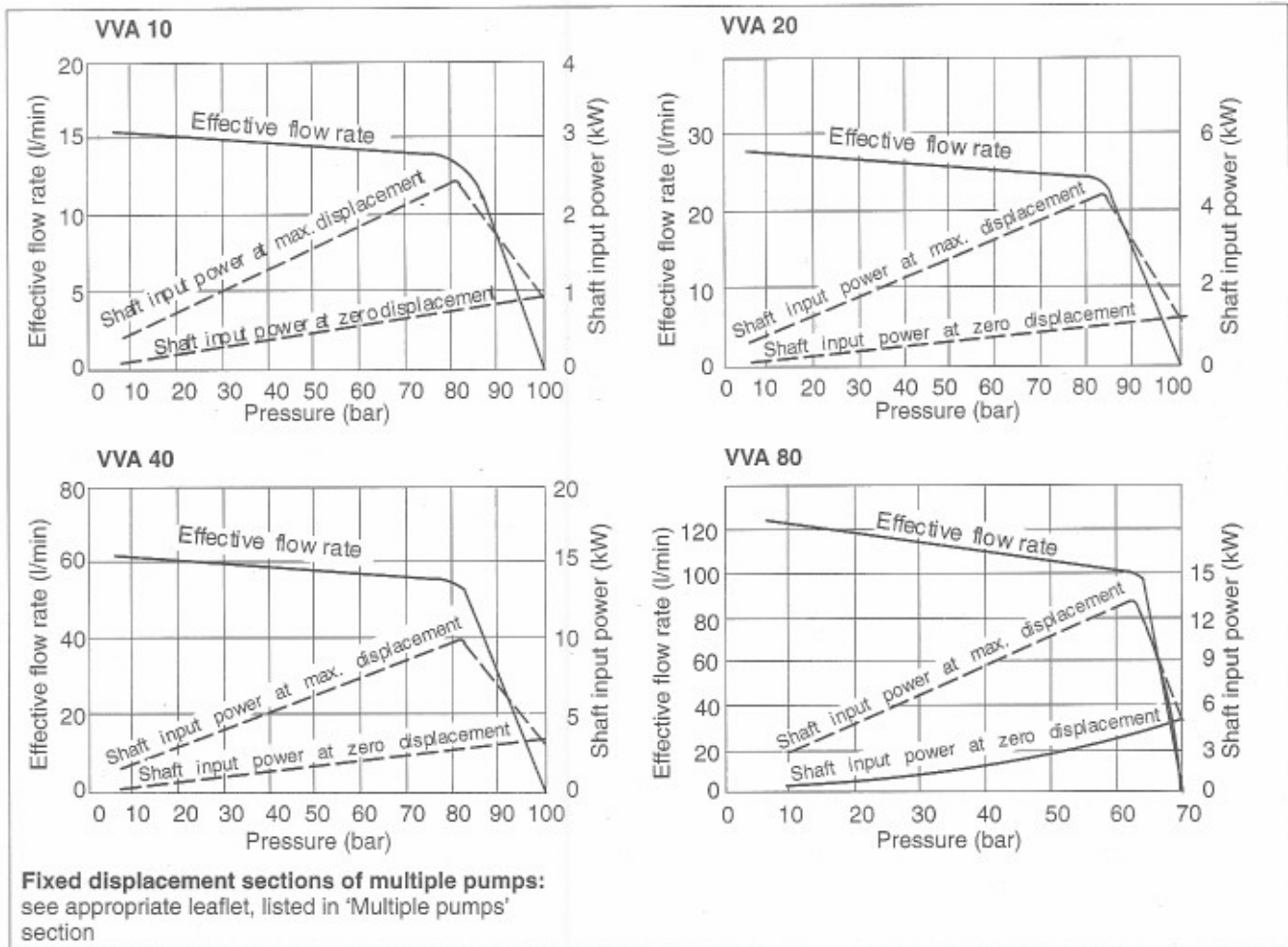
Pressure compensator, 'C' type

Typical flow/pressure characteristics shown by performance curves on previous page. Choice of adjustable pressure ranges defined in model code above.

Dual pressure compensator, 'CD' type

Two separately-adjustable pressure settings can be selected by remote control. Suitable controls are DG4V-3 solenoid operated, DG17V-3 hand lever operated or DG20V-3 cam lever operated directional control valves. The remote control should be applied as in the following example:





A low pressure setting is obtained when the compensator pilot port is drained to reservoir. Conversely, a high setting is obtained when pump outlet pressure is connected to the pilot port. Instructions for adjusting the pressure settings are given on the next page.

• Hydraulic fluids

Antiwear hydraulic coils in accordance with 'Technical information' leaflet B-920.

Maximum viscosity at starting

Full displacement 800 cSt
Zero displacement 200 cSt

Running viscosity range

Variable displacement single and multiple pumps 16 to 160 cSt
Multiple pumps that include GPA model fixed displacement section(s) 30 to 45 cSt
Multiple pumps that include a V10 model fixed displacement section 16 to 54 cSt

• Temperature limits

Ambient and operating temperature
..... -10°C to +70°C

• Filtration requirements
25 µm absolute or finer

• Drive shaft rotation and load limits

Direction of rotation

Single pumps and all multiple pumps are available for clockwise rotation only, viewed at the shaft end.

Torque limits

Single and double pumps
No special check required.

Triple pumps

Those comprised of three VVA sections require no special check, but for all others check that shaft loadings for each application do not exceed the limits in the following table where:

p_1, p_2 and p_3 = Max. pressure (bar) of section (referenced from shaft end) for the application.
 V_1, V_2 and V_3 = Max. displacement (cm^3/r) of section (referenced from the shaft end) for the application.

Shaft end pump model	Check that	
	$p_1 V_1 + p_2 V_2 + p_3 V_3$	$p_2 V_2 + p_3 V_3$
VVA 10	≤ 3000 bar cm^3/r	≤ 2000 bar cm^3/r
VVA 20	≤ 5700 bar cm^3/r	≤ 3800 bar cm^3/r
VVA 40	≤ 12900 bar cm^3/r	≤ 8600 bar cm^3/r

Drive arrangement

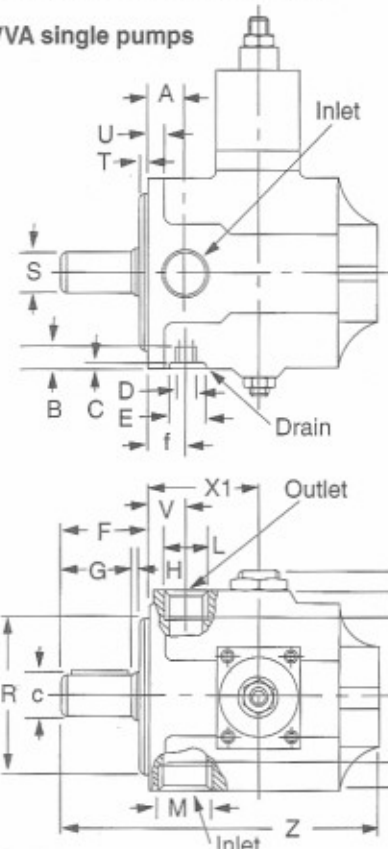
Direct drive through a flexible coupling is preferred. If an indirect drive and/or one imposing axial loading is envisaged, please consult your Vickers representative.

Installation Dimensions, Single Pumps

mm (unless otherwise indicated)

1st angle projection 

VVA single pumps

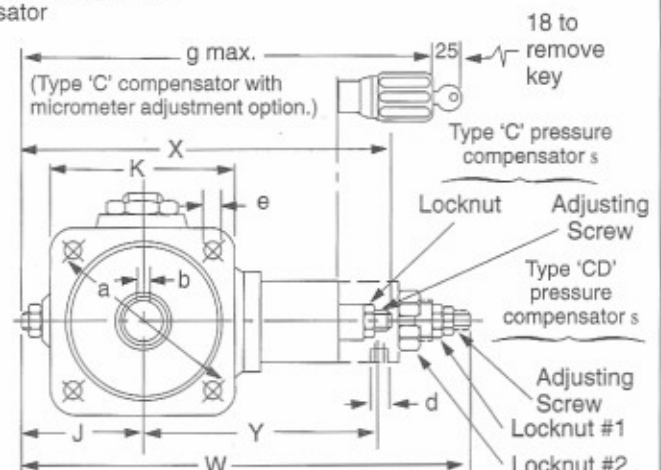


Type 'C' compensator adjustment
 Slacken locknut or turn key (as appropriate) anticlockwise to unlock. Turn adjusting screw clockwise to increase or anticlockwise to decrease pressure setting. Re-tighten locking device.

Type 'CD' compensator adjustment
 - Low pressure
 With pilot port drained to reservoir, adjust low pressure setting as for type 'C' compensator

- High pressure setting
 With pump outlet pressure applied at compensator pilot port, turn locknut #2 anticlockwise to increase, or clockwise to decrease pressure setting.

Caution - This setting must not exceed the maximum for the appropriate range as listed under [5] in the 'Model Code' section.



	A	a	B	b	C	c	D	d	E	e	F	f
VVA 10(F)R	20	100±0,2	15	6.h9	1	20,5	G1/4"	G1/8"	24	9	34,5	20
VVA 20(F)R	25	125±0,2	15	6.h9	1	21,5	G1/4"	G1/8"	24	11	34,5	25
VVA 40(F)R	33	160±0,2	16	10.h9	1	35,3	G3/8"	G1/8"	30	14	68	33
VVA 80(F)R	36	200±0,2	20	10.h9	1	41,3	G1/2"	G1/8"	34	18	75	21
VVA 10(*)P	20	100±0,2	15	3,19 3,15	1	20,6	1/4" NPT	1/8" NPT	24	9	34,5	15,5
VVA 20(*)P	25	127±0,2	15	3,20 3,17	1	20,6	7/16"-20 UNF-2B	1/8" NPT	24	11	34,5	20
VVA 40(*)P	33	161,9±0,2	16	6,38 6,35	1	34,6	9/16"-18 UNF-2B	1/8" NPT	30	14	68	27
VVA 80(*)P	36	228,5±0,2	20	9,55 9,52	1	42,3	3/4"-10 UNF-2B	1/8" NPT	34	20	68	22
	G	g	H	h	J	K	L	M	N	O	P	Q
VVA 10(F)R	28	256	2,5	8	69	95	G3/8"	G1/2"	15	16	58	47,5
VVA 20(F)R	28	271	2,5	10	76	110	G1/2"	G3/4"	16	20	65	55
VVA 40(F)R	58	326	6	12	96	150	G1"	G1 1/4"	20	22	83	75
VVA 80(F)R	58	428	7	-	125	200	G1 1/4"	G1 1/2"	25	27	100	100
VVA 10(*)P	28	256	2,5	8	69	95	3/8" NPT	1/2" NPT	15	16	58	47,5
VVA 20(*)P	28	271	2,5	10	76	110	3/4"-16 UNF-2B	1 1/16"-12 UNF-2B	16	20	65	55
VVA 40(*)P	58	326	6	12	96	150	1 5/16"-12 UNF-2B	1 7/8"-12 UNF-2B	20	22	83	75
VVA 80(*)P	58	428	1	-	125	200	1 5/8"-12 UNF-2B	1 7/8"-12 UNF-2B	22	25	100	100

	R	S	T	U	V	W	X	Y	Z	X1
VVA 10(F)R	80.h8	18.k6	4	9	20	239	227	113	141	53
VVA 20(F)R	100.h8	19.k6	4	11	25	259	243	126	170	68
VVA 40(F)R	125.h8	32.k6	4	14	33	326	298	170	254	91
VVA 80(F)R	160.h8	38.k6	10	18	35	430	390	240	250	97
VVA 10(*)P	80.h8	19,048 19,035	4	9	20	239	227	113	141	53
VVA 20(*)P	101,60 101,55	19,05 19,02	4	11	25	259	243	126	170	68
VVA 40(*)P	127,00 126,95	31,75 31,70	4	14	33	326	298	170	254	91
VVA 80(*)P	152,40 152,35	38,10 38,05	9	18	36	430	390	240	250	97

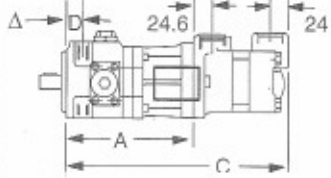
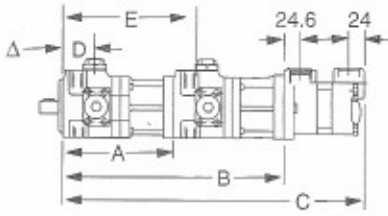
Installation Dimensions, Multiple Pumps

Comprising pump sections and adapter kit(s) to be ordered as (and supplied as) separate items for assembly by the user. Approved combinations are shown below followed by information about possible non-VVA pump sections, a list of adapter kits and assembly information.

For triple pumps, check that the max. torque resulting from the proposed application will not exceed that defined in the 'Drive Shaft Rotation and Torque Limits' section.

Pump combination	Basic model combination	Dimensions					
		A	B	C	D	E	F
	VVA 10/VVA 10	165,5		272	20	185,5	
	VVA 20/VVA 10	197		303,5	25	217	
	VVA 20/VVA 20	195		330,5	25	220	
	VVA 40/VVA 10	258		364,5	33	278	
	VVA 40/VVA 20	256		391,5	33	281	
	VVA 40/VVA 40	292,5		478,5	33	325,5	
	VVA 80/VVA 10	258,5		365	35	278,5	
	VVA 80/VVA 20	256,5		392	35	281,5	
	VVA 80/VVA 40	292		478	35	325	
	VVA 80/VVA 80	298,5		478,5	35	333,5	
		VVA 10/VVA 10/VVA 10	165,5	331	437,5	20	185,5
VVA 20/VVA 10/VVA 10		197	362,5	469	25	217	382,5
VVA 20/VVA 20/VVA 10		195	392	498,5	25	220	412
VVA 20/VVA 20/VVA 20		195	390	525,5	25	220	415
VVA 40/VVA 10/VVA 10		258	423,5	530	33	278	443,5
VVA 40/VVA 20/VVA 10		256	453	559,5	33	281	473
VVA 40/VVA 20/VVA 20		256	451	586,5	33	281	476
VVA 40/VVA 40/VVA 10		292,5	550,5	656,5	33	325,5	570,5
VVA 40/VVA 40/VVA 20		292,5	548,5	684	33	325,5	573,5
VVA 40/VVA 40/VVA 40		292,5	585	771	33	325,5	618
VVA 80/VVA 10/VVA 10		258,5	424	530,5	35	278,5	444
VVA 80/VVA 20/VVA 10		256,5	453,5	560	35	281,5	473,5
VVA 80/VVA 20/VVA 20		256,5	451,5	587	35	281,5	476,5
VVA 80/VVA 40/VVA 10		292	550	656,5	35	325	570
VVA 80/VVA 40/VVA 20		292	548	683,5	35	325	573
VVA 80/VVA 40/VVA 40		292	584,5	770,5	35	333,5	617,5
VVA 80/VVA 80/VVA 10		298,5	557	663,5	35	333,5	577
VVA 80/VVA 80/VVA 20		298,5	555	690,5	35	333,5	580
VVA 80/VVA 80/VVA 40		298,5	590,5	776,5	35	333,5	623,5
VVA 80/VVA 80/VVA 80		298,5	597	777	35	333,5	632

Installation Dimensions, Multiple Pumps

Pump combination	Basic model combination	Dimensions					
		A	B	C	D	E	F
	VVA 10/V 10 VVA 20/V 10 VVA 40/V 10	172,5 205 266		299,5▲ 332 ▲ 393 ▲	20 25 33		
	VVA 10/VVA 10/VVA 10 VVA 20/VVA 10/VVA 10 VVA 20/VVA 20/VVA 10 VVA 40/VVA 10/VVA 10 VVA 40/VVA 20/VVA 10 VVA 40/VVA 40/VVA 10	165,5 197 195 258 256 292,5	338 369,5 400 430,5 461 558,5	465 496,5 527 557,5 588 685,5	20 25 25 33 33 33	185,5 217 220 278 281 325,5	

▲ Maximum. Can be less, dependent on the displacement sizes of the sections.
 D Stated values apply to VVA**(F)R models.

Non-VVA pump sections

Refer to the following table for details of possible fixed displacement pumps.

Displacement (cm ³ /r) per section	Max. pressure (bar)	Model series and type	Technical information leaflet
6,5 to 16,4	155	V10 vane pumps, single models	V-108

Adapter kits

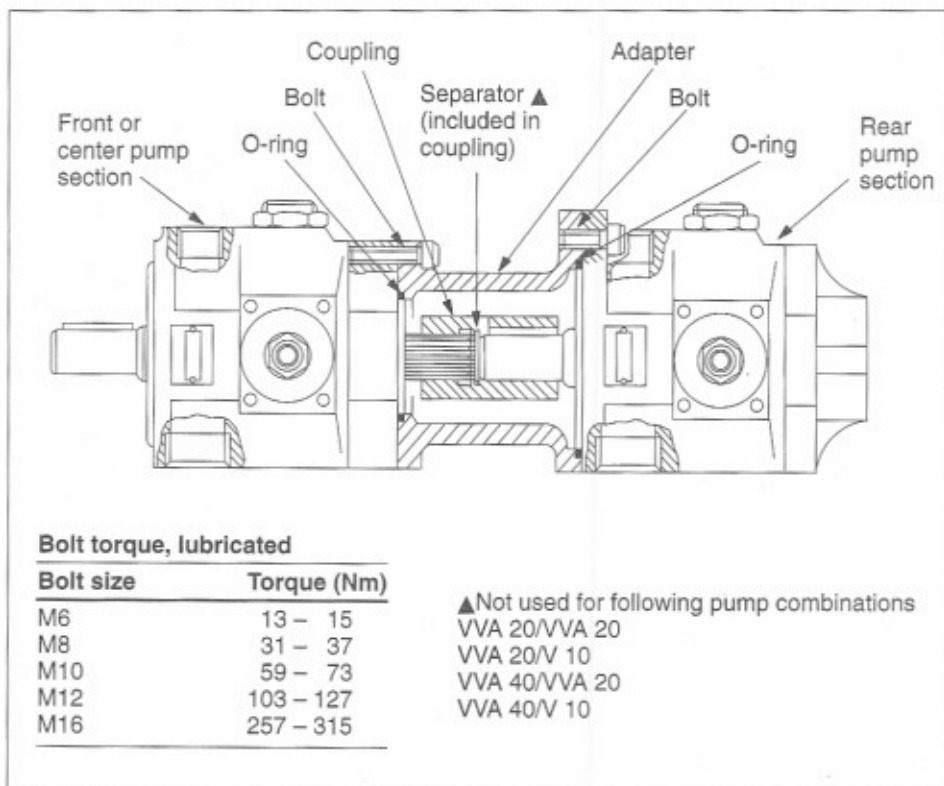
Pumps section combination	Kit model
VVA 10 + V 10	AK-VVA 10/V 10
VVA 10 + VVA 10	AK-VVA 10/10
VVA 20 + V 10	AK-VVA 20/V 10
VVA 20 + VVA 10	AK-VVA 20/10
VVA 20 + VVA 20	AK-VVA 20/20
VVA 40 + V 10	AK-VVA 40/V 10
VVA 40 + VVA 10	AK-VVA 40/10
VVA 40 + VVA 20	AK-VVA 40/20
VVA 40 + VVA 40	AK-VVA 40/40
VVA 80 + VVA 10	AK-VVA 80/10
VVA 80 + VVA 20	AK-VVA 80/20
VVA 80 + VVA 40	AK-VVA 80/40
VVA 80 + VVA 80	AK-VVA 80/80

Example:

For a VVA 40/VVA 20/V 10 combination, two adapter kits are required:

- 1 of AK-VVA 40/20
- 1 of AK-VVA 20/V 10

Assembly of Multiple Pumps



Mass Approx.

Single pumps, sections and adapter kits:

VVA 10*R/P	5,6 kg
VVA 10R/P	5,7 kg
VVA 20*R/P	9,6 kg
VVA 20R/P	9,9 kg
VVA 40*R/P	23,8 kg
VVA 40R/P	23,2 kg
VVA 80*R/P	37,8 kg
VVA 80R/P	37,4 kg
Non-VVA pump sections ..	See leaflets listed on previous page
AK-VVA 10/V 10	1,0 kg
AK-VVA 10/10	1,0 kg
AK-VVA 20/V 10	1,1 kg
AK-VVA 20/10	1,1 kg
AK-VVA 20/20	1,1 kg
AK-VVA 40/V 10	2,0 kg
AK-VVA 40/10	2,0 kg
AK-VVA 40/20	2,0 kg
AK-VVA 40/40	3,7 kg
AK-VVA 80/10	3,5 kg
AK-VVA 80/20	3,7 kg
AK-VVA 80/40	5,0 kg
AK-VVA 80/80	6,0 kg

Multiple pumps:

Total masses of relevant pump sections and adapter kit(s).

Mounting Attitude

Optional

Ordering Procedure

Specify quantities and full model designations of all items required. In the case of multiple pump sections and adapter kits e.g. for two typical VVA 20/VVA 10/V 10 combinations:

- 2 of VVA 20FR-CBWW-20 pump
- 2 of VVA 10FR-CBWW-20 pump
- 2 of V 10-IB5B-1A-20 pump
- 2 of AK-VVA 20/10 adapter kit
- 2 of AK-VVA 10/V 10 adapter kit