



METALCHEM-WARSZAWA
SPÓŁKA AKCYJNA



PUMP FOR TRANSFORMER OIL
type CTR

USER MANUAL

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1. General rules

While using the pump one should comply with general requirements and safety rules.

The work parameters, type and all properties of the pumped liquid should correspond to the values specified in the table 1.

All changes and repairs during the warranty period can be carried out only by the producer or an authorised person entitled by him.

The producer is not responsible for the pump inappropriate work or damages if the pump is not operated, stored and maintained in accordance with the below mentioned rules.

All inquiries concerning the pump work should contain the following information in the pump's nameplate:

- pump type
- manufacturing number
- year of production.

2. Technical description

2.1. Application

The centrifugal pumps – type CTR are designed for pumping oil in the closed cooling circuits of electrical transformers. The pumps can be used in wide range of ambient temperatures: $-40 \div +40^{\circ}\text{C}$

2.2. Nominal parameters

The nominal work parameters of the pump for pumping oil through the transformer at the temperature of 80°C and density of 900 kg/m^3 are indicated in below:

Table 1

Descriptions	Designation	Unit of measure	Type of pump		
			CTR125-5,5	CTR125-5,5A	CTR100-3
1	2	3	4	5	6
Flow	Q	m^3/h	100	100	45
		dm^3/s	27,8	27,8	12,5
		dm^3/min	1666,7	1666,7	750
Head	H	m	12	8,0	13
Oil temperature	T	$^{\circ}\text{C}$	$-20 \div +80$	$-20 \div +80$	$-20 \div +80$
Pressure of suction	P_1	MPa	min. 0,02 max. 0,6	min. 0,02 max. 0,6	min. 0,02 max. 0,6
Motor power	P	kW	5,5	5,5	3,0
Rotation speed	n	min^{-1}	1450	1450	1415
Voltage	U	V	400	400	400
Rated current	I	A	10,9	10,9	6,5



2.3. *Pump design*

The pumps for transformer oil – type CTR – are of a glandless structure and they do not possess mechanical seals. The pump together with its motor is a hermetically closed monoblock. The main component parts are: the pump and the motor casing inside which there are impeller and its motor's rotor on their common shaft. The shaft is supported by anti-friction ball bearings. The system of holes and passages creates an inner circulation of the pumped oil which cools the motor, lubricates the bearings and reduces to minimum the axial forces on the bearings. The electrical supply to the terminal box of the motor is made through a compression cable gland. The space of the terminal box is separated from the space of the motor by a sealed terminal plate. The CTR pumps do not require an additional cooling of the motor. The motors have the ability to self-venting in the course of the pump's operation. If there is a necessity for deaeration of the pump before putting in operation (because of its pumping system), one should do it by using the deaerating plugs. Being both the cooling factor and the lubricating one the pump oil must absolutely pure. If there is any possibility of impurities in oil a filter unit must be installed in the inlet of the pump.

3. Transport and storage

The pump can be transported without packing provided that their suction and discharge stubs are blanked with pipe caps. In order to prepare the pump for transport or storage one should:

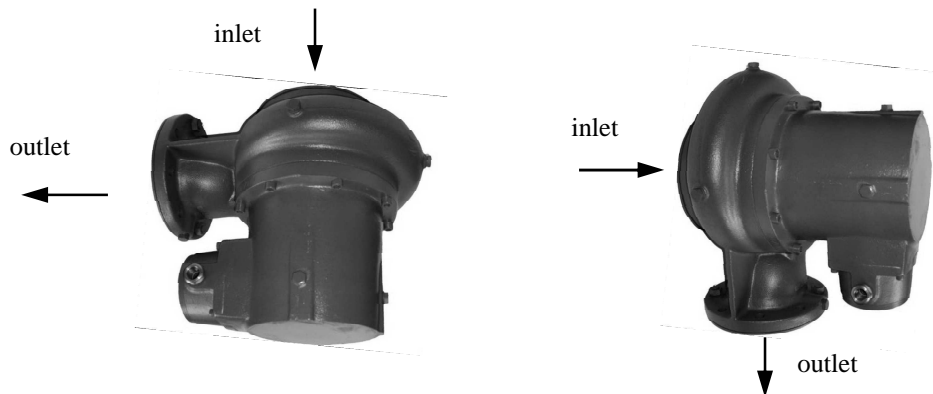
- dismantle the pump out of the pipeline,
- empty the pump,
- blank the pump's suction and discharge stubs.

Being transported, the pump must be protected from the possibility of movement, mechanical damages and impurities. The pumps should be stored in a dry store-room and protected from the impurities and damages.

4. Pump installation in a pipeline

The pump may be installed in a pipeline in an optional position provided that the pump's shaft is in a horizontal position and the pipeline diameter of inlet and outlet correspond to the diameters of the pump's stub. The pump should be installed in such a way so that it does not have to carry any outer dynamic, thermic or assembly load.

Pumps can be mounted in a horizontal position (horizontal pump shaft) or a vertical position provided inlet stub is up. It is unacceptable to install inlet suction pumps vertically or obliquely downwards.



Examples of acceptable pump positions

5. Wiring system.

The pump motors may be connected to a power network of the voltage indicated in the pump's nameplate. Motor is designed to direct start up with triangle arrangement. Motor connection should be done through the system of fuses which prevents the motor from overloading and in case of the lockout or any damage caused by the motor work at the phase decay.

The overload current fuse should be selected according to the nominal parameters indicated in the nameplate.

Note: Before connecting the power, one should check impedance of insulator between phases and as well between phase and earth. The impedance should be greater than $1M\Omega$.

6. Starting.

Before starting or after reinstallation of the pump, one should check:

- correctness of pump instalment in a pipeline,
- correctness of motor connection to a power source,
- correctness of earthing system or neutral earthing.
- correctness of rotation direction

The pump should be set into motion when valves of suction and pumping are open. In order to check the right direction of motor's rotations one should compare the manometer's indications of the pumping with the nominal pressure (head) of the pump which is indicated in table 1 at the closed valve of discharge branch.

When the pressure is lower than the nominal one or in case the pump's turbulent work, one should change the direction of the pump rotations and interchange the hot wires (phase conductors).



7. Routine inspections and repairs.

The pumps – type CTR, due to advanced design, do not require periodical maintenance inspections.

The inspection of the pump is only required when the pulsations, vibrations and noisy work of bearings appears. When there is a necessity of pump dismantling, one has to renew the rubber sealings.

8. Faults – possible causes and ways of removal

Malfunction	Possible causes	Remedy
Pump when you turn on the network does not work (Motor does not rotate)	No power supply	Restore power source
	Uszkodzony silnik	Oddać silnik do serwisu
	A damaged power cable	Check cable and repair
	Fuse blown	Check the cause. Switch on the fuse
The pump runs, but does not pump oil (motor rotates)	Wrong direction of rotation of the impeller	Check the direction according paragraph 6
	Excessive wear of impeller	Replace worn parts
	Improper voltage supply	Check the voltage and connect the supply line voltage complied with nameplate of the pump
The pump is noisy and / or drawing too much current	Pump bearings are worn or damaged	Have it service for repair
	Short circuit in one phase	Have the cable and motor checked and repaired by qualified electrician. Check the current in all phases. The same current means that motor is OK.
	Winding insulation damaged	Check the insulation by an inductor



9. Parts list

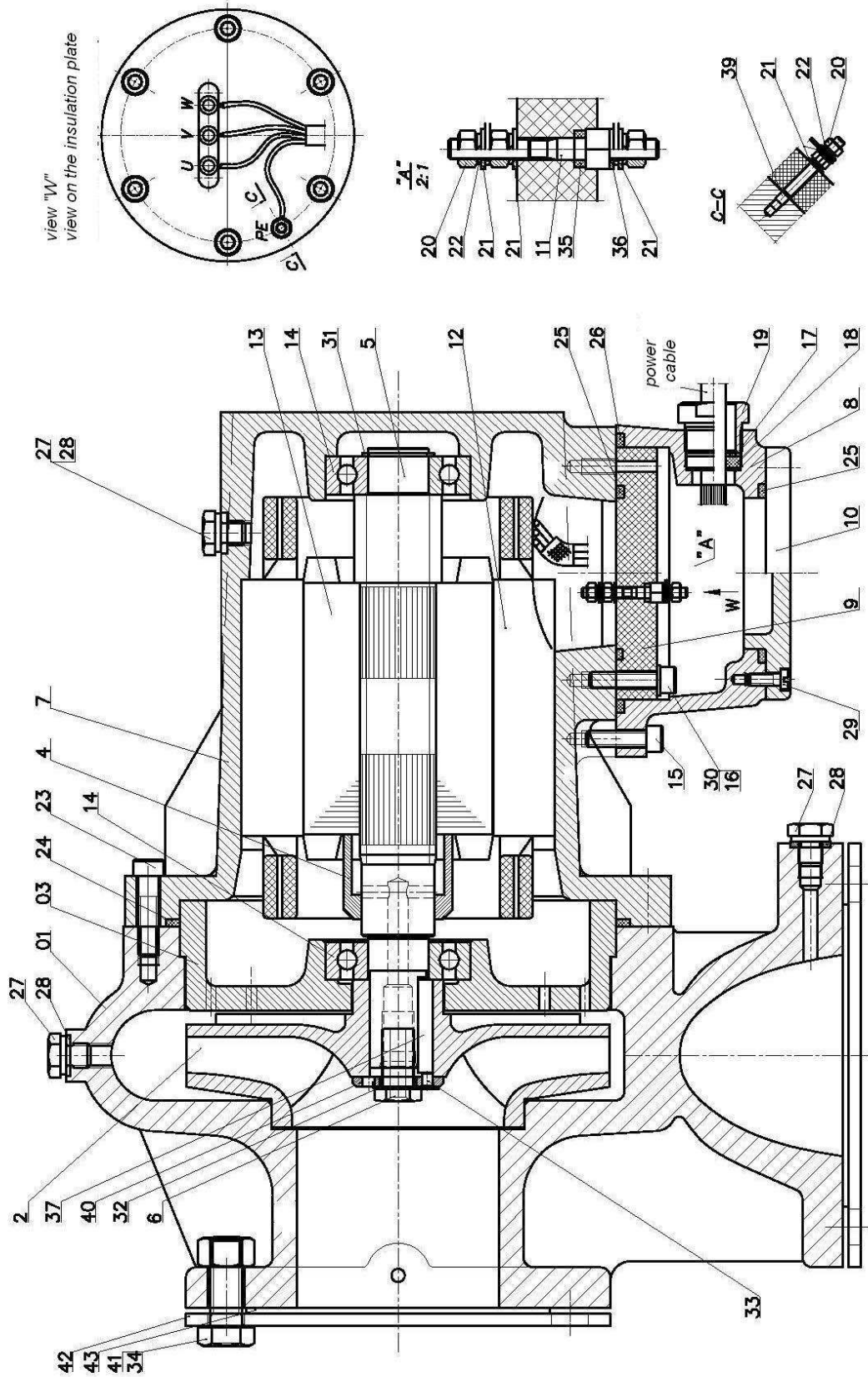
Part number	Nazwa części	Tails number	
		CTR 100-3	CTR 125-5,5
1.	Pump's casing	1	1
2.	Impeller	1	1
3.	Bearing housing	1	1
4.	Sleeve	1	1
5.	Shaft	1	1
6.	Screw	1	1
7.	Motor's housing	1	1
8.	Terminal box	1	1
9.	Insulation plate	1	1
10.	Cover	1	1
11.	Pin	6	6
12.	Stator winding	1	1
13.	Rotor	1	1
14.	Ballbearing 6306	2	-
	Ballbearing 6307	-	2
15.	Screw M8x30	6	6
16.	Screw M8x35	6	6
17.	Cable gland + seal	1	1
18.			
19.			
20.	Nut M5	12	12
21.	Washer	12	12
22.	Spring washer	12	12
23.	Screw M10x40	8	-
	Screw M12x40	-	8
24.	O-ring	1	1
25.	O-ring	2	2
26.	O-ring	1	1
27.	Plug M12x1,5	8	8
28.	Gasket	8	8
29.	Bolt	4	4
30.	Washer	6	6
31.	Spring ring	1	1
32.	Star washer	1	1
33.	Pin	1	1
34.	Screw M16x45	8	16
35.	O-ring	3	3
36.	Connector	3	3
37.	Key	1	1
38.	Nameplate	1	1
39.	Stud M5x35	1	1
40.	Washer	1	1
41.	Nut M16	8	16
42.	End cap	2	2
43.	Sealing	2	2

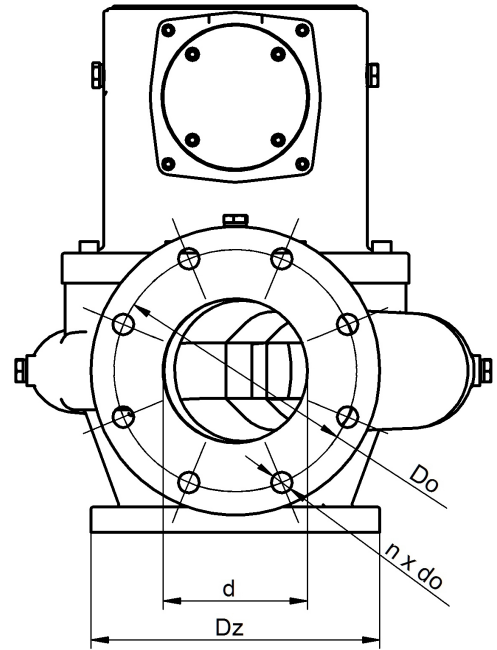
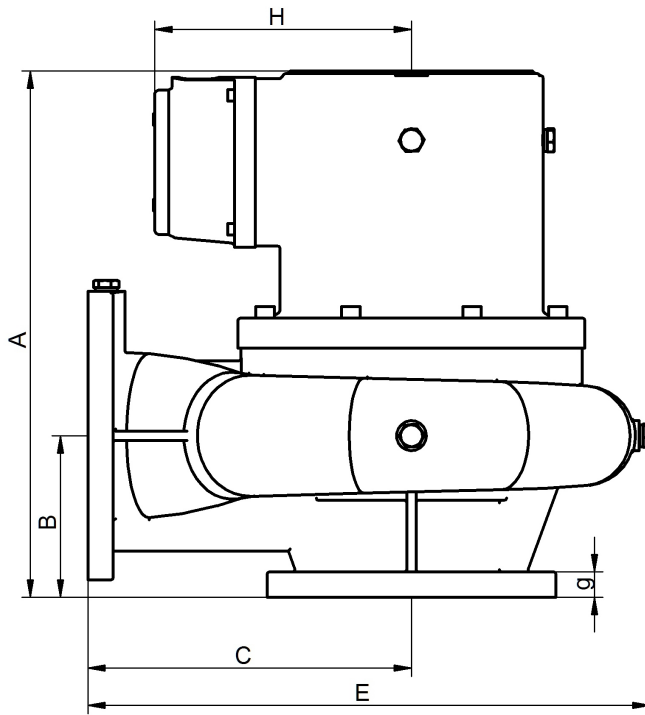
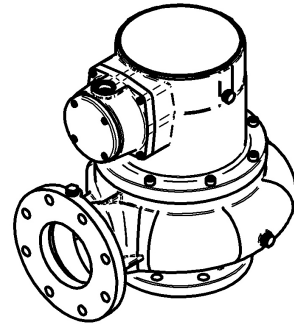
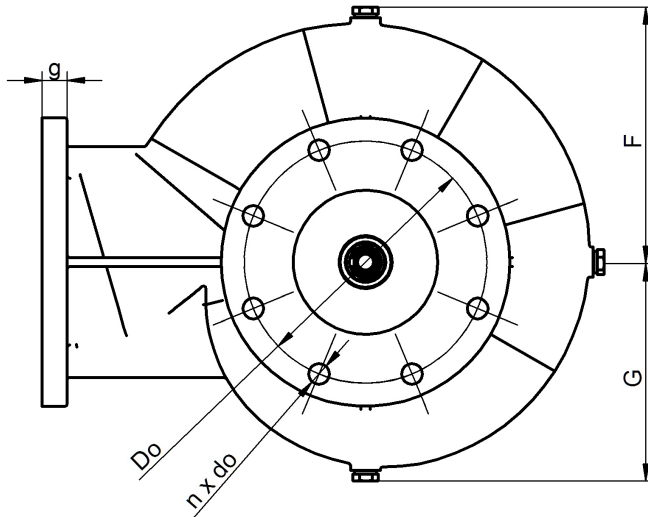


10. Assembly drawing

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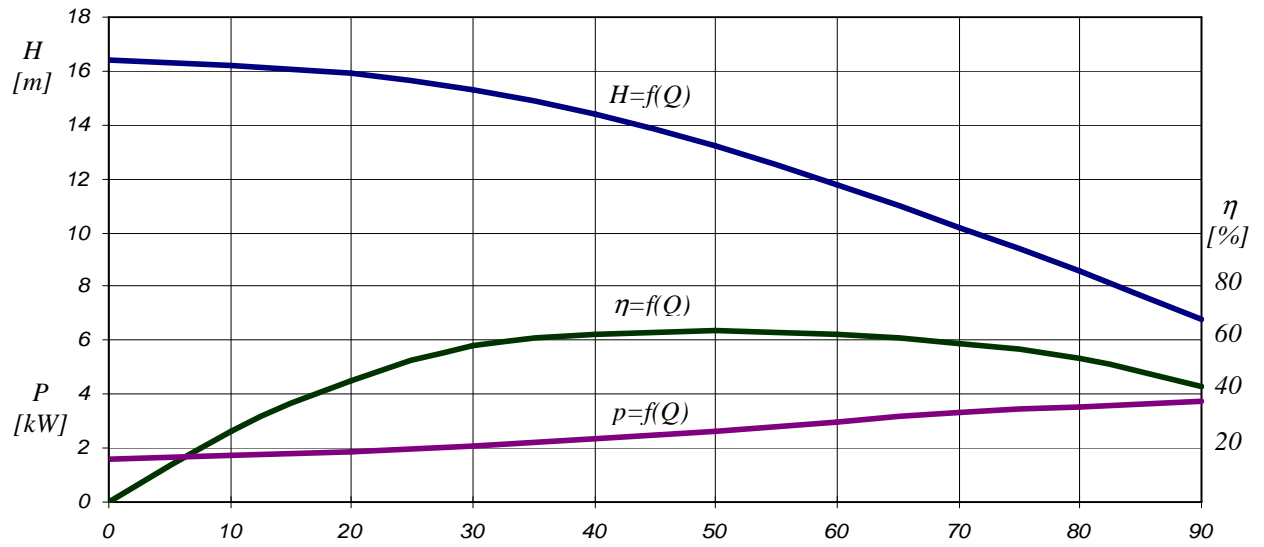




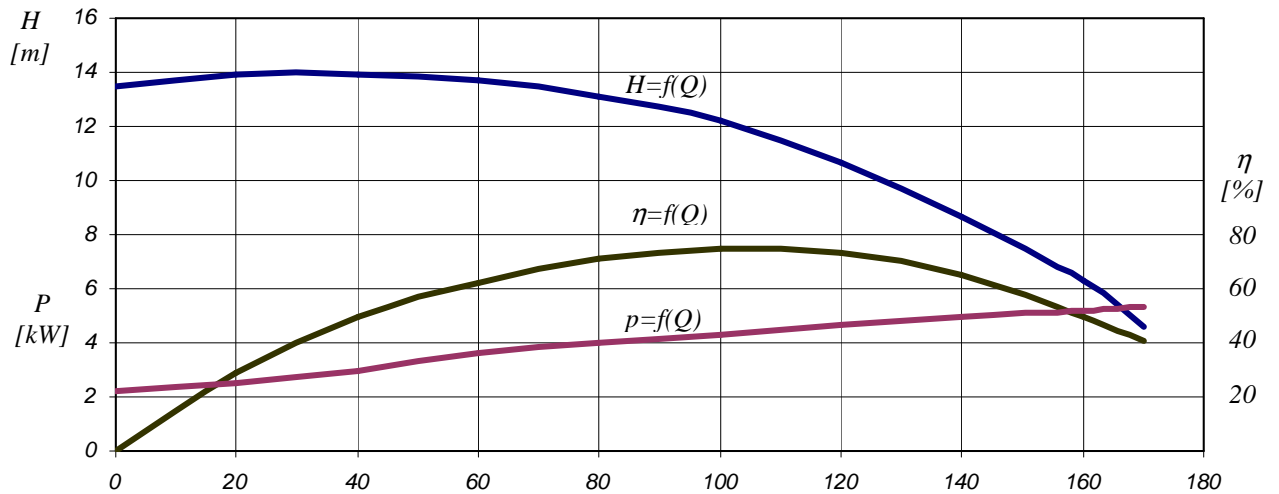
Dim. Pump type	Main dimensions in mm							Flange connections in mm						Weight kg
	A	B	C	E	F	G	H	d	Dz	Do	g	do	n	
CTR 125-5,5	470	140	280	480	220	190	222	125	250	210	22	18	8	112
CTR100-3	460	125	220	390	180	150	194	100	210	180	20	18	8	90



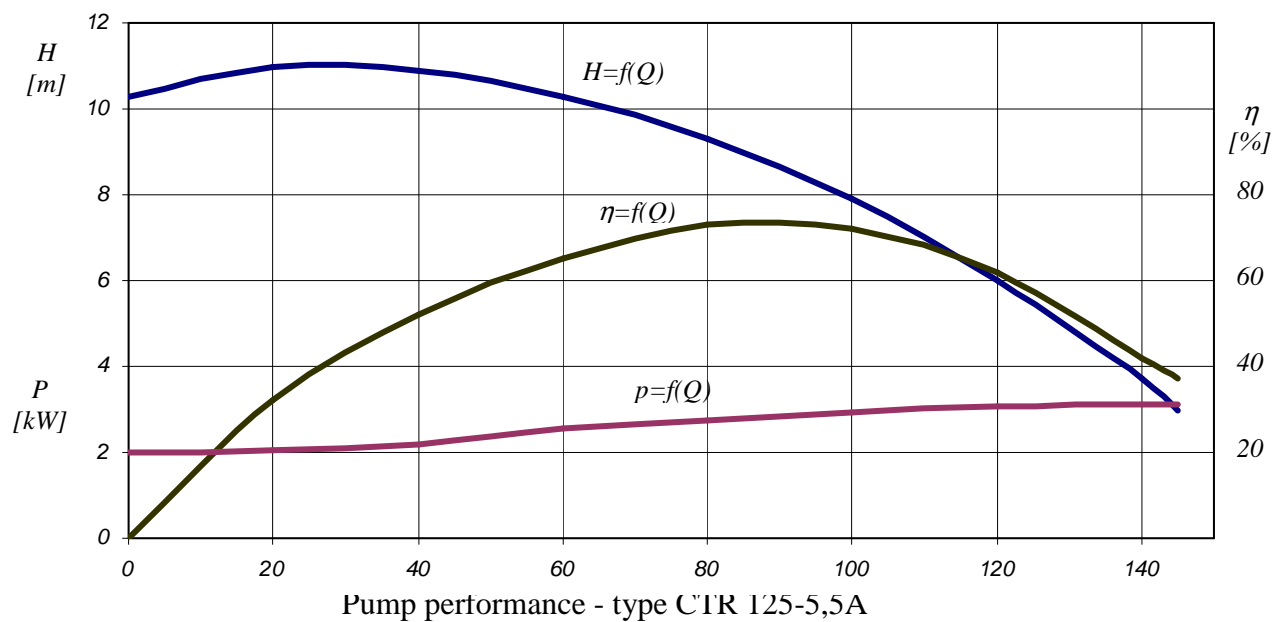
12. Performance curves



Pump performance - type CTR 100-3



Pump performance - type CTR 125-5,5



Pump performance - type CTR 125-5,5A