

CRT, CRTE

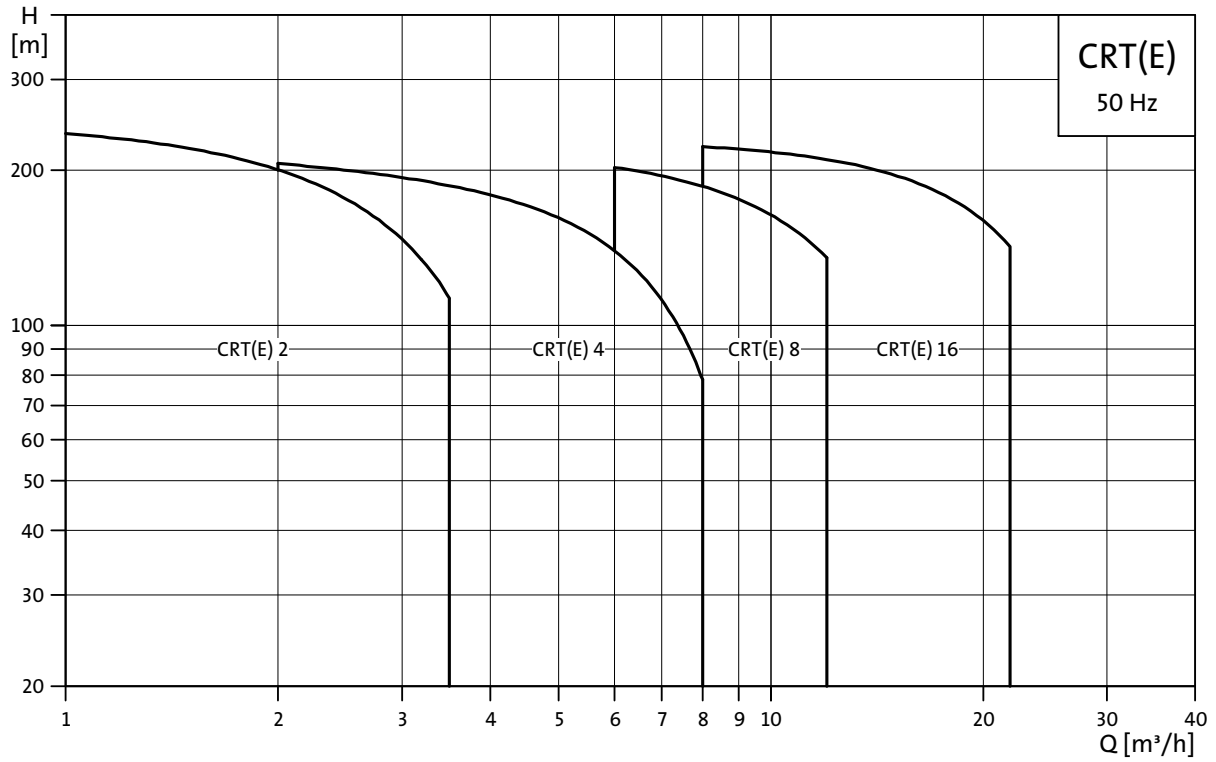
Vertical, multistage, centrifugal titanium pumps
50/60 Hz



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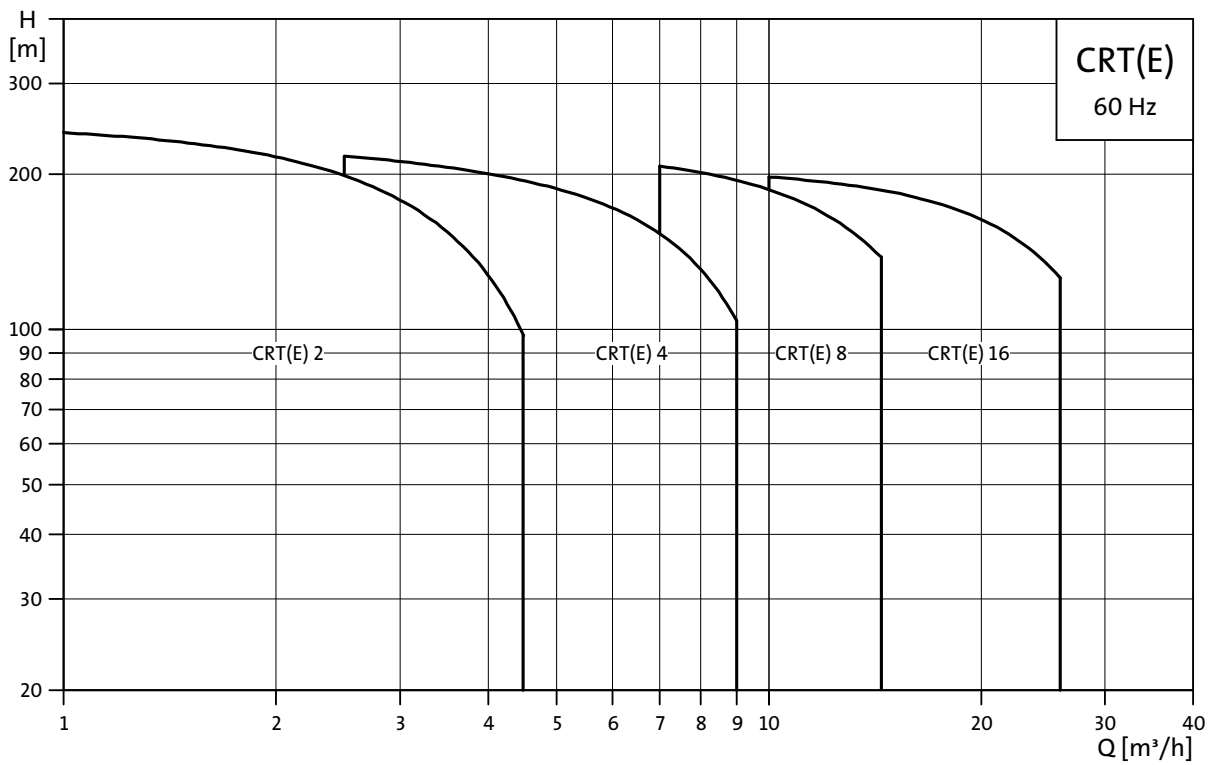
1. Product data

Performance range, 50 Hz



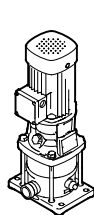
TM01 4866 3605

Performance range, 60 Hz

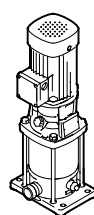


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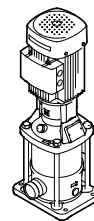
Product range



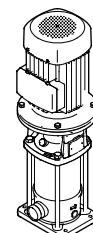
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TM02 7331 3203



TM02 7185 2703



TM02 7195 2803

Description	CRT(E) 2	CRT(E) 4	CRT(E) 8	CRT(E) 16
Range				
Nominal flow rate [m ³ /h]	2	4	8	16
Maximum pressure [bar]	25	25	25	25
Temperature range [°C]	-20 to +120	-20 to +120	-20 to +120	-20 to +120
Maximum efficiency [%]	48	59	64	70
50 Hz				
Flow rate [m ³ /h]	1 - 3.5	2 - 8	6 - 12	8 - 22
Motor power [kW]	0.37 - 3.0	0.37 - 4.0	0.37 - 7.5	2.2 - 18.5
60 Hz				
Flow rate [m ³ /h]	1 - 4.5	2 - 9	6 - 14.5	8 - 26
Motor power [kW]	0.37 - 4.0	0.37 - 5.5	0.37 - 11	2.2 - 15
Pipe connection				
PJE coupling with socket for welding/threaded socket	Rp 1 1/4	Rp 1 1/4	R 2	R 2
DIN flange on request	DN 32	DN 32	DN 50	DN 50

Applications

Reliable and cost-efficient, CRT pumps handle a variety of liquids from seawater to sodium hypochlorite.

Excellent corrosion resistance

Titanium is widely used for many industrial applications due to its high resistance to corrosion.

Totally unaffected by corrosive attacks by salt water or marine atmospheres, titanium also has an exceptional resistance to a wide range of acids, alkalis, natural water and industrial chemicals.

The fine corrosion resistance of titanium is due to a stable, protective and strongly adherent oxide film, formed instantly on the metal when a fresh surface is exposed to air or moisture.

Fields of application

Marine environment

- ballast pumps
- washing/cleaning.

Pulp and paper industries

- bleaching solutions.

Offshore industries and refineries

- firefighting
- cooling.

Metal-finishing industries (electroplating)

- copper chloride etching
- ammonium chloride etching.

Power generation plants

- FGD (Flue Gas Desulphurisation).

Food processing, brewing and pharmaceutical industries

- CIP (Cleaning In Place)
- disinfection.

Desalination industries

- reverse osmosis
- distillation.

Chemical processing industries

- chlorine and chlorates
- organic acids
- oxidising acids (nitric acid, chromic acid)
- chloride-containing salts (ferric chloride)
- inhibited reducing acids.

Other

- fish farming
- aquaria
- fun water parks.



GR7369

Fig. 1 CRT pumps

Pump

The CRT(E) 2, 4, 8 and 16 pump is a non-self-priming, vertical, multistage centrifugal pump fitted with a Grundfos standard motor.

The pump consists of a base and a pump head. The pump body and the outer sleeve are fixed between the base and the pump head by means of staybolts. The base has in-line suction and discharge ports. The pump has a maintenance-free mechanical shaft seal with dimensions to DIN 24960.

Motor

MG motors

CRT pumps are fitted with a totally enclosed, fan-cooled, 2-pole Grundfos standard motor with principal dimensions to EN standards.

Electrical tolerances according to EN 60034.

CRT pumps are fitted with three-phase MG motors as standard.

CRT pumps from 0.37 to 2.2 kW are also available with single-phase motors (1 x 220-230/240 V). See WinCAPS or WebCAPS.

MGE motors

CRTE pumps are fitted with a totally enclosed, fan-cooled, 2-pole frequency-controlled motor with principal dimensions to EN standards.

Electrical tolerances according to EN 60034.

CRTE pumps from 0.37 - 1.1 kW are fitted with single-phase MGE motors as standard.

CRTE pumps from 0.75 - 1.1 kW are also available with three-phase MGE motors. See Win-/WebCAPS.

Electrical data

	MG motor	MGE motor
Mounting designation	Up to 4 kW: V 18 From 5.5 kW: V 1	
Insulation class	F	
Efficiency class	IE3 / IE2-IE3 ¹⁾	
Enclosure class	IP55 ²⁾	IP54
50 Hz Supply voltage (tolerance ± 10 %)	P ₂ : 0.37 - 1.5 kW: 3 x 220-240/380-415 V	P ₂ : 0.37 - 1.1 kW: 1 x 200-240 V
	P ₂ : 2.2 - 5.5 kW: 3 x 380-415 V	P ₂ : 0.75 - 18.5 kW: 3 x 380-480 V
	P ₂ : 7.5 - 18.5 kW: 3 x 380-415/660-690 V	
60 Hz Supply voltage (tolerance ± 10 %)	P ₂ : 0.37 - 1.1 kW: 3 x 220-255/380-440 V	
	P ₂ : 1.5 - 15 kW: 3 x 220-277/380-480 V	
	P ₂ : 2.2 - 5.5 kW: 3 x 380-480 V	
	P ₂ : 7.5 - 15 kW: 3 x 380-480/660-690 V	

¹⁾ Specified motor efficiency class, see section 4. *Motor data*.

²⁾ IP44, IP54 and IP65 - on request.

Motors for other voltages are available on request.

Operating conditions

Description	Operating conditions
Liquid temperature	EPDM: -20 °C to +120 °C FKM: -20 °C to +90 °C
Ambient temperature	Maximum +60 °C (CRTE +40 °C)
Minimum inlet pressure	According to the NPSH curve + a safety margin of minimum 0.5 metres head.

Sectional drawing

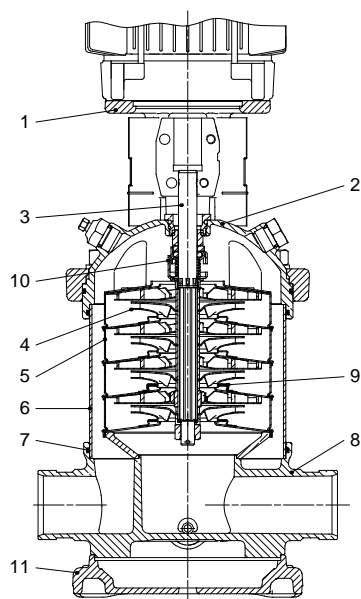


Fig. 2 Sectional drawing of CRT pump

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Materials

Pos.	Description	Material	EN/DIN	AISI/ASTM
1	Pump head	Stainless steel	1.4308	ASTM 25B
2	Pump head cover	Titanium		ASTM B 265/1993
3	Shaft	Titanium		ASTM B 348/1993
4	Impeller	Titanium		ASTM B 265
5	Chamber	Titanium		ASTM B 265
6	Seeve	Titanium		ASTM B 265
7	O-ring for sleeve	EPDM or FKM		
8	Base	Titanium		ASTM B 265
9	Neck ring	PTFE		
10	Shaft seal	AUUE/AUV		
11	Base plate	Stainless steel	1.4408	CF8M (equal to AISI 316)
	Rubber parts in pump	Same as in shaft seal		EPDM/FKM

Pumped liquids

Thin, non-explosive liquids, not containing solid particles or fibres. The liquid must not attack the pump materials chemically.

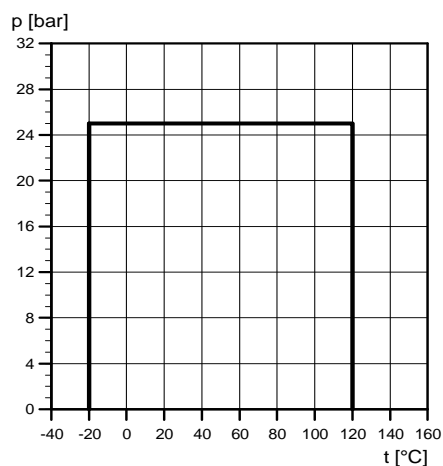
When pumping liquids with a density and/or viscosity higher than that of water, motors with correspondingly higher outputs must be used, if required.

CRT(E) pumps can be used for liquid transfer, circulation and pressure boosting.

Type key

Example	CR T E 16 - 3 A - P - A - E AUUE
Pump range	16 - 3
Vital parts made of titanium	A
Pump with integrated frequency converter	P
Nominal flow rate [m ³ /h]	A
Number of impellers	E
Code for pump version	
Code for pipe connection	
Code for materials, excl. plastic and rubber parts (A = basic version)	
Code for neck ring material	
Code for shaft seal and plastic/rubber parts, excl. neck ring	

Maximum operating pressure and temperature limits



p = Maximum operating pressure

Fig. 3 Operating pressure and temperature limits

Note: Liquid temperatures above 90 °C may involve the risk of periodic noise from the shaft seal.

Maximum inlet pressure

The following table shows the maximum permissible inlet pressure. However, the actual inlet pressure + the pressure against a closed valve must always be lower than the maximum permissible operating pressure.

50 Hz			60 Hz		
		[bar]			[bar]
CRT(E) 2-2	2-11	10	CRT(E) 2-2	2-6	10
CRT(E) 2-13	2-26	15	CRT(E) 2-7	2-18	15
CRT(E) 4-1	4-12	10	CRT(E) 4-1	4-7	10
CRT(E) 4-14	4-22	15	CRT(E) 4-8	4-16	15
CRT(E) 8-1	8-20	10	CRT(E) 8-1	8-14	10
CRT(E) 16-2	16-17	10	CRT(E) 16-2	16-10	10

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Corrosion resistance

Media	Concentration [%]	Temperature [°C]	Seal face		Bearing
			Binderless tungsten carbide	Silicon carbide	Silicon carbide
Demineralised water		120	●		●
Groundwater		120	●		●
Brackish water		120	●		●
Seawater		80	●		●
Sulfuric acid	3	60		● 1)	●
Phosphoric acid	30	35	●		●
	10	60			
Formic acid	50	80		● 1)	●
Citric acid	50	100	●		●
Oxalic acid	5	20	●		●
Inorganic salts (including FeCl ₃)				● 1)	●
Sodium hydroxide	10	100			
	50	60	●		●
Potassium hydroxide	50	20	●		●
Calcium hydroxide	Saturated	100	●		●
Ammonium hydroxide	28	100	●		●
Alcohols (except for methanol, aldehydes, ketones 2)			●		●

1) Available on request.

2) Titanium is susceptible to stress corrosion cracking (SSC) in methanol and should not be used with methanol.

2. Selection and sizing

Selection of pumps

Selection of pumps should be based on these parameters:

- the duty point of the pump (see page 8)
- dimensional data such as pressure loss as a result of height differences, friction loss in the pipework, pump efficiency (see page 8)
- pump materials (see page 10)
- pump connections (see page 10)
- shaft seal (see page 10).

Duty point of the pump

From a duty point it is possible to select a pump on the basis of the curve charts shown in section 3. *Performance curves/technical data.*

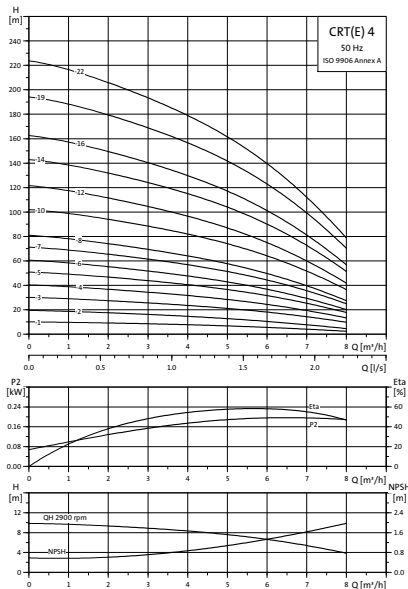


Fig. 4 Example of a curve chart

Dimensional data

When sizing a pump, take these parameters into account:

- Required flow and pressure at the draw-off point.
- Pressure loss as a result of height differences (H_{geo}).
- Friction loss in the pipework (H_f).
It may be necessary to account for pressure loss in connection with long pipes, bends or valves, etc.
- Best efficiency at the estimated duty point.
- NPSH value.
For calculation of the NPSH value, see section *Minimum inlet pressure - NPSH*, page 11.

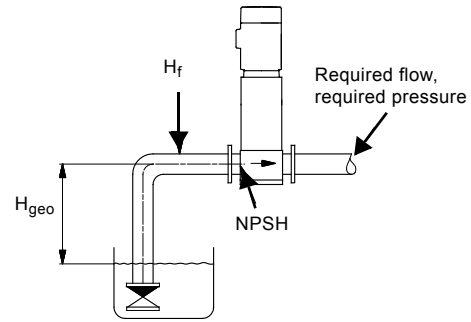


Fig. 5 Dimensional data

Pump efficiency

Before determining the best efficiency point, identify the operation pattern of the pump. If the pump is expected to operate at the same duty point, select a CRT(E) pump which is operating at a duty point corresponding to the best efficiency of the pump.

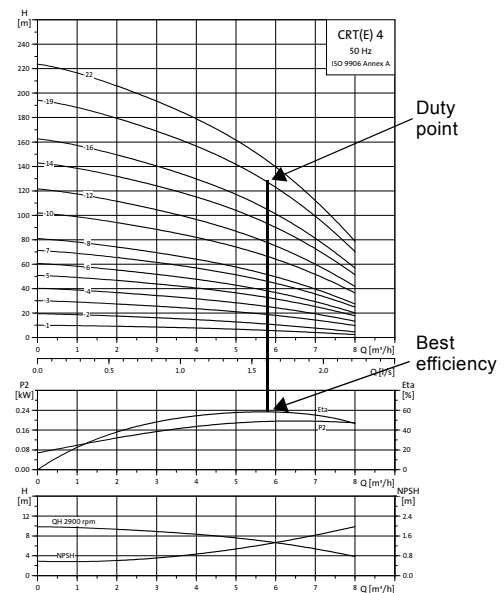


Fig. 6 Example of the duty point of a CRT(E) pump

As the pump is sized on the basis of the highest possible flow, it is important always to have the duty point to the right on the efficiency curve (η_a) in order to keep the efficiency high when the flow drops.

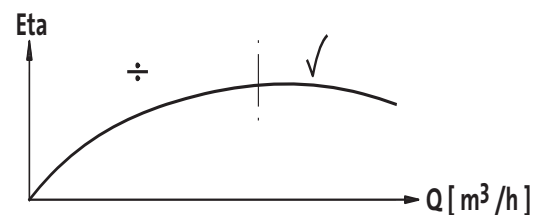


Fig. 7 Best efficiency

TM02 6711 1403

TM01 4872 3605

TM01 4872 3605

TM00 9190 1303

Normally, CRTE pumps are used in applications characterised by a variable flow. Consequently, it is not possible to select a pump that is constantly operating at optimum efficiency.

In order to achieve optimum operating economy, the pump should be selected on the basis of the following criteria:

- The max. duty point required should be as close as possible to the QH curve of the pump.
- The flow rate at the duty point required should be close to the optimum efficiency (eta) for most operating hours.

Between the min. and max. performance curves, E-pumps have an infinite number of performance curves, each representing a specific speed. Therefore, it may not be possible to select a duty point close to the 100 % curve.

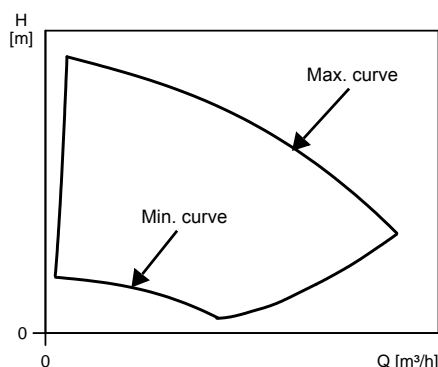


Fig. 8 Min. and max. performance curves

In situations where it is not possible to select a duty point close to the 100 % curve, the below affinity equations can be used. The head (H), the flow (Q) and the input power (P) are all the appropriate variables for the motor speed (n).

Note:

The approximated formulas apply on condition that the system characteristic remains unchanged for n_n and n_x and that it is based on the formula $H = k \times Q^2$ where k is a constant.

The power equation implies that the pump efficiency is unchanged at the two speeds. In practice, this is not quite correct.

To obtain a precise calculation of the power savings resulting from a reduction of pump speed, take into account the efficiencies of the frequency converter and the motor.

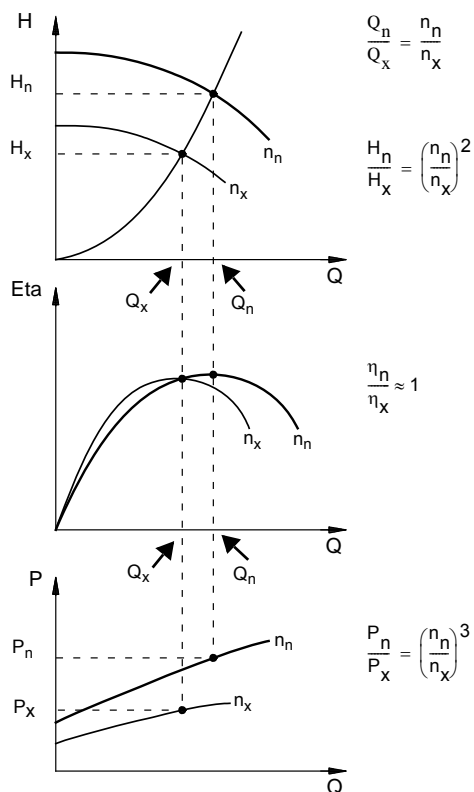


Fig. 9 Affinity equations

Legend

- H_n Rated head in metres.
- H_x Actual head in metres.
- Q_n Rated flow rate in m³/h.
- Q_x Actual flow rate in m³/h.
- n_n Rated motor speed in min⁻¹ ($n_n = 2900$ min⁻¹).
- n_x Actual motor speed in min⁻¹.
- η_n Rated efficiency in %.
- η_x Actual efficiency in %.

WinCAPS and WebCAPS

WinCAPS and WebCAPS are both selection programmes offered by Grundfos.

The two programmes make it possible to calculate the specific duty point and energy consumption of a CRTE pump.

By entering the dimensional data of the pump, WinCAPS and WebCAPS can calculate the exact duty point and energy consumption.

For further information, see section 7. *Further product documentation.*

TM01 4916 4803

TM00 8720 3496

Pump material

Select material variant on the basis of the liquid to be pumped.

Pump connections

Selection of pump connection depends on the rated pressure and pipework. To meet any requirement, Grundfos offers flexible connections such as:

- DIN flange - on request
- PJE coupling.

Shaft seal

As standard, the CRT(E) range is fitted with a Grundfos type A shaft seal suitable for the most common applications.

In service situations, Grundfos type A shaft seals can be replaced without removing the pump head.

These three key parameters must be taken into account when selecting the shaft seal:

- type of pumped liquid
- liquid temperature
- maximum pressure.

Operating pressure and inlet pressure

Do not exceed the limit values stated on page 6 for these pressures:

- maximum operating pressure
- maximum inlet pressure.

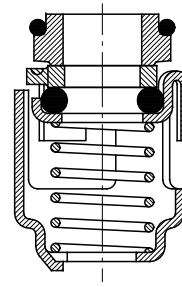


Fig. 12 Shaft seal

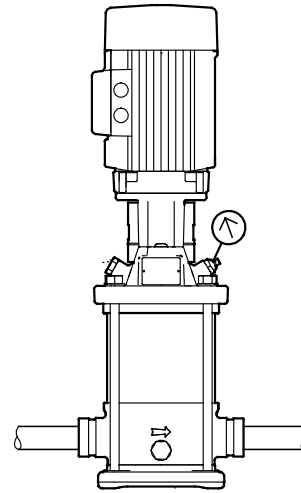


Fig. 13 Inlet and operating pressures

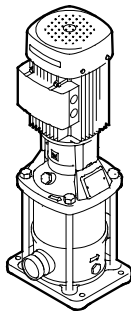


Fig. 10 CRT pump

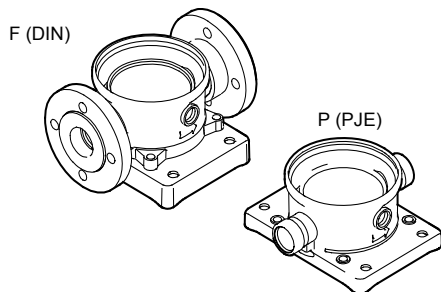


Fig. 11 Pump connections

TM00 2581 4593

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TM02 7185 2703

TM02 7436 3403

Minimum inlet pressure - NPSH

Calculation of the inlet pressure "H" is recommended in these situations:

- The liquid temperature is high.
- The flow is significantly higher than the rated flow.
- Water is drawn from depths.
- Water is drawn through long pipes.
- Inlet conditions are poor.

To avoid cavitation, make sure that there is a minimum pressure on the suction side of the pump.

The maximum suction lift "H" in metres head can be calculated as follows:

$$H = p_b \times 10.2 - NPSH - H_f - H_v - H_s$$

p_b	=	Barometric pressure in bar. (Barometric pressure can be set to 1 bar). In closed systems, p_b indicates the system pressure in bar.
NPSH	=	Net Positive Suction Head in metres head. (To be read from the NPSH curve at the highest flow the pump will be delivering.)
H_f	=	Friction loss in suction pipe in metres head. (At the highest flow the pump will be delivering.)
H_v	=	Vapour pressure in metres head. (To be read from the vapour pressure scale. H_v depends on the liquid temperature t_m .)
H_s	=	Safety margin = minimum 0.5 metres head.

If the calculated "H" is positive, the pump can operate at a suction lift of maximum "H" metres head.

If the calculated "H" is negative, an inlet pressure of minimum "H" metres head is required.

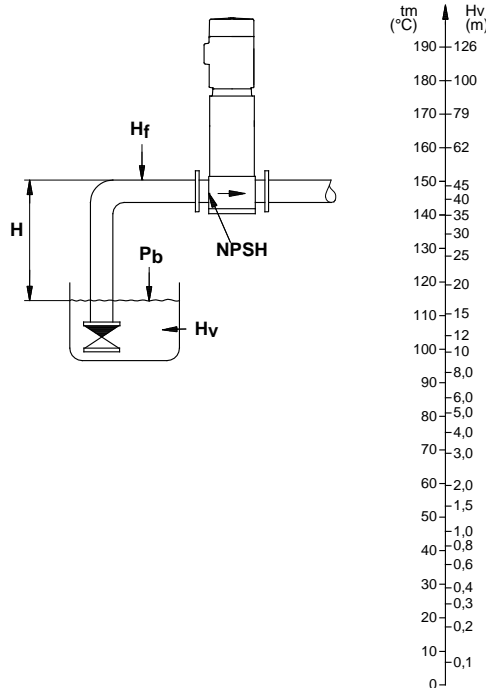


Fig. 14 Minimum inlet pressure, NPSH

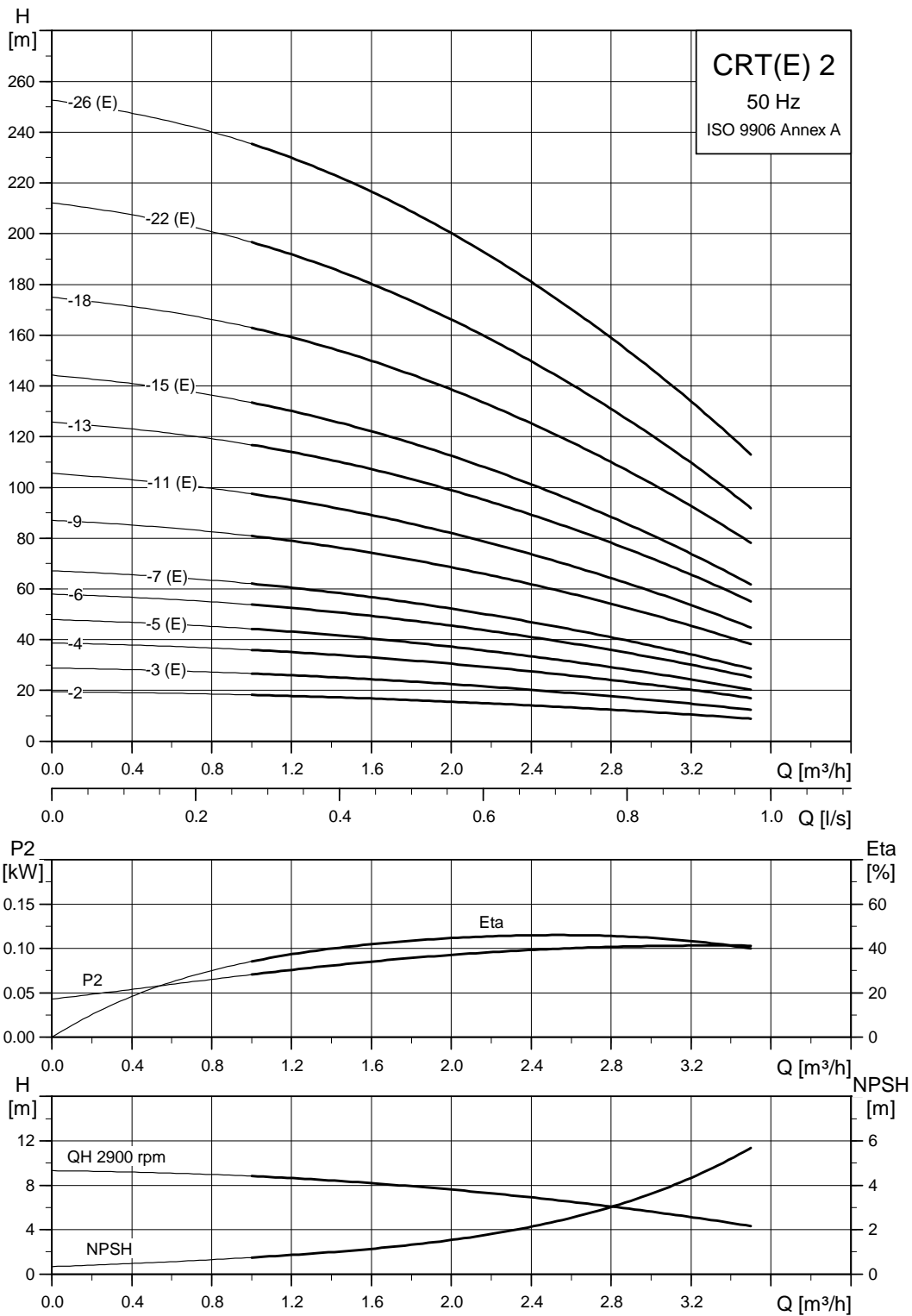
Note: To avoid cavitation, never select a pump with a duty point too far to the right on the NPSH curve.

Always check the NPSH value of the pump at the highest possible flow.

TM02 7439 3403

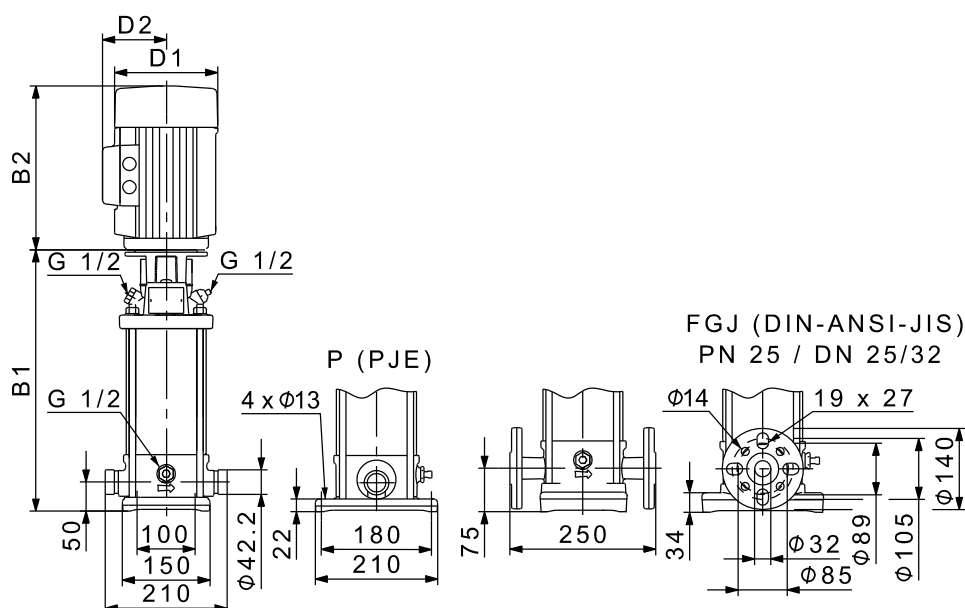
3. Performance curves/technical data

CRT, CRTE 2 - 50 Hz



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Dimensional sketch

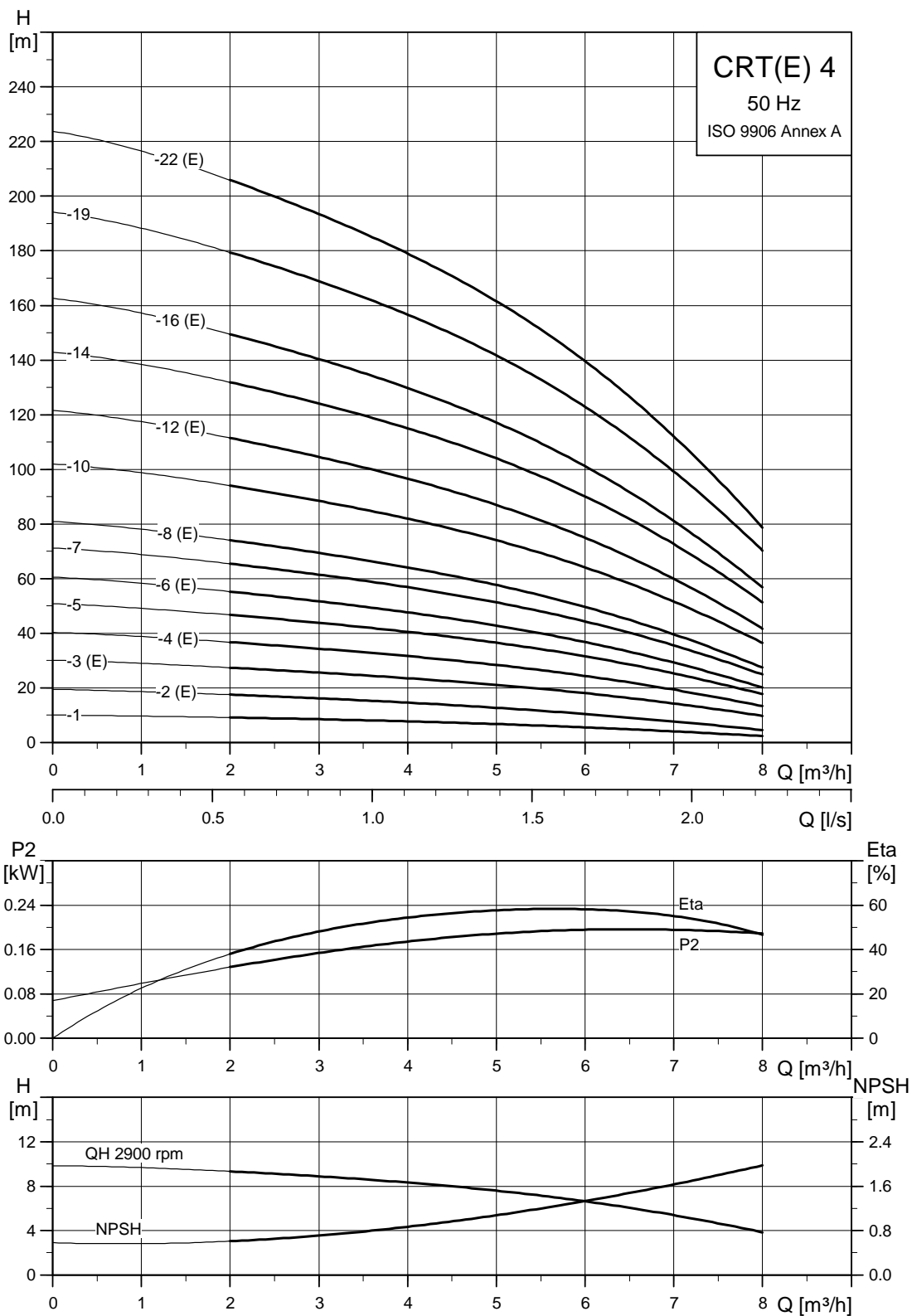


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Dimensions and weights

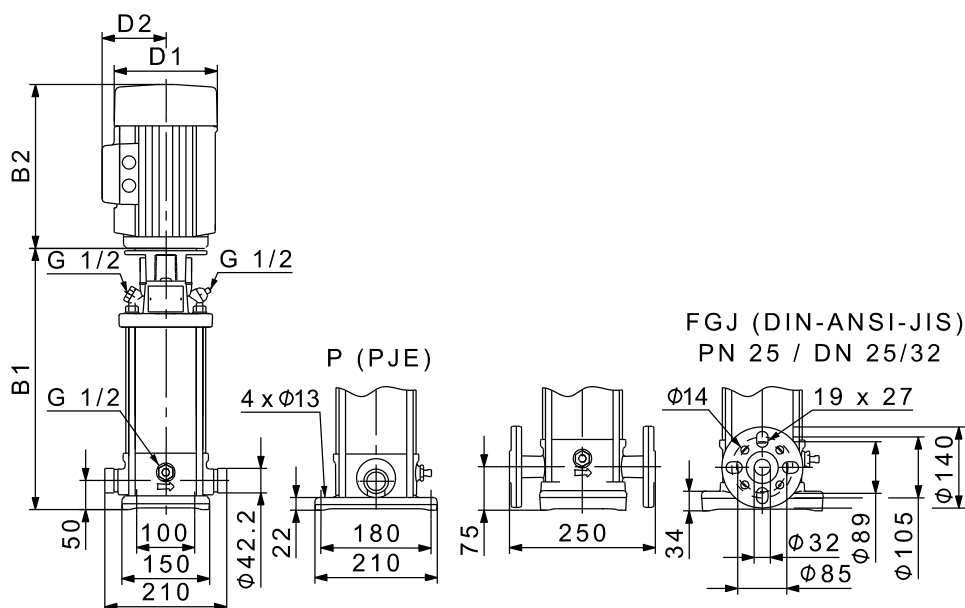
Pump type	Motor P ₂ [kW]	CRT								CRTE							
		Dimension [mm]				Net weight [kg]				Dimension [mm]				Net weight [kg]			
		PJE		DIN flange		D1	D2	PJE	DIN flange	PJE		DIN flange		D1	D2	PJE	DIN flange
		B1	B1+B2	B1	B1+B2					B1	B1+B2	B1	B1+B2				
CRT 2-2	0.37	253	444	278	469	141	109	15	19	-	-	-	-	-	-	-	-
CRT(E) 2-3	0.37	253	444	278	469	141	109	15	19	253	444	278	469	141	140	17	21
CRT 2-4	0.55	289	480	314	505	141	109	17	21	-	-	-	-	-	-	-	-
CRT(E) 2-5	0.55	289	480	314	505	141	109	17	21	289	480	314	505	141	140	18	22
CRT 2-6	0.75	331	562	356	587	141	109	19	23	-	-	-	-	-	-	-	-
CRT(E) 2-7	0.75	331	562	356	587	141	109	19	23	331	562	356	587	178	167	22	26
CRT 2-9	1.1	403	654	428	679	141	109	20	24	-	-	-	-	-	-	-	-
CRT(E) 2-11	1.1	403	654	428	679	141	109	20	24	403	634	428	659	178	167	23	27
CRT 2-13	1.5	491	772	516	797	178	110	31	35	-	-	-	-	-	-	-	-
CRT(E) 2-15	1.5	491	772	516	797	178	110	31	35	491	772	516	797	178	167	32	36
CRT 2-18	2.2	545	866	570	891	178	110	31	35	-	-	-	-	-	-	-	-
CRT(E) 2-22	2.2	617	938	642	963	178	110	33	37	617	938	642	963	178	167	32	36
CRT(E) 2-26	3	694	1029	719	1054	198	120	39	43	694	1029	744	1054	198	177	33	37

CRT, CRTE 4 - 50 Hz



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Dimensional sketch

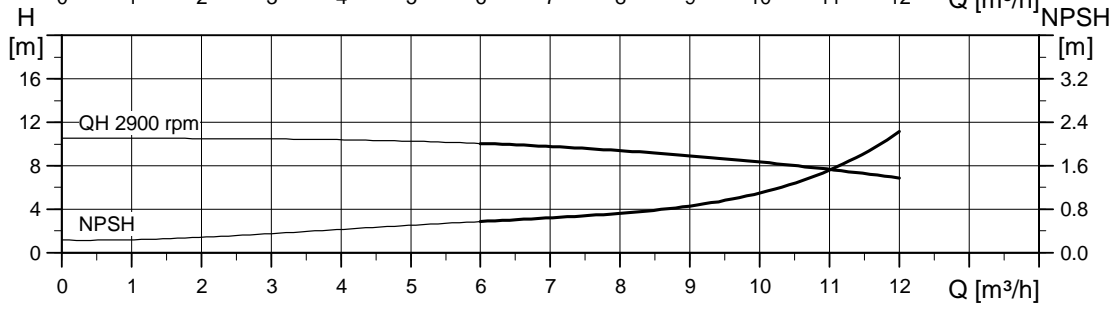
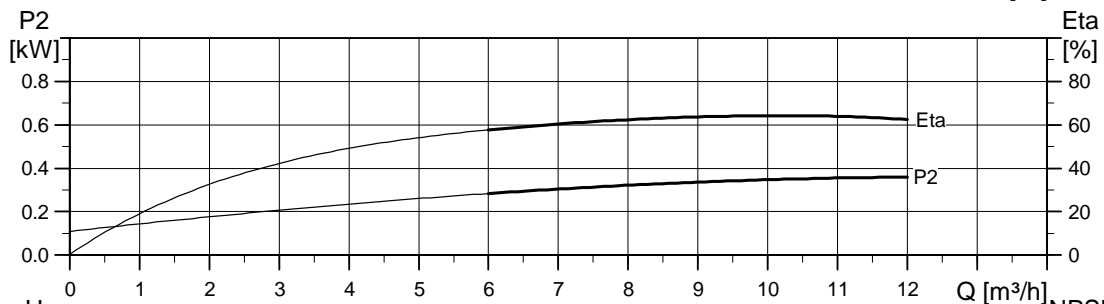
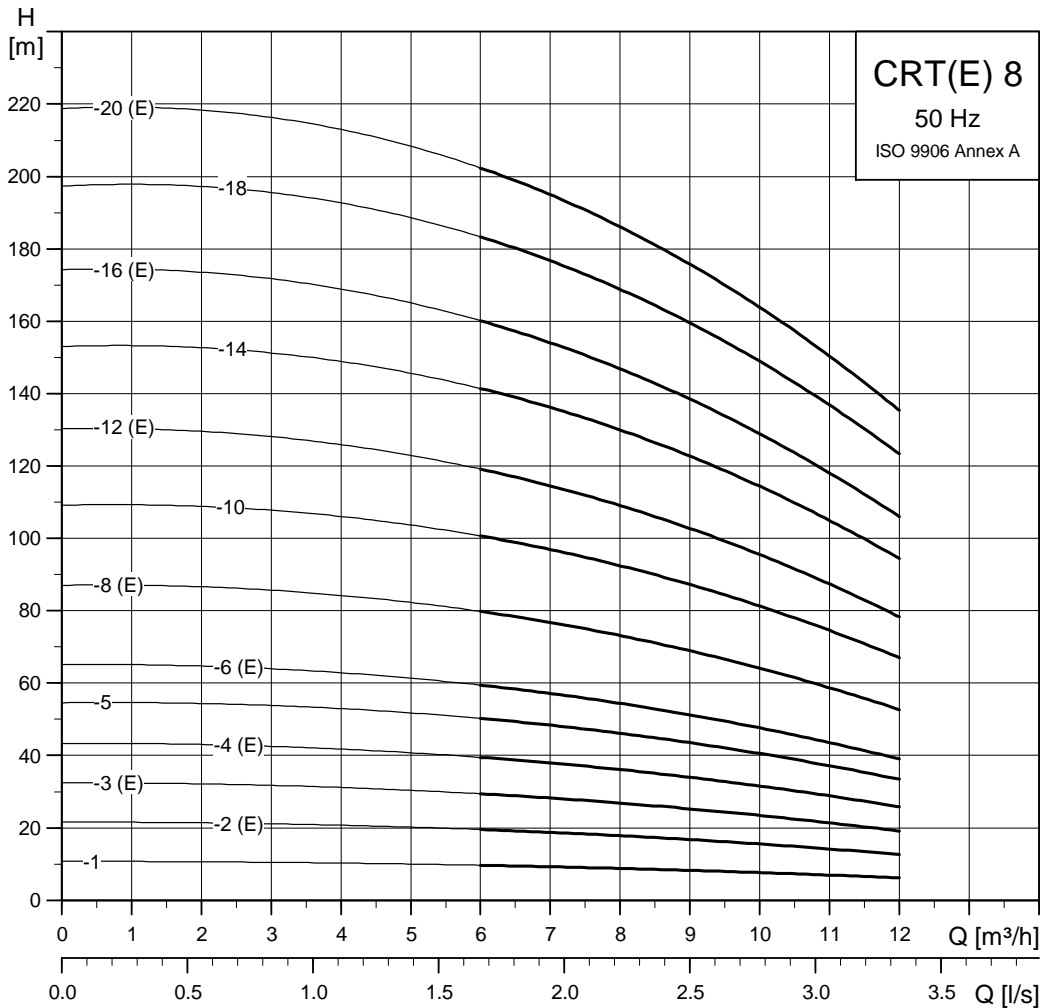


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Dimensions and weights

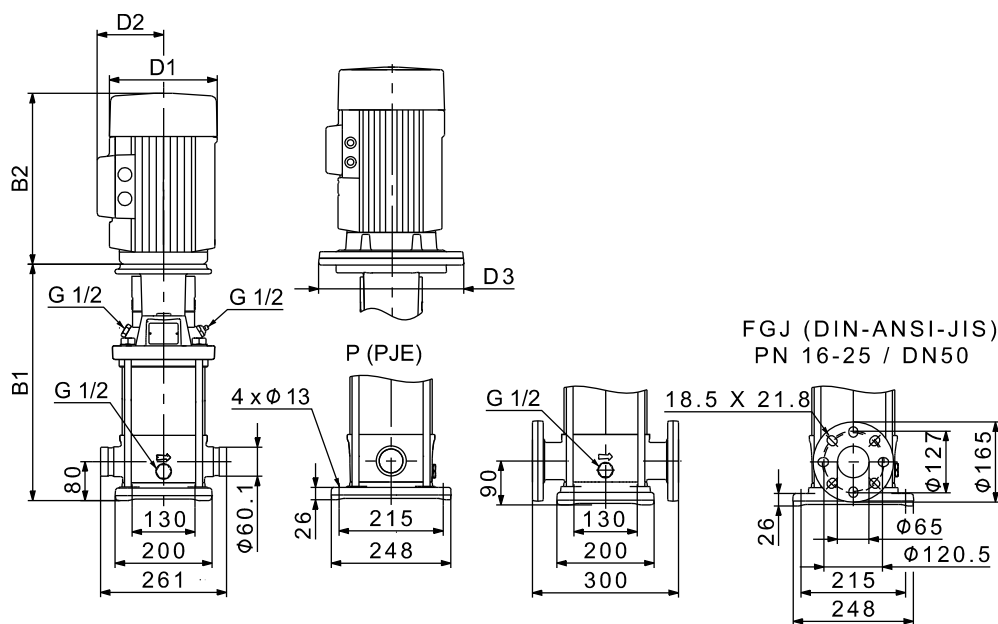
Pump type	Motor P ₂ [kW]	CRT								CRTE							
		Dimension [mm]				Net weight [kg]				Dimension [mm]				Net weight [kg]			
		PJE		DIN flange		D1	D2	PJE	DIN flange	PJE		DIN flange		D1	D2	PJE	DIN flange
		B1	B1+B2	B1	B1+B2					B1	B1+B2	B1	B1+B2				
CRT 4-1	0.37	253	444	278	253	141	109	15	19	-	-	-	-	-	-	-	-
CRT(E) 4-2	0.37	253	444	278	469	141	109	15	19	253	444	278	469	141	140	17	21
CRT(E) 4-3	0.55	280	471	305	496	141	109	17	21	313	504	338	529	141	140	18	22
CRT(E) 4-4	0.75	313	544	338	569	141	109	19	23	313	544	338	569	141	140	22	26
CRT 4-5	1.1	367	618	392	643	141	109	20	24	-	-	-	-	-	-	-	-
CRT(E) 4-6	1.1	367	618	392	643	141	109	20	24	367	598	392	623	178	167	23	27
CRT 4-7	1.5	437	718	462	743	178	110	30	34	-	-	-	-	-	-	-	-
CRT(E) 4-8	1.5	437	718	462	743	178	110	30	34	437	718	462	743	178	167	32	36
CRT 4-10	2.2	545	866	570	891	178	110	12	16	-	-	-	-	-	-	-	-
CRT(E) 4-12	2.2	545	866	570	891	178	110	37	41	545	866	570	891	178	167	36	40
CRT 4-14	3	658	993	683	1018	198	120	37	41	-	-	-	-	-	-	-	-
CRT(E) 4-16	3	658	993	683	1018	198	120	38	42	658	993	683	1018	198	177	44	48
CRT 4-19	4	739	1111	764	1136	220	134	50	54	-	-	-	-	-	-	-	-
CRT(E) 4-22	4	820	1192	845	1217	134	134	20	24	820	1192	845	1217	220	188	53	57

CRT, CRTE 8 - 50 Hz



TM01 4874 3605

Dimensional sketch

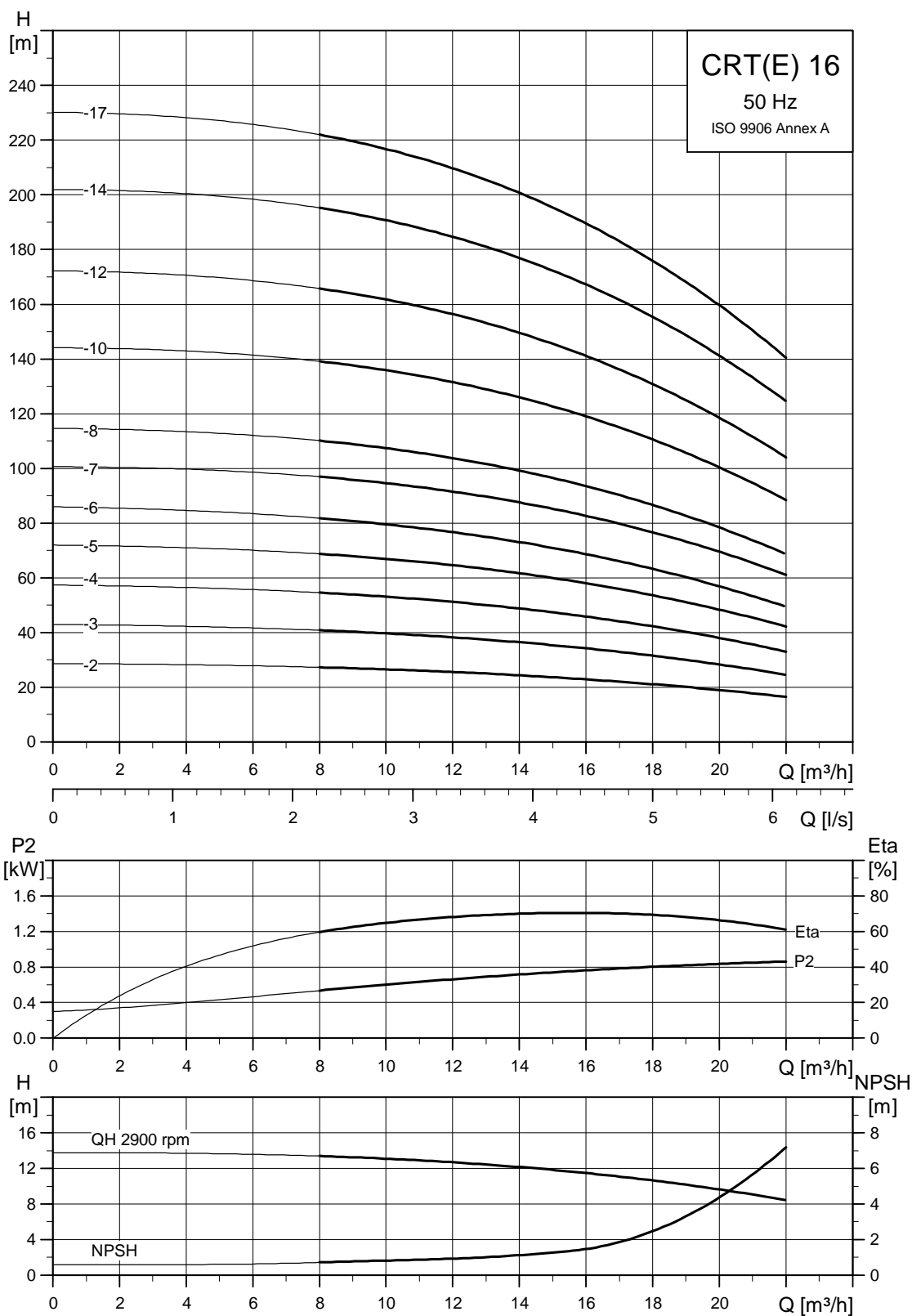


TM05 1099 0511

Dimensions and weights

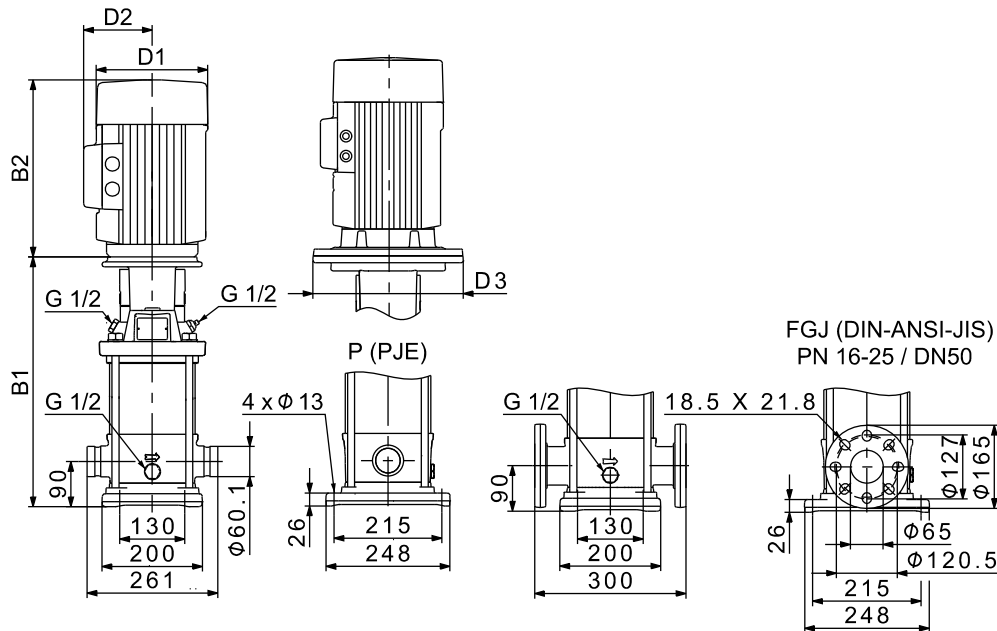
Pump type	Motor P ₂ [kW]	CRT									CRTE								
		Dimension [mm]						Net weight [kg]			Dimension [mm]						Net weight [kg]		
		PJE		DIN flange		D1	D2	D3	PJE	DIN flange	PJE		DIN flange		D1	D2	D3	PJE	DIN flange
		B1	B1+B2	B1	B1+B2						B1	B1+B2	B1	B1+B2					
CRT 8-1	0.37	353	544	363	554	141	109	-	23	27	-	-	-	-	-	-	-	-	-
CRT(E) 8-2	0.75	357	588	367	598	141	109	-	26	30	357	638	367	648	178	167	-	39	43
CRT(E) 8-3	1.1	417	668	427	678	141	109	-	28	32	417	698	427	708	178	167	-	40	44
CRT(E) 8-4	1.5	433	714	443	724	178	110	-	35	39	433	714	443	724	178	167	-	40	44
CRT 8-5	2.2	493	814	503	824	178	110	-	39	43	-	-	-	-	-	-	-	-	-
CRT(E) 8-6	2.2	493	814	503	824	178	110	-	40	44	493	814	503	824	178	167	-	46	50
CRT(E) 8-8	3	618	953	628	963	198	120	-	46	50	618	953	628	963	198	177	-	53	57
CRT 8-10	4	618	990	628	1000	220	134	-	59	63	-	-	-	-	-	-	-	-	-
CRT(E) 8-12	4	738	1110	748	1120	220	134	-	61	65	738	1110	748	1120	220	188	-	71	75
CRT 8-14	5.5	770	1161	780	1171	220	134	300	82	86	-	-	-	-	-	-	-	-	-
CRT(E) 8-16	5.5	890	1281	900	1291	220	134	300	85	89	890	1281	900	1291	220	188	300	95	99
CRT(E) 8-18	7.5	890	1269	900	1279	260	159	300	102	106	890	1269	900	1279	260	213	300	103	107
CRT(E) 8-20	11	980	1451	990	1461	314	204	350	133	137	980	1451	990	1461	314	308	350	172	176

CRT, CRTE 16 - 50 Hz



TM01 4876 3605

Dimensional sketch

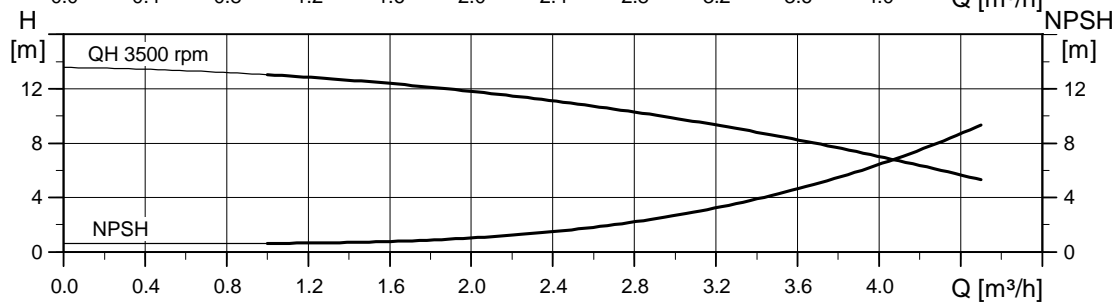
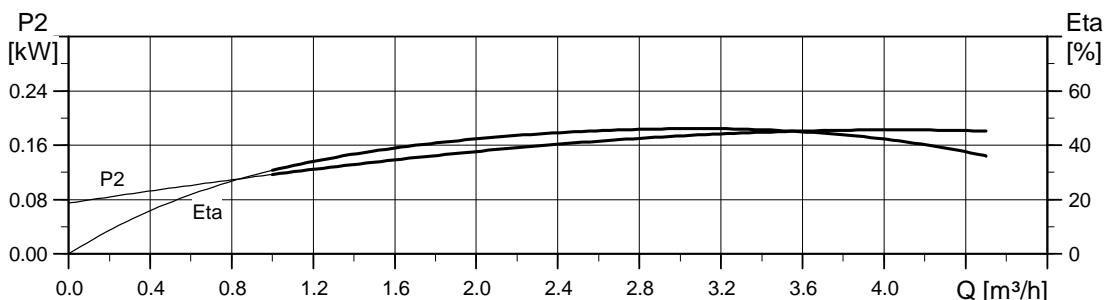
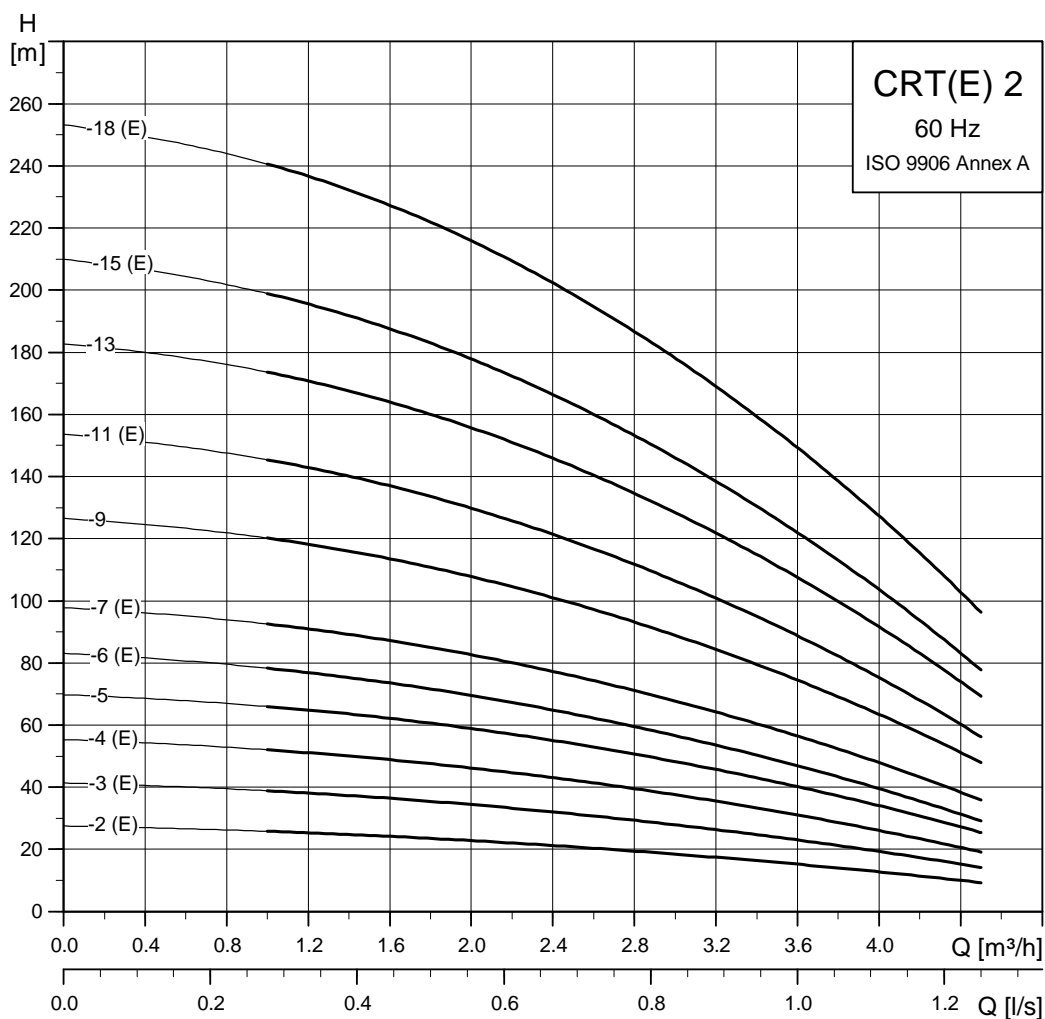


TM05 1100 0411

Dimensions and weights

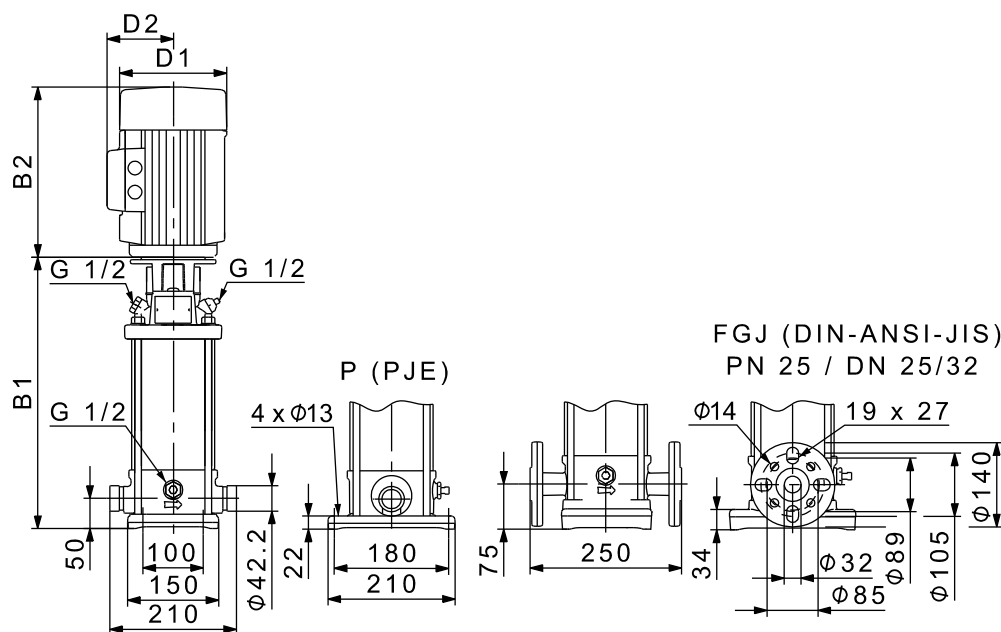
Pump type	Motor P ₂ [kW]	CRT										CRTE							
		Dimension [mm]						Net weight [kg]				Dimension [mm]						Net weight [kg]	
		PJE		DIN flange		D1	D2	D3	PJE	DIN flange	PJE		DIN flange		D1	D2	D3	PJE	DIN flange
		B1	B1+B2	B1	B1+B2						B1	B1+B2	B1	B1+B2					
CRT(E) 16-2	2.2	458	779	458	779	178	110	-	37	41	178	167	178	167	178	167	-	43	47
CRT(E) 16-3	3	463	798	463	798	198	120	-	42	46	198	177	198	177	198	177	-	49	53
CRT(E) 16-4	4	553	925	553	925	220	134	-	67	71	220	188	220	188	220	188	-	77	81
CRT 16-5	5.5	585	976	585	976	220	134	300	76	-	-	-	-	-	-	-	-	-	-
CRT(E) 16-6	5.5	675	1066	675	1066	220	134	300	77	81	220	188	220	188	220	188	300	87	91
CRT 16-7	7.5	675	1054	675	1054	260	159	300	93	-	-	-	-	-	-	-	-	-	-
CRT(E) 16-8	7.5	810	1189	810	1189	260	159	300	93	97	260	213	260	213	260	213	300	94	98
CRT 16-10	11	840	1311	840	1311	314	204	350	120	-	-	-	-	-	-	-	-	-	-
CRT(E) 16-12	11	1020	1491	1020	1491	314	204	350	138	142	314	308	314	308	314	308	350	177	181
CRT(E) 16-14	15	1020	1491	1020	1491	314	204	350	136	140	314	308	314	308	314	308	350	208	212
CRT(E) 16-17	18.5	1155	1670	1155	1670	314	204	350	166	170	314	308	314	308	314	308	350	240	244

CRT, CRTE 2 - 60 Hz



TM01 4871 3605

Dimensional sketch

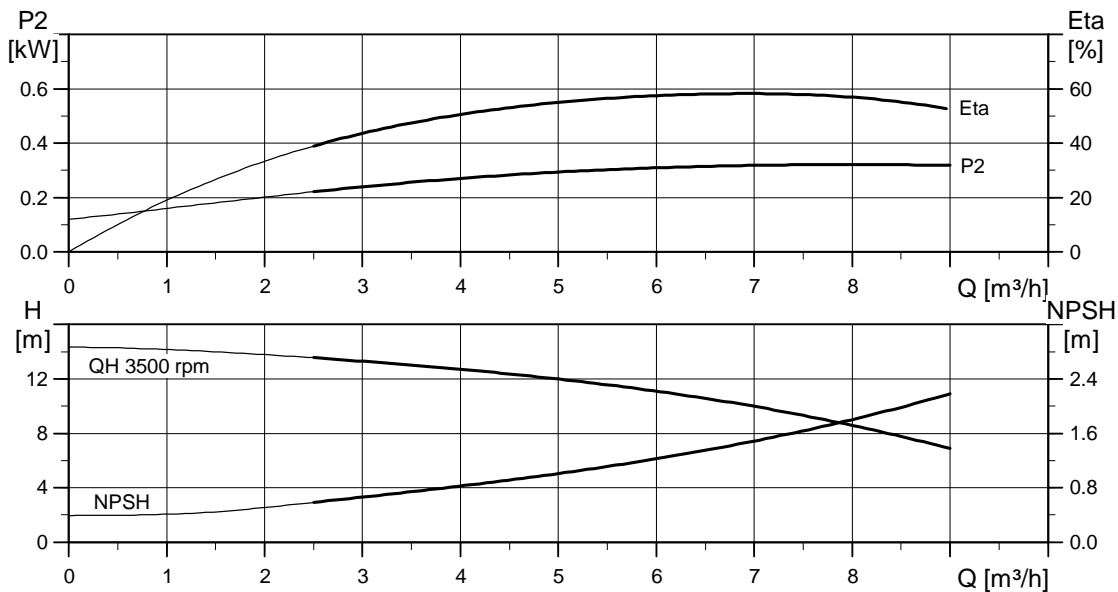
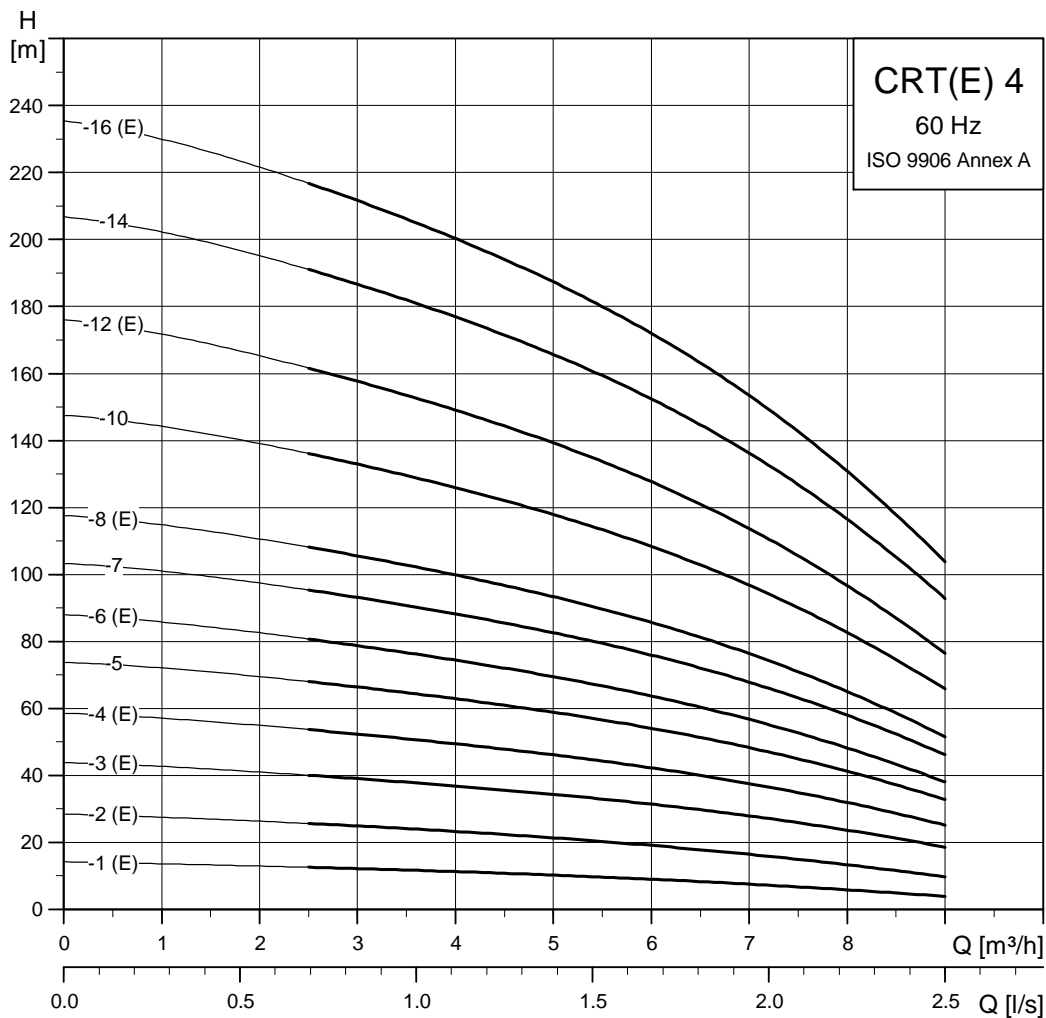


TM05 1098 0511

Dimensions and weights

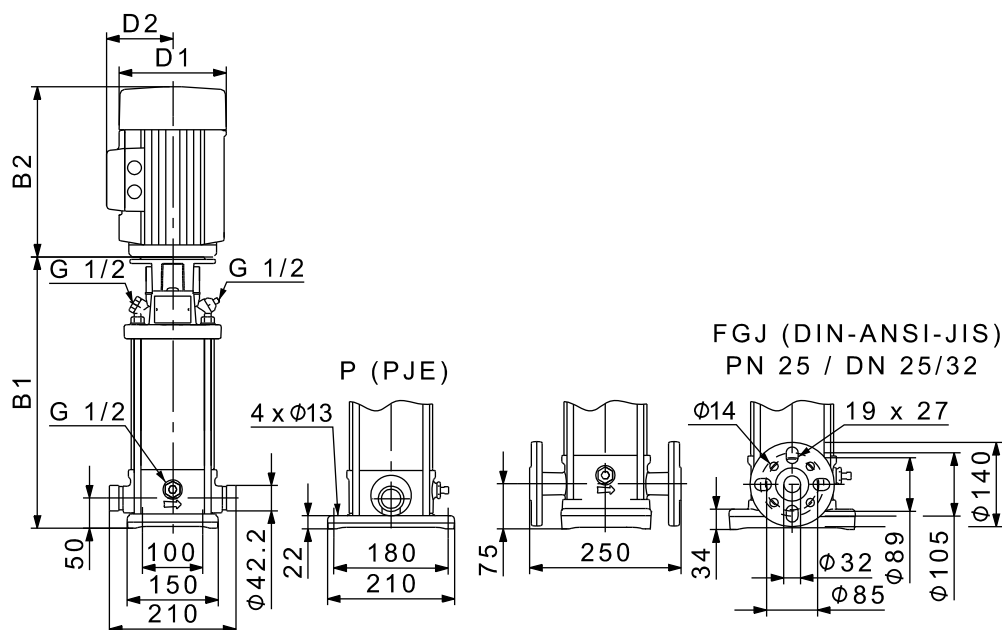
Pump type	Motor P ₂ [kW]	CRT								CRTE							
		Dimension [mm]				Net weight [kg]				Dimension [mm]				Net weight [kg]			
		PJE		DIN flange		D1	D2	PJE	DIN flange	PJE		DIN flange		D1	D2	PJE	DIN flange
		B1	B1+B2	B1	B1+B2					B1	B1+B2	B1	B1+B2				
CRT(E) 2-2	0.37	253	444	278	469	141	109	15	19	253	444	278	469	141	140	17	21
CRT(E) 2-3	0.55	253	444	278	469	141	109	15	19	253	444	278	469	141	140	17	21
CRT(E) 2-4	0.75	295	526	320	551	141	109	19	23	295	526	320	551	178	167	18	22
CRT 2-5	1.1	295	546	320	571	141	109	19	23	-	-	-	-	-	-	-	-
CRT(E) 2-6	1.1	331	582	356	607	141	109	19	23	331	562	356	587	178	167	23	27
CRT(E) 2-7	1.5	347	628	372	653	178	110	29	33	347	628	372	653	178	167	34	38
CRT 2-9	2.2	419	740	444	765	178	110	34	38	-	-	-	-	-	-	-	-
CRT(E) 2-11	2.2	419	740	444	765	178	110	34	38	419	740	444	765	178	167	40	44
CRT 2-13	3	496	831	521	856	198	120	35	39	-	-	-	-	-	-	-	-
CRT(E) 2-15	3	496	831	521	856	198	120	35	39	496	831	521	856	198	177	45	49
CRT(E) 2-18	4	550	922	575	947	220	134	46	50	550	922	575	947	220	188	57	61

CRT, CRTE 4 - 60 Hz



TM01 4873 3605

Dimensional sketch

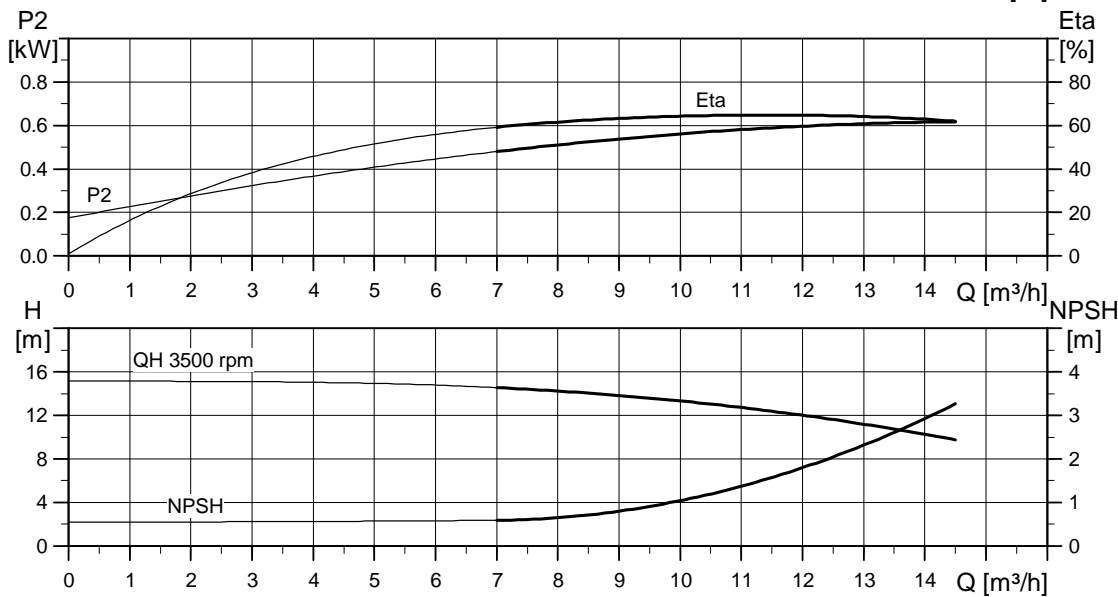
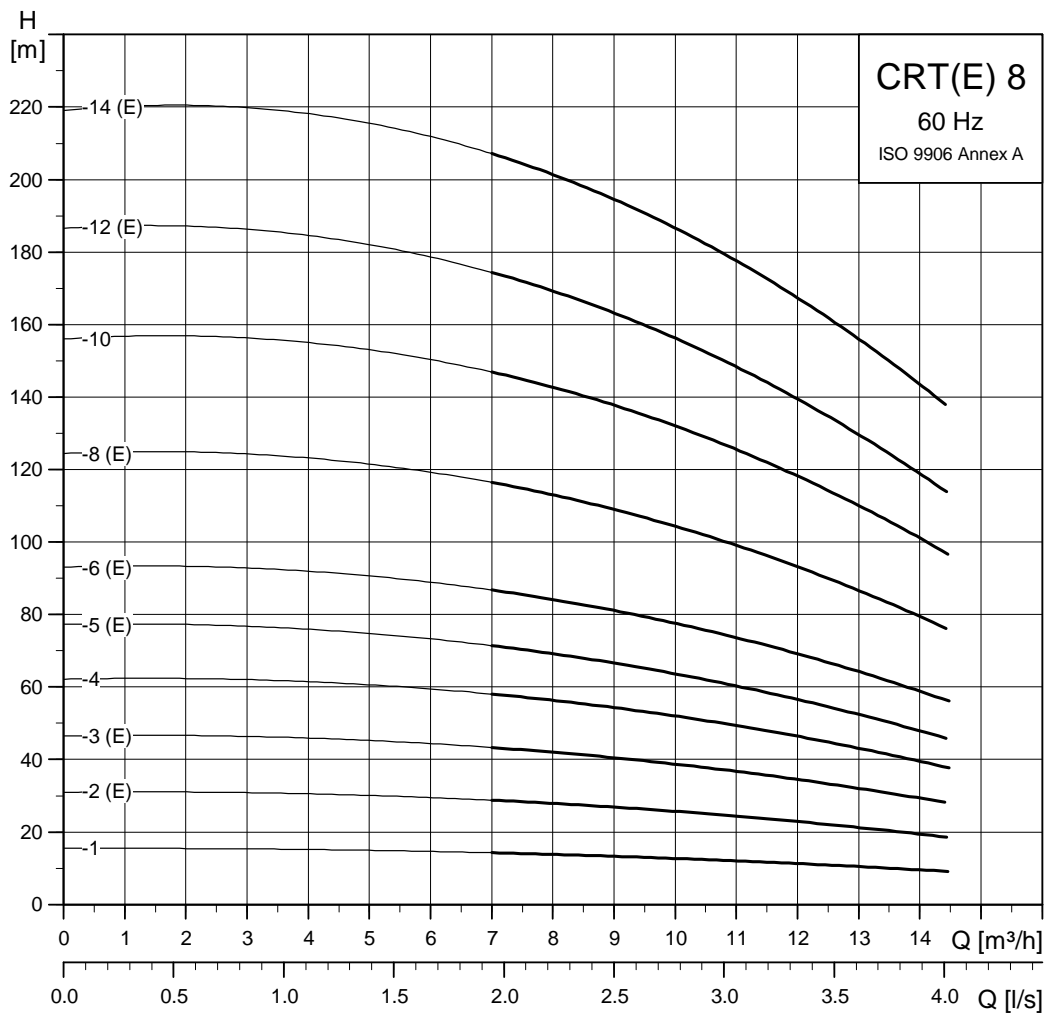


TM05 1098 0511

Dimensions and weights

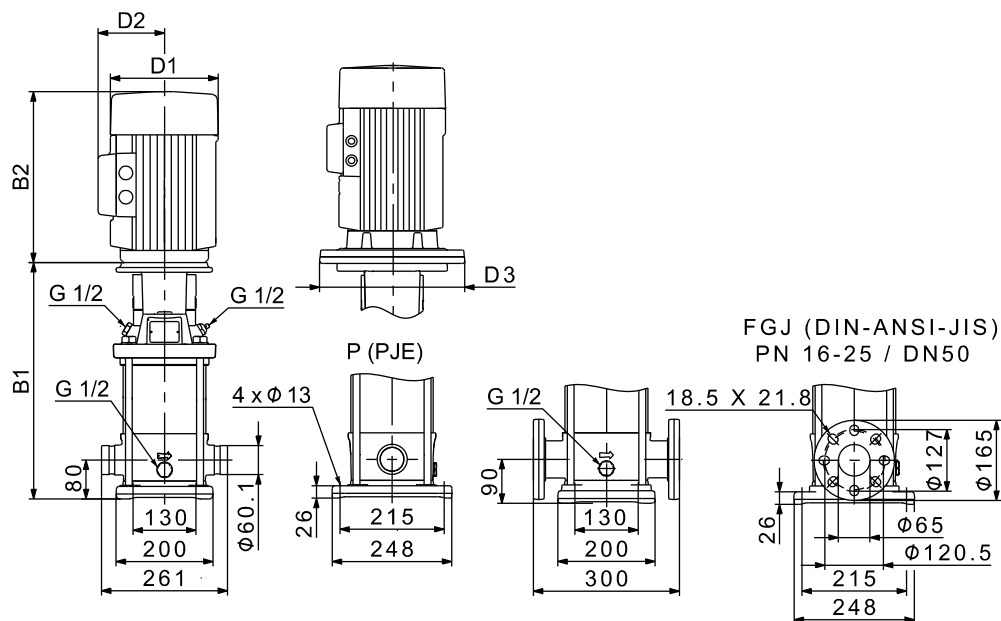
Pump type	Motor P ₂ [kW]	CRT										CRTE							
		Dimension [mm]						Net weight [kg]				Dimension [mm]						Net weight [kg]	
		PJE		DIN flange		D1	D2	D3	PJE	DIN flange	PJE		DIN flange		D1	D2	D3	PJE	DIN flange
		B1	B1+B2	B1	B1+B2						B1	B1+B2	B1	B1+B2					
CRT(E) 4-1	0.37	253	444	278	469	278	253	-	13	17	253	444	278	469	141	140	-	17	21
CRT(E) 4-2	0.75	253	484	278	509	278	509	-	16	20	-	-	-	-	-	-	-	-	-
CRT(E) 4-3	1.1	286	537	311	562	311	562	-	18	22	286	517	311	542	178	167	-	24	28
CRT(E) 4-4	1.5	329	610	354	635	354	635	-	25	29	329	610	354	635	178	167	-	34	38
CRT 4-5	2.2	383	704	408	729	408	729	-	27	31	-	-	-	-	-	-	-	-	-
CRT(E) 4-6	2.2	383	704	408	729	408	729	-	28	32	383	704	408	729	178	167	-	43	47
CRT 4-7	3	442	777	467	802	467	802	-	33	37	-	-	-	-	-	-	-	-	-
CRT(E) 4-8	3	442	777	467	802	467	802	-	34	38	442	777	467	802	198	177	-	43	47
CRT 4-10	4	550	922	575	947	575	947	-	46	50	-	-	-	-	-	-	-	-	-
CRT(E) 4-12	4	550	922	575	947	575	947	-	46	50	550	922	575	947	220	188	-	56	60
CRT 4-14	5.5	687	1078	712	1103	712	1103	300	56	60	-	-	-	-	-	-	-	-	-
CRT(E) 4-16	5.5	687	1078	712	1103	712	1103	300	57	61	687	1078	712	1103	220	188	300	67	71

CRT, CRTE 8 - 60 Hz



TM01 4875 3605

Dimensional sketch

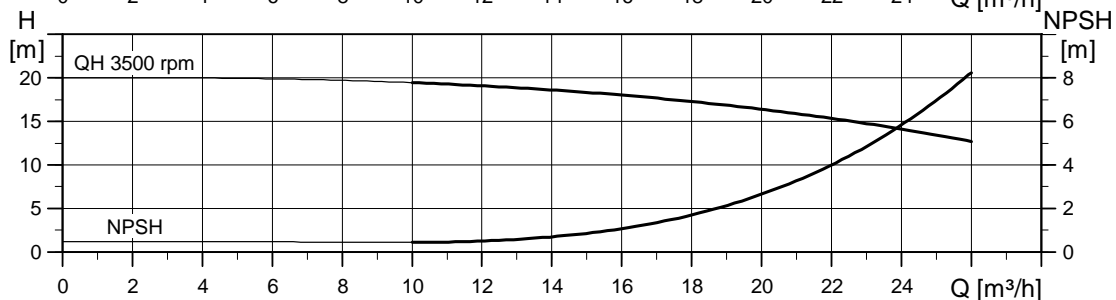
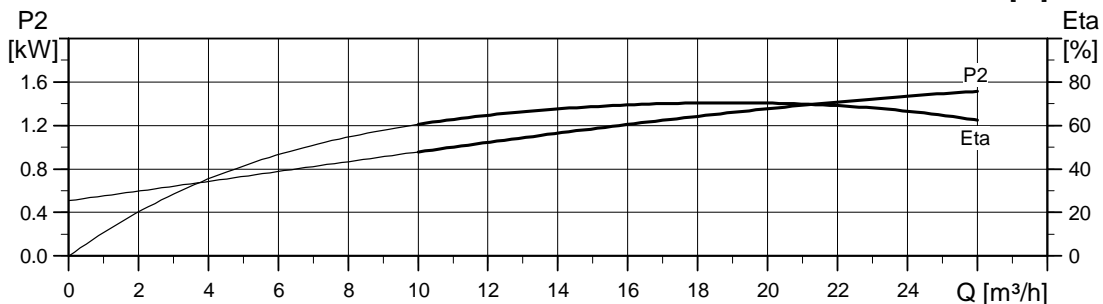
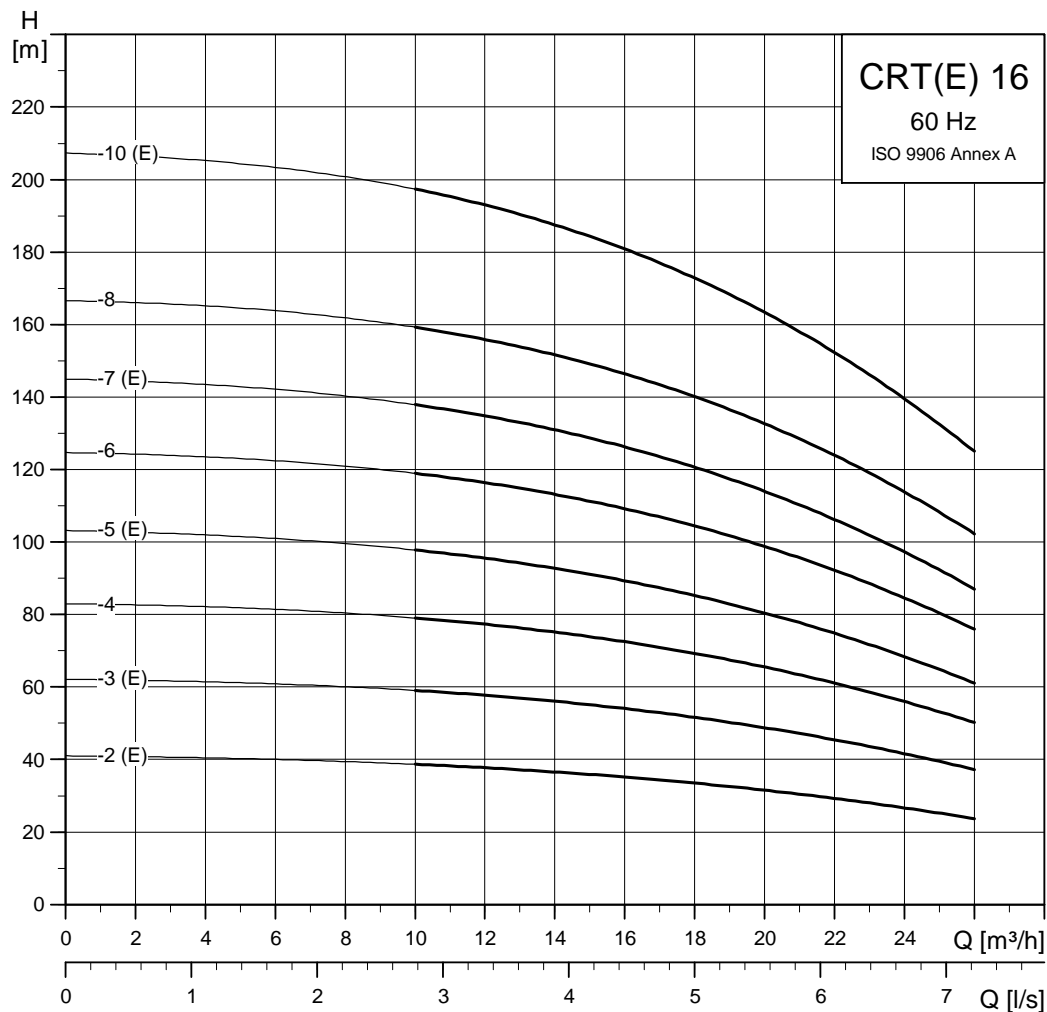


TM05 1099 0511

Dimensions and weights

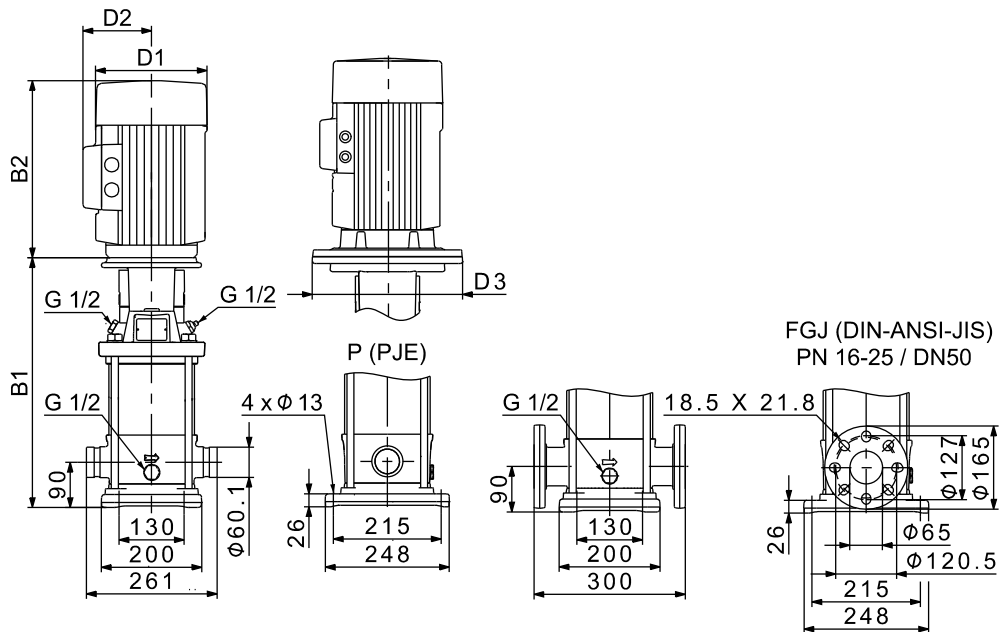
Pump type	Motor P ₂ [kW]	CRT										CRTE								
		Dimension [mm]					Net weight [kg]					Dimension [mm]				Net weight [kg]				
		PJE		DIN flange			D1	D2	D3	PJE	DIN flange	PJE		DIN flange		D1	D2	D3	PJE	DIN flange
		B1	B1+B2	B1	B1+B2	B1						B1+B2	B1	B1+B2						
CRT 8-1	0.75	357	588	367	598	141	109	-	26	30	-	-	-	-	-	-	-	-	-	
CRT(E) 8-2	1.5	373	654	383	664	178	110	-	33	37	373	654	383	664	178	167	-	38	42	
CRT(E) 8-3	2.2	433	754	443	764	178	110	-	37	41	433	754	443	764	178	167	-	42	46	
CRT 8-4	3	438	773	448	783	198	120	-	42	46	-	-	-	-	-	-	-	-	-	
CRT(E) 8-5	3	498	833	508	843	198	120	-	43	47	498	833	508	843	198	177	-	50	54	
CRT(E) 8-6	4	498	870	508	880	220	134	-	55	59	498	870	508	880	220	188	-	65	69	
CRT(E) 8-8	5.5	650	1041	660	1051	220	134	300	76	80	650	1041	660	1051	220	188	300	86	90	
CRT 8-10	7.5	650	1029	660	1039	260	159	300	92	96	-	-	-	-	-	-	-	-	-	
CRT(E) 8-12	7.5	770	1149	780	1159	260	159	300	95	99	770	1149	780	1159	260	213	300	96	100	
CRT(E) 8-14	11	800	1271	810	1281	314	204	350	119	123	800	1271	810	1281	314	308	350	158	162	

CRT, CRTE 16 - 60 Hz



TM01 4877 3605

Dimensional sketch



TM05 1100 0511

Dimensions and weights

Pump type	Motor P ₂ [kW]	CRT									CRTE								
		Dimension [mm]						Net weight [kg]			Dimension [mm]						Net weight [kg]		
		PJE		DIN flange		D1	D2	D3	PJE	DIN flange	PJE		DIN flange		D1	D2	D3	PJE	DIN flange
		B1	B1+B2	B1	B1+B2						B1	B1+B2	B1	B1+B2					
CRT(E) 16-2	3	463	798	463	798	198	120	-	40	44	463	798	198	177	198	177	-	47	51
CRT(E) 16-3	5.5	495	886	495	886	220	134	300	73	77	495	886	220	188	220	188	300	83	87
CRT 16-4	7.5	585	964	585	964	260	159	300	88	92	-	-	-	-	-	-	-	-	-
CRT(E) 16-5	7.5	585	964	585	964	260	159	300	88	92	585	964	260	213	260	213	300	89	93
CRT 16-6	11	705	1176	705	1176	314	204	350	113	117	-	-	-	-	-	-	-	-	-
CRT(E) 16-7	11	705	1176	705	1176	314	204	350	129	133	705	1176	314	308	314	308	350	168	172
CRT 16-8	15	840	1311	840	1311	314	204	350	125	129	-	-	-	-	-	-	-	-	-
CRT(E) 16-10	15	840	1311	840	1311	314	204	350	149	153	840	1311	314	308	314	308	350	220	224

4. Motor data

50 Hz

Standard motors for CRT

Motor P2 [kW]	Frame size [mm]	Standard voltage [V]	$I_{1/1}$ [A]	$\cos \varphi_{1/1}$	η [%]	Efficiency class	I_{start} [A]	Speed [min ⁻¹]	MG
0.37	71	220-240Δ 380-415Y	1.7/1.0	0.80-0.70	78.5	-	8.5-9.2/4.9-5.3	2850-2880	
0.55	71	220-240Δ 380-415Y	2.5/1.4	0.80-0.70	80.0	-	12-13/6.9-7.5	2830-2850	
0.75	80	220-240Δ 380-415Y	3.3/1.9	0.81-0.71	81.0	IE3	19.1-20.5/11.0-11.8	2840-2870	
1.1	80	220-240Δ 380-415Y	4.5/2.6	0.84-0.76	82.8	IE3	28.5-31.5/16.3-17.9	2820-2860	
1.5	90	220-240Δ 380-415Y	5.5/3.2	0.87-0.82	85.5	IE3	46.3-50.7/26.8-29.3	2890-2910	
2.2	90	380-415Δ	4.5-4.5	0.89-0.87	87.5	IE3	37.8-42.3	2890-2910	
3.0	100	380-415Δ	6.3-6.3	0.87-0.82	87.5	IE3	52.9-58.0	2900-2920	
4.0	112	380-415Δ	8.0-8.0	0.88-0.84	89.0	IE3	89.6-98.4	2910-2930	
5.5	132	380-415Δ	11.2-11.2	0.88-0.84	90.0	IE3	120-131	2910-2930	
7.5	132	380-415Δ 660-690Y	14.8-13.6/8.5-8.1	0.89-0.88	89.5-90.5	IE3	115-124/66.3-73.7	2920-2930	
11	160	380-415Δ 660-690Y	21.2-19.6/12.2-11.6	0.90-0.88	90.0-88.0	IE3	140-153/80.5-90.5	2920-2940	
15	160	380-415Δ 660-690Y	28.5-26.0/16.2-15.6	0.91-0.90	91.0-92.3	IE3	188-203/107-122	2920-2940	
18.5	160	380-415Δ 660-690Y	35.0-32.0/20.0-19.2	0.91-0.90	91.6-92.6	IE3	249-272/142-163	2920-2940	



TM03 1711 2805

E-motors for CRTE

Motor P2 [kW]	Frame size [mm]	Phase	Standard voltage [V]	$I_{1/1}$ [A]	$\cos \varphi_{1/1}$	η [%]	Efficiency class	MGE
0.37	71	1	200-240	2.7-2.5	0.96	68.0		
0.55	71	1	200-240	3.9-3.6	0.96	70.0		
0.75	80	1	200-240	5.1-4.7	0.97	72.0	IE2	
1.1	80	1	200-240	7.4-6.8	0.97	73.0	IE2	
0.75*	90	3	380-480	2.1-1.8	0.80-0.70	77.0	IE3	
1.1*	90	3	380-480	2.6-2.3	0.88-0.77	78.0	IE3	
1.5	90	3	380-480	3.3-2.7	0.91-0.87	81.0	IE3	
2.2	90	3	380-480	4.6-3.8	0.92-0.90	83.0	IE3	
3.0	100	3	380-480	6.2-5.0	0.94-0.92	83.0	IE3	
4.0	112	3	380-480	8.1-6.6	0.94-0.92	85.0	IE3	
5.5	132	3	380-480	11.0-8.8	0.94-0.93	85.5	IE3	
7.5	132	3	380-480	14.8-11.6	0.94-0.95	86.0	IE3	
11	132	3	380-480	22.5-18.8	0.90-0.90	86.5	IE3	
15	160	3	380-480	30.0-26.0	0.91-0.86	87.5	IE3	
18.5	160	3	380-480	37.0-31.0	0.91-0.88	88.0	IE3	




TM03 1712 2805

* Pumps are normally fitted with single-phase MGE motors. Previous dimensions tables show pumps with single-phase MGE motors.


60 Hz

Standard motors for CRT

Motor P2 [kW]	Frame size [mm]	Standard voltage [V]	I _{1/1} [A]	Cos φ _{1/1}	η [%]	Efficiency class	I _{start} [A]	Speed [rpm]	MG
0.37	71	220-255Δ 380-440Y	1.5-1.4/0.9-0.8	0.85-0.76	79.0-80.0	-	8.3-9.4/4.8-4.9	3410-3470	
0.55	71	220-255Δ 380-440Y	2.2-2.1/1.3-1.2	0.85-0.76	81.5-83.0	-	10.8-12.3/6.3-7.2	3390-3460	
0.75	80	220-255Δ 380-440Y	2.9-2.7/1.7-1.6	0.86-0.78	83.0-85.0	IE3	17.1-20.0/9.9-11.5	3400-3470	
1.1	80	220-255Δ 380-440Y	4.2-3.9/2.5-2.2	0.88-0.82	82.0-84.5	IE2-IE3	25.6-30.4/14.9-17.5	3390-3460	
1.5	90	220-277Δ 380-480Y	5.4-4.7/3.1-2.7	0.90-0.81	84.0-85.0	IE2-IE3	41.7-49.4/24.2-28.4	3470-3530	
2.2	90	380-480Δ	4.5-3.7	0.91-0.85	84.0-87.0	IE2-IE3	34.7-40.7	3470-3530	
3.0	100	380-480Δ	6.2-5.7	0.89-0.84	84.0-87.5	IE2-IE3	49.6-62.2	3430-3530	
4.0	112	380-480Δ	7.8-6.8	0.90-0.82	88.0-89.5	IE3	79.6-102	3510-3540	
5.5	132	380-480Δ	10.8-9.5	0.90-0.82	89.0-89.0	IE3	108-138	3510-3540	
7.5	132	380-480Δ 660-690Y	14.4-12.0/8.3-8.1	0.91-0.85	90.0-91.5	IE2-IE3	97.9-126/56.4-85.1	3480-3510	
11	160	380-480Δ 660-690Y	21.2-17.2/12.2-11.6	0.91-0.87	90.0-92.5	IE2-IE3	123-153/70.8-103	3500-3550	
15	160	380-480Δ 660-690Y	29.0-22.8/16.6-15.8	0.92-0.89	90.0-92.5	IE2-IE3	168-203/96.3-141	3500-3550	

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E-motors for CRTE

Motor P2 [kW]	Frame size [mm]	Phase	Standard voltage [V]	I _{1/1} [A]	Cos φ _{1/1}	η [%]	Efficiency class	MGE
0.37	71	1	200-240	2.7-2.5	0.96	68.0	-	
0.55	71	1	200-240	3.9-3.6	0.96	70.0	-	
0.75	80	1	200-240	5.1-4.7	0.97	72.0	IE2	
1.1	80	1	200-240	7.4-6.8	0.97	73.0	IE2	
0.75*	90	3	380-480	2.1-1.8	0.80-0.70	77.0	IE2	
1.1*	90	3	380-480	2.6-2.3	0.88-0.77	78.0	IE3	
1.5	90	3	380-480	3.3-2.7	0.91-0.87	81.0	IE3	
2.2	90	3	380-480	4.6-3.8	0.92-0.90	83.0	IE3	
3.0	100	3	380-480	6.2-5.0	0.94-0.92	83.0	IE3	
4.0	112	3	380-480	8.1-6.6	0.94-0.92	85.0	IE3	
5.5	132	3	380-480	11.0-8.8	0.94-0.93	85.5	IE3	
7.5	132	3	380-480	14.8-11.6	0.94-0.95	86.0	IE3	
11	132	3	380-480	22.5-18.8	0.90-0.90	86.5	IE3	
15	160	3	380-480	30.0-26.0	0.91-0.86	87.5	IE3	

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* Pumps are normally fitted with single-phase MGE motors. Previous dimensions tables show pumps with single-phase MGE motors.

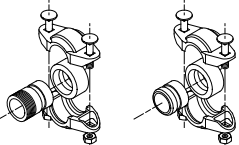
5. Accessories

Pipe connection

PJE couplings for CRN(E)

Materials in contact with the pumped liquid are made of titanium and rubber.

A set consists of two coupling halves (Victaulic type 77), one gasket, one pipe stub (for welding or threaded), bolts and nuts.

Coupling	Pump type	Socket	PN	Pipe connection	Number of coupling sets needed	Product number	
						EPDM	FKM
	CRT(E) 2 and CRT(E) 4	Threaded	80	R 1 1/4	2	415520	415538
		For welding	80	DN 32	2	415521	415539
	CRT(E) 8 and CRT(E) 16	Threaded	70	R 2	2	425935	425951
		For welding	70	DN 50	2	425934	425952

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6. Variants

The variants are available on request.

Although the Grundfos CRT(E) product range offers a number of pumps for different applications, customers require specific pump solutions to satisfy their needs. See the Grundfos CR "Custom-built pumps" catalogue.

Below please find the range of options available for customising the CRT(E) pumps to meet the customers' demands.

Contact Grundfos for further information or for requests other than the ones mentioned below.

Motors

Variant	Description
ATEX-approved motor	For operation in hazardous atmospheres, explosion-proof or dust-ignition-proof motors may be required.
Motor with anti-condensation heating unit	For operation in humid environments motors with built-in anti-condensation heating unit may be required.
Motor with thermal protection	Grundfos offers motors with built-in bimetallic thermal switches or temperature-controlled PTC sensors (thermistors) incorporated in the motor windings.
Oversize motor	Ambient temperatures above 40 °C or installation at altitudes of more than 1000 metres above sea level require the use of an oversize motor (i.e. derating).
4-pole motor	Grundfos offers 4-pole standard motors.

Shaft seals

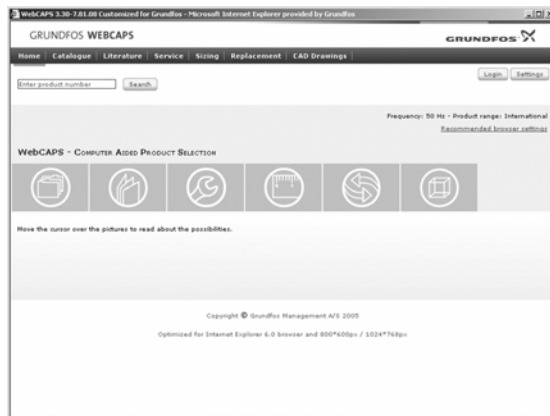
Variant	Description
Shaft seal with FFKM O-ring	Shaft seals with FFKM O-ring are recommended for applications where the pumped liquid may damage the standard O-ring material.
Shaft seal with SiC/SiC	Grundfos offers shaft seals with silicon carbide/silicon carbide (SiC/SiC).

Pumps

Variant	Description
Horizontally mounted pump	For safety or height reasons, certain applications, for instance on ships, require the pump to be mounted in the horizontal position. For easy installation the pump is fitted with brackets that support motor and pump.
Pump with bearing flange	The bearing flange is suitable for applications where the inlet pressure is higher than the maximum pressure recommended. The bearing flange increases the life of motor bearings. Recommended for standard motors.
Belt-driven pumps	Belt-driven pumps designed to operate in places with limited space or where no electrical power is available.

7. Further product documentation

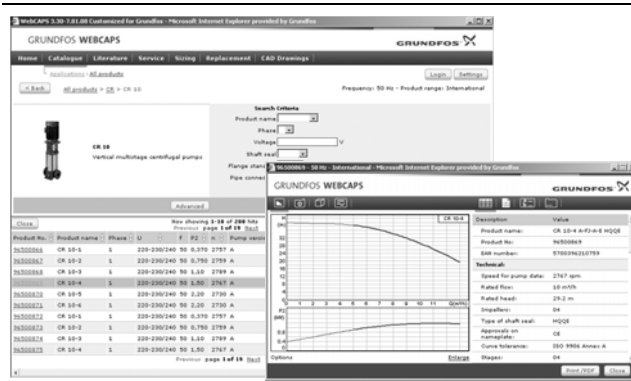
WebCAPS



WebCAPS is a **Web-based Computer Aided Product Selection** program available on www.grundfos.com. WebCAPS contains detailed information on more than 220,000 Grundfos products in more than 30 languages.

Information in WebCAPS is divided into six sections:

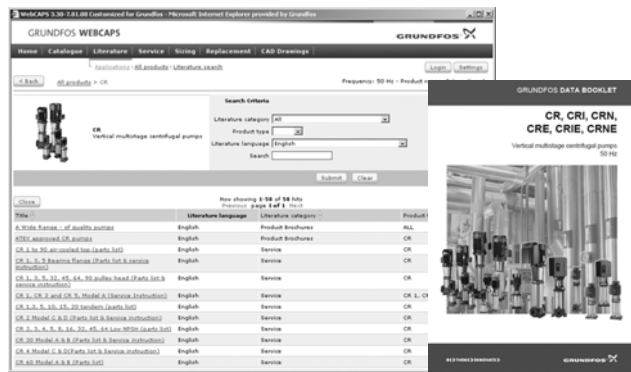
- Catalogue
- Literature
- Service
- Sizing
- Replacement
- CAD drawings.



Catalogue

Based on fields of application and pump types, this section contains the following:

- technical data
- curves (QH, Eta, P1, P2, etc.) which can be adapted to the density and viscosity of the pumped liquid and show the number of pumps in operation
- product photos
- dimensional drawings
- wiring diagrams
- quotation texts, etc.



Literature

This section contains all the latest documents of a given pump, such as

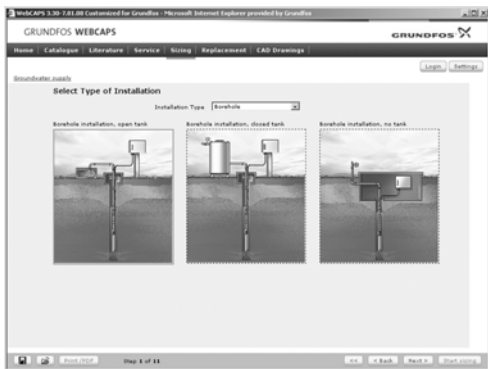
- data booklets
- installation and operating instructions
- service documentation, such as Service kit catalogue and Service kit instructions
- quick guides
- product brochures.



Service

This section contains an easy-to-use interactive service catalogue. Here you can find and identify service parts of both existing and discontinued Grundfos pumps.

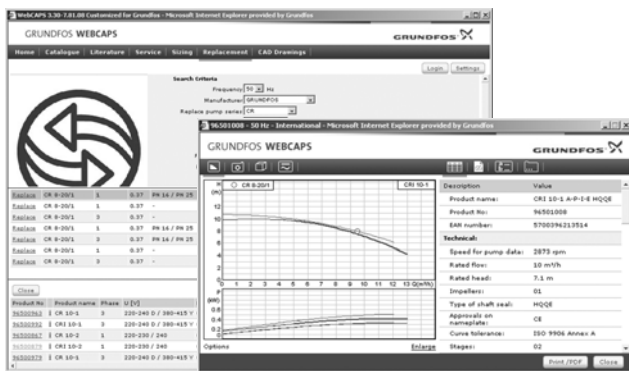
Furthermore, the section contains service videos showing you how to replace service parts.



Sizing

This section is based on different fields of application and installation examples and gives easy step-by-step instructions in how to size a product:

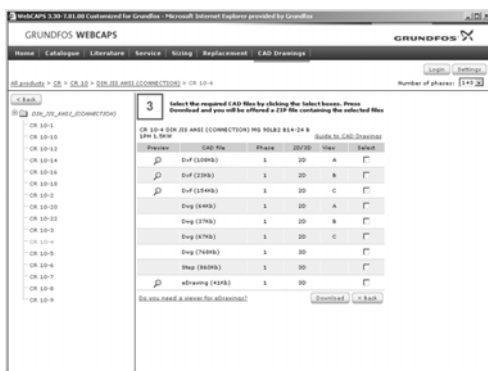
- Select the most suitable and efficient pump for your installation
- Carry out advanced calculations based on energy consumption, payback periods, load profiles, life cycle costs, etc.
- Analyse your selected pump via the built-in life cycle cost tool
- Determine the flow velocity in wastewater applications, etc.



Replacement

In this section you find a guide to selecting and comparing replacement data of an installed pump in order to replace the pump with a more efficient Grundfos pump. The section contains replacement data of a wide range of pumps produced by other manufacturers than Grundfos.

Based on an easy step-by-step guide, you can compare Grundfos pumps with the one you have installed on your site. When you have specified the installed pump, the guide will suggest a number of Grundfos pumps which can improve both comfort and efficiency.



CAD drawings

In this section, it is possible to download 2-dimensional (2D) and 3-dimensional (3D) CAD drawings of most Grundfos pumps.

These formats are available in WebCAPS:

- 2-dimensional drawings:
- .dxf, wireframe drawings
 - .dwg, wireframe drawings.
- 3-dimensional drawings:
- .dwg, wireframe drawings (without surfaces)
 - .stp, solid drawings (with surfaces)
 - .eprt, E-drawings.

WinCAPS



Fig. 15 WinCAPS CD-ROM

WinCAPS is a **Windows-based Computer Aided Product Selection** program containing detailed information on more than 220,000 Grundfos products in more than 30 languages.

The program contains the same features and functions as WebCAPS, but is an ideal solution if no internet connection is available.

WinCAPS is available on CD-ROM and updated once a year.

Subject to alterations.

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