

Circulator Pumps with Manual Speed Variation



Rio



Rio Z

Fields of Application

- Hot-water heating systems
- Heat recovery systems
- Cooling circuits in air-conditioning systems

Fluid Pumped

Clean water and/or water treated in accordance with the relevant regulations, not containing aggressive, abrasive or solid substances.

Water with commercial antifreeze agents based on glycols (mixture ratio max. 1:1) with inhibitors (antirust). If the glycol content exceeds 20 %, the operating data must be checked and verified.

Heating water in accordance with VDI 2035.

Operating Data

Screw-ended pump

Q Rp 1 to 1 1/4
up to 8.6 m³/h, 2.4 l/s
H up to 11 m
P₁ up to 330 W
p 10 bar
t -10 °C to +130 °C
(for short periods
up to +140 °C)

Flanged pump ¹⁾

DN 32 to 100
up to 90 m³/h, 25.0 l/s ²⁾
up to 12 m
up to 1675 W
6 bar, 10 bar on option
-10 °C to +130 °C ³⁾
(for short periods
up to +140 °C)

Ambient temperature max. +40 °C.

¹⁾ DN 32 - DN 65: adapter flanges PN 6/PN 10

²⁾ If operated in parallel.

³⁾ If a display module is used, the max. permissible temperature of the fluid pumped is reduced to +20 °C to +110 °C.

Design

Rio: Maintenance-free wet rotor pump (glandless), flanged or screw-ended, with three speed levels.

Rio Z: Rio twin pump for standby operation (integrated swing check valve) or on option peak-load operation (parallel operation).

Bearings

Special plain bearings lubricated by the medium handled.

Materials

Volute casing	cast iron EN-GJL-250 ⁴⁾
Shaft	chrome steel X 40 Cr 13
Impeller	glass-fibre reinforced polypropylene
Bearings	special carbon, metal-impregnated

⁴⁾ To EN 1561 (previously GG-25)

Drive

Canned motor, IP 43, thermal class F, interference suppression class N

Connection to power supply

1~230-240 V, 50 Hz

3~400-415 V, 50 Hz

Designation

Rio Z 50 - 100

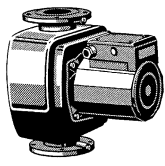
Type series _____

Twin pump _____

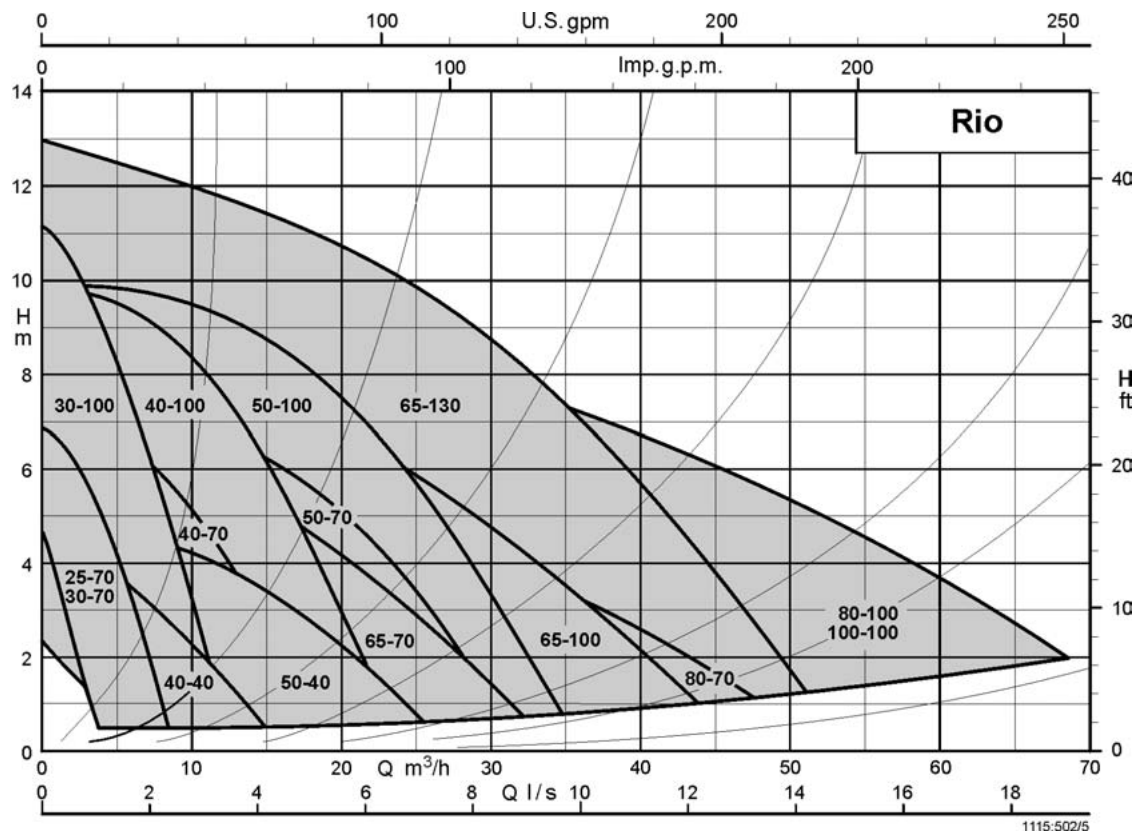
Nominal diameter in mm _____

Discharge head in m x 10 (example 100 = 10 m) _____

Selection Chart, Single Pumps 2800 1/min

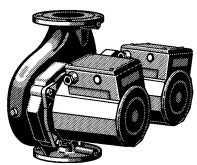


Rio

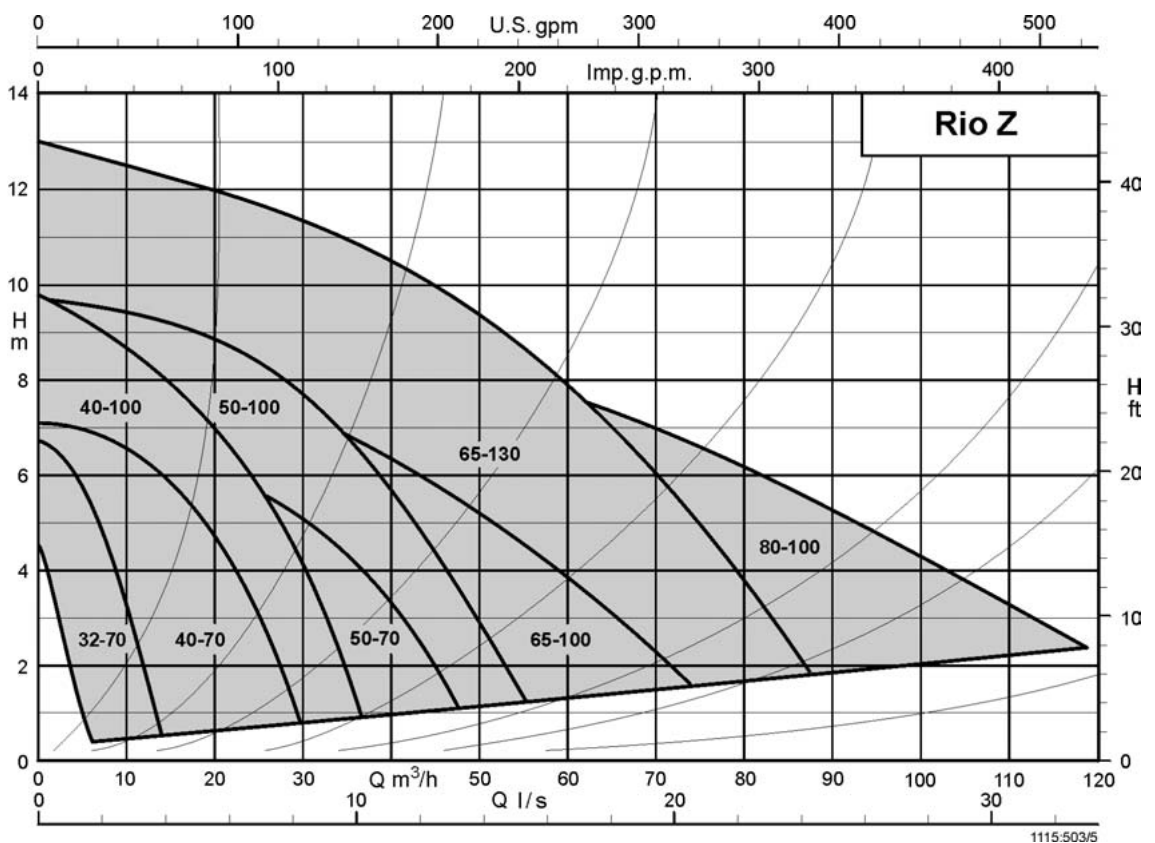


Selection Chart, Twin Pumps 2800 1/min

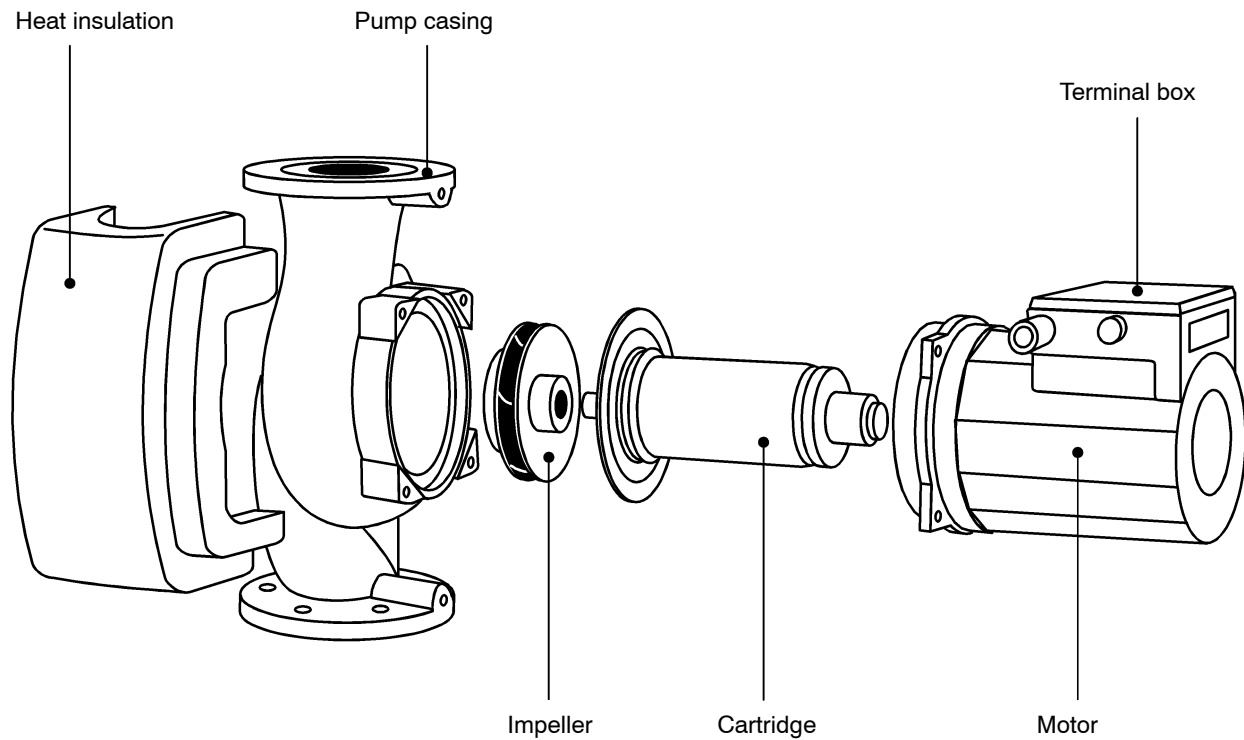
The characteristic curves refer to parallel operation of both pumps.



Rio Z



Modular Design Principle



Sectional Drawing

Single pumps

Screw unions
Rp 1 and Rp 1 1/4
Flanges
DN 40 - DN 100

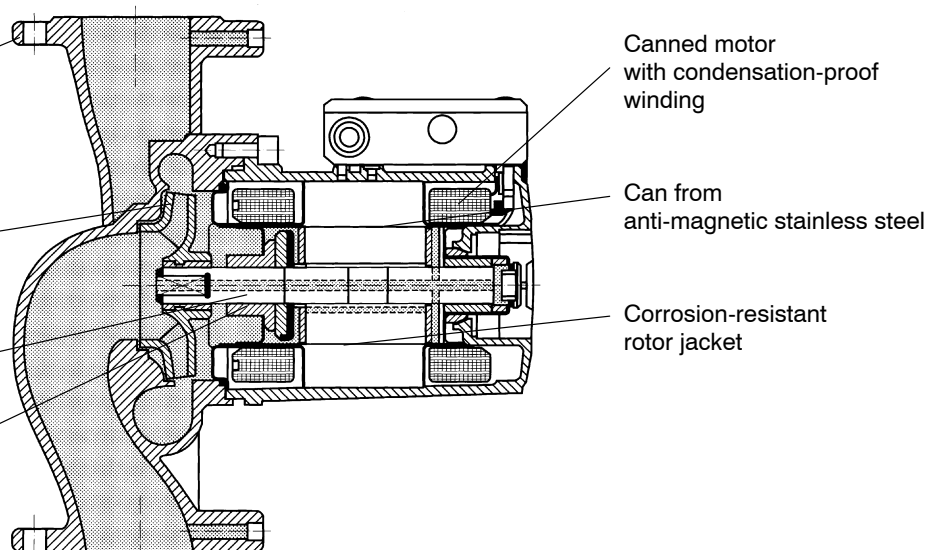
Twin pumps

Flanges
DN 32 - DN 80

High efficiency
plastic impeller with
multiply curved vanes

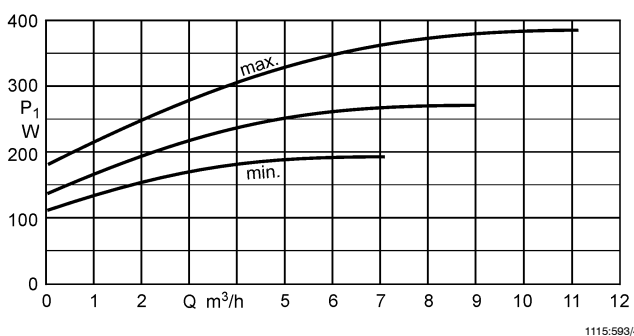
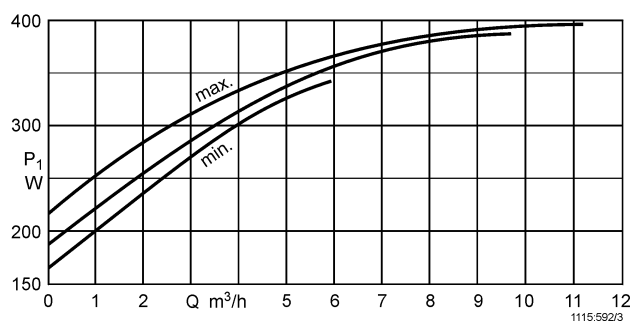
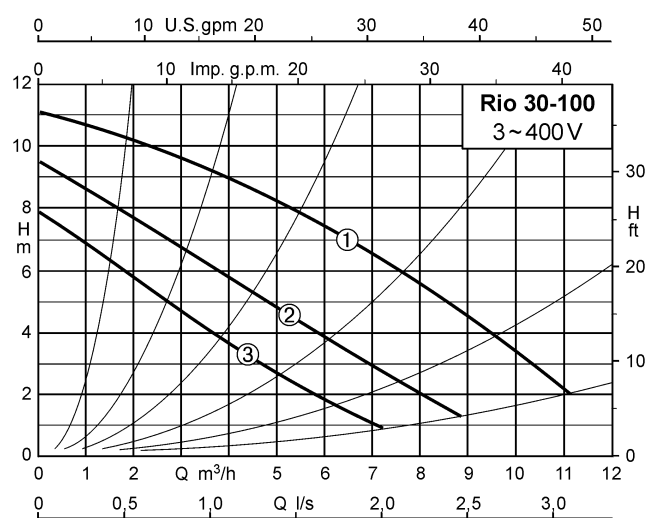
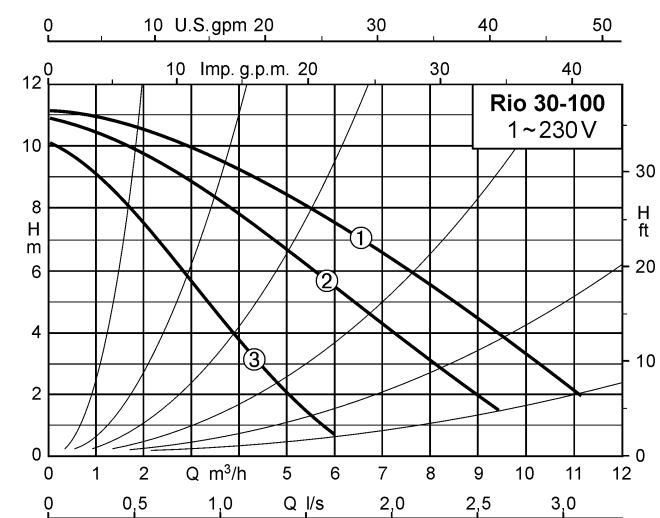
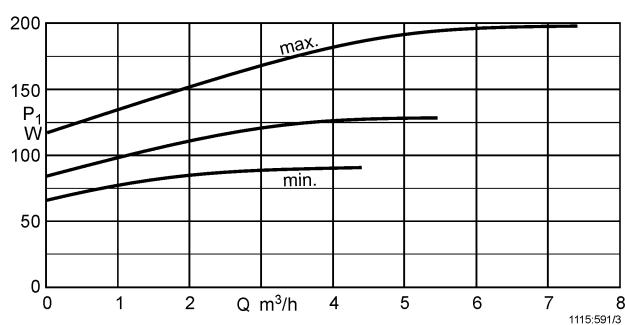
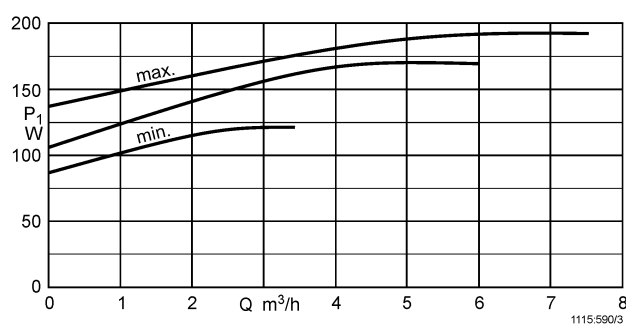
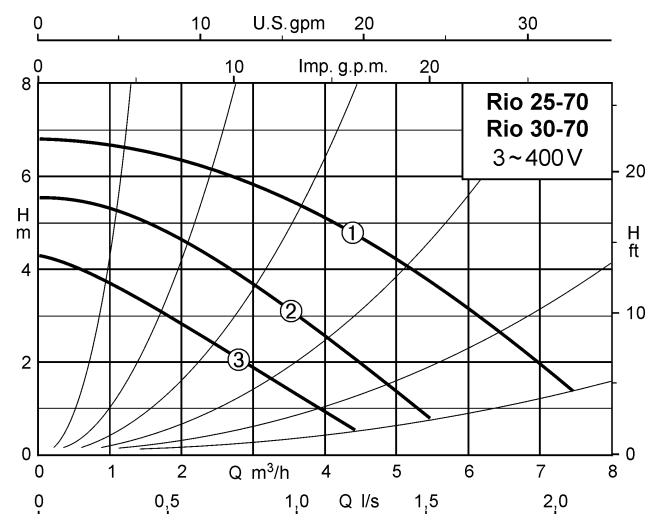
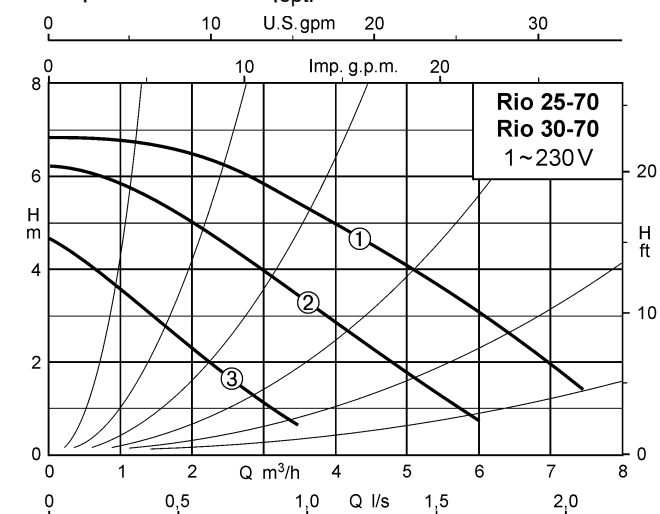
Shaft from
corrosion-resistant
chrome steel

Carbon plain bearings
- Wear-resistant
- Safe to run dry
for short intervals
- Low noise



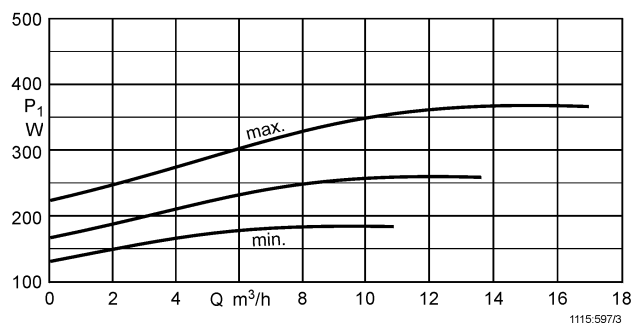
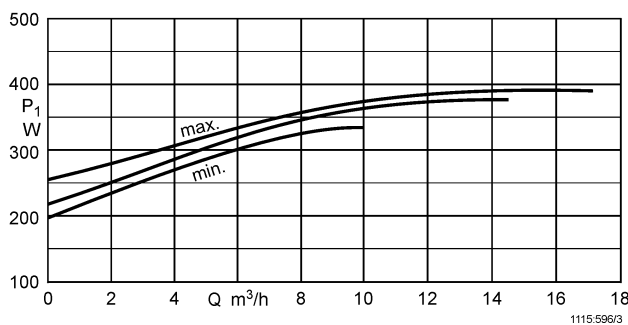
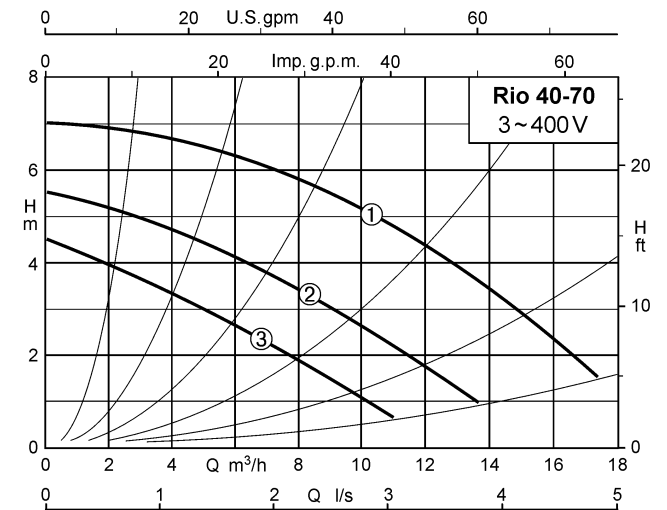
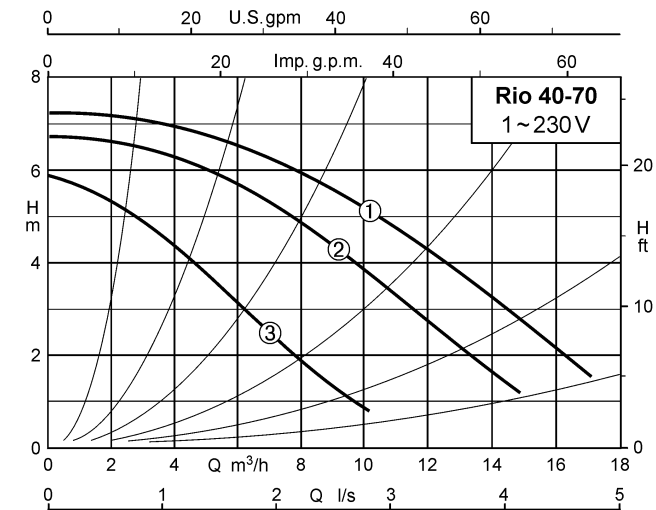
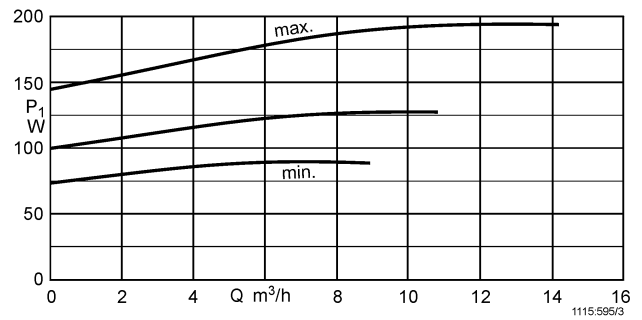
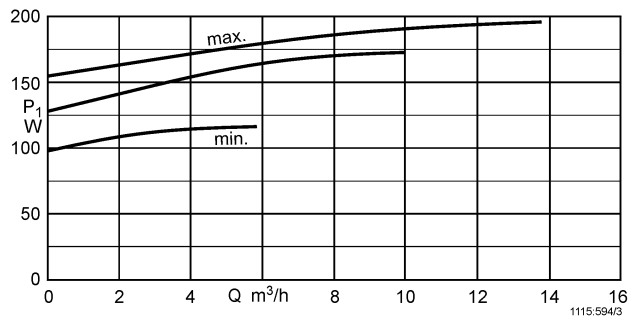
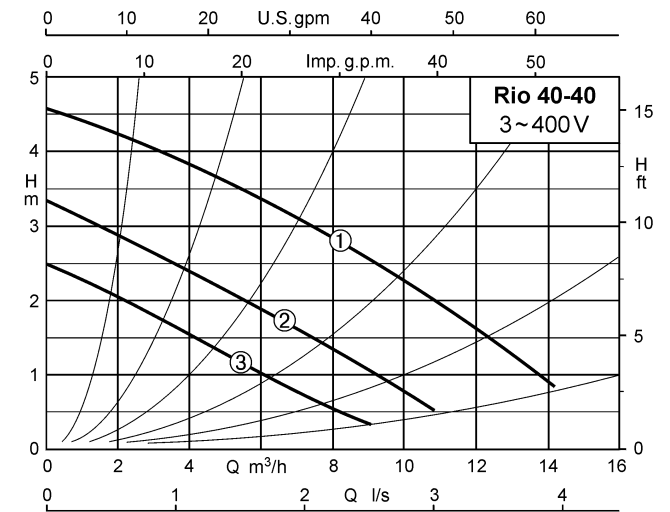
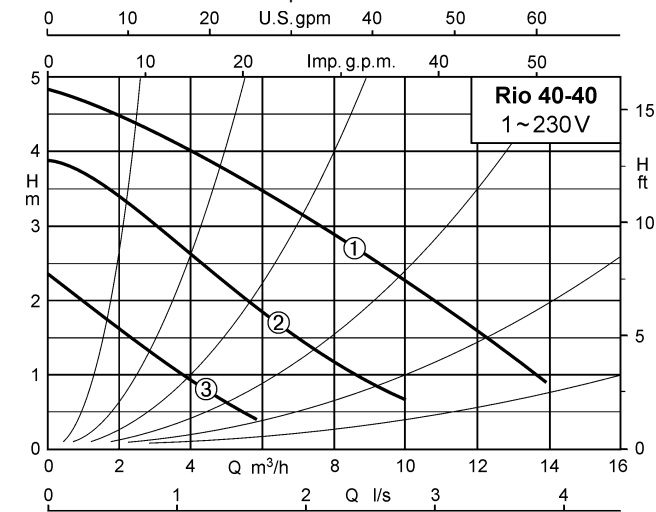
Single Pump Characteristic Curves ≈ 2800 1/min

○ = Speed level and η_{opt}



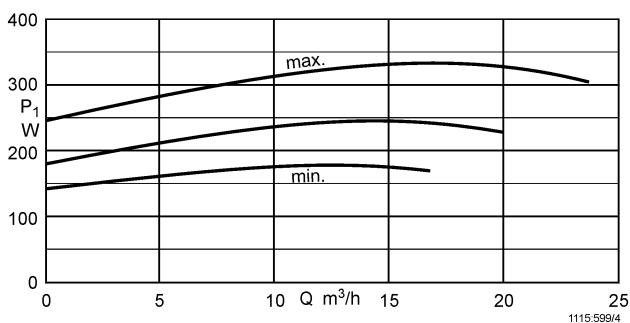
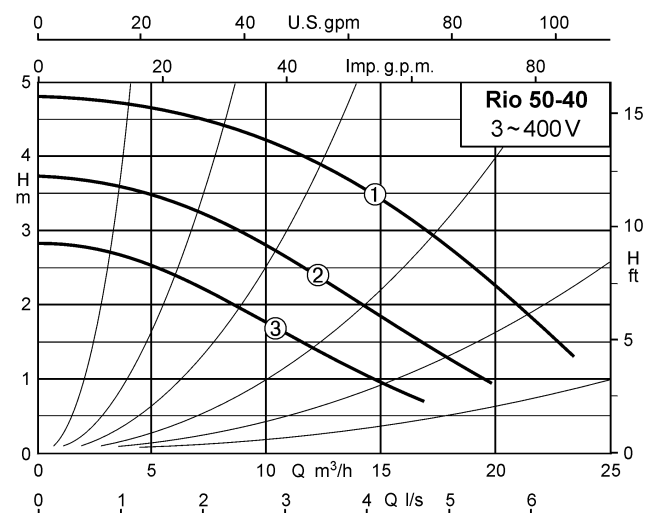
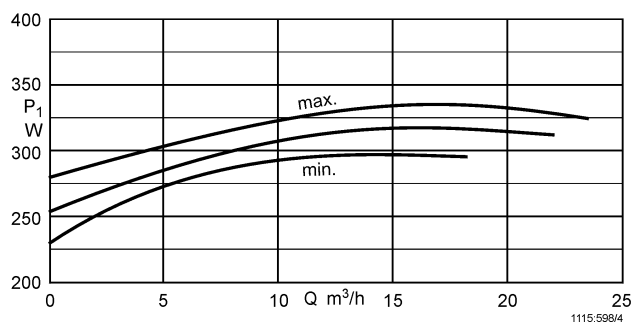
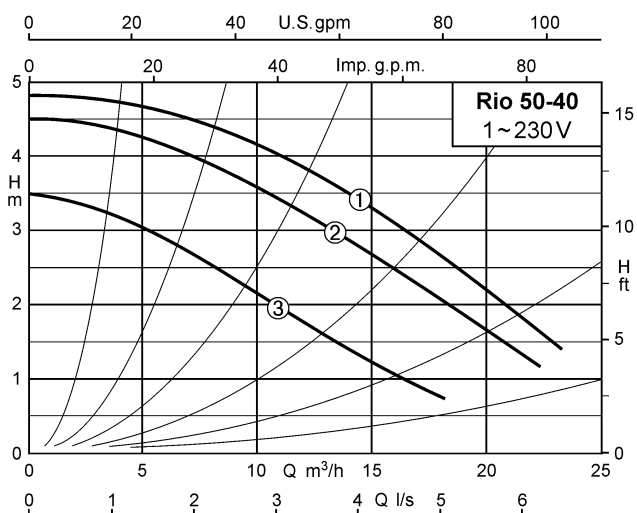
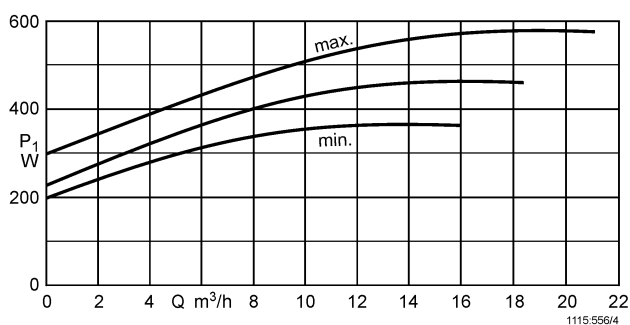
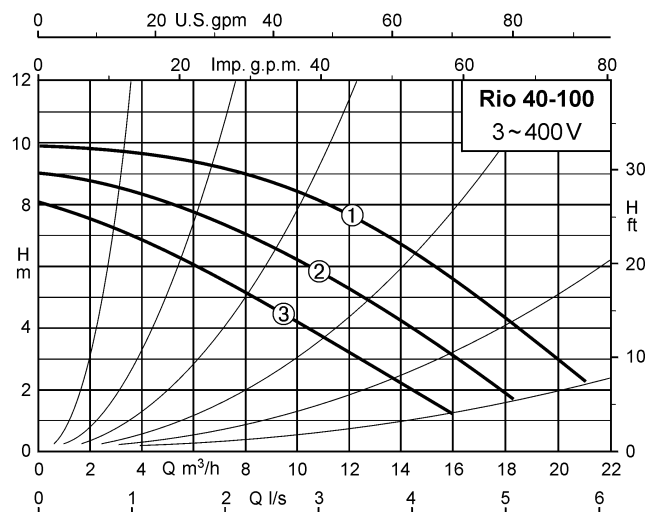
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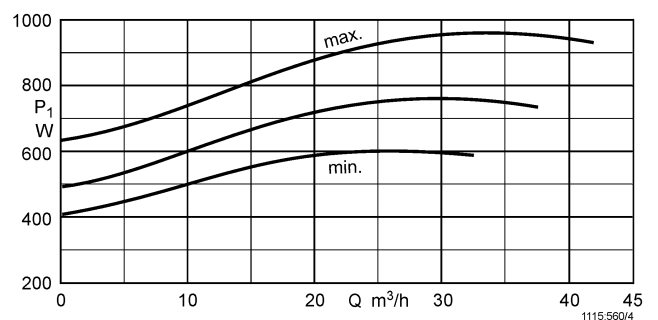
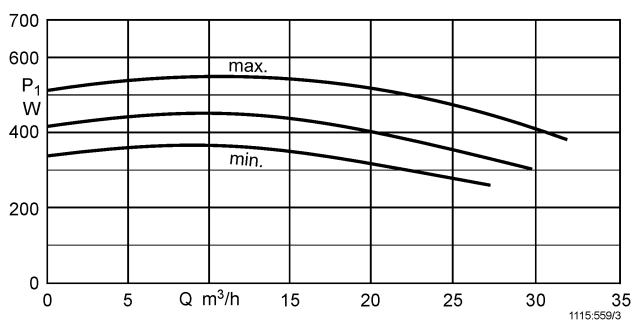
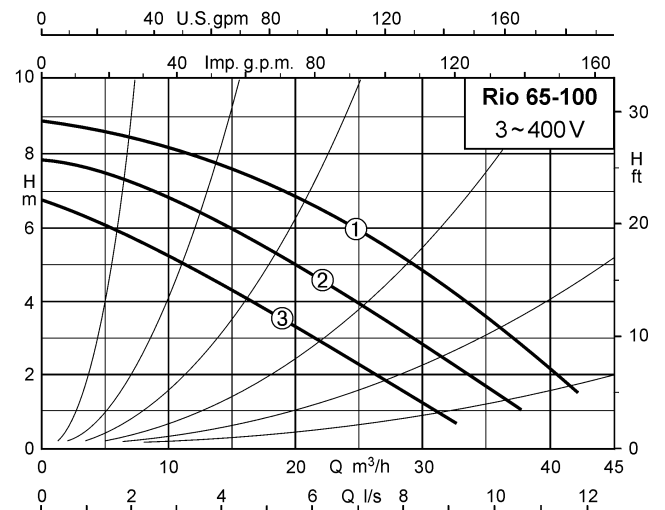
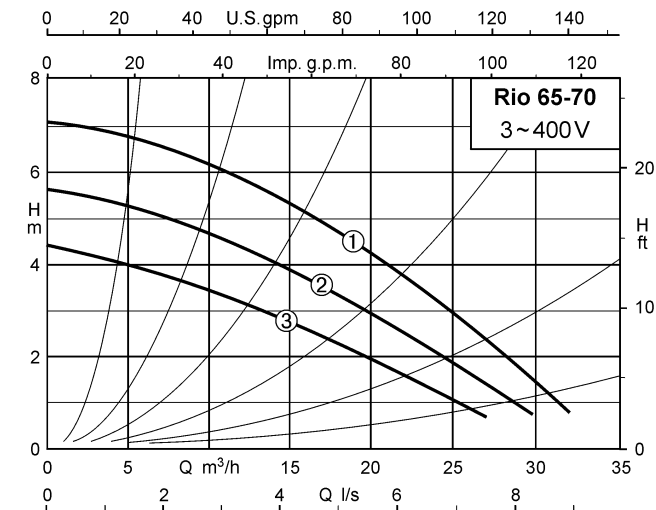
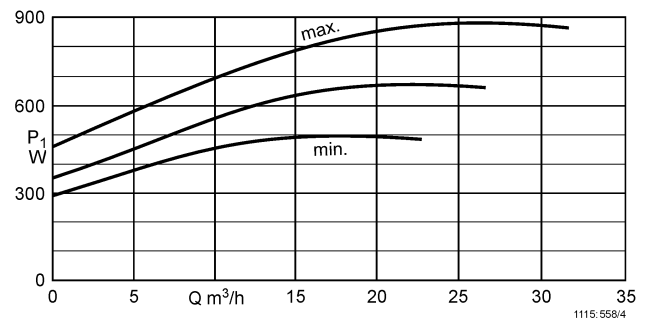
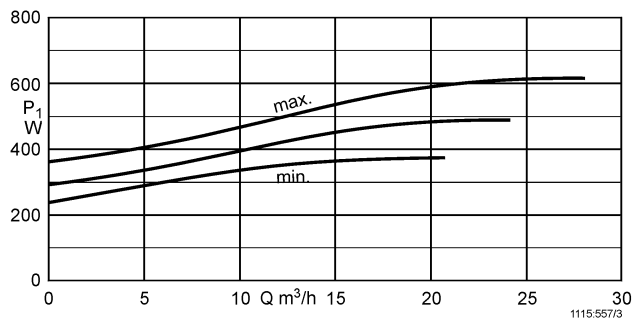
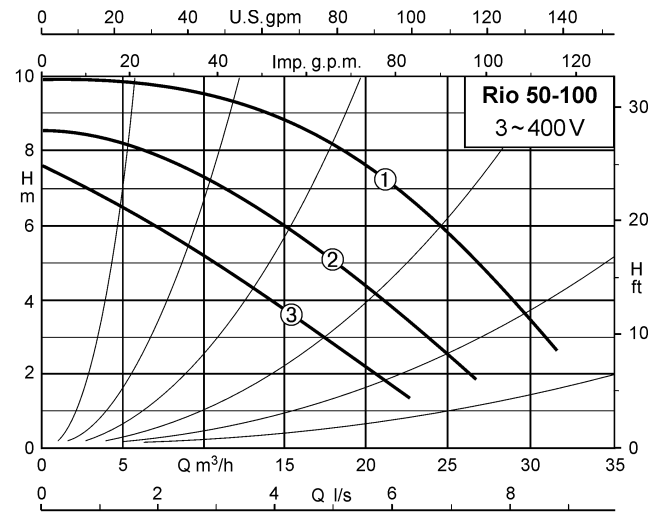
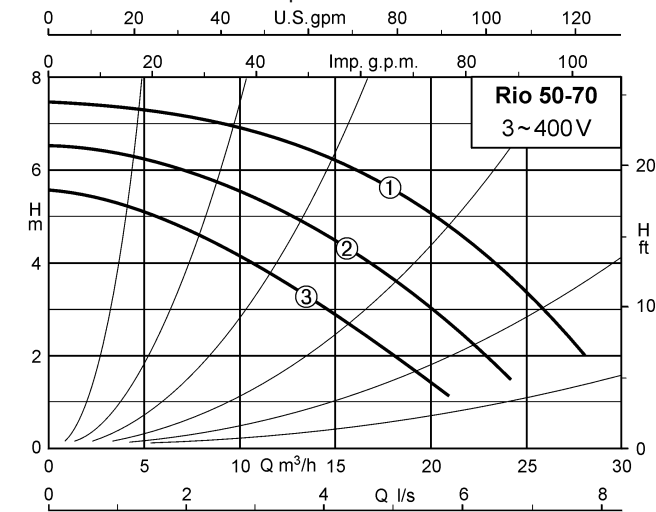
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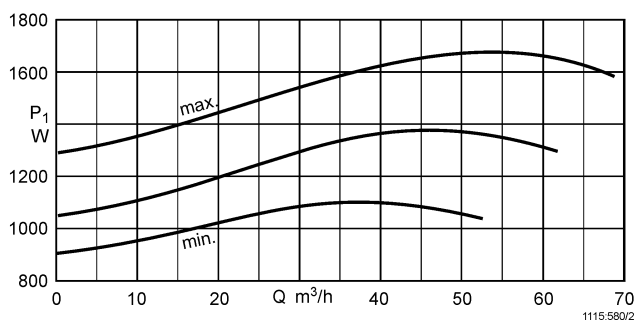
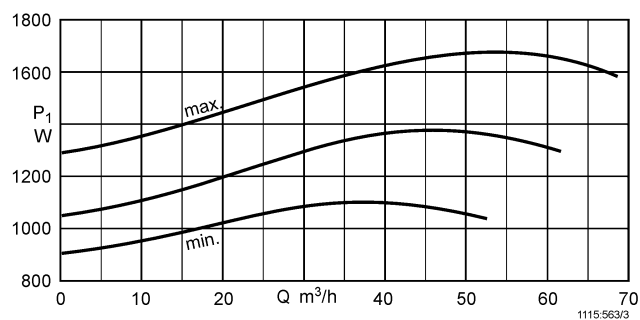
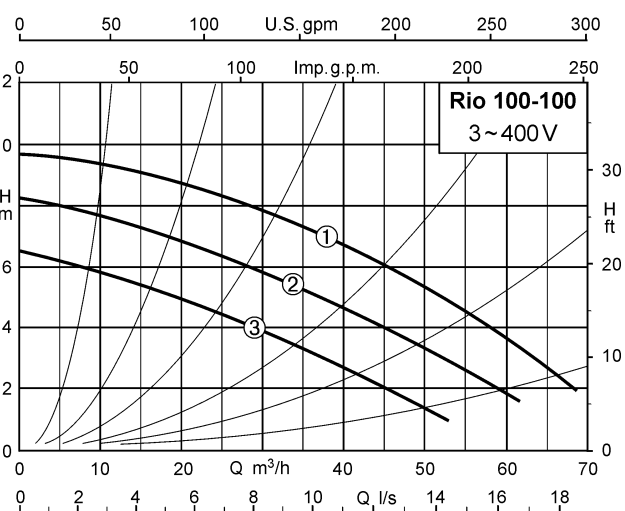
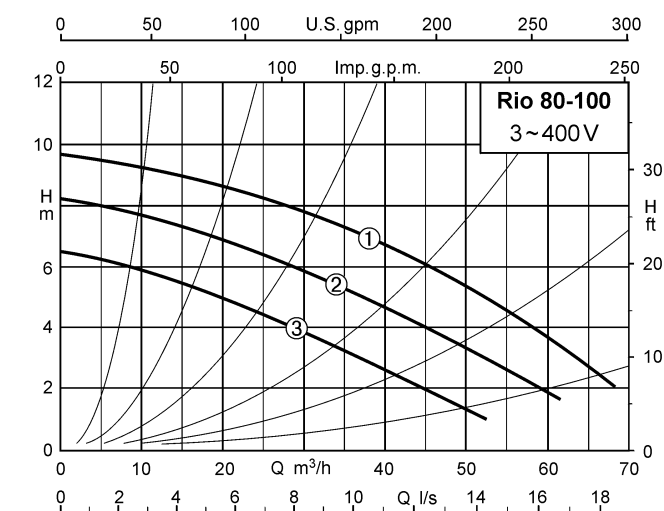
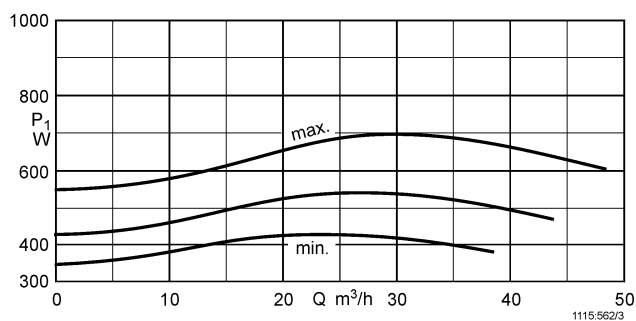
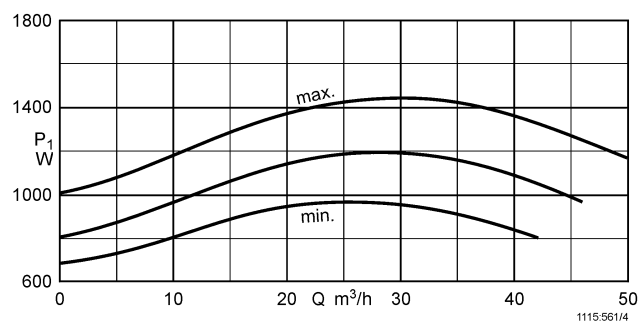
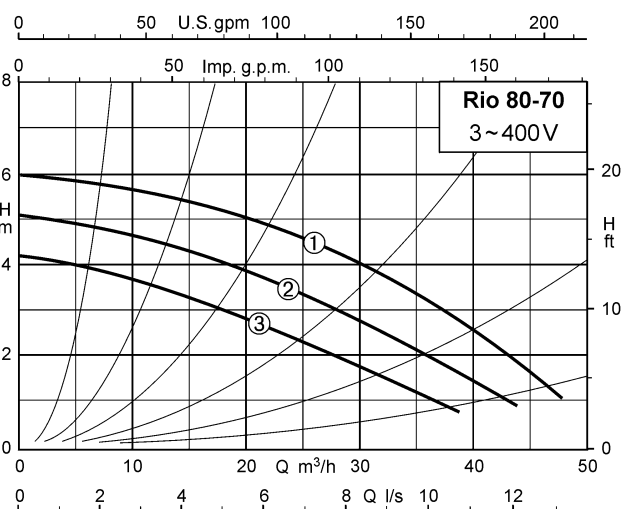
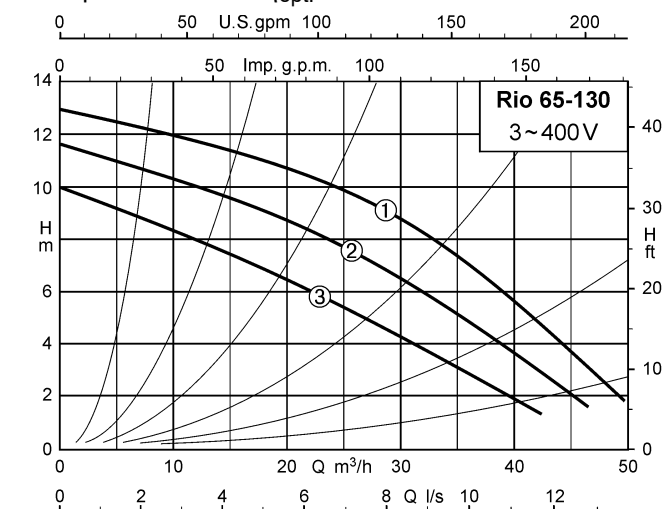
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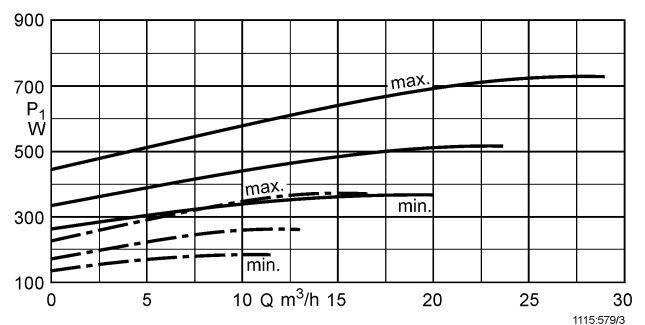
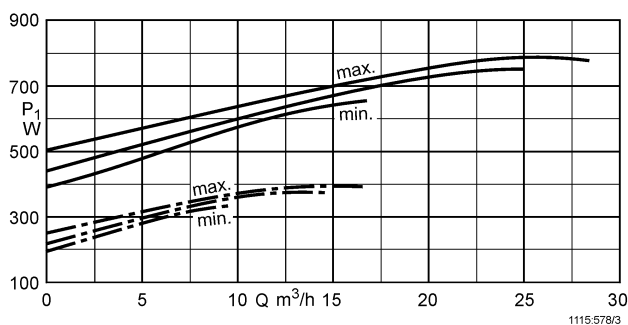
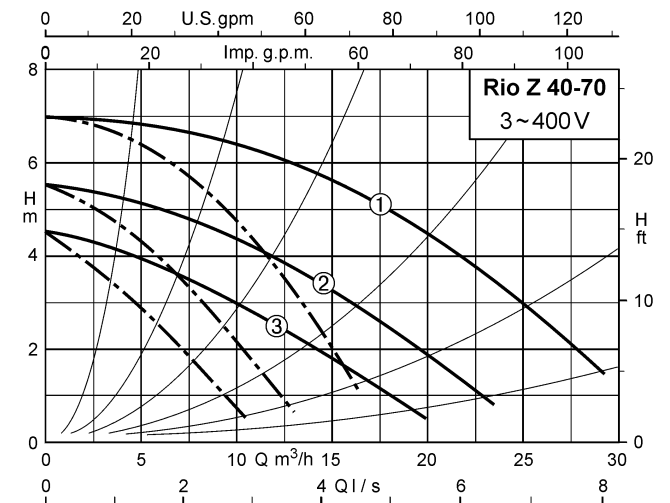
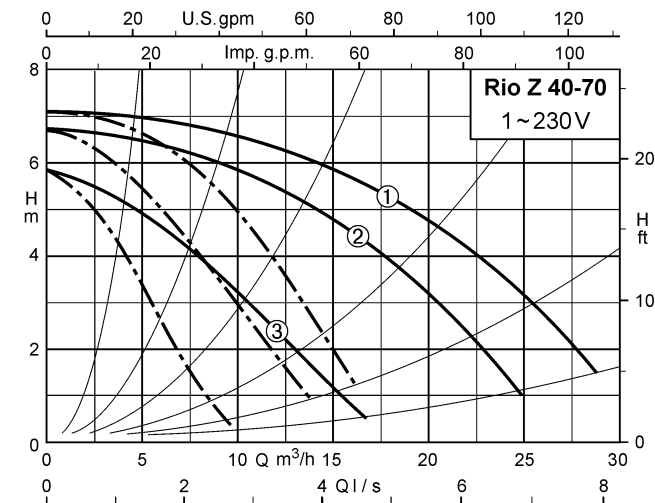
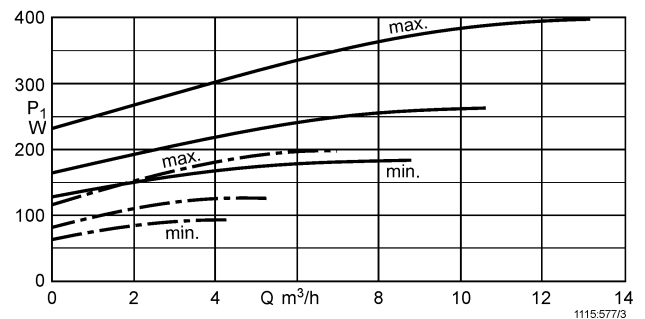
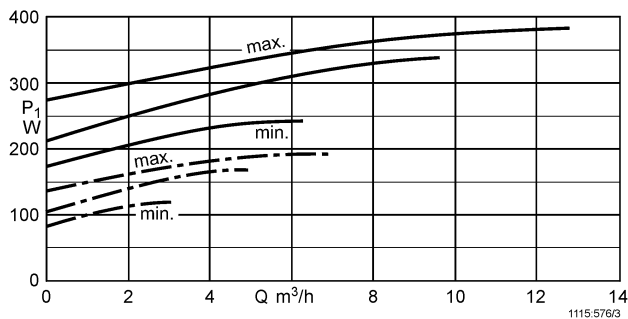
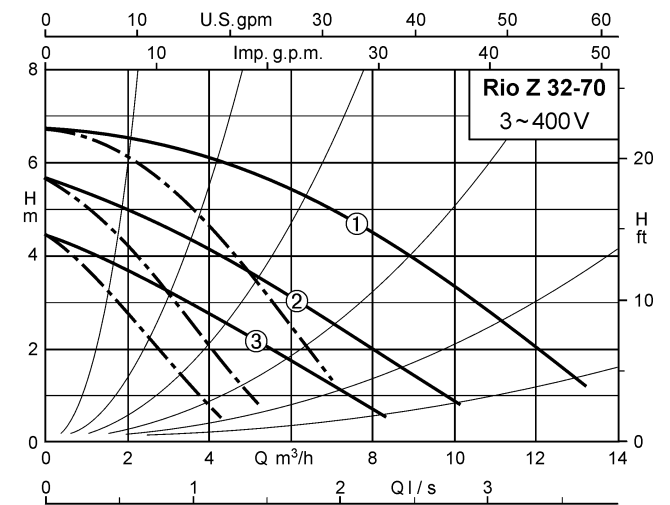
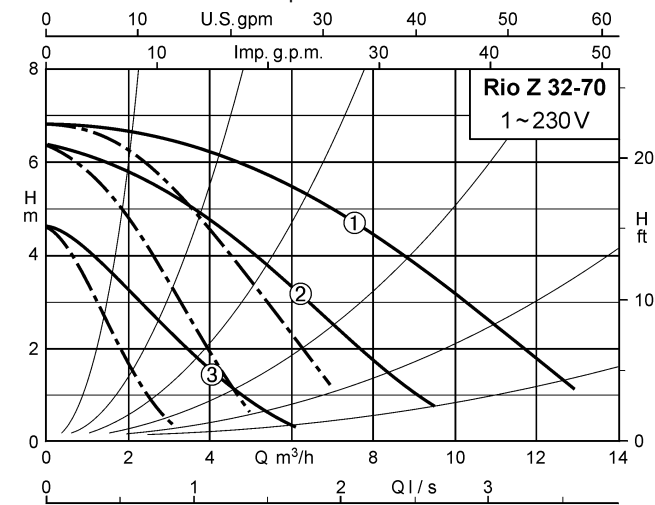
Single Pump Characteristic Curves ≈ 2800 1/min

○ = Speed level and η_{opt} .



Twin Pump Characteristic Curves ≈ 2800 1/min

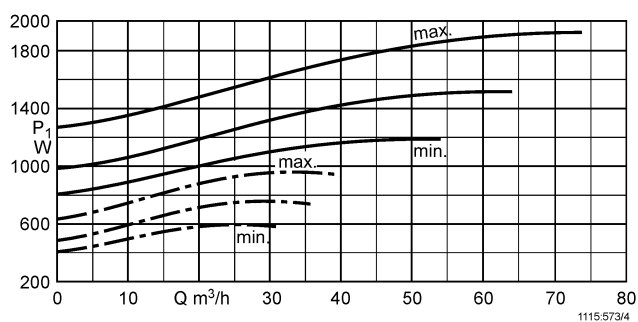
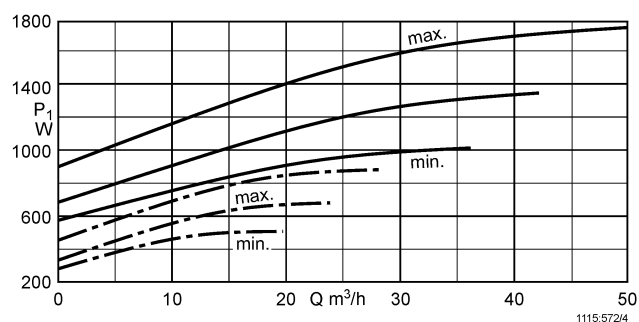
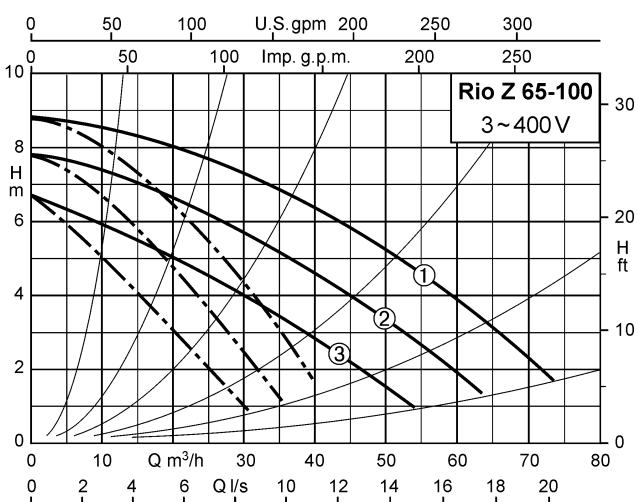
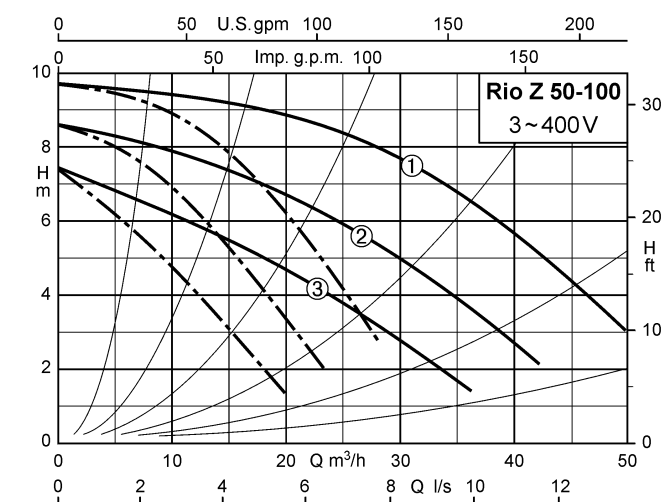
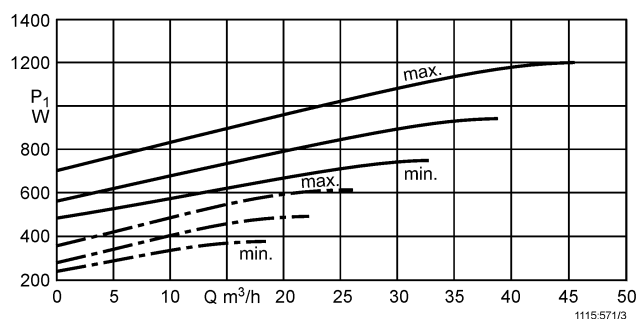
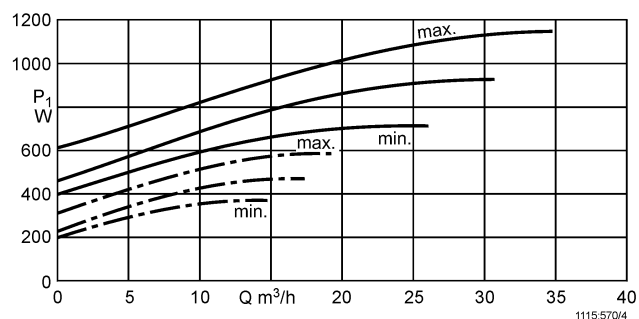
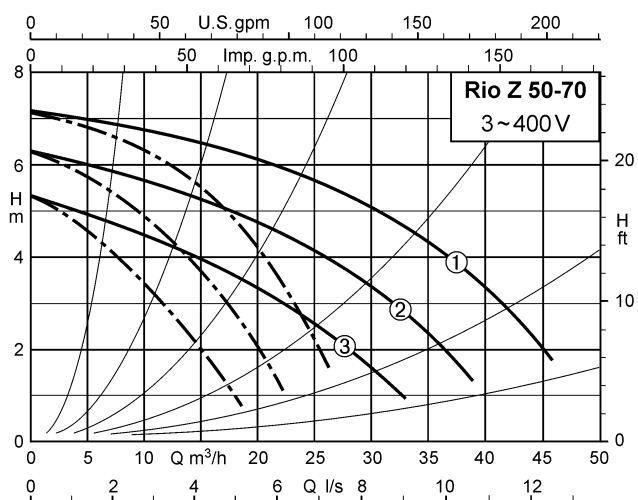
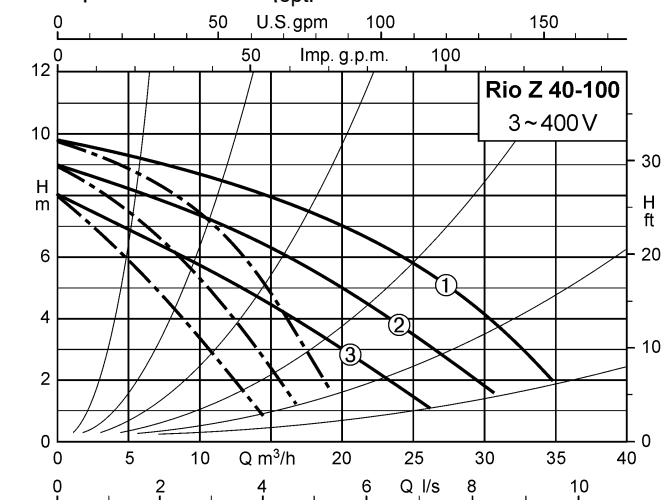
○ = Speed level and η_{opt} .



— - — Single pump operation — Parallel operation

Twin Pump Characteristic Curves ≈ 2800 1/min

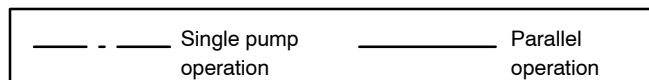
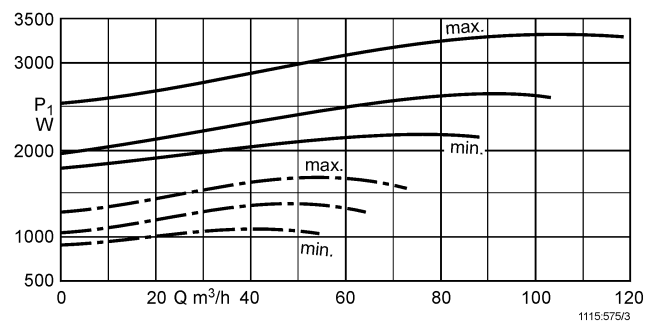
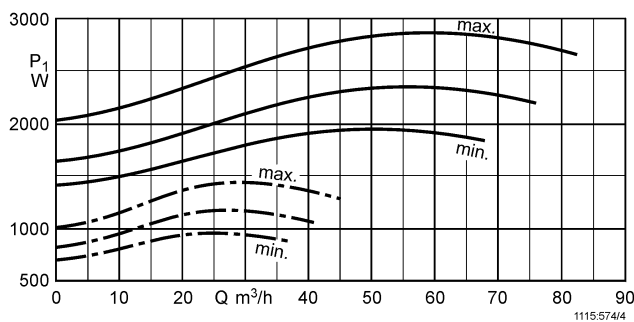
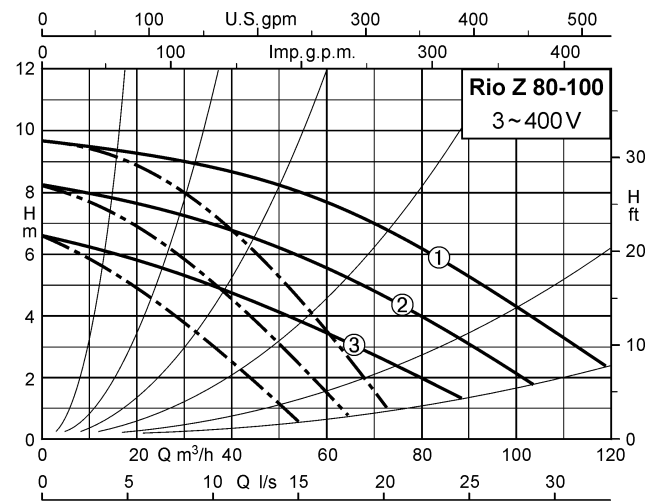
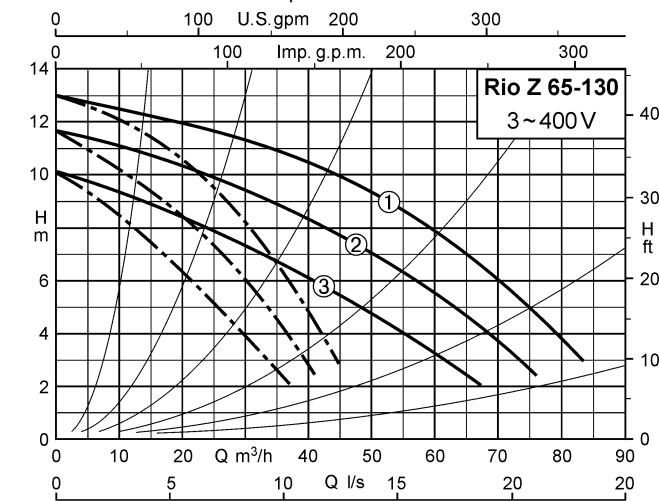
○ = Speed level and η_{opt}



— · —	Single pump operation	— — —	Parallel operation
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Twin Pump Characteristic Curves ≈2800 1/min

○ = Speed level and η_{opt} .


Min. Pressure

Min. pressure p_{min} at the pump suction nozzle to avoid cavitation noise at an ambient temperature of +40 °C and a pumped-water temperature of t:

The values are applicable up to 300 m above sea level.

For installation altitudes >300 m, +0.01 bar/100 m have to be added.

t	50 °C	95 °C	110 °C	130 °C
Rio/Rio Z	P _{min}			
	bar	bar	bar	bar
Rp 1, Rp 1 1/4	0.05	0.8	1.4	2.6
DN 32	0.05	0.8	1.4	2.6
DN 40	0.05	0.8	1.4	2.6
DN 50	0.3	1.0	1.6	2.9
DN 65	0.3	1.0	1.6	2.9
DN 80	0.3	1.0	1.6	2.9
DN 100	0.3	1.0	1.6	2.9

Pipe Connection

Flanged pumps fitted with an adapter flange (oval bolt hole pattern) can be connected to PN 6 and PN 16 mating flanges to DIN or DIN EN up to nominal diameters of DN 65. Adapter flanges of this type cannot be connected with other adapter flanges. Use bolts of property class 4.6 or higher for the flange connections. The washers included in the scope of supply must be fitted between the bolt / nut head and the adapter (oval bolt hole) flange.

Recommended bolt lengths:

Thread	Tightening torque	Min. bolt length	
		DN 32/DN 40	DN 50/DN 65
PN 6 flanged connection			
M 12	40 Nm	55 mm	60 mm
PN 16 flanged connection			
M 16	95 Nm	60 mm	65 mm

Technical Data

Rio ¹⁾	ISO 7/1 ²⁾	Speed level	Speed 1/min	P ₁ W	P ₂ max W	Motor protection ³⁾	Signalling contacts ⁴⁾	⁵⁾	Rated current			Max. permissible operating pressure			
									230 V 1~ A	400 V 3~ A	230 V 3~ A	PN 6		PN 10	
	Rp/DN											kg		kg	
25-70 E	1	1 2 3	2600 2300 1800	140 - 195 110 - 175 85 - 120	90	○	-	A	0.95 0.87 0.62	- - -	- - -	-	-	29 130 147	5
25-70 D	1	1 2 3	2600 2100 1750	120 - 200 85 - 130 65 - 90	90	○	Display module	B	- - -	0.45 0.25 0.17	0.78 0.43 0.30	-	-	29 130 138	5
30-70 E	1 1/4	1 2 3	2600 2300 1800	140 - 195 110 - 175 85 - 120	90	○	-	A	0.95 0.87 0.62	- - -	- - -	-	-	29 130 148	5
30-70 D	1 1/4	1 2 3	2600 2100 1750	120 - 200 85 - 130 65 - 90	90	○	Display module	B	- - -	0.45 0.25 0.17	0.78 0.43 0.30	-	-	29 130 139	5
30-100 E	1 1/4	1 2 3	2600 2500 2300	220 - 400 185 - 390 165 - 345	180	DV/DVP	WSK	B	2.02 1.93 1.75	- - -	- - -	-	-	29 130 149	7
30-100 D	1 1/4	1 2 3	2600 2200 1800	180 - 390 140 - 270 110 - 195	180	●	SSM Display module	B	- - -	0.78 0.48 0.34	1.36 0.83 0.60	-	-	29 130 140	7
40-40 E	40	1 2 3	2550 2100 1600	155 - 195 130 - 175 100 - 120	90	○	-	A	0.95 0.87 0.62	- - -	- - -	-	-	29 130 500	10
40-40 D	40	1 2 3	2550 2050 1700	145 - 195 100 - 130 70 - 90	90	○	Display module	B	- - -	0.45 0.25 0.17	0.78 0.43 0.30	-	-	29 130 501	10
40-70 E	40	1 2 3	2650 2450 2200	250 - 390 220 - 380 200 - 330	180	DV/DVP	WSK	B	1.93 1.88 1.70	- - -	- - -	-	-	29 130 502	11
40-70 D	40	1 2 3	2600 2100 1800	220 - 370 165 - 260 130 - 185	180	●	SSM Display module	B	- - -	0.76 0.47 0.33	1.31 0.81 0.57	-	-	29 130 503	11
40-100 D	40	1 2 3	2800 2500 2200	300 - 585 230 - 465 200 - 365	350	●	SSM Display module	C	- - -	1.17 0.82 0.65	2.02 1.43 1.12	-	-	29 130 504	14
50-40 E	50	1 2 3	2650 2450 1950	280 - 330 255 - 320 235 - 290	180	DV/DVP	WSK	B	1.62 1.61 1.51	- - -	- - -	-	-	29 130 505	13
50-40 D	50	1 2 3	2600 2100 1700	245 - 330 190 - 240 145 - 180	180	●	SSM Display module	B	- - -	0.71 0.44 0.32	1.25 0.78 0.56	-	-	29 130 506	13
50-70 D	50	1 2 3	2800 2450 2150	360 - 625 290 - 495 245 - 380	350	●	SSM Display module	C	- - -	1.23 0.87 0.68	2.13 1.51 1.17	-	-	29 130 507	16
50-100 D	50	1 2 3	2700 2300 2000	450 - 880 330 - 680 280 - 500	450	●	SSM Display module	C	- - -	1.73 1.20 0.89	3.00 2.09 1.54	-	-	29 130 508	17
65-70 D	65	1 2 3	2800 2500 2200	380 - 550 310 - 445 270 - 360	350	●	SSM Display module	C	- - -	1.11 0.79 0.63	1.92 1.37 1.09	-	-	29 130 509	18.5
65-100 D	65	1 2 3	2800 2500 2150	620 - 960 480 - 760 400 - 600	570	●	SSM Display module	C	- - -	1.94 1.37 1.08	3.36 2.37 1.88	-	-	29 130 510	23.5
65-130 D	65	1 2 3	2800 2550 2250	1000 - 1450 810 - 1180 700 - 960	1100	●	SSM Display module	eC	- - -	2.93 2.10 1.74	5.07 3.64 3.00	-	-	29 130 511	25.5
80-70 D	80	1 2 3	2750 2400 2100	530 - 720 410 - 560 345 - 440	450	●	SSM Display module	C	- - -	1.51 1.00 0.78	2.65 1.74 1.35	29 130 239	26	29 130 240	28
80-100 D	80	1 2 3	2800 2500 2150	1270 - 1685 1040 - 1390 895 - 1100	1100	●	SSM Display module	C	- - -	3.27 2.47 2.00	5.66 4.28 3.46	29 130 124	28	29 130 125	30
100-100 D	100	1 2 3	2800 2500 2150	1270 - 1685 1040 - 1390 895 - 1100	1100	●	SSM Display module	C	- - -	3.27 2.47 2.00	5.66 4.28 3.46	29 130 207	32	29 130 208	34

¹⁾ E = 1~230 V, D = 3~400 V

²⁾ Union ends and union nuts are not included in the scope of supply

³⁾ ○ = No motor protection required, anti-jam motors

DV/DVP = Motor protection at all speeds with trip devices

● = Integrated motor protection in the terminal box

⁴⁾ WSK = Thermal circuit breaker for DV / DVP motor protection equipment

SSM = General fault signalling contact (voltage-free, for 230 V, 1 A)

Display module (on option, see Accessories) for fault and operation reporting, as well as PCP (process control processor) interface

⁵⁾ Type of PG cable gland

A = 1 x PG 11, B = 1 x PG 12.5, C = 1 x PG 13.5 + 1 blind plug

Technical Data

Rio 1)	DN	Speed level	Speed 1/min	P ₁ W	P ₂ max W	Motor protection 2)	Signalling contacts 3)	4)	Rated current			Max. permissible operating pressure			
									230 V 1~ A	400 V 3~ A	230 V 3~ A	PN 6		PN 10	
													kg		kg
Z 32-70 E	32	1	2600	140 - 195	90	○	-	A	0.95	-	-	-	-	29 130 512	14
		2	2300	110 - 175					0.87	-	-				
		3	1800	85 - 120					0.62	-	-				
Z 32-70 D	32	1	2600	120 - 200	90	○	Display module	B	-	0.45	0.78	-	-	29 130 513	14
		2	2100	85 - 130					-	0.25	0.43				
		3	1750	65 - 90					-	0.17	0.30				
Z 40-70 E	40	1	2650	250 - 390	180	DV/DVP	WSK	B	1.93	-	-	-	-	29 130 514	20.5
		2	2450	220 - 380					1.88	-	-				
		3	2200	200 - 330					1.70	-	-				
Z 40-70 D	40	1	2600	220 - 370	180	●	SSM Display module	B	-	0.76	1.31	-	-	29 130 515	20.5
		2	2100	165 - 260					-	0.47	0.81				
		3	1800	130 - 185					-	0.33	0.57				
Z 40-100 D	40	1	2800	300 - 585	350	●	SSM Display module	C	-	1.17	2.02	-	-	29 130 516	29.5
		2	2500	230 - 465					-	0.82	1.43				
		3	2200	200 - 365					-	0.65	1.12				
Z 50-70 D	50	1	2800	360 - 625	350	●	SSM Display module	C	-	1.23	2.13	-	-	29 130 517	30.5
		2	2450	290 - 495					-	0.87	1.51				
		3	2150	245 - 380					-	0.68	1.17				
Z 50-100 D	50	1	2700	450 - 880	450	●	SSM Display module	C	-	1.73	3.00	-	-	29 130 518	33.5
		2	2300	330 - 680					-	1.20	2.09				
		3	2000	280 - 500					-	0.89	1.54				
Z 65-100 D	65	1	2800	620 - 960	570	●	SSM Display module	C	-	1.94	3.36	-	-	29 130 519	46.5
		2	2500	480 - 760					-	1.37	2.37				
		3	2150	400 - 600					-	1.08	1.88				
Z 65-130 D	65	1	2800	1000 - 1450	1100	●	SSM Display module	C	-	2.93	5.07	-	-	29 130 520	50
		2	2550	810 - 1180					-	2.10	3.64				
		3	2250	700 - 960					-	1.74	3.00				
Z 80-100 D	80	1	2800	1270 - 1685	1100	●	SSM Display module	C	-	3.27	5.66	29 130 136	54.5	29 130 137	56
		2	2500	1040 - 1390					-	2.47	4.28				
		3	2150	895 - 1100					-	2.00	3.46				

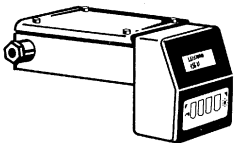
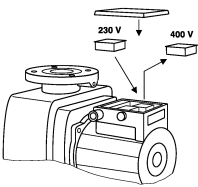
1) E = 1~230 V, D = 3~400 V

- 2) ○ = No motor protection required, anti-jam motors
 DV/DVP = Motor protection at all speeds with trip devices
 ● = Integrated motor protection in the terminal box

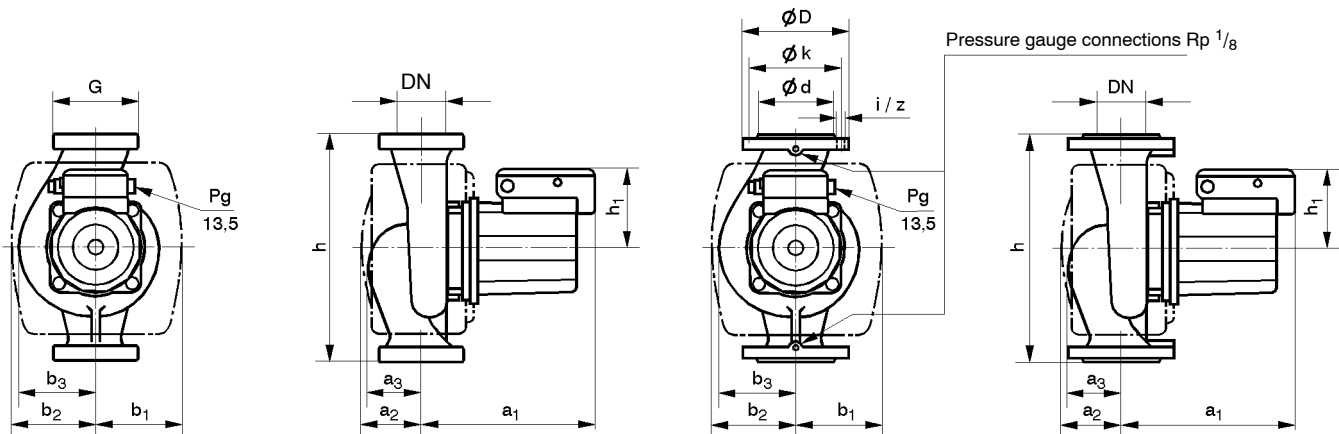
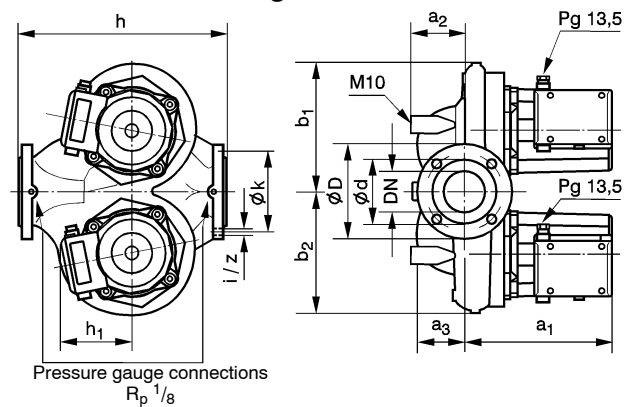
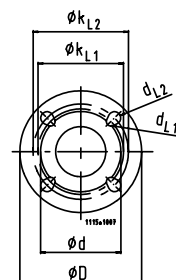
3) WSK = Thermal circuit breaker for DV / DVP motor protection equipment
 SSM = General fault signalling contact (volt-free, for 230 V, 1 A)
 Display module (on option, see Accessories) for fault and operation reporting, as well as PCP (process control processor) interface

4) Type of PG cable gland (for each motor)
 A = 1 x PG 11, B = 1 x PG 12,5, C = 1 x PG 13,5 + 1 blind plug

Extension Modules and Accessories for Rio / Rio Z

		for Rio / Rio Z			Ident. No.	~kg
		25-70 30(32)-70 40-40	30-100 40-70 50-40	40-100 to 100-100		
	Display module for Rio / Rio Z with three-phase current motor - Pump data display - Communication via contacts and PCP interface - Time-controlled operation / twin pump management The display module must feature identical or higher-version software (version No.) than the pump in order to avoid display errors.		X	X	01 061 429 01 061 430	0.8 0.8
	Switch plug for connecting Rio / Rio Z with three-phase current motor to 3/NPE/230 V 50 Hz AC	X	X	X	01 036 476	0.1
	Switchgear DV 84 x 130 x 66 for full motor protection activation and manual start-up/stopping. For Rio/Rio Z with three-phase current motor.		X		00 521 822	0.35
	Switchgear DVP 84 x 130 x 66 Switchgear as above, but with volt-free contacts for operation and fault reporting. For Rio/Rio Z with three-phase current motor.		X		01 018 335	0.35

For pump accessories see page 15.

Rio Outline Drawings

Rio Z Outline drawing

Flange dimensions


Adapter flange	ØD	Ød	Øk _{L1} /k _{L2}		n x d _{L1} /d _{L2}	
			PN 6	PN 10	PN 6	PN 10
DN 32	140	78	90	100	4xØ14	4xØ19
DN 40	150	88	100	110	4xØ14	4xØ19
DN 50	165	102	110	125	4xØ14	4xØ19
DN 65	185	122	130	145	4xØ14	4xØ19

Dimension Table

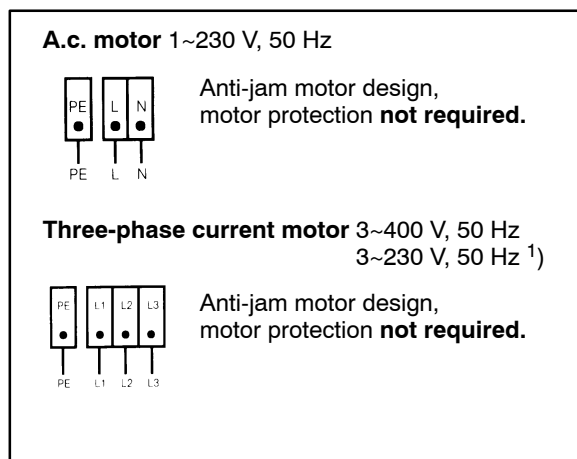
Rio	Rp/DN	G	a ₁	a ₂	a ₃	b ₁	b ₂	b ₃	h	h ₁	D		d		k		i		z	
											PN6	PN16	PN6	PN16	PN6	PN16	PN6	PN16	PN6	PN16
25-70	1	1 1/2	164	54	34	77	77	66	180	92	Screw-ended pumps									
30-70	1 1/4	2	171	63	40	90	90	66	180	92										
30-100	1 1/4	2	181	69	28	90	90	73	180	103										
40-40	40	-	176	77	52	101	101	83	220	92	Adapter flanges For flange dimensions see above.									
40-70	40	-	190	70	47	98	98	78	250	103										
40-100	40	-	214	88	57	115	115	90	250	110										
50-40	50	-	197	75	50	110	110	93	240	103										
50-70	50	-	222	90	63	115	115	91	280	110										
50-100	50	-	219	102	69	120	120	101	280	110										
65-70	65	-	231	105	72	118	118	111	280	110										
65-100	65	-	251	107	79	134	134	118	340	120	190	200	128	138	150	160	18	18	4	8
80-70	80	-	253	130	95	152	152	135	360	110	190	200	128	138	150	160	18	18	4	8
80-100	80	-	253	130	95	152	152	135	360	120	190	200	128	138	150	160	18	18	4	8
100-100	100	-	253	130	95	152	152	135	360	120	190	200	128	138	150	160	18	18	4	8
Rio Z																				
Z 32-70	32	-	171	-	39	119	126	-	220	92	Adapter flanges For flange dimensions see above.									
Z 40-70	40	-	190	73	43	143	150	-	250	103										
Z 40-100	40	-	213	75	64	172	178	-	250	110										
Z 50-70	50	-	221	83	62	179	169	-	280	110										
Z 50-100	50	-	219	83	69	198	192	-	280	110										
Z 65-100	65	-	251	93	80	223	209	-	340	120										
Z 65-130	65	-	250	93	80	223	209	-	340	120										
Z 80-100	80	-	253	100	94	249	231	-	360	120	190	200	128	138	150	160	18	18	4	8

Flanges PN 6 to DIN 2531, flanges PN 16 to DIN 2533

Wiring Diagrams for Rio / Rio Z

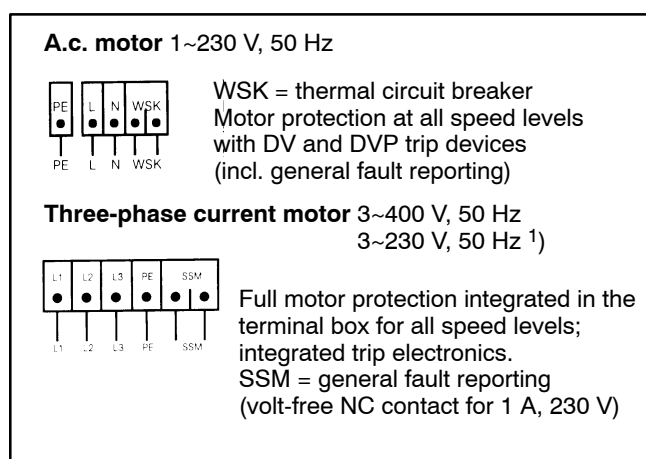
Pump sizes:

25-70, 30-70, 32-70 and 40-40

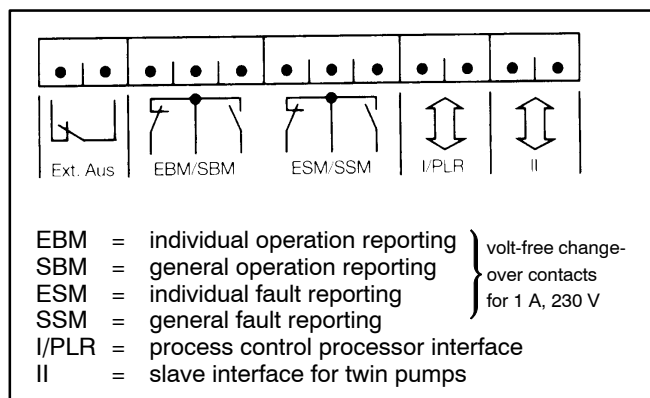

¹⁾ with switch plug (see Accessories, page 13)

Pump sizes:

30-100, 40-70, 40-100, 50-..., 65-..., 80-... and 100-...



Wiring Diagram for Display Module (for 3~models only) Types 32 and 42



The display module is available for three-phase current models only.

Pump Accessories

			Rio/Rio Z							Ident. No.	~kg
			Rp 1	Rp 1 1/4	DN 40	DN 50	DN 65	DN 80	DN 100		
	Y-pipes for duplex pumps PN 10 / 16 Scope of supply: bolts, nuts, gaskets and integrated changeover flap (on discharge side only)	suction side			X					40 000 688	12.0
		discharge side		X	X					40 000 679	13.0
		suction side				X				40 000 689	15.0
		discharge side			X					40 000 680	17.0
		suction side					X			40 000 690	19.0
		discharge side					X			40 000 681	20.0
		suction side						X		48 936 065	25.0
		discharge side						X		48 936 202	28.0
		suction side							X	40 000 692	33.0
		discharge side							X	40 000 440	35.0
	Screw union set with internal thread of malleable cast iron Scope of supply: without union nuts and gaskets		X	X						40 980 836	0.2
										40 980 837	0.2

For electric accessories refer to page 13.

Technical Data of the Display Module

Ambient temperature	max. 40 °C	Connection SSM / SBM and ESM / EBM	
Temperature of fluid pumped	20 °C to 110 °C	Max. switching capacity	250 V/1 A
Weight	approx. 0.6 kg	Terminal cross-section	max. 2.5 mm ²
Type of enclosure	IP 43	Connection PCP interface	
Interference suppression class	N	Terminal cross-section	min. 0.75 mm ² max. 2.5 mm ²
Thermal class	F	Max. cable length (no shielding required)	500 m
Power reserve	72 hours min.		

Display Module Functions

LCD for displaying the actual hydraulic and electric values, the statistics and a defined fault message	Q:	Flow rate	displayed
	W:	Power input (kWh)	may be reset
	I:	Motor current (I)	displayed
	U:	Motor voltage (V)	displayed
	P ₁ :	Power (W)	displayed
	Σ t:	Operating hours (h)	displayed
	X Error:	Error (last fault)	may be reset
Operating modes can be selected	Fault message:	SSM/ESM	selectable
	Operation message:	SBM/EBM	selectable
	Q = 0	Shutoff head adjustment	selectable
	Mode:	Manual / automatic	selectable
	Level:	Speed	selectable
	Type:	Pump type	selectable
	Timer:	Time / Date	selectable
Pump communication	Programme	Switching times / weekly programme for individual and twin pump operation	selectable
	Individual and general operation and fault reporting (volt-free change-over contact)		
	External On / Off switching via volt-free contact		
	Interface to digital building management system via KSB bus (PCP - process control processor)		
Twin pump management (2 display modules required for 2 pumps of identical output)	Interface for twin pump management		
	<u>Fault changeover</u> to available pump (external Off overrides).		
	<u>Programmable timer</u> with daily and weekly programme for time-controlled - starting / stopping - night-time operation (pump changeover: pumps with different speeds) - peak load operation (additional starting of pump with identical speed)		

Subject to technical modification without prior notice.

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