Hydro EN

Grundfos firefighting systems

GRUNDFOS

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1. System introduction

System description

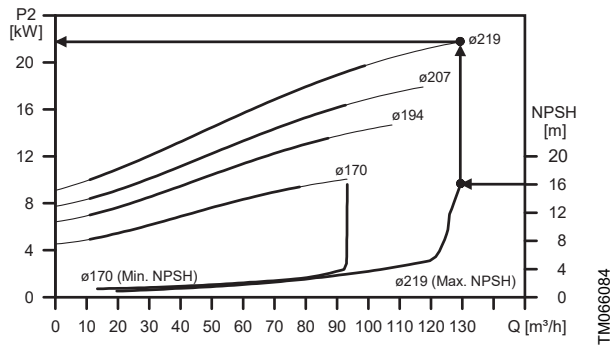
The Hydro EN system is designed for automatic sprinkler systems and in compliance with the following standard:

- EN 12845 - Fixed firefighting systems - Automatic sprinkler systems - Design, installation and maintenance.

The system is compact, robust, modular and supplied in pre-assembled blocks to make transport, handling and installation easier.

The pumps are of the back pull-out design, enabling removal of the coupling, bearing bracket and impeller without moving the motor, pump housing or pipes.

The shape of the QH curve is stable. The motors or engines deliver, as minimum, the required power up to the flow rate corresponding to the NPSHr value which is 16 m.



Size criteria for the motor and engine

The diesel engine makes it possible to operate continuously at full load with a continuous power rating in compliance with the ISO 3046 standard.

The diesel pump is cooled in one of the following ways:

- with direct air.
- with water/water heat exchanger.

  This solution provides adequate operation that is as unrestricted as possible by the heat elimination conditions of the technical control room.

The fuel tank is sized to ensure at least 6 hours of continuous operation and is equipped with a containment basin and vent connection.

All systems supplied are factory-tested. In addition, the diesel pumps are supplied with a factory test report as required by the EN 12845 standard.

The range consists of the following types:

- S version: One or two duty pumps operated by an electric motor.
- Y version: Two duty pumps. One pump is operated by an electric motor and the other pump is operated by a diesel engine.
- T version: One or two duty pumps operated by a diesel engine.

The systems described above include the following:

- One jockey electric pump controlled by an operating panel. The jockey pump, complete with a 24-litre tank, restores the system pressure in case of small leaks.
- An independent operating panel for each duty pump with operating and control buttons. Two pressure switches for each duty pump which are hydraulically connected to each other with a manifold of 15 mm in diameter.
- A pressure switch on each duty pump to detect the actual pressure supplied.
- Connection for the priming circuit and connection for the recirculation circuit to prevent overheating of the pump when running against closed valves.

As required by the EN 12845 standard, the periodic system performance check must be carried out by the installer of the firefighting system or by qualified persons. The activities performed must be documented in a dedicated register kept in the building.

The system is equipped with the necessary instrumentation to simplify the operations during tests and commissioning.

The following accessories can be provided:

- A suction kit dedicated for installation in suction lift or in positive head conditions, including an eccentric divergent pipe with a controlled taper, a vacuum pressure gauge and an isolating valve (not included in the version for installation in suction lift conditions). All accessories are sized according to the prescriptions of the standard.
- A testing kit including a flowmeter, valves and straight pipe sections to get the optimum flow rate reading.

An industrial silencer is supplied as standard for diesel systems.

Applications

The system is designed for operation with clean water and for automatic sprinkler systems such as single, superior single, duplicate or combined water supply sources.

The system covers the following performance range: flow rate up to 650 m^3/h and head up to 140 m for each duty pump. Contact Grundfos for performance values in excess of the range described in this data booklet.

Variants

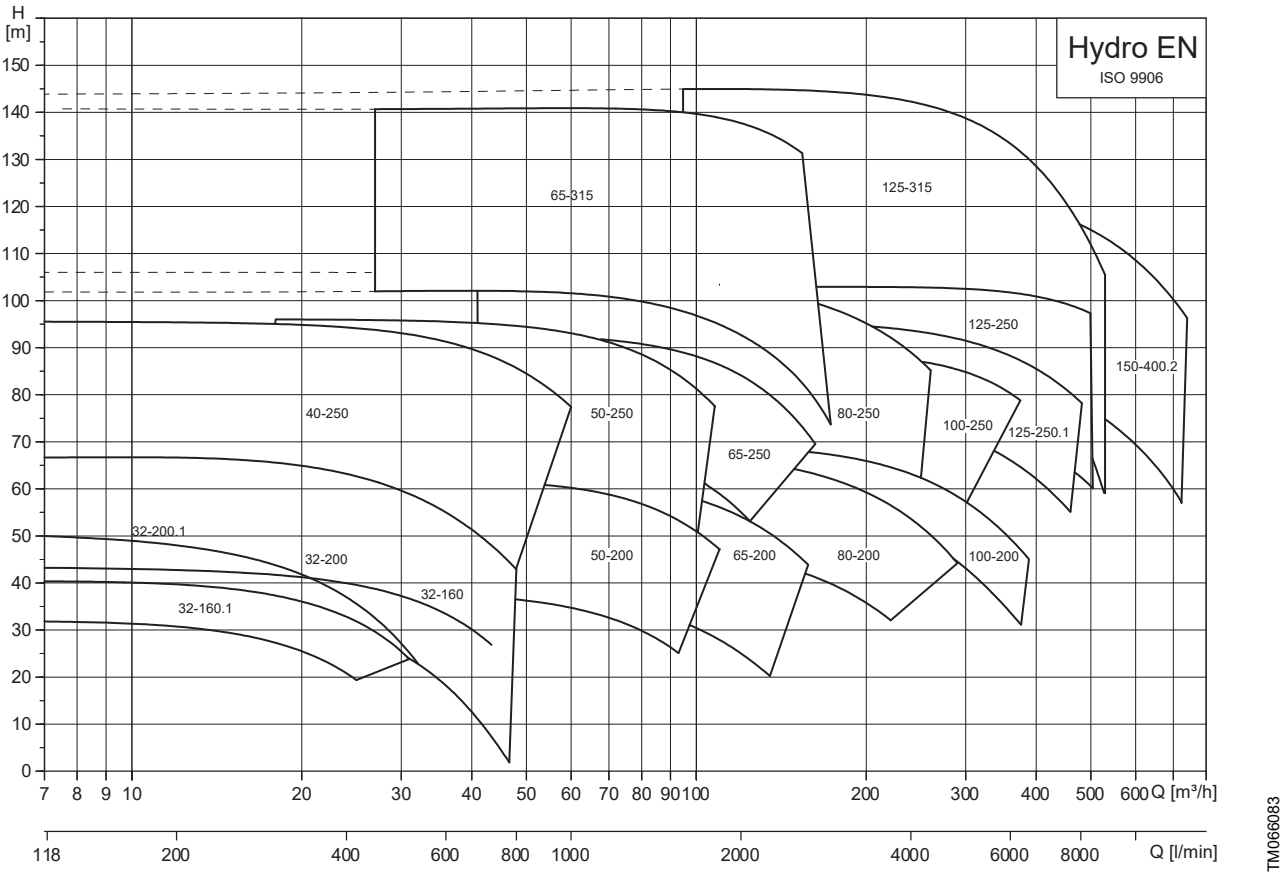
The following versions are available upon request:

- 1 electric pump, 2 duty diesel pumps and 1 jockey electric pump
- 3 duty electric pumps and 1 jockey electric pump
- 3 duty diesel pumps and 1 jockey electric pump
- with performance values in excess of the range described in this data booklet
- IP55 panels.

Contact Grundfos to define versions not listed above or for accessories not listed in the equipment described in this data booklet.

2. System data

Performance range



Type key

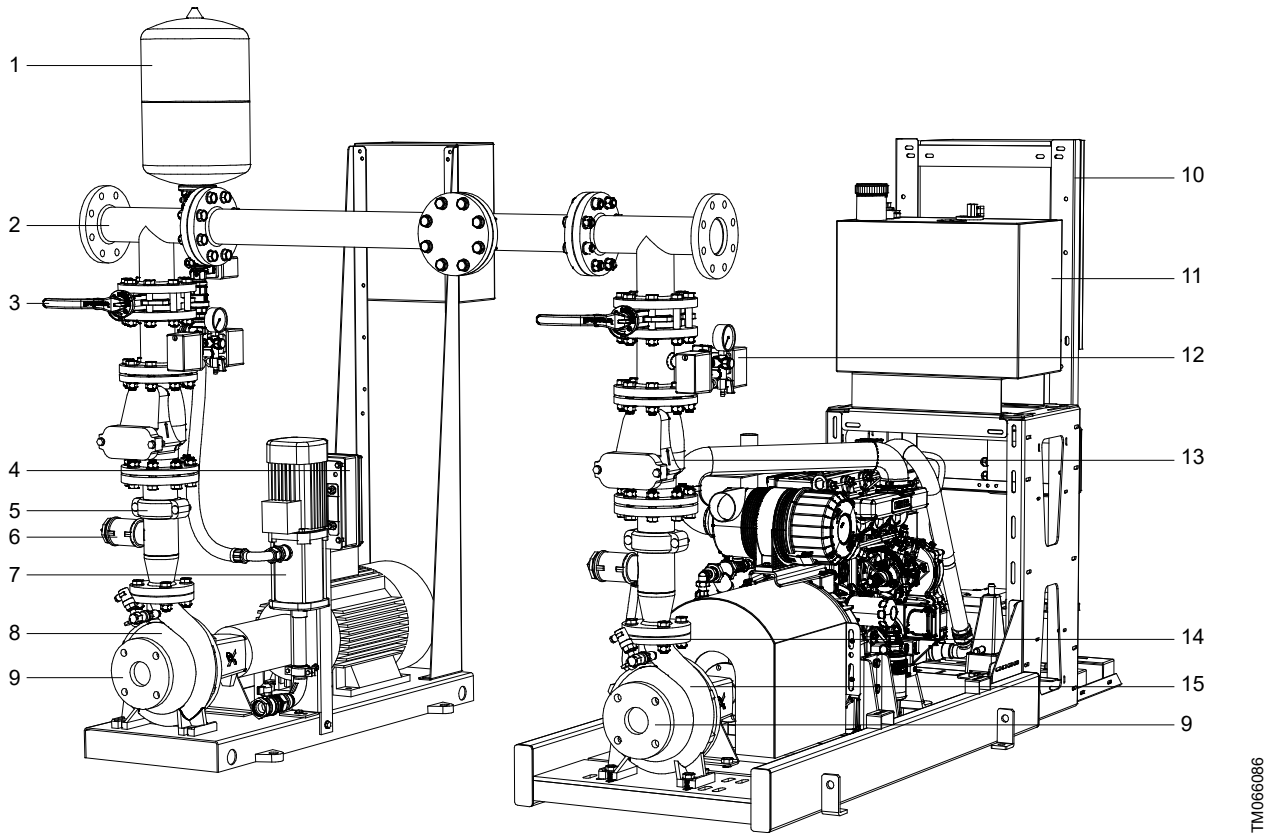
Example: Hydro EN 50-250/263-Y JS A SD-U3-B-X

Code	Explanation	Designation
Hydro EN		System type
50-250/263	Example: NKF 50-250 impeller ∅263	Pump type
-Y	S1: One duty electric pump (100 %) S2: One duty electric pump and one standby electric pump (100 % + 100 %) S3: Two duty electric pumps and one standby electric pump (50 % + 50 % + 50 %) T1: One duty diesel pump (100 %) T2: One duty diesel pump and one standby diesel pump (100 % + 100 %) T3: Two duty diesel pumps and one standby diesel pump (50 % + 50 % + 50 %) Y: One duty electric pump and one standby diesel pump (100 % + 100 %) Y1: Two duty electric pumps and one standby diesel pump (50 % + 50 % + 50 %) Y2: One duty electric pump, one duty diesel pump and one standby diesel pump (50 % + 50 % + 50 %)	Configuration
JS	JS: With a standard jockey pump JV: With a customised jockey pump (on request) NJ: Without a jockey pump (on request)	Jockey pump
A	A: Standard B: IP55 N: Without control cabinet X: Special execution control cabinet	Control cabinet
SD	DL: Direct-on-line SD: Star-delta	Starting method
-U3	U1: 3 × 400 V, 50 Hz duty electric pump (or standby pump) - 3 × 400 V, 50 Hz jockey electric pump U2: 1 × 220 V, 50 Hz duty diesel pump (or standby pump) - 3 × 400 V, 50 Hz jockey electric pump U3: 3 × 400 V, 50 Hz duty electric pump (or standby pump) - 1 × 220 V, 50 Hz duty diesel pump (or standby pump) - 3 × 400 V, 50 Hz jockey electric pump	Mains supply
-B	A: Direct air with fan B: Water/water heat exchanger	Diesel engine cooling, if present
-X	X: Other versions based on customer specifications (on request)	Other versions

3. Construction

The following drawing shows the standard configuration of the system.

In the order, you can define any changes or adaptations to specific needs and any integration of optional components and/or accessories not listed in our standard equipment described in this data booklet.



Example of Hydro EN -Y configuration

Pos.	Description
1	Diaphragm pressure tank, 24 litre (included)
2	Outlet manifold
3	Isolating valve
4	Control cabinet of the jockey pump
5	Grooved coupling
6	Connection to priming circuit
7	Jockey pump
8	Duty electric pump with spacer coupling
9	Independent inlet for pumps
10	Control cabinet of the standby diesel pump
11	Fuel tank sized to ensure at least 6 hours of continuous operation, complete with containment basin
12	Starting circuit complete with two pressure switches and a pressure gauge according to the EN12845 standard
13	Non-return valve
14	Pressure sensor to detect pump operation
15	Standby diesel pump with cardan shaft coupling

The modular construction concept of the Hydro EN range makes transport, handling and positioning at the place of installation easier. All systems are supplied in blocks which are usually split as below:

- a base plate for the duty pump, the jockey pump and the relevant control cabinets with brackets and hydraulic components, in the case of systems with two duty pumps
- a second base plate for the second standby pump and the control cabinet with brackets and hydraulic components.

The arrangement of the parts provides immediate reading of the measurement instruments and signals, making the operations during commissioning and periodic checks of the system easier.

Pump description

Grundfos, world leader in the development and manufacturing of pumping solutions, has designed and produced a range of pumps for firefighting applications in full compliance with the EN 12845 standard.

The duty pumps are of the flanged single impeller, centrifugal NKF type with horizontal axis and volute casing, axial inlet port and radial delivery port with flanges compliant with the EN 1092-2 standard.

All pumps are dynamically balanced to prevent unbalancing of the rotating masses and to ensure their reliability and durability.

The duty pumps are made in class PN 16 and therefore for a pressure of 1.6 MPa (16 bar).

The maximum inlet pressure allowed is equal to the difference between 16 bar and the maximum head of the specific model.

The pumps are suitable for operation with clean, non-dense, non-explosive liquids that contain neither solids nor fibres and are mechanically or chemically non-aggressive for the pump.

The mechanical seal has standard dimensions compliant with the DIN 24960 standard and is of the Grundfos BAQE type.

These pumps have proven their high level of reliability and durability over time - fundamentally important features for this type of application - thanks to the carefully chosen materials, high-precision manufacturing techniques, PN 16 construction, cataphoresis treatment and the dynamic balancing of the rotating masses.

Jockey pumps

The jockey pump is either a Grundfos CM or Grundfos CR series.

The jockey pump is multistage centrifugal pumps, not self-priming, with direct-start motors.

The jockey pump is installed to avoid unnecessary starting of the duty pump and to maintain the system pressure in case of small leakages.

The performance of the jockey pump does not contribute to the calculation of the nominal flow of the system. According to the standard description, the performance of the jockey pump must not be sufficient to supply a single sprinkler.

Duty electric pumps

The duty electric pumps are built as back pull-out and are driven by an electric motor capable of delivering at least the power required for the flow rate corresponding to the NPSHr value equal to 16 m.

The pump is coupled to the motor via a spacer coupling so that the pump and motor can be removed independently in order for you to perform maintenance on the parts inside the pump without having to remove the inlet or outlet pipes.

Pump performance is compliant with the ISO 9906:2012 - Grade 2B standard. The characteristic curve QH is stable.

Duty diesel pumps

The duty diesel pumps are driven by a diesel engine capable of delivering at least the power required for the flow rate corresponding to the NPSHr value equal to 16 m.

The diesel engines are able to operate continuously at full load. The delivered power is chosen from the continuous power curve (ICN, ICFN, ICXN or NA) according to the ISO 3046 standard and can supply, as minimum, the power required by the pump at the flow rate corresponding to the NPSHr value of 16 m.

The pump is coupled to the diesel engine via a cardan shaft so that the pump and the engine can be removed independently in order for you to perform maintenance on the parts inside the pump without having to remove the inlet or outlet pipes.

The fuel tank complete with containment basin and connection for the vent pipe is sized to ensure at least 6 hours of operation.

The starting of the diesel engine is guaranteed by two 12 V DC batteries that are constantly charged by two battery chargers.

The battery charger is electronically controlled to achieve consistent and calibrated performance to ensure maximum effectiveness and extended battery life.

The automatic and manual starting systems are independent and use four separate power relays.

The starting of the diesel engines requires an automatic sequence of six alternating attempts, each lasting from 5 to 10 seconds with a maximum pause of 10 seconds, on the two batteries.

Automatic battery changeover is made at every starting attempt and an automatic cut-out of the inefficient battery improves system reliability.

The exhaust silencer is included in the scope of supply, either integrated or loose for mounting during installation. In the latter case, a flexible pipe is supplied to ease the connection between the silencer and the exhaust manifold of the diesel engine.

In compliance with the requirements of the standard, all diesel pumps are factory-tested and accompanied by a test report.

Hydraulic components

The hydraulic components are selected and sized to minimise pressure losses and water speed in compliance with the requirements of the EN 12845 standard, at any flow rate value stated on the performance curve.

The following components are placed on the outlet side of each duty and standby pump:

- A concentric divergent pipe with controlled taper mounted on the outlet side of the pump inclusive connection for the recirculation circuit to prevent overheating of the pump when operated against closed valves.
- A grooved coupling of the flexible type that allows not to transfer any tensions deriving from misalignments of the outlet pipes to the pump.
- A non-return valve.
- An isolating valve of the butterfly type with a lockable handle and status indicator. Operation is by a handwheel with gearbox for sizes higher than DN 100.
- A 1/2" drain valve on the outlet side of the pump according to the EN 12845 standard.
- A starting device complete with two starting pressure switches, a glycerine bath manometer with 16 bar full scale, an isolating valve and a bypass with a non-return valve and a drain valve. The operating mode requires two pressure switches for each pump that are connected so that each one can provide automatic start, while stopping is manual.
- A 1" connection for the sprinkler circuit of the technical control room.
- A pressure switch on the outlet side to detect that the pump is delivering pressure.
- A flanged outlet manifold for the connection to the system and the testing kit.

The jockey pump is equipped with the following components:

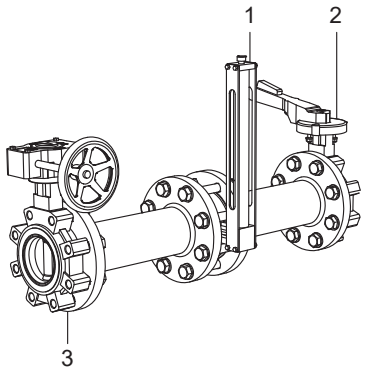
- a connection for priming
- a 1" non-return valve on the outlet side
- two isolating valves of the ball type with lever operation, one on the outlet side (1") and one on inlet side (1 1/4")
- a pressure switch for starting and stopping the pump
- a diaphragm tank for optimal jockey pump operation.

Accessories can be provided to complete the supply, including the following:

- A suction kit for positive head or suction head installation including an eccentric divergent pipe with controlled taper, a vacuum pressure gauge, an isolating valve on the pipe connection side. All accessories are sized according to the requirements stated in the EN 12845 standard. You can choose the suction kit that is best suited for the type of installation that you want.
- A testing kit including a flowmeter, adjustment valves and spacers to get optimum flow rate reading.

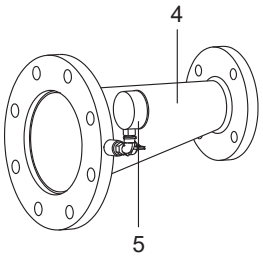
Accessories

The following accessories are available on request:



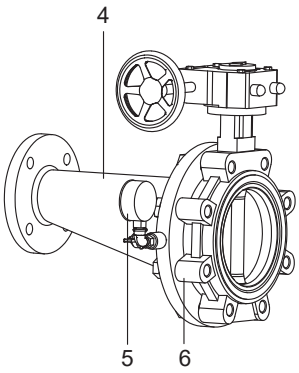
TM066087

Test kit



TM066089

Suction kit, suction lift installation



TM066088

Suction kit, positive head installation

Pos.	Description
1	Flowmeter
2	Isolating valve
3	Adjustment valve
4	Eccentric cone with controlled taper
5	Vacuum pressure gauge
6	Isolating valve

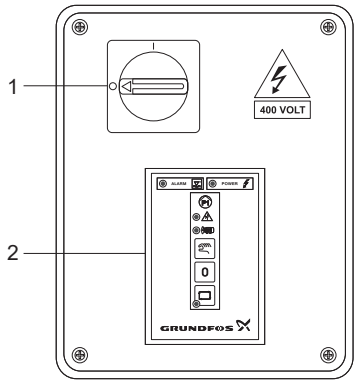
Operating panel

Operating panel for the jockey pump

The jockey pump is controlled by a dedicated panel that automatically manages the operation of the pump based on the state in a low-voltage powered pressure switch, isolated from the network by a transformer.

The starting method of the electric motor is direct-on-line (DL).

A lockable general door-lock disconnector allows safe maintenance.



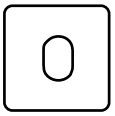
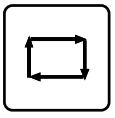
Operating panel for the jockey pump

The operating panel includes the following components and functions available in the door:

Pos.	Description
1	Door-lock disconnector (lockable)
2	Control interface

The control interface has the following luminous indications and actuation keys:

- LED - power supply present
- LED - pump running
- LED - automatic operating mode active
- LED - intervention of thermal protection
- LED - Intervention of protection against dry running.

	Manual **START** button (unstable condition)
	**STOP** button
	Button to enable automatic operation By pressing this button, the pump starts and stops according to the pressure switch setting.

Signalling outputs (potential-free contacts) for jockey pump

For the supervision of the jockey pump, the outputs listed below are provided:

Signalling	Description
Pump in operation	Start of the jockey pump Closed contact indicates that the pump is running.
General alarm (cumulative)	Thermal protection tripping, protection against dry-running, power supply failure, non-automatic operating mode, an excessive number of close start-ups, prolonged operation. Closed contact indicates an alarm.

Contact type: AC1, potential-free relay contacts.

Maximum voltage: 115 V.

Maximum current: 2 A.

Modbus communication

The operating panel is equipped with a communication interface for Modbus RTU networks; therefore it can be integrated into a supervision system. Through an appropriate configuration, it is possible to remotely view all the information available in the panel, including the status of the LEDs and all the alarms.

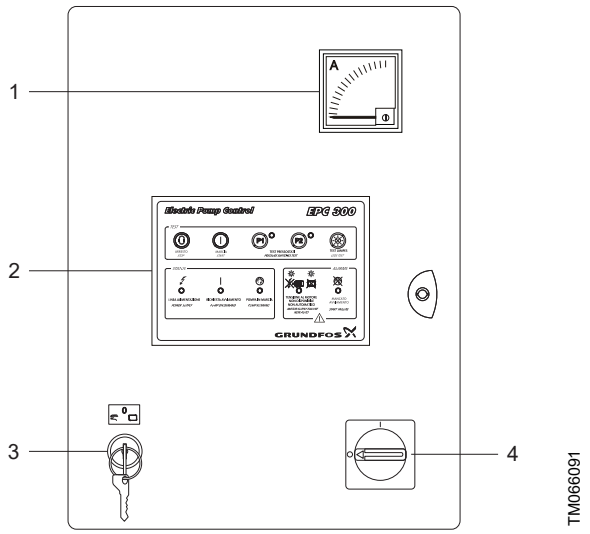
Operating panel for the duty electric pump

The duty electric pumps are controlled by an independent operating panel which provides easy reading of the measurement instruments and signals from a single observation point.

The starting of the electric motors is available as standard in the following configurations:

- direct-on-line, DL, for powers up to 30 kW
- star-delta, SD, for powers from 37 kW and higher.

To ensure greater safety for operators, the control pressure switch is powered by low voltage isolated from the mains by a transformer.



Operating panel for the electric pump

The panel includes the following components and functions available in the door:

Pos.	Description
1	Ammeter
2	EPC 300 control unit with buttons and warning lights
3	TEST-0-AUT operating mode selector with a removable key in AUT position
4	Main switch, pad lockable

The user interface of the EPC 300 control unit shows the following signal lights and operating buttons:

I	Manual **START** button
0	Manual **STOP** button
	TEST LEDs button When pressed, all the LEDs light up and a dedicated signalling output is activated.
P1	**P1** and **P2** buttons For starting the test of the independent pressure switches
P2	

Additionally, the control unit also shows the following signals:

- power not available or wrong sequence phase connection, LED
- pump on demand, LED
- pump running, LED
- no voltage to the motor (permanently-on light), automatic operating mode disabled (flashing light), LED
- start failure, LED.

Signalling outputs (potential-free contacts) for duty electric pump

The outputs listed below in accordance with the EN 12845 standard are provided for supervising the system from a control room:

Signalling	Description
Electric mains	Mains voltage is missing.
Motor voltage, or non-automatic operating mode	These outputs can indicate one of the following conditions: • There is no voltage to the motor when the pump is requested to start. • The operating mode selector is positioned on **TEST** or **0** (the group is not ready to start if requested).
Starting request	Request for starting the electric pump.
Pump in operation	The electric pump is in operation (two outputs are available, one used to start up the fan of the room ventilation system when the pump is in operation.)
Failure to start	The pump did not start on request.

Contact type: AC1, potential-free relay contacts.

Maximum voltage: 115 V.

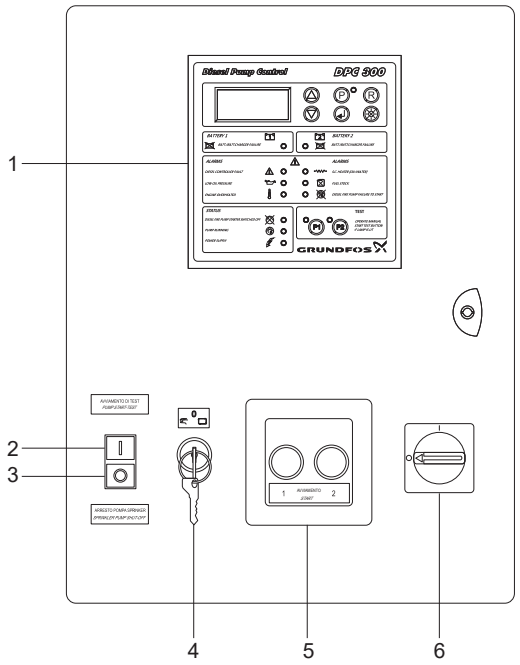
Maximum current: 2 A.

Modbus communication

The operating panel is equipped with a communication interface for Modbus RTU networks; therefore it can be integrated into a supervision system. Through an appropriate configuration, it is possible to remotely view all the information available in the panel, including the status of the LEDs and all the alarms.

Operating panel for the duty diesel pump

The duty diesel pump is controlled by an independent operating panel which provides easy reading of the measurement instruments and signals from a single observation point.



Operating panel for the diesel pump

The panel includes the following components and functions available in the door:

Pos.	Description
1	DPC 300 control unit with buttons, warning lights and LCD multifunction display
2	Engine test start button
3	Manual engine stop button
4	TEST-0-AUT operating mode selector, with removable key in AUT position
5	Manual engine start button using battery 1 or 2, protected by breakable glass
6	Main switch, pad lockable

The control interface has a backlit LCD display, so you can read it even when the room lighting is poor. By means of the light signals, the system status is always under control.

The indications and their functions are divided as follows.

The LCD display has eight parameters in simultaneous reading:

- engine status or speed with the engine running
- status of the operating mode selector
- operation hour counter
- engine temperature
- oil pressure
- diesel fuel level
- battery 1 voltage
- battery 2 voltage.

In the case of an alarm, the description of the alarm is displayed instead of the battery voltage.

Programming area

- Parameter selection button
- programming button
- confirmation button
- reset button
- LED operation check button.

Battery 1:

- battery charger failure (flashing LED) or battery failure (LED is permanently on).

Battery 2:

- battery charger failure (flashing LED) or battery failure (LED is permanently on).

Alarm indication area

- Operating panel failure
- low oil pressure
- high engine temperature
- short circuit of oil or water pre-heating system
- diesel reserve
- engine start failure.

Status area

- Automatic start disabled
- pump in operation
- mains present.

Test area

- Button for pressure switch 1: test and operation check of the emergency starting circuit
- Button for pressure switch 2: test and operation check of the emergency starting circuit.

Two independent battery chargers and all the electromechanical components needed are housed inside the cabinet.

Signalling outputs (potential-free contacts) for duty diesel pump

The operating panel of the diesel pump can be connected with remote devices such as, for example, the Grundfos remote acoustic-visual alarm.

The operating panel has the following relay outputs available on the terminal board. For detailed information, refer to the wiring diagram of the operating panel.

Relay outputs	Description
Pump in operation	The closing of the contact indicates the actual start of the diesel pump. Two outputs are available: one can be used to start the fan of the room ventilation system when the pump is in operation.
General alarm (cumulative)	The closing of the contact indicates the intervention of one of the following alarm conditions: battery charger failure, over- or under-voltage batteries, mains power failure, low oil pressure, high engine temperature, start failure, operating mode selector not in automatic position, fuel reserve, oil/water heater.
Failure to start	The closing of the contact indicates the engine start failure after six unsuccessful attempts.
Operating mode not in automatic	The closing of the contact indicates the alarm generated by the operating mode selector set in **0** or **TEST** position. The diesel pump is not ready to start in case of request.
Operating panel failure	The closing of the contact indicates that the DPC 300 control unit does not work properly.
AUX Programmable contact [1)]	This output contact can be set to indicate one of the following three conditions (not cumulative): • fuel reserve • battery charger failure, over-voltage or under-voltage • power failure • pre-heating system protection alarm.

1) This contact is not available on the terminal board, but must be connected on the DPC 300. Refer to the wiring diagram for cabling.

Contact type: AC1, potential-free relay contacts.

Maximum voltage: 115 V.

Maximum current: 2 A.

Modbus communication

The operating panel is equipped with a communication interface for Modbus RTU networks; therefore it can be integrated into a supervision system. Through an appropriate configuration, it is possible to remotely view all the information available in the panel, including the status of the LEDs and all the alarms.

4. Installation

The criteria for installing firefighting systems is described in the EN 12845 standards. Refer to this standard and to all the applicable local standards for all the necessary guidelines.

In order for the system to perform efficiently, it is important that the inlet pipes comply with the criteria listed in the EN 12845 standard regarding the water speed in the pipes:

- 1.8 m/s for positive head installation
- 1.5 m/s for suction lift installation.

We recommend that you select a suction kit according to the type of installation. The suction kit is available on request.

The requirements of the EN 12845 standard regarding the installation type are summarised below.

Positive head installation

To be in accordance with the EN 12845 standard, you must install the firefighting system in positive head and according to the following conditions:

- At least two-thirds of the water reserve must be above the level of the duty pump axis.
- The minimum water level in the inlet tank is no more than 2 metres below the level of the pump axis.
- You must install a foot valve if the axis of the duty pump is above the minimum level of the water to be sucked.

Suction lift installation

You can install the firefighting system in the suction lift as long as the following conditions are met:

- The minimum water level in the inlet tank must be no more than 3.2 metres below the level of the pump axis.
- You must install a foot valve in the lowest point of the inlet pipe.

5. Operation

Operating conditions

Installation	Indoors, waterproof room, protected against freezing
Installation level	Electric pumps: up to 1000 m above sea level Diesel pumps: up to 300 m above sea level
Performance	See the specific curve of the model. Performance according to ISO 9906.
Nominal pressure	Components and materials PN 16
Fluid pumped	Solid- and fibre-free clean water
Water temperature	0-40 °C
Ambient temperature	4-40 °C Minimum 10 °C for diesel pumps
Suction capacity	According to specific performance of the model chosen
Maximum inlet pressure	The maximum inlet pressure is linked to the maximum shut-off pressure delivered by the pump, which means that the sum of the inlet pressure with the shut-off pressure must be less than the nominal pressure of the pump. In case of water-cooled diesel pumps, the max inlet pressure is 2 bar.
Electric power	According to specific performance of the model chosen.
Starting method	Direct-on-line up to 30 kW Star-delta starting from 37 kW
Power supply	3 × 400 V, 50 Hz for electric pumps 1 × 230 V, 50 Hz. Imax = 4 A for diesel pumps

Operating modes

The jockey pump starts and stops automatically, ensuring pressurisation of the firefighting system in case of leaks and preventing unjustified starting of the duty pumps.

When the network pressure drops, the first duty pump is started automatically by the pressure switches (two redundant). If present on the system, the second duty pump is activated automatically if the network pressure drops further.

You can only stop the duty pumps manually by pressing the button on the front door of the control cabinet.

The standard scope of supply always includes an adjustable timer to automatically shut down the duty pump. You can activate the function (disabled from factory) during commissioning if necessary and if the relevant norm in place allows to do so.

Specific selectors allow you to start and stop every single pump at any time. This is useful also for the commissioning and the periodic operation check.

Starting the motors and engines

The starting of the electric motors is available as standard in the following configurations:

- direct-on-line, DL, for powers up to 30 kW
- star-delta, SD, for powers from 37 kW and higher.

You start the diesel engines with two direct-current batteries, which are constantly charged.

An electronic circuit allows alternate use of the two batteries alternating at every startup and automatic cut-out of the battery if it is inefficient.

Remote signals

According to the requirements of the EN 12845 standard, you must connect a remote alarm unit to the operating panel of the duty pumps to monitor the status of the system. The alarm unit, complete with visual and acoustic signal, must be installed in a permanently attended room.

For this reason, the operating panels of the duty pumps have the following outputs available on the terminal block.

Operating panel of the electric pump:

- electric motor powered
- pump starting request
- pump running (two outputs)
- start failure
- mains power not available
- automatic mode off.

Operating panel of the diesel pump:

- automatic mode off
- diesel engine start failure
- pump running (two outputs)
- control panel failure
- general alarm (see sections dedicated to the operating panel).

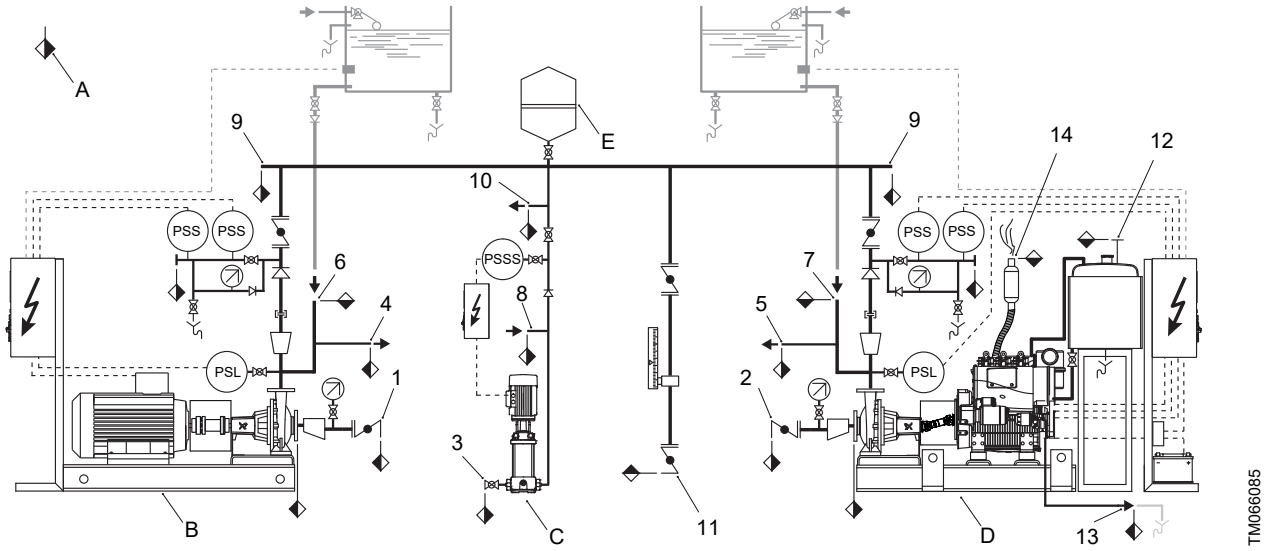
Operating panel of the jockey pump:

- pump running
- general alarm (see sections dedicated to the operating panel).

Modbus interface

All operating panels, thanks to a communication interface for Modbus RTU networks, can be easily integrated into a supervision system. Through an appropriate configuration it is possible to remotely view all the information available in the panel, including the status of the LEDs and all the alarms.

6. Functional diagram



Functional diagram

Pos.	Connection/description
1	Independent inlet connection for the duty electric pump
2	Independent inlet connection for the standby diesel pump
3	Inlet connection for the jockey pump
4	Recirculation circuit connection for the duty or standby electric pump
5	Recirculation circuit connection for the duty or standby diesel pump with direct air cooling
6	Priming circuit connection for the duty or standby electric pump
7	Priming circuit connection for the duty or standby diesel pump
8	Priming circuit connection for the jockey pump
9	System outlet connection
10	Connection for technical room sprinkler
11	Test circuit outlet
12	Diesel tank vent
13	Cooling circuit outlet with water/water heat exchanger, if present
14	Diesel engine exhaust gas outlet
A	Scope of supply limits
B	Duty electric pump
C	Jockey pump
D	Standby diesel pump
E	Diaphragm pressure tank

Symbol	Description
	Non-return valve
	Ball valve

Symbol	Description
	Butterfly valve
	Concentric divergent
	Eccentric divergent
[=]	Grooved coupling
	Flowmeter
PSS	Pressure switch
	Pressure gauge
	Diaphragm pressure tank
	Control cabinet
	Drain connection
	Power and signal connections
	Main and auxiliary flow pipes

7. Selection

Before choosing the system, check the requirements and specifications of the equipment designer, the prescriptions of the authorities and local regulations, the implications regarding the place and method of installation, etc.

To assess the effect of the installation conditions on the performance provided, proceed as follows when selecting the pump model for the system.

1. Use the above-mentioned values to choose the system.
2. Use a part of the generated flow as a continuous flow to prevent overheating when the pump operates against a closed valve or to feed the heat exchanger to cool the diesel engine, if available.
3. Add this flow rate to the design flow rate to make the selection.
4. The outlet pressure is influenced by the installation conditions:
   - Suction lift installation: Deduct the height in metres between the level of the pump axis and the minimum water level in the inlet tank from the head values specified in the tables.
   - Positive head installation: Add the height in metres between the level of the pump axis and the minimum water level in the inlet tank to the head values specified in the tables.
5. Deduct the friction losses in the inlet line (foot valve, pipes, curves, etc.), calculated at the design flow rate, from the head value.
6. Respect the minimum condition NPSHd ≥ NPSHr +1 [m] including the suction head and the suction head losses that has to be evaluated by the designer. You find the NPSHr value in the performance curve section.

Cooling flow

As specified in the EN 12845 standard, you must install a device on the system that meets the following purposes:

- prevents overheating when the pump operates against closed valves
- supplies the water/water heat exchanger for diesel engine cooling, if available.

See the performance curves and technical data for more information about the minimum flow rate values which are necessary to meet the purposes listed above.

Motors and types of starting

The motors deliver, as minimum, the required power up to the flow rate corresponding to the NPSH value which is 16 m.

The electrical data refer to single duty electric pumps.

In the standard version, the starting method of the electric motor is direct, DL, for powers up to 30 kW, and star-delta, SD, for powers from 37 kW and higher.

Type of water supply

The systems are designed for water supplies where each duty pump must deliver the following:

- 100 % of the specified performance if there are one or two pumps installed. The second duty pump is considered as a standby pump.
- 50 % of the specified performance if there are three pumps installed. The third duty pump is considered as a standby pump. The three-pump version is available on request.

According to the EN 12845 standard, when more than one pump is installed in a superior or duplicate water supply, only one pump must be driven by an electric motor.

8. Performance curves and technical data

How to read the data and curves

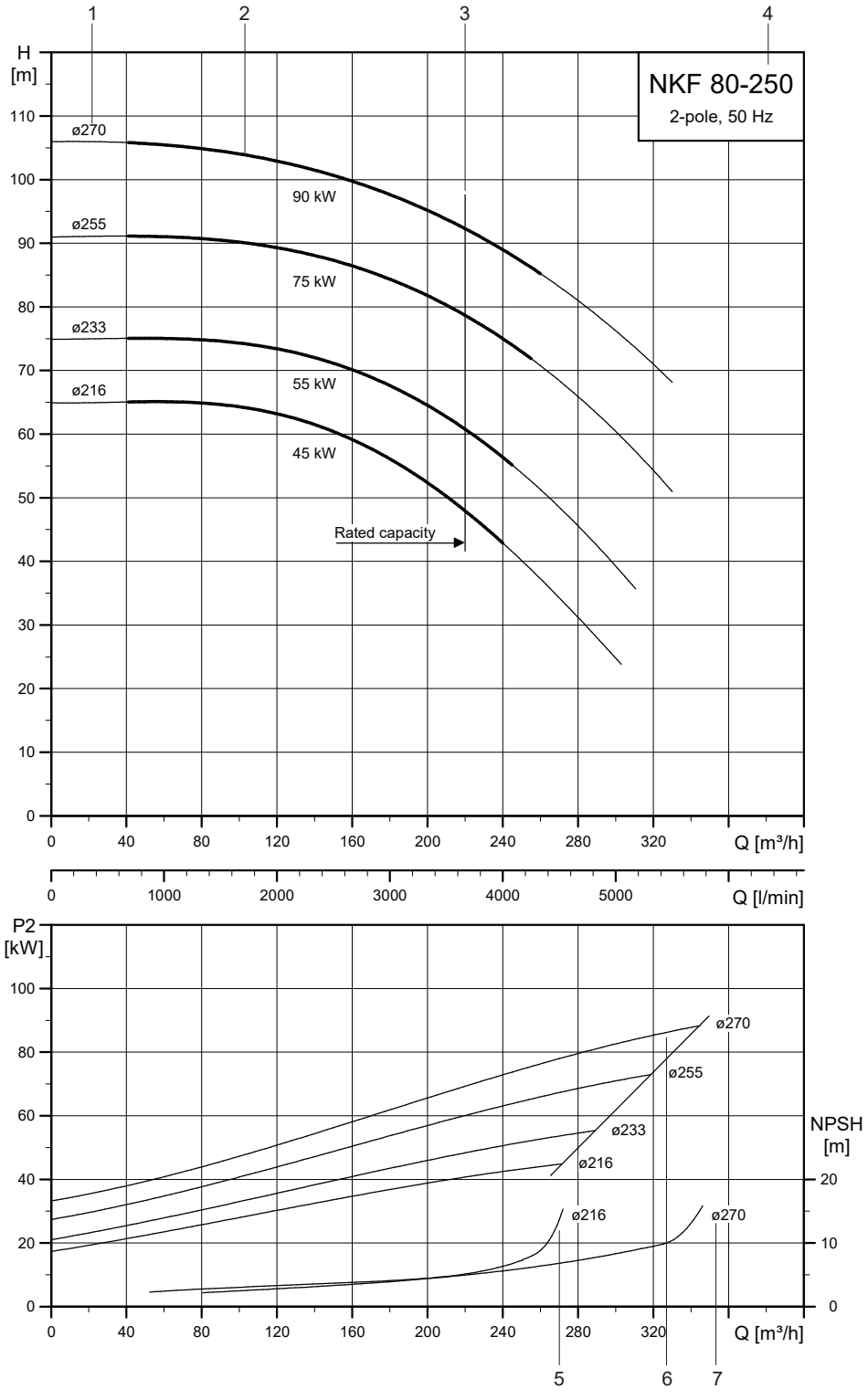
The complete performance curves and the technical data for each pump are shown in the specific charts below the curves for easy selection.

The values shown can be used entirely, and the last point is not the end of the curve.

In any case, check that the standard condition is met when choosing the pump for the actual installation:

NPSHd ≥ NPSHr +1 [m].

Performance curve tables

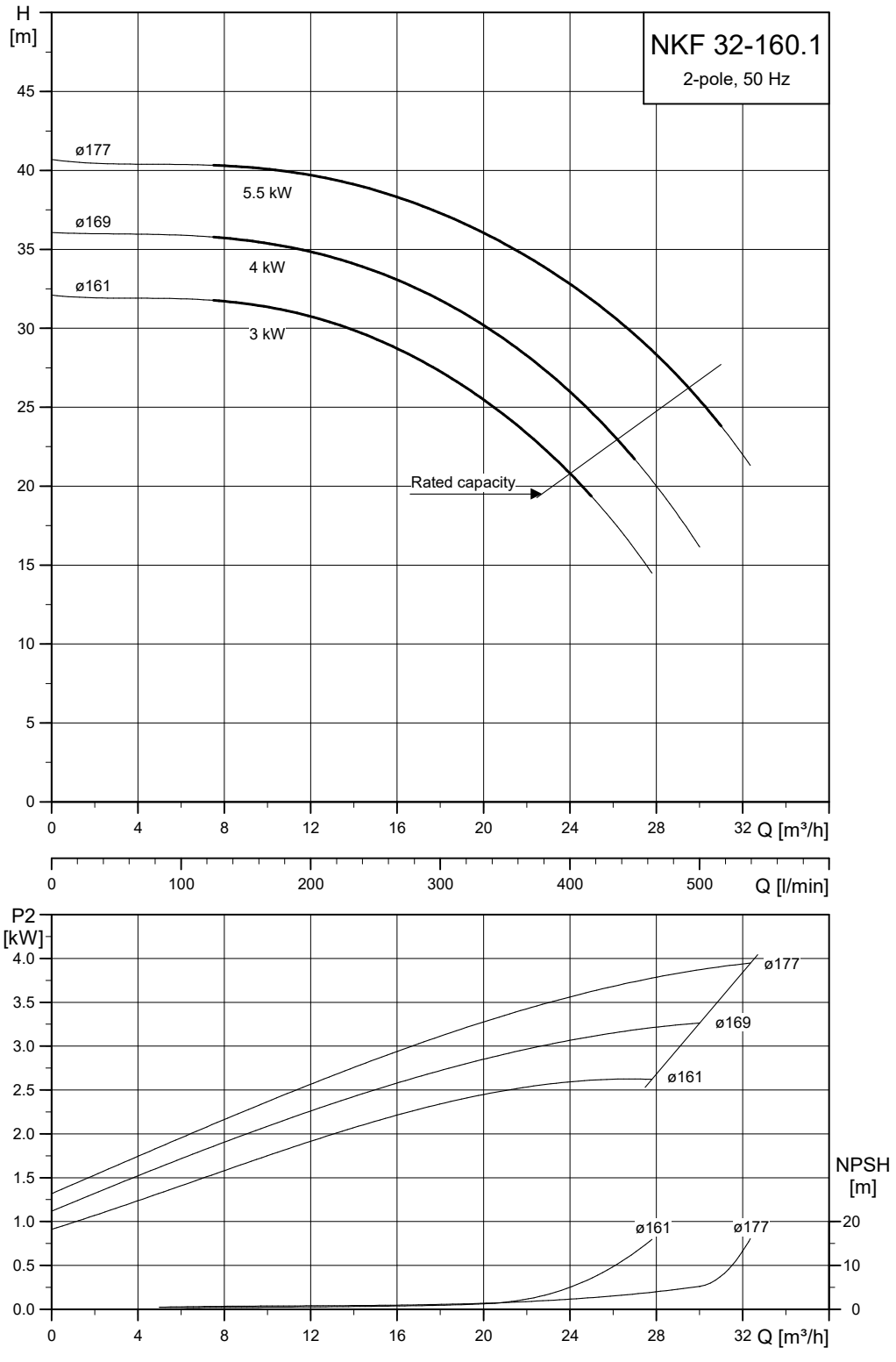


Hydro EN model	Electric pump				Diesel pump			Jockey pump			Q [m³/h] v.s. H [m]										
	P [kW]	$I_{1/1}$ [A]	Q_{min} [m³/h]	Na(Nb) [kW]	Q_{min} [m³/h]	Cooling system	Version	P [kW]	$I_{1/1}$ [A]	0	9	12	15	18	21	23	25	27	29	31
32-160.1/161	3	5.6	0.5	4.1 (4.5)	0.5	○	CM 3-6	0.65	1.8	32	32	31	29	27	24	22	19	16	-	-
32-160.1/169	4	7	0.5	4.1 (4.5)	0.5	○	CM 3-7	1.1	2.72	36	36	35	34	32	29	27	25	22	18	-
32-160.1/177	5.5	10	0.5	4.1 (4.5)	0.5	○	CM 3-7	1.1	2.72	41	40	40	39	37	35	34	32	30	27	24

TM066104

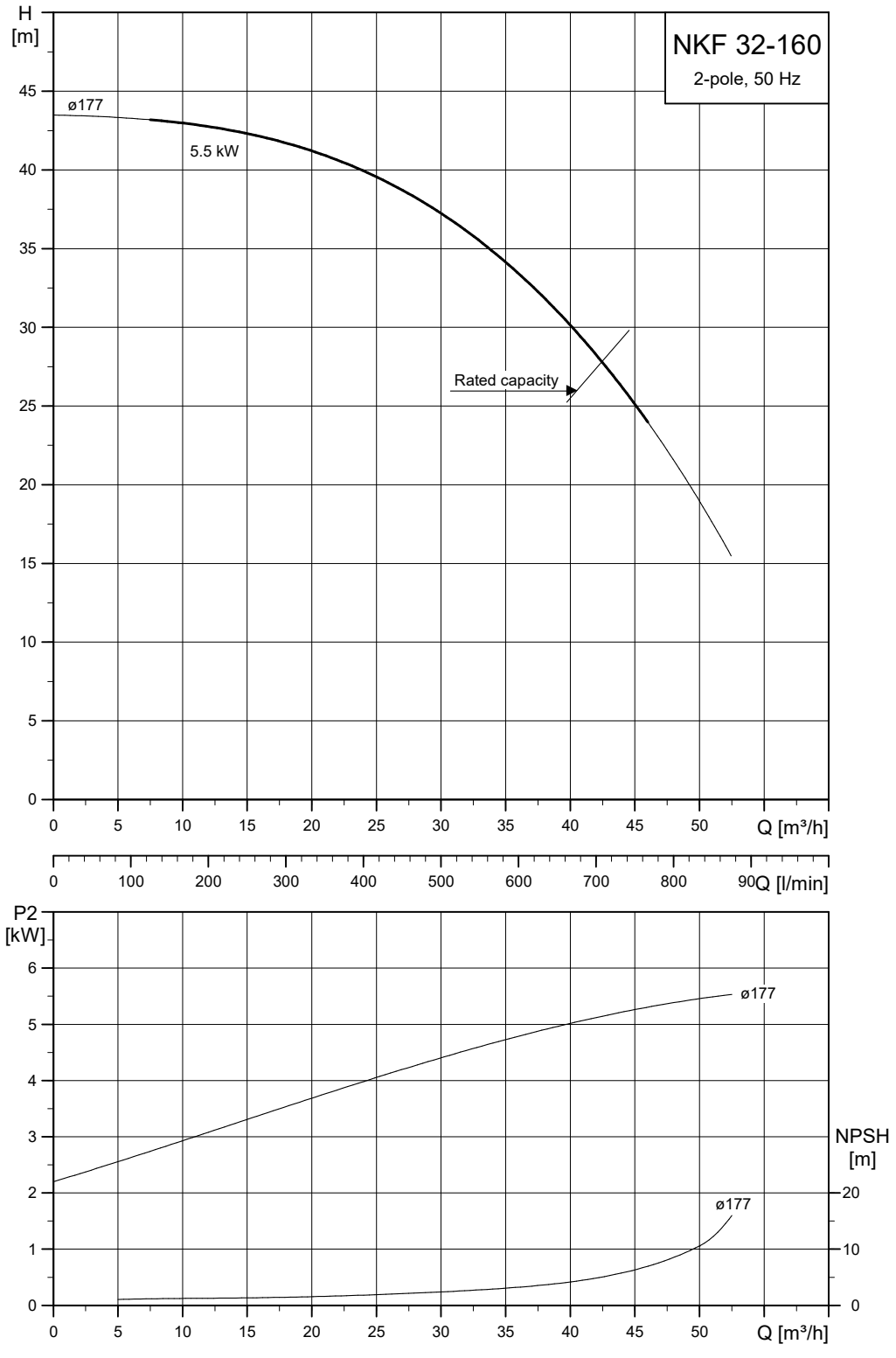
Pos.	Description
1	Indicates the diameter in mm of the impeller installed in the duty pumps.
2	The bold part of the curve indicates the performance, QH, where the speed of the water in the hydraulic components of the system is in compliance with the standard requirements. Contact Grundfos for information regarding performance outside the bold part of the curve.
3	Indicates the limit of 5 m of NPSHr.
4	Indicates the size of the pump.
5	NPSHr curve extended up to 16 m regarding the minimum impeller diameter in this pump.
6	Power curve [P2].
7	NPSHr curve extended up to 16 m regarding the maximum impeller diameter in this pump.
8	System model.
9	Power of the electric motor installed on the duty electric pump, if available.
10	Rated current of the electric motor installed on the duty electric pump, if available.
11	Flow rate of the recirculation circuit installed on the duty electric pump.
12	Rated power of the diesel engine compliant with the ISO 3046 standard. Na: continuous nominal power. Nb: discontinuous nominal power.
13	In the case of systems equipped with air-cooled engines, it indicates the flow rate of the recirculation circuit on the duty diesel pump. In the case of liquid-cooled engines, the number indicates the cooling flow rate of the diesel engine. It also acts as recirculation for the pump coupled to the diesel engine.
14	Cooling system used by the diesel engine, if available: ❍: direct air-cooled engine ●: liquid-cooled engine by a water/water heat exchanger.
15	The model of the installed jockey pump.
16	Power of the electric motor installed on the jockey electric pump.
17	Rated current of the electric motor installed on the jockey electric pump.
18	Head v.s. flow.

Hydro EN 32-160.1



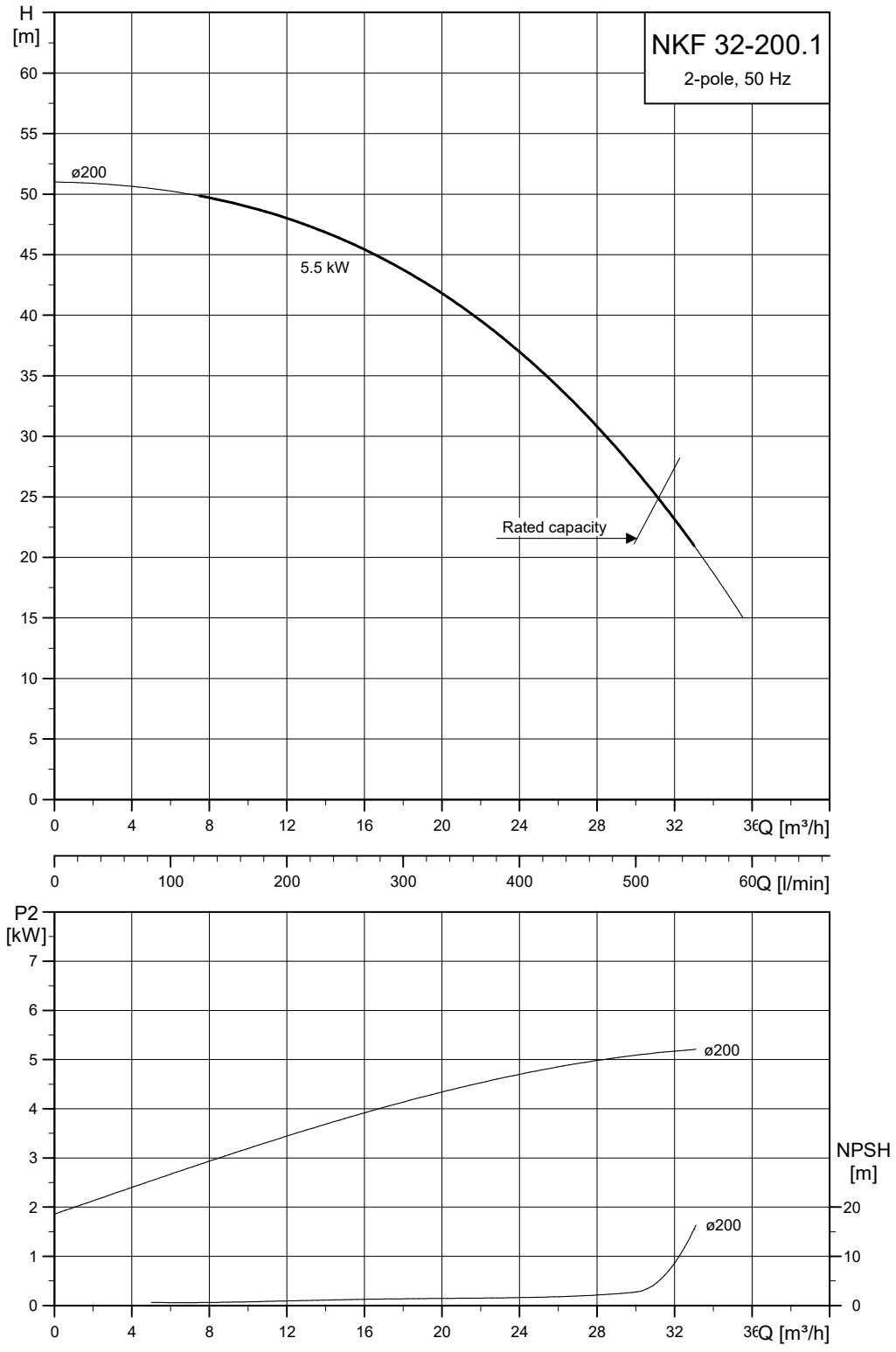
Hydro EN model	Electric pump			Diesel pump			Jockey pump			Q [m³/h] v.s. H [m]										
	P [kW]	$I_{1/1}$ [A]	Q_{min} [m³/h]	Na (Nb) [kW]	Q_{min} [m³/h]	Cooling system	Version	P [kW]	$I_{1/1}$ [A]	0	9	12	15	18	21	23	25	27	29	31
32-160.1/161	3	5.6	0.5	6.5 (7.2)	0.5	❍	CM 3-6	0.65	1.8	32	32	31	29	27	24	22	19	16	-	-
32-160.1/169	4	7	0.5	6.5 (7.2)	0.5	❍	CM 3-7	1.1	2.72	36	36	35	34	32	29	27	25	22	18	-
32-160.1/177	5.5	10	0.5	6.5 (7.2)	0.5	❍	CM 3-7	1.1	2.72	41	40	40	39	37	35	34	32	30	27	24

Hydro EN 32-160



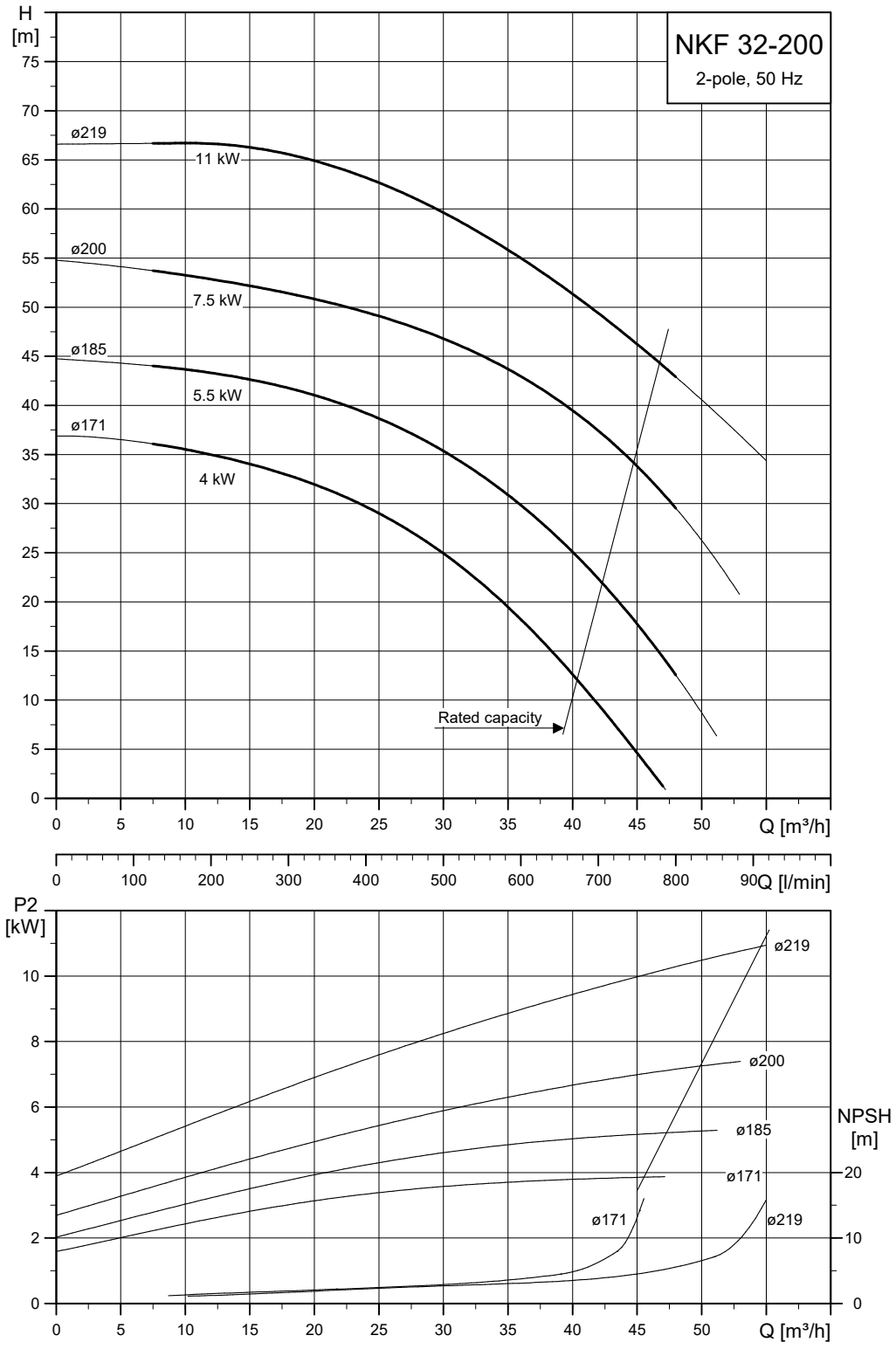
Hydro EN model	Electric pump			Diesel pump			Jockey pump			Q [m³/h] v.s. H [m]										
	P [kW]	$I_{1/1}$ [A]	Q_{min} [m³/h]	Na (Nb) [kW]	Q_{min} [m³/h]	Cooling system	Version	P [kW]	$I_{1/1}$ [A]	0	10	14	18	22	26	30	34	38	42	46
32-160/177	5.5	10	0.5	6.5 (7.2)	0.5	❍	CM 3-7	1.1	2.72	43	43	42	42	41	39	37	35	32	28	24

Hydro EN 32-200.1



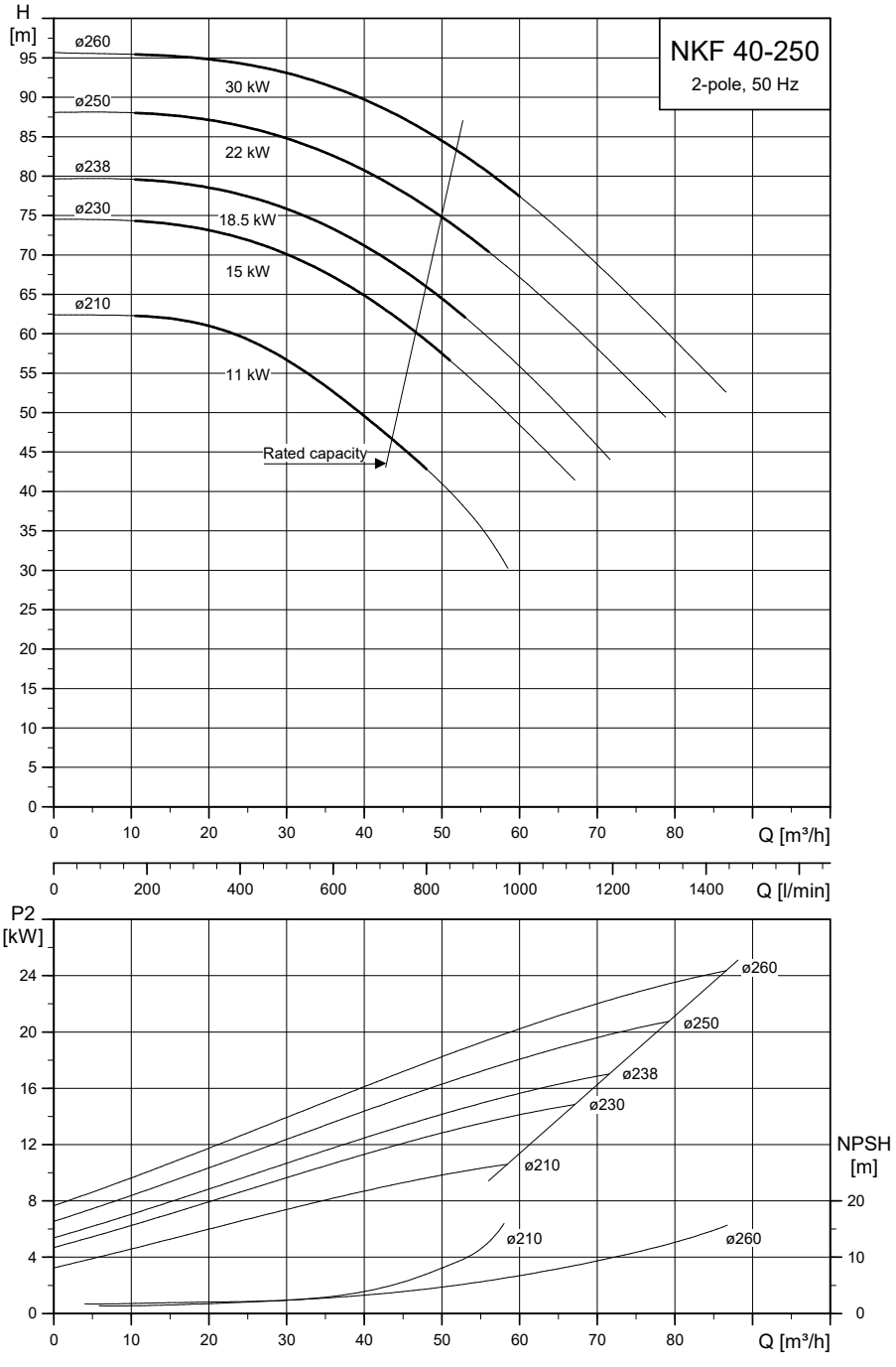
Hydro EN model	Electric pump			Diesel pump			Jockey pump			Q [m³/h] v.s. H [m]										
	P [kW]	$I_{1/1}$ [A]	Q_{min} [m³/h]	Na (Nb) [kW]	Q_{min} [m³/h]	Cooling system	Version	P [kW]	$I_{1/1}$ [A]	0	10	13	16	19	22	25	27	29	31	33
32-200.1/200	5.5	10	0.5	6.5 (7.2)	0.5	❍	CM 3-8	1.1	2.72	51	49	47	45	43	40	36	32	29	25	21

Hydro EN 32-200



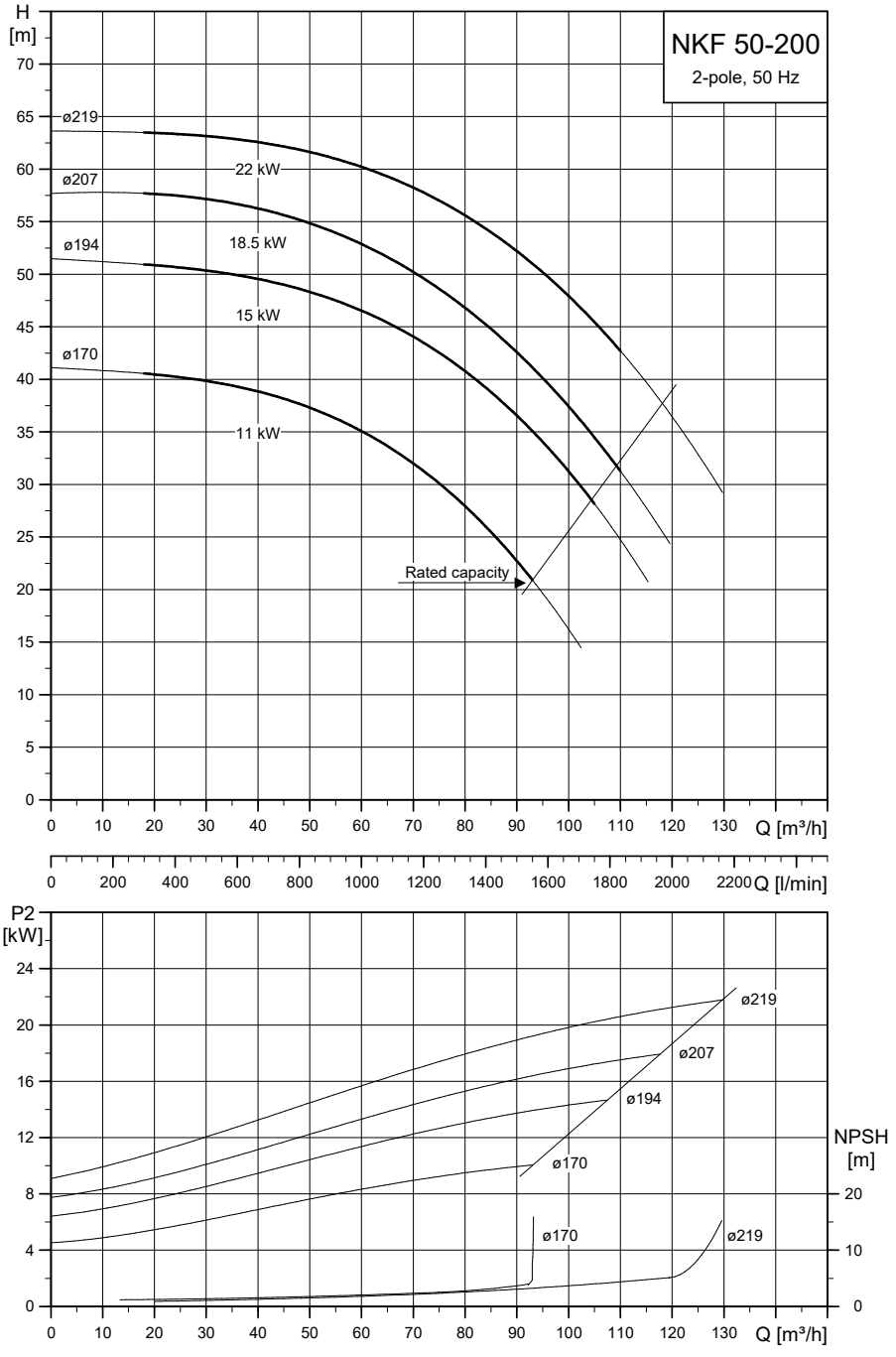
Hydro EN model	Electric pump			Diesel pump			Jockey pump			Q [m³/h] v.s. H [m]										
	P [kW]	$I_{1/1}$ [A]	Q_{min} [m³/h]	Na (Nb) [kW]	Q_{min} [m³/h]	Cooling system	Version	P [kW]	$I_{1/1}$ [A]	0	10	15	20	25	30	33	35	40	45	48
32-200/171	4	7.4	0.5	6.5 (7.2)	0.5	❍	CM 3-7	1.1	2.72	37	36	34	32	29	25	22	19	13	5	-
32-200/185	5.5	9.9	0.5	6.5 (7.2)	0.5	❍	CM 3-8	1.1	2.72	45	44	43	41	39	35	33	31	25	18	13
32-200/200	7.5	13.2	0.5	10.2 (11.2)	0.5	❍	CM 3-8	1.1	2.72	55	53	52	51	49	47	45	44	39	34	29
32-200/219	11	20	0.5	13.5 (14.8)	0.5	❍	CM 3-10	1.5	3	67	67	66	65	63	60	57	56	51	46	43

Hydro EN 40-250



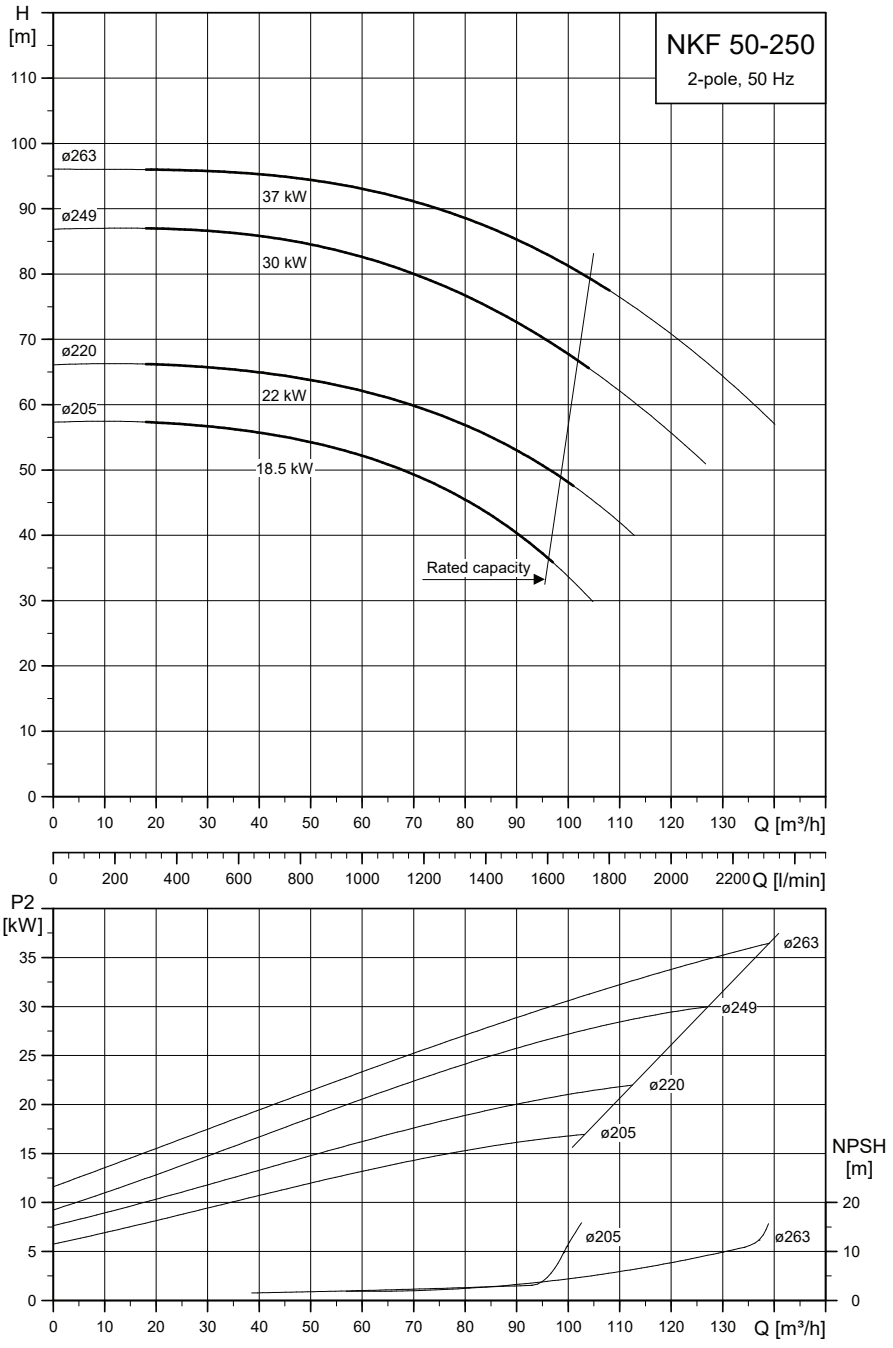
Hydro EN model	Electric pump			Diesel pump			Jockey pump			Q [m³/h] v.s. H [m]										
	P [kW]	$I_{1/1}$ [A]	Q_{min} [m³/h]	Na (Nb) [kW]	Q_{min} [m³/h]	Cooling system	Version	P [kW]	$I_{1/1}$ [A]	0	10	20	30	35	40	43	45	50	55	60
40-250/210	11	20	1	11.2 (12.3)	1	❍	CM 3-10	1.5	3.3	62	62	61	57	53	50	47	45	-	-	-
40-250/230	15	27.5	1	17 (18.7)	1	❍	CM 3-11	1.5	3.3	75	74	73	70	68	65	63	61	57	-	-
40-250/238	18.5	32	1	17 (18.7)	1	❍	CM 3-12	1.5	3.3	80	80	79	76	74	71	69	68	64	60	-
40-250/250	22	38.5	1	23 (25.5)	1.5	●	CM 3-13	2.2	4.6	88	88	87	85	83	81	79	78	75	71	67
				26.1 (28.5)	1	❍														
40-250/260	30	54	1	28 (30.8)	2.4	●	CM 3-13	2.2	4.6	96	95	95	93	92	90	88	87	84	81	77
				26.1 (28.5)	1	❍														

Hydro EN 50-200



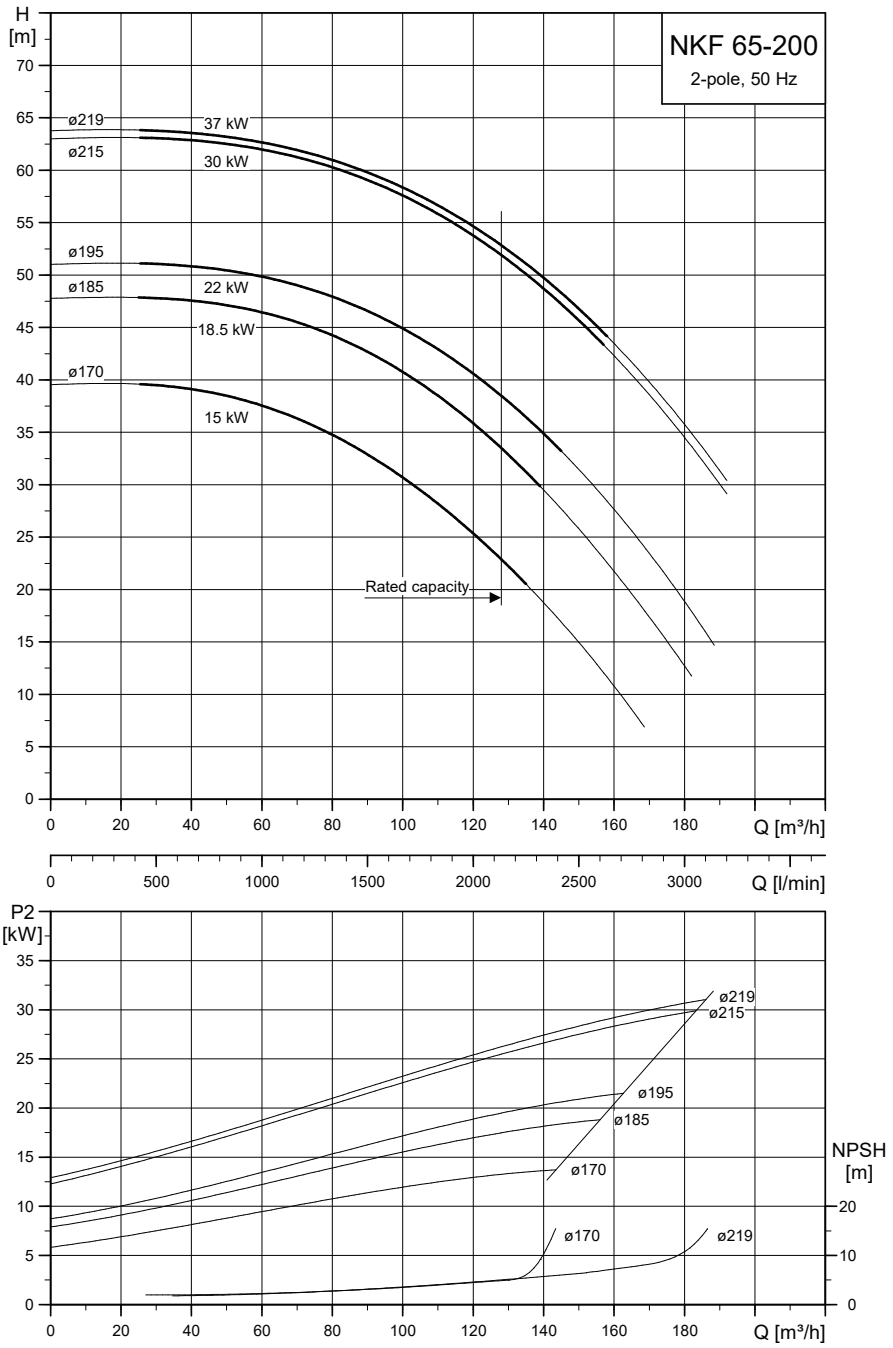
Hydro EN model	Electric pump			Diesel pump			Jockey pump			Q [m³/h] v.s. H [m]										
	P [kW]	$I_{1/1}$ [A]	Q_{min} [m³/h]	Na (Nb) [kW]	Q_{min} [m³/h]	Cooling system	Version	P [kW]	$I_{1/1}$ [A]	0	40	50	60	70	80	90	93	100	105	110
50-200/170	11	20	2	11.2 (12.3)	2	❍	CM 3-7	1.1	2.72	41	39	37	35	32	28	23	-	-	-	-
50-200/194	15	27.5	2	17 (18.7)	2	❍	CM 3-8	1.1	2.72	51	50	48	47	44	41	37	35	31	28	-
50-200/207	18.5	32	2	23 (25.3)	2	•	CM 3-9	1.1	2.72	58	56	55	53	50	47	43	41	37	34	31
				26.1 (28.5)	2	❍														
50-200/219	22	38.5	2	23 (25.3)	2	•	CM 3-10	1.5	3.3	64	63	62	60	58	56	52	51	48	45	43
				26.1 (28.5)	2	❍														

Hydro EN 50-250



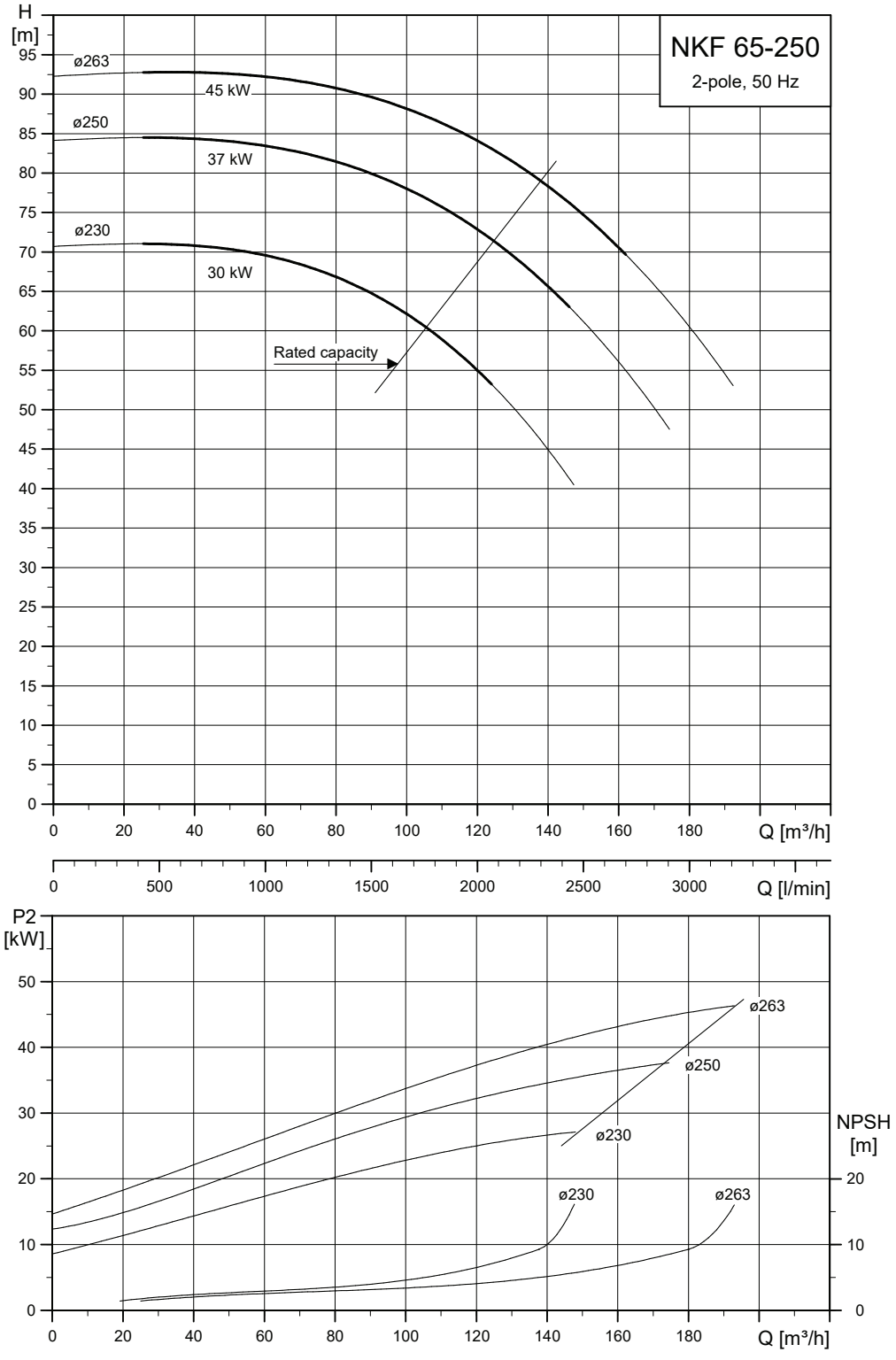
Hydro EN model	Electric pump			Diesel pump			Jockey pump			Q [m³/h] v.s. H [m]										
	P [kW]	$I_{1/1}$ [A]	Q_{min} [m³/h]	Na (Nb) [kW]	Q_{min} [m³/h]	Cooling system	Version	P [kW]	$I_{1/1}$ [A]	0	40	50	60	70	80	90	96	98	100	105
50-250/205	18.5	32	2	17 (18.7)	2	❍	CM 3-9	1.1	2.72	57	56	54	52	49	45	40	37	35	-	-
50-250/220	22	38.5	2	23 (25.3)	2	●	CM 3-10	1.5	3.3	66	65	64	62	60	57	53	50	49	48	-
				26.1 (28.5)	2	❍														
50-250/249	30	54	2	36.4 (40)	2.4	●	CM 3-13	2.2	4.6	87	86	85	83	80	77	73	70	69	68	65
50-250/263	37	66	2	36.4 (40)	2.4	●	CM 3-13	2.2	4.6	96	95	94	93	91	89	85	83	82	81	79

Hydro EN 65-200



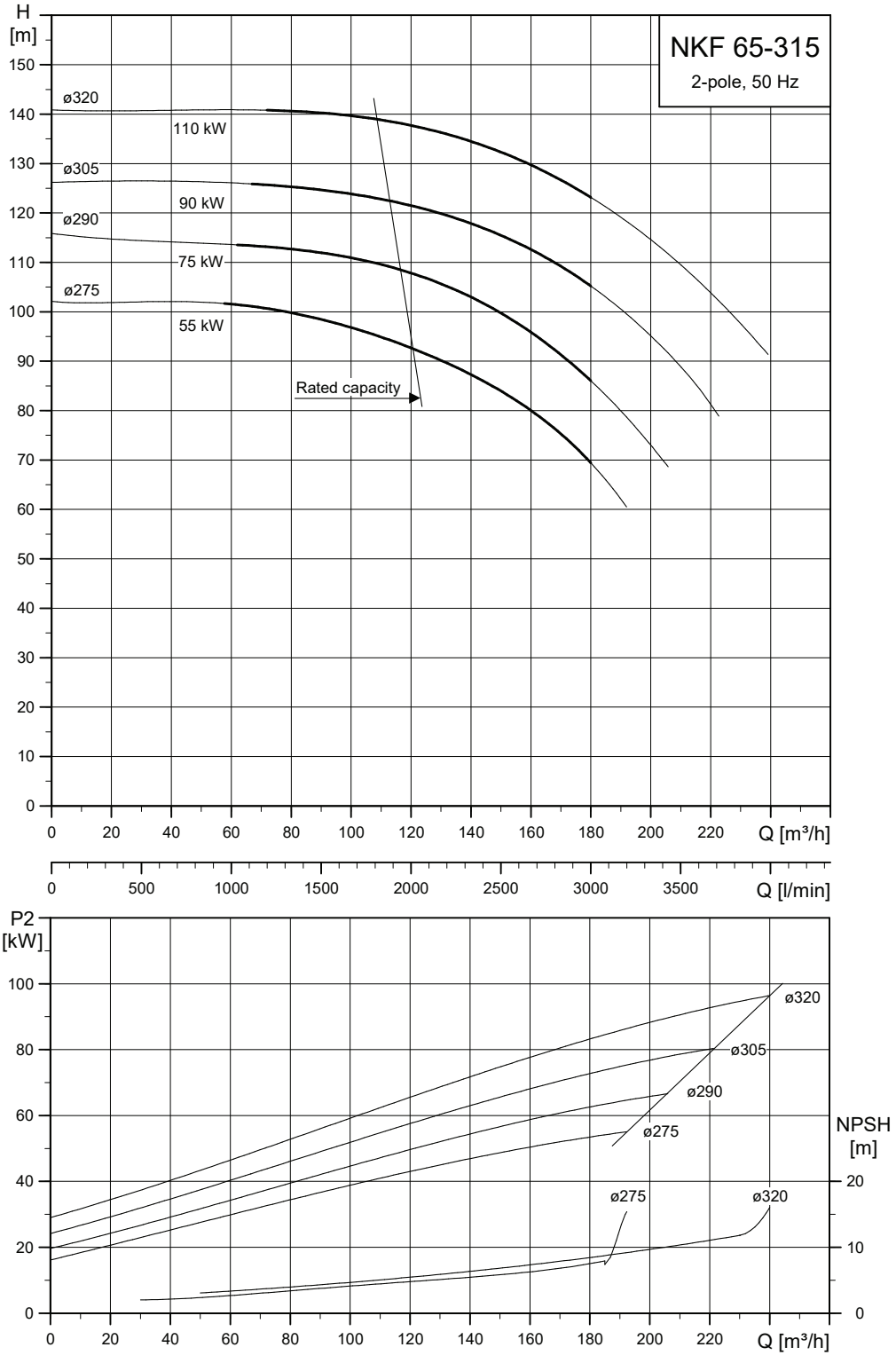
Hydro EN model	Electric pump			Diesel pump			Jockey pump			Q [m³/h] v.s. H [m]										
	P [kW]	$I_{1/1}$ [A]	Q_{min} [m³/h]	Na (Nb) [kW]	Q_{min} [m³/h]	Cooling system	Version	P [kW]	$I_{1/1}$ [A]	0	80	85	90	95	100	110	120	125	135	150
65-200/170	15	27.5	2.5	11.2 (12.3)	2.5	❍	CM 3-6	0.65	1.8	40	35	34	33	32	30	28	25	23	20	-
65-200/185	18.5	32	2.5	23 (25.3) / 26.1 (28.5)	2.5	● / ❍	CM 3-7	1.1	2.72	48	44	43	42	41	40	38	35	34	31	-
65-200/195	22	38.5	2.5	23 (25.3) / 26.1 (28.5)	2.5	● / ❍	CM 3-8	1.1	2.72	51	47	47	46	45	44	42	40	39	36	-
65-200/215	30	54	2.5	36.4 (40)	2.5	●	CM 3-10	1.5	3.3	63	60	59	59	58	57	55	53	52	50	45
65-200/219	37	66	2.5	36.4 (40)	2.5	●	CM 3-10	1.5	3.3	64	62	61	60	59	58	57	55	53	51	47

Hydro EN 65-250



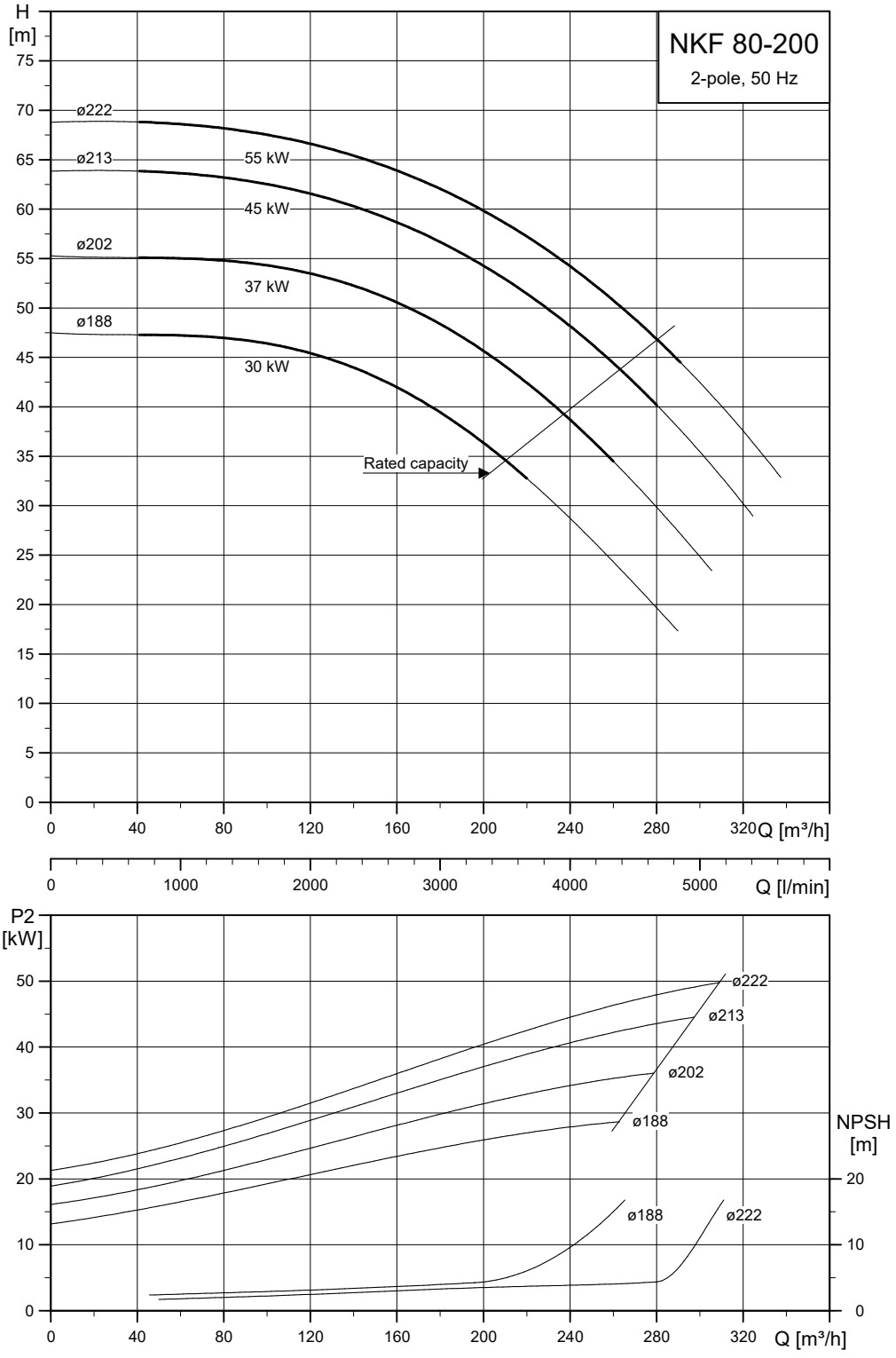
Hydro EN model	Electric pump			Diesel pump			Jockey pump			Q [m³/h] v.s. H [m]										
	P [kW]	$I_{1/1}$ [A]	Q_{min} [m³/h]	Na (Nb) [kW]	Q_{min} [m³/h]	Cooling system	Version	P [kW]	$I_{1/1}$ [A]	0	85	95	105	115	125	135	140	145	150	155
65-250/230	30	52.7	2.5	28 (30.8)	2.5	•	CM 3-11	1.5	3.3	71	66	64	61	57	53	-	-	-	-	-
65-250/250	37	63.3	2.5	48.2 (53)	3	•	CM 3-12	1.5	3.3	84	81	79	77	74	71	68	66	63	-	-
65-250/263	45	78.5	2.5	48.2 (53)	3	•	CM 3-13	2.2	4.6	92	90	89	87	85	83	80	78	77	75	73

Hydro EN 65-315



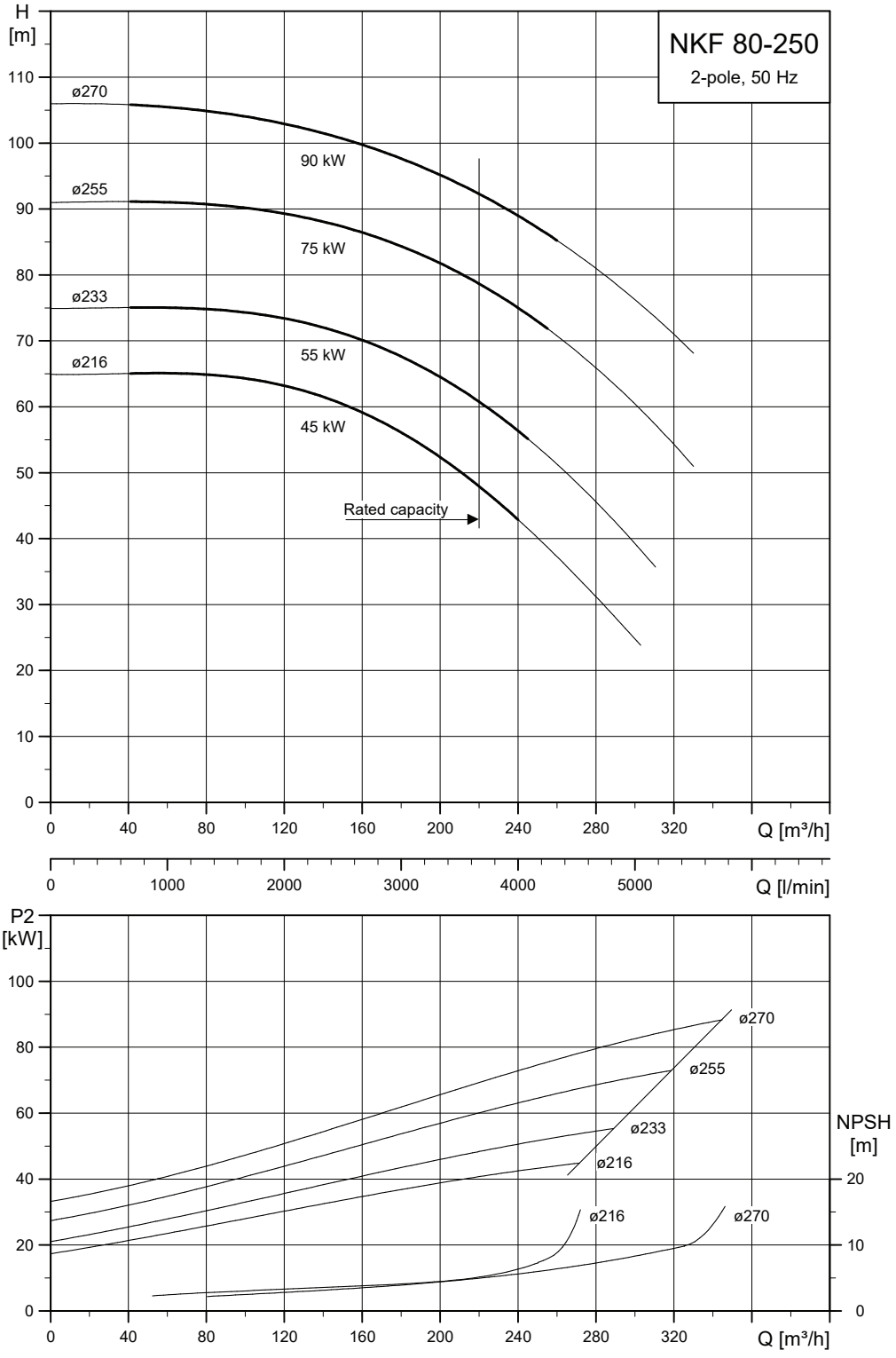
Hydro EN model	Electric pump			Diesel pump			Jockey pump			Q [m³/h] v.s. H [m]										
	P [kW]	$I_{1/1}$ [A]	Q_{min} [m³/h]	Na (Nb) [kW]	Q_{min} [m³/h]	Cooling system	Version	P [kW]	$I_{1/1}$ [A]	0	80	90	100	110	120	130	140	150	165	180
65-315/275	55	95.7	3.5	66.4 (73)	6	•	CM 3-14	2.2	4.6	102	100	98	97	95	93	90	87	84	78	69
65-315/290	75	124.3	3.5	66.4 (73)	6	•	CR 3-14	2.2	4.6	116	113	112	111	110	108	106	103	100	94	86
65-315/305	90	148.6	3.5	99 (109)	6	•	CR 3-23	2.2	4.6	126	125	125	124	123	121	120	118	115	112	105
65-315/320	110	185.3	3.5	99 (109)	6	•	CR 3-23	2.2	4.6	141	141	140	140	139	138	136	134	132	128	123

Hydro EN 80-200



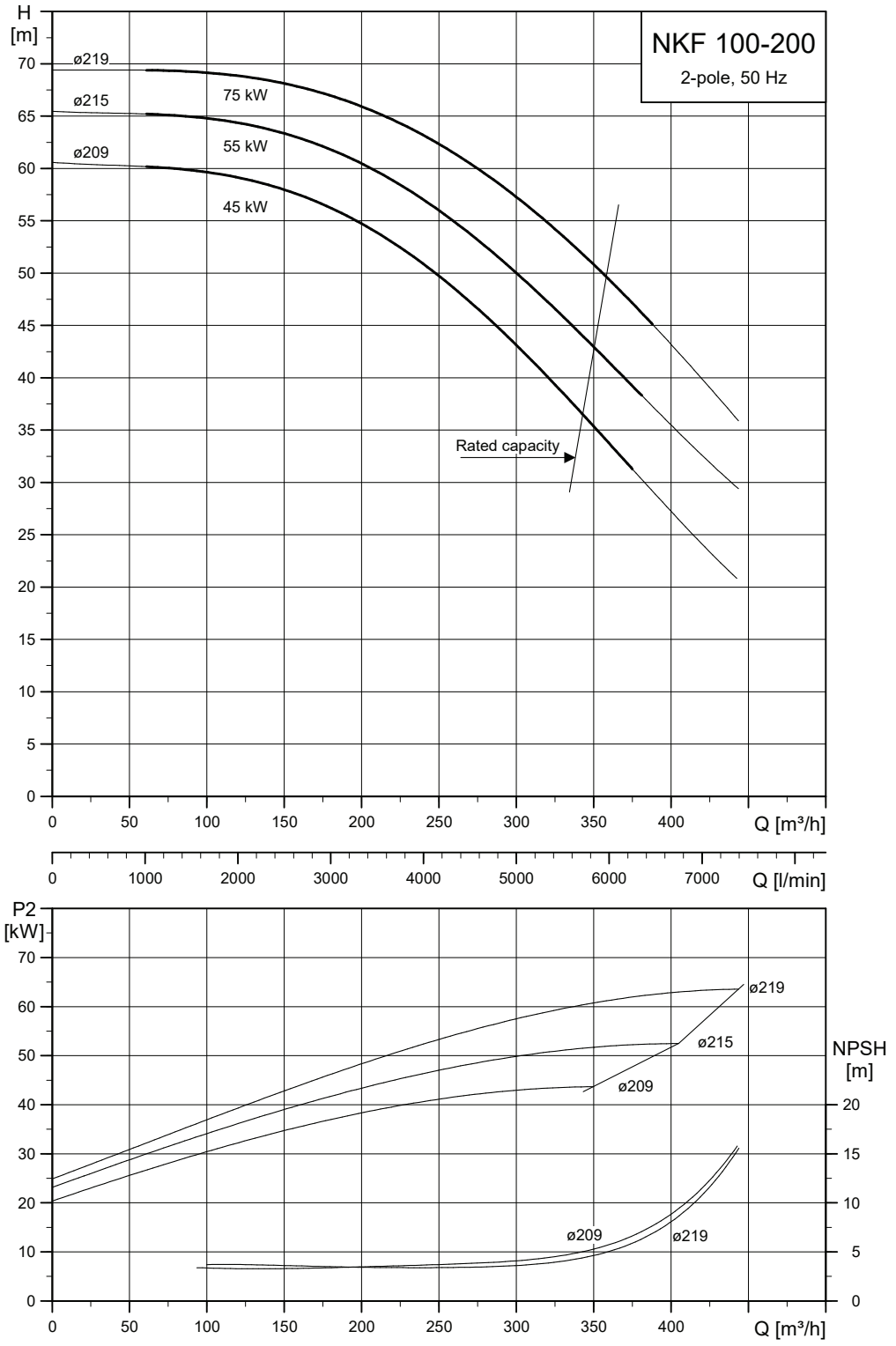
Hydro EN model	Electric pump			Diesel pump			Jockey pump			Q [m³/h] v.s. H [m]										
	P [kW]	$I_{1/1}$ [A]	Q_{min} [m³/h]	Na (Nb) [kW]	Q_{min} [m³/h]	Cooling system	Version	P [kW]	$I_{1/1}$ [A]	0	100	120	140	160	180	200	220	240	270	290
80-200/188	30	54	4	36.4 (40)	4	•	CM 3-7	1.1	2.72	48	46	45	44	42	39	36	32	-	-	-
80-200/202	37	66	4	36.4 (40)	4	•	CM 3-8	1.1	2.72	55	54	53	52	50	48	45	42	38	32	-
80-200/213	45	78	4	48.2 (53)	4	•	CM 3-10	1.5	3.3	63	62	61	60	58	56	54	51	48	42	38
80-200/222	55	95	4	66.4 (73)	6	•	CM 3-10	1.5	3.3	68	67	66	65	63	61	59	57	54	48	44

Hydro EN 80-250



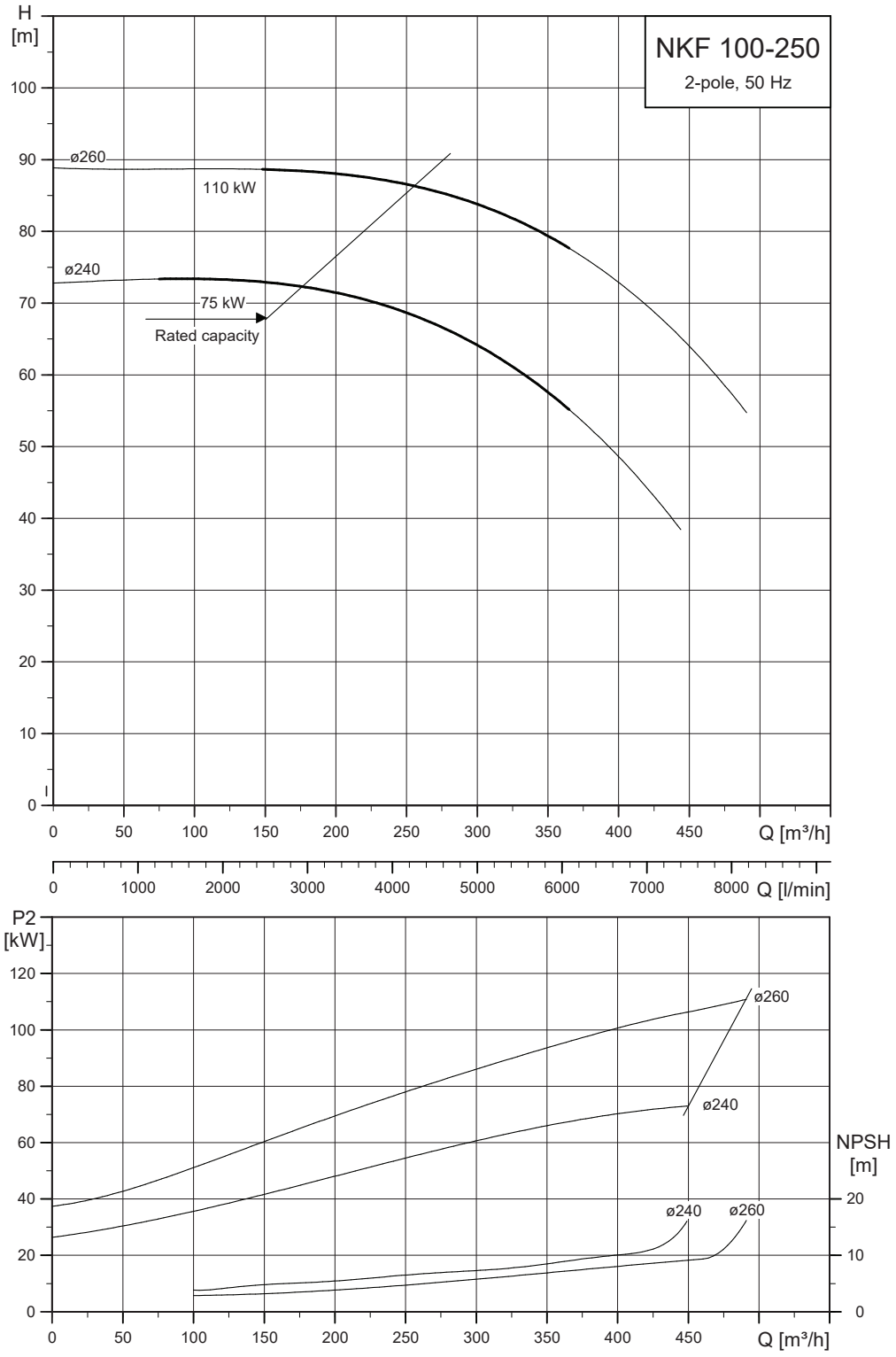
Hydro EN model	Electric pump			Diesel pump			Jockey pump			Q [m³/h] v.s. H [m]										
	P [kW]	$I_{1/1}$ [A]	Q_{min} [m³/h]	Na (Nb) [kW]	Q_{min} [m³/h]	Cooling system	Version	P [kW]	$I_{1/1}$ [A]	0	50	100	120	160	180	200	220	240	250	260
80-250/216	45	78	4	48.2 (53)	4	•	CM 3-10	1.5	3.3	65	65	64	62	58	55	51	47	42	-	-
80-250/233	55	95	4	66.4 (73)	6	•	CM 3-12	1.5	3.3	75	75	74	73	69	66	63	59	55	53	-
80-250/255	75	128	4	99 (109)	6	•	CM 3-13	2.2	4.6	91	91	90	89	86	84	81	78	74	72	70
80-250/270	90	152	4	99 (109)	6	•	CM 3-14	2.2	4.6	106	106	104	103	100	98	95	92	89	87	85

Hydro EN 100-200



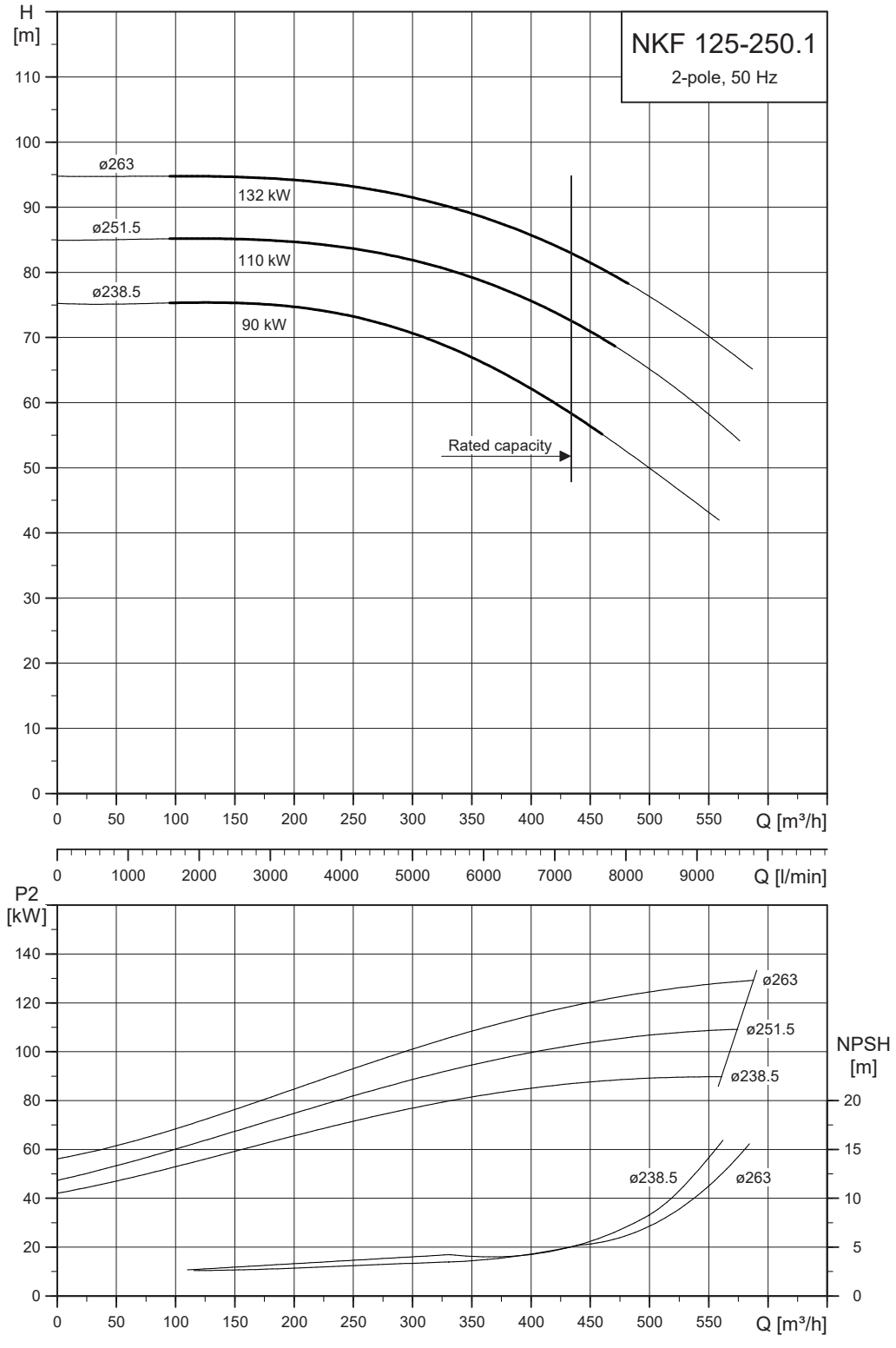
Hydro EN model	Electric pump			Diesel pump			Jockey pump			Q [m³/h] v.s. H [m]									
	P [kW]	$I_{1/1}$ [A]	Q_{min} [m³/h]	Na (Nb) [kW]	Q_{min} [m³/h]	Cooling system	Version	P [kW]	$I_{1/1}$ [A]	0	200	220	240	260	300	310	330	350	370	390
100-200/209	45	78	5	48.2 (53)	5	•	CM 3-10	1.5	3.3	61	55	53	51	49	43	42	39	35	32	-
100-200/215	55	95	5	66.4 (73)	6	•	CM 3-10	1.5	3.3	65	60	59	57	55	50	49	46	43	40	37
100-200/219	75	128	5	66.4 (73)	6	•	CM 3-10	1.5	3.3	69	66	65	63	61	57	56	54	51	48	45

Hydro EN 100-250



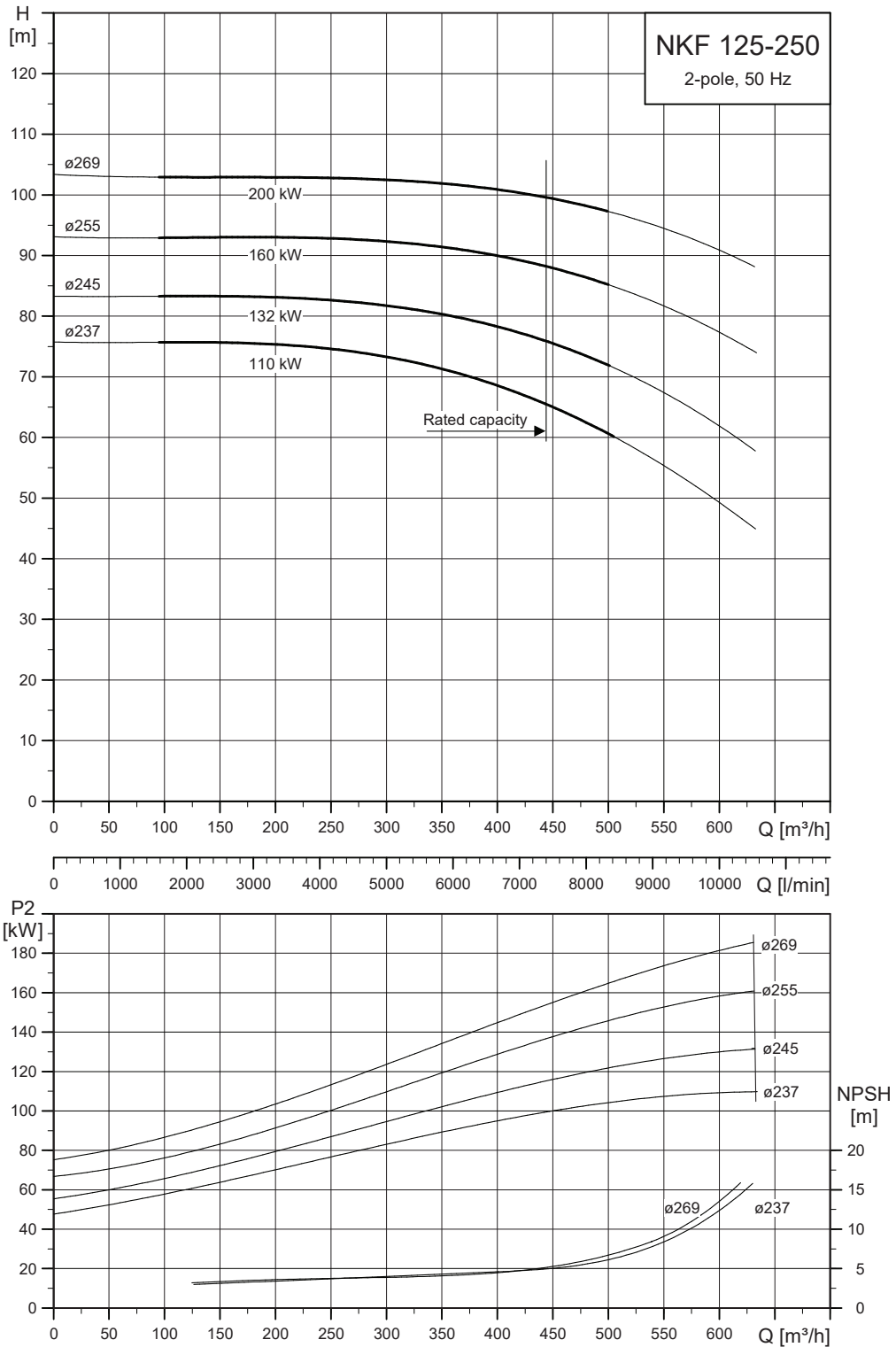
Hydro EN model	Electric pump			Diesel pump			Jockey pump			Q [m³/h] v.s. H [m]										
	P [kW]	$I_{1/1}$ [A]	Q_{min} [m³/h]	Na (Nb) [kW]	Q_{min} [m³/h]	Cooling system	Version	P [kW]	$I_{1/1}$ [A]	0	210	220	230	240	250	270	290	310	330	350
100-250/240	90	148.6	5	99 (109)	6	•	CM 3-11	1.5	3.3	73	71	71	70	69	68	67	65	63	60	57
100-250/260	110	185.3	5	132 (145)	6	•	CM 3-13	2.2	4.6	89	88	88	87	87	87	86	84	83	81	79

Hydro EN 125-200.1



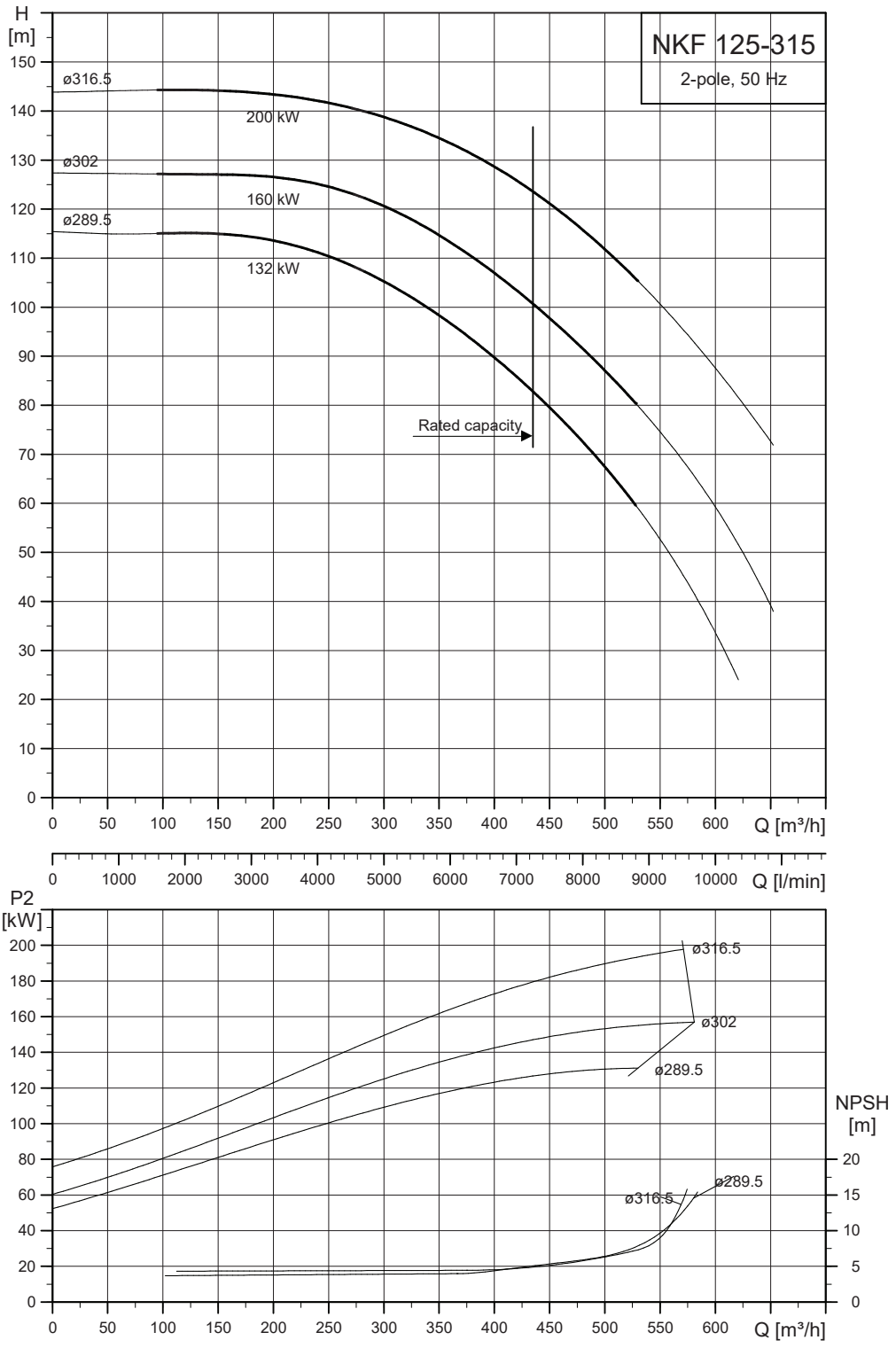
Hydro EN model	Electric pump			Diesel pump			Jockey pump			Q [m³/h] v.s. H [m]										
	P [kW]	$I_{1/1}$ [A]	Q_{min} [m³/h]	Na (Nb) [kW]	Q_{min} [m³/h]	Cooling system	Version	P [kW]	$I_{1/1}$ [A]	0	150	200	250	300	350	375	400	425	450	475
125-250.1/238	90	152	9	99 (109)	9	•	CM 3-12	1.5	3.3	75	76	75	74	71	67	65	62	59	56	-
125-250.1/251	110	184	9	132 (145)	9	•	CM 3-12	1.5	3.3	85	86	85	84	82	79	77	75	73	71	68
125-250.1/263	132	220	9	132 (145)	9	•	CM 3-13	2.2	4.6	95	95	95	93	91	89	87	86	84	81	79

Hydro EN 125-250



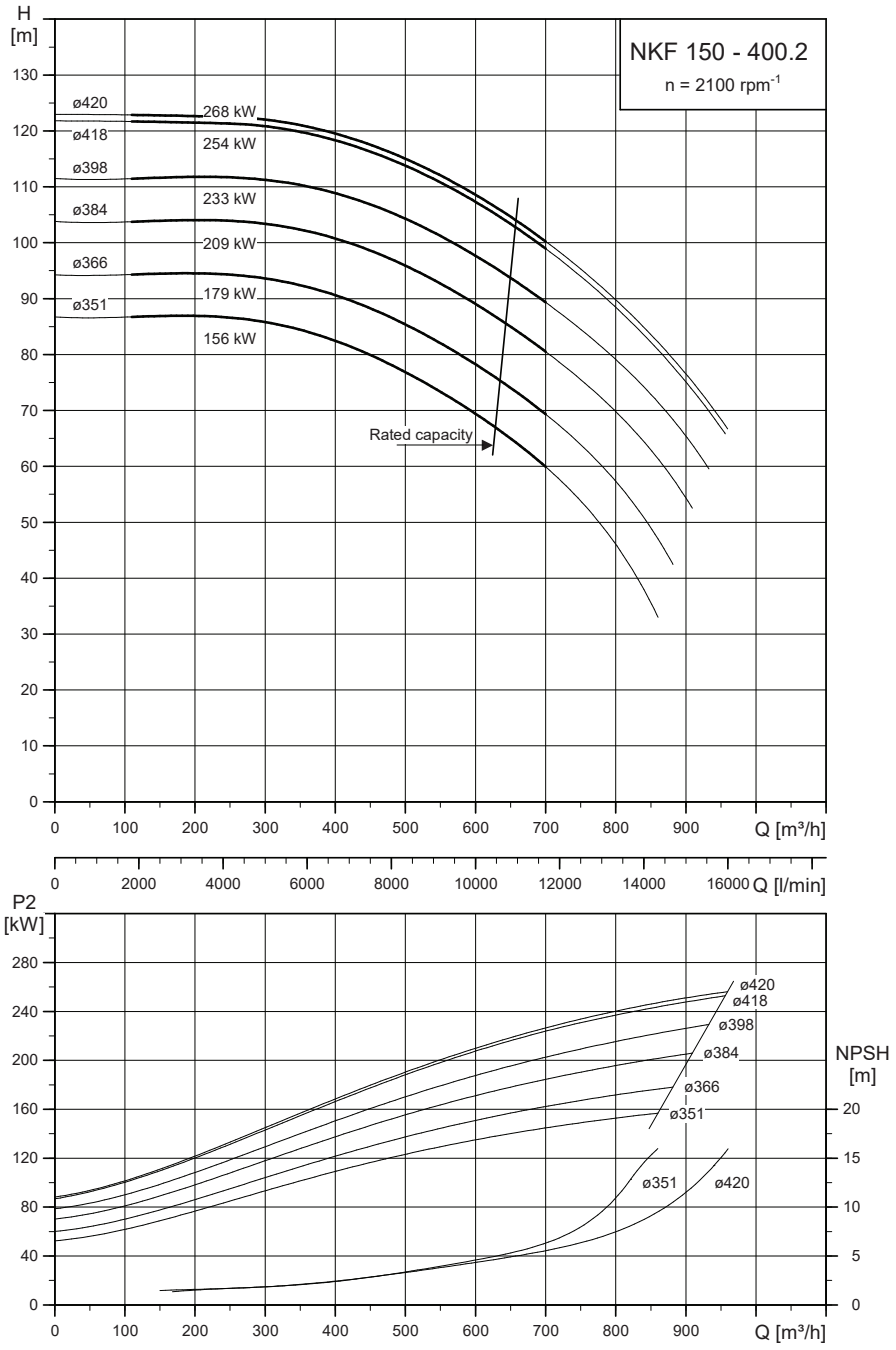
Hydro EN model	Electric pump			Diesel pump			Jockey pump			Q [m³/h] v.s. H [m]										
	P [kW]	$I_{1/1}$ [A]	Q_{min} [m³/h]	Na (Nb) [kW]	Q_{min} [m³/h]	Cooling system	Version	P [kW]	$I_{1/1}$ [A]	0	150	200	250	300	350	375	400	425	450	500
125-250/237	110	184	9	132 (145)	9	•	CM 3-12	1.5	3.3	76	76	75	75	73	71	70	69	67	65	61
125-250/245	132	220	9	132 (145)	9	•	CM 3-12	1.5	3.3	83	83	83	83	82	80	79	78	77	76	72
125-250/255	160	265	9	179 (197)	9	•	CM 3-13	2.2	4.6	93	93	93	93	92	91	91	90	89	88	85
125-250/269	200	330	9	202 (222)	9	•	CM 3-14	2.2	4.6	103	103	103	103	103	102	101	101	100	99	97

Hydro EN 125-315



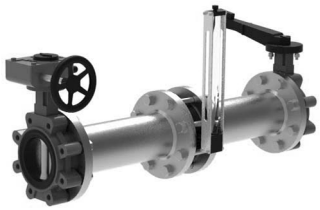
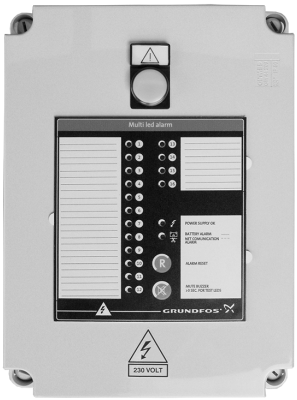
Hydro EN model	Electric pump			Diesel pump			Jockey pump			Q [m³/h] v.s. H [m]										
	P [kW]	$I_{1/1}$ [A]	Q_{min} [m³/h]	Na (Nb) [kW]	Q_{min} [m³/h]	Cooling system	Version	P [kW]	$I_{1/1}$ [A]	0	100	150	200	250	300	350	400	425	475	525
125-315/289	132	220	9	132 (145)	9	•	CR 3-21	2.2	4.6	116	116	115	113	110	105	99	90	85	74	60
125-315/302	160	265	9	179 (197)	9	•	CR 3-23	2.2	4.6	129	129	128	127	124	120	115	107	103	93	81
125-315/316	200	330	9	202 (222)	9	•	CR 3-23	2.2	4.6	145	145	145	144	142	139	134	129	125	117	107

Hydro EN 150-400.2



Hydro EN model	Electric pump			Diesel pump			Jockey pump			Q [m³/h] v.s. H [m]										
	P [kW]	$I_{1/1}$ [A]	Q_{min} [m³/h]	Na (Nb) [kW]	Q_{min} [m³/h]	Cooling system	Version	P [kW]	$I_{1/1}$ [A]	0	250	300	350	400	450	500	550	600	650	700
150-400.2/351	Electric pump is not available			164 (180)	7	•	CM 3-13	2.2	4.6	87	86	86	84	82	80	77	73	69	65	60
150-400.2/366				187 (206)	7	•	CM 3-13	2.2	4.6	94	94	94	92	91	88	85	82	78	74	69
150-400.2/384				263.6 (290)	18	•	CM 3-14	2.2	4.6	104	103	103	102	101	99	96	93	89	85	81
150-400.2/398				263.6 (290)	18	•	CM 3-14	2.2	4.6	111	111	111	110	109	107	104	101	98	94	89
150-400.2/418				263.6 (290)	18	•	CM 3-14	2.2	4.6	122	121	121	120	118	116	114	111	107	103	99
150-400.2/420				263.6 (290)	18	•	CR 3-21	2.2	4.6	123	122	122	121	120	118	115	112	109	105	100

9. Accessories

Option		Description
Suction kit		To make sure that an installation complies with the guidelines in the EN 12845 standard, you need an installation kit including an eccentric divergent pipe with a controlled taper, a vacuum pressure gauge, an isolating valve and a compensation joint on the side where the pipe is connected. The components are sized in accordance with the requirements of the standard regarding the minimum diameter and the maximum water velocity prescribed at the maximum flow rate stated on the performance curve: • positive head installation: a minimum permissible diameter of DN 65 and a maximum water speed of 1.8 m/s • suction lift installation: a minimum permissible diameter of DN 80 and a maximum water speed of 1.5 m/s.
Test kit		A complete flow rate test circuit is available as an option. The test circuit includes a flowmeter, spacers and an adjustment valve. With this configuration you can measure the flow rate with adequate accuracy. This accessory is essential to verify the performance as required by the standard when carrying out inspections and periodic verifications.
Acoustic and visual alarm signalling panel		The panel allows you to monitor the operation of the pumps from a permanently attended room. The panel provides a visual and acoustic indication of the alarms from the duty pump panels: • seven digital alarm inputs • a yellow control lamp and acoustic alarm, 85 dB • a buffer battery with 30 hours of continuous operation and battery charger • a mains control lamp • a lamp and acoustic signal test button • an acoustic alarm silencing button.
MultiLed alarm signalling panel		The panel meets the requirements of the EN 12845 standard Annex I for electric and diesel systems. There are 12 yellow LEDs for alarm type B and four red LEDs for alarm type A available. The purpose of the LEDs is to monitor the system components as well as the system alarms. A label system allows the user to customise the description of each LED alarm. Due to a buffer battery, the panel ensures the display of the alarms, individually selectable NO or NC, even in the absence of mains voltage. When an alarm is activated, the LED lights up on the panel and a buzzer and a yellow control lamp are activated. A type A alarm relay and type B alarm relay are activated at the same time. You can decide to store the alarm. In that case, the LED remains on even if the alarm disappears. In this case, use the R button to turn off the LED. You can use a button that mutes the buzzer with time recovery. If you press this button for more than three seconds, it tests the LEDs and buzzer. There is also an RS 485 port with Modbus RTU protocol that allows various information to be communicated.
Priming tank		A 500-litre water priming tank suitable for suction lift installation and complete with accessories is available on request.

Option		Description
Switches for main valves		According to the EN 12845 standard, you must monitor the status of each isolating valve remotely. Upon request, the following isolating valves can be equipped with a micro-switch: • inlet valve [2)] • outlet valve • test circuit valve [2)]. The use and connection of the monitoring system is the responsibility of the installer.
Set of diesel engine spare parts		To meet the requirements of the EN 12845 standard, you can request a set of diesel engine spare parts: • two series of fuel filters with seals • two series of oil filters with seals • two series of belts, if used on the engine • a full set of connections, seals and hoses for the engine • two injector nozzles.
Residential type silencer		The residential silencer is supplied loose for mounting during installation. Flexible pipe is delivered to ease the connection between the silencer and the exhaust manifold of the diesel engine. A diesel engine equipped with a residential silencer for further reduction of the noise generated by the engine exhaust is available on request.
Manual pump for fuel tank filling		A manual pump for diesel tank filling is available on request. The manual pump makes it easy to refill the diesel tank as you can build a fixed filling system on the outside of the technical control room.

Option		Description
Power supply unit for drainage pump		The power supply unit, SE 2000, is ideal in case of electricity blackouts as the unit automatically goes into operation and generates electricity from a series of buffer batteries. Combined with a single-phase Grundfos drainage pump, it allows the latter to remain operational even in the event of a temporary interruption of electricity. Characteristics: • Output voltage: single-phase 230 VAC, 50 Hz • input voltage, batteries: 48 V • nominal power rating: 2000 VA • metal enclosure IP20 • warning lights indicating the operating status of the emergency power supply unit • protection against reversing the battery connection • thermal protection of the panel • protection fuses for output.
Drainage pump		Where it is not possible to create a gravity connection to the sewer network (for example in underground rooms), a system with two suitably sized pumps is required. Contact Grundfos for more information about drainage pumps that are suitable to combine with the emergency power supply unit described above.
Control interface in local languages	-	The control interface is provided as standard in two languages: • Italian • English. If needed, it is possible, on request, to have the captions on the control cabinet door and the texts on the display in the following languages: • Bulgarian • Danish • Estonian • Spanish • French • Hungarian • Lithuanian • Latvian • Norwegian • Polish • Portuguese • Romanian • Serbian • Ukranian • Finnish • Slovak.

2) If the relevant kit is included.

After-sales service

Grundfos offers after-sales service with competent persons and original spare parts.

This service can be extended with a maintenance contract or check and inspection agreements depending on your needs.

10. Documentation

All systems are delivered with the following documents in digital format:

- installation and operating instructions
  - for the system
  - for the duty electric pumps
  - for the jockey electric pump
  - for the pressure switches
- IOS manual with EC declaration of conformity (in paper copy)
- electrical diagrams of the control cabinets
- assembling and setting verification
- two copies of the nameplate of the system in addition to the one on the base frame of the system
- pump performance curves.

If available, the kit for measuring the flow rate is supplied with the installation and operating instructions of the flowmeter.

If a diesel pump is available, the following documents are also delivered:

- installation and operating instructions for the diesel engine
- safety data sheet for the batteries
- factory test report for the diesel pump as described in the EN 12845 standard.

If you need specific documents or any additional hard or digital copies of the documents listed above, request these during the bidding process.

11. Grundfos Product Center

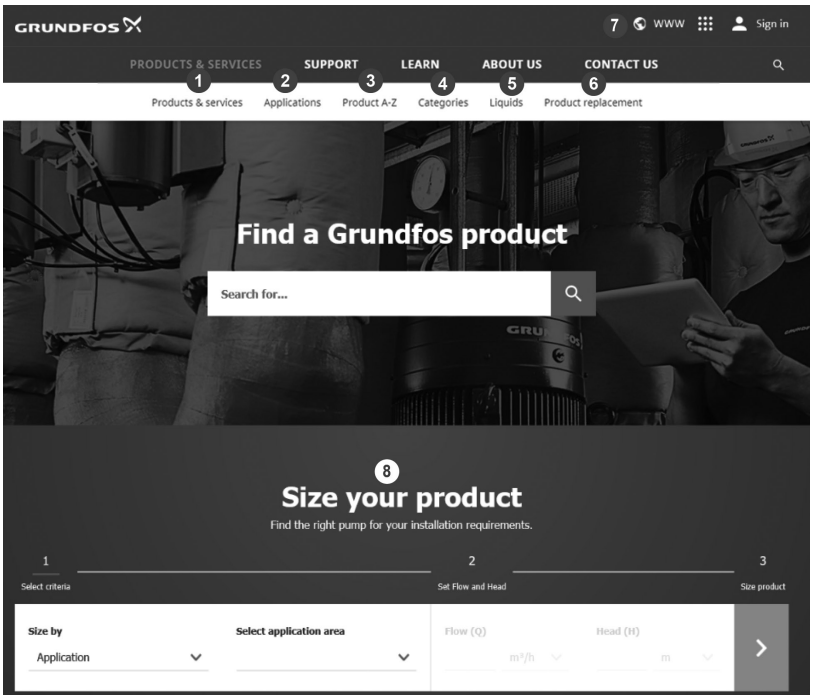
Online search and sizing tool to help you make the right choice.
From the international view, you can select your specific country to view the product range available to you.
International view: *https://product-selection.grundfos.com*

All the information you need in one place

Performance curves, technical specifications, pictures, dimensional drawings, motor curves, wiring diagrams, spare parts, service kits, 3D drawings, documents, system parts. The Product Center displays any recent and saved items - including complete projects - right on the main page.

Downloads

On the product pages, you can download installation and operating instructions, data booklets, service instructions, etc., in PDF format.



When you select your country, you will see the menus below. Note that some menus may not be available depending on the country.
Example: *https://product-selection.grundfos.com/uk*

Pos.	Description
1	**Products & services** enables you to find products and documents by typing a product number or name into the search field.
2	**Applications** enables you to choose an application to see how Grundfos can help you design and optimise your system.
3	**Products A-Z** enables you to look through a list of all the Grundfos products.
4	**Categories** enables you to look for a product category.
5	**Liquids** enables you to find pumps designed for aggressive, flammable or other special liquids.
6	**Product replacement** enables you to find a suitable replacement.
7	**WWW** enables you to select the country, which changes the language, the available product range and the structure of the website.
8	**Sizing** enables you to size a product based on your application and operating conditions.

Argentina
Bombas GRUNDFOS de Argentina S.A.
Ruta Panamericana km. 37.500industin
1619 - Garín Pcia. de B.A.
Tel.: +54-3327 414 444
Fax: +54-3327 45 3190

Australia
GRUNDFOS Pumps Pty. Ltd.
P.O. Box 2040
Regency Park
South Australia 5942
Tel.: +61-8-8461-4611
Fax: +61-8-8340-0155

Austria
GRUNDFOS Pumpen Vertrieb Ges.m.b.H.
Grundfosstraße 2
A-5082 Grödig/Salzburg
Tel.: +43-6246-883-0
Fax: +43-6246-883-30

Belgium
N.V. GRUNDFOS Bellux S.A.
Boomsesteenweg 81-83
B-2630 Aartselaar
Tel.: +32-3-870 7300
Fax: +32-3-870 7301

Bosnia and Herzegovina
GRUNDFOS Sarajevo
Zmaja od Bosne 7-7A
BiH-71000 Sarajevo
Tel.: +387 33 592 480
Fax: +387 33 590 465
www.ba.grundfos.com
E-mail: grundfos@bih.net.ba

Brazil
BOMBAS GRUNDFOS DO BRASIL
Av. Humberto de Alencar Castelo Branco, 630
CEP 09850 - 300
São Bernardo do Campo - SP
Tel.: +55-11 4393 5533
Fax: +55-11 4343 5015

Bulgaria
Grundfos Bulgaria EOOD
Slatina District
Iztochna Tangenta street no. 100
BG - 1592 Sofia
Tel.: +359 2 49 22 200
Fax: +359 2 49 22 201
E-mail: bulgaria@grundfos.bg

Canada
GRUNDFOS Canada inc.
2941 Brighton Road
Oakville, Ontario
L6H 6C9
Tel.: +1-905 829 9533
Fax: +1-905 829 9512

China
GRUNDFOS Pumps (Shanghai) Co. Ltd.
10F The Hub, No. 33 Suhong Road
Minhang District
Shanghai 201106 PRC
Tel.: +86 21 612 252 22
Fax: +86 21 612 253 33

Columbia
GRUNDFOS Colombia S.A.S.
Km 1.5 vía Siberia-Cota Conj. Potrero Chico,
Parque Empresarial Arcos de Cota Bod. 1A.
Cota, Cundinamarca
Tel.: +57(1)-2913444
Fax: +57(1)-8764586

Croatia
GRUNDFOS CROATIA d.o.o.
Buzinski prilaz 38, Buzin
HR-10010 Zagreb
Tel.: +385 1 6595 400
Fax: +385 1 6595 499
www.hr.grundfos.com

Czech Republic
GRUNDFOS Sales Czechia and Slovakia s.r.o.
Čajkovského 21
779 00 Olomouc
Tel.: +420-585-716 111

Denmark
GRUNDFOS DK A/S
Martin Bachs Vej 3
DK-8850 Bjerringbro
Tel.: +45-87 50 50 50
Fax: +45-87 50 51 51
E-mail: info_GDK@grundfos.com
www.grundfos.com/DK

Estonia
GRUNDFOS Pumps Eesti OÜ
Peterburi tee 92G
11415 Tallinn
Tel.: + 372 606 1690
Fax: + 372 606 1691

Finland
OY GRUNDFOS Pumput AB
Trukkikuja 1
FI-01360 Vantaa
Tel.: +358-(0) 207 889 500

France
Pompes GRUNDFOS Distribution S.A.
Parc d'Activités de Chesnes
57, rue de Malacombe
F-38290 St. Quentin Fallavier (Lyon)
Tel.: +33-4 74 82 15 15
Fax: +33-4 74 94 10 51

Germany
GRUNDFOS GMBH
Schlüterstr. 33
40699 Erkrath
Tel.: +49-(0) 211 929 69-0
Fax: +49-(0) 211 929 69-3799
E-mail: infoservice@grundfos.de
Service in Deutschland:
kundendienst@grundfos.de

Greece
GRUNDFOS Hellas A.E.B.E.
20th km. Athinon-Markopoulou Av.
P.O. Box 71
GR-19002 Peania
Tel.: +0030-210-66 83 400
Fax: +0030-210-66 46 273

Hong Kong
GRUNDFOS Pumps (Hong Kong) Ltd.
Unit 1, Ground floor, Siu Wai industrial Centre
29-33 Wing Hong Street & 68 King Lam Street, Cheung Sha Wan
Kowloon
Tel.: +852-27861706 / 27861741
Fax: +852-27858664

Hungary
GRUNDFOS South East Europe Kft.
Tópark u. 8
H-2045 Törökbálint
Tel.: +36-23 511 110
Fax: +36-23 511 111

India
GRUNDFOS Pumps india Private Limited
118 Old Mahabalipuram Road
Thoraipakkam
Chennai 600 097
Tel.: +91-44 2496 6800

Indonesia
PT GRUNDFOS Pompa
Graha intirub Lt. 2 & 3
Jln. Cililitan Besar No.454. Makasar,
Jakarta Timur
ID-Jakarta 13650
Tel.: +62 21-469-51900
Fax: +62 21-460 6910 / 460 6901

Ireland
GRUNDFOS (Ireland) Ltd.
Unit A, Merrywell Business Park
Ballymount Road Lower
Dublin 12
Tel.: +353-1-4089 800
Fax: +353-1-4089 830

Italy
GRUNDFOS Pompe Italia S.r.l.
Via Gran Sasso 4
I-20060 Truccazzano (Milano)
Tel.: +39-02-95838112
Fax: +39-02-95309290 / 95838461

Japan
GRUNDFOS Pumps K.K.
1-2-3, Shin-Miyakoda, Kita-ku
Hamamatsu
431-2103 Japan
Tel.: +81 53 428 4760
Fax: +81 53 428 5005

Kazakhstan
Grundfos Kazakhstan LLP
7' Kyz-Zhibek Str., Kok-Tobe micr.
KZ-050020 Almaty Kazakhstan
Tel.: +7 (727) 227-98-55/56

Korea
GRUNDFOS Pumps Korea Ltd.
6th Floor, Aju Building 679-5
Yeoksam-dong, Kangnam-ku, 135-916
Seoul, Korea
Tel.: +82-2-5317 600
Fax: +82-2-5633 725

Latvia
SIA GRUNDFOS Pumps Latvia
Deglava biznesa centrs
Augusta Deglava ielā 60
LV-1035, Rīga,
Tel.: + 371 714 9640, 7 149 641
Fax: + 371 914 9646

Lithuania
GRUNDFOS Pumps UAB
Smolensko g. 6
LT-03201 Vilnius
Tel.: + 370 52 395 430
Fax: + 370 52 395 431

Malaysia
GRUNDFOS Pumps Sdn. Bhd.
7 Jalan Peguam U1/25
Glenmarie industrial Park
40150 Shah Alam, Selangor
Tel.: +60-3-5569 2922
Fax: +60-3-5569 2866

Mexico
Bombas GRUNDFOS de México
S.A. de C.V.
Boulevard TLC No. 15
Parque industrial Stiva Aeropuerto
Apodaca, N.L. 66600
Tel.: +52-81-8144 4000
Fax: +52-81-8144 4010

Netherlands
GRUNDFOS Netherlands
Veluwezoom 35
1326 AE Almere
Postbus 22015
1302 CA ALMERE
Tel.: +31-88-478 6336
Fax: +31-88-478 6332
E-mail: info_gnl@grundfos.com

New Zealand
GRUNDFOS Pumps NZ Ltd.
17 Beatrice Tinsley Crescent
North Harbour Industrial Estate
Albany, Auckland
Tel.: +64-9-415 3240
Fax: +64-9-415 3250

Norway
GRUNDFOS Pumper A/S
Strømsveien 344
Postboks 235, Leirdal
N-1011 Oslo
Tel.: +47-22 90 47 00
Fax: +47-22 32 21 50

Poland
GRUNDFOS Pompy Sp. z o.o.
ul. Klonowa 23
Baranowo k. Poznania
PL-62-081 Przeźmierowo
Tel.: (+48-61) 650 13 00
Fax: (+48-61) 650 13 50

Portugal
Bombas GRUNDFOS Portugal, S.A.
Rua Calvet de Magalhães, 241
Apartado 1079
P-2770-153 Paço de Arcos
Tel.: +351-21-440 76 00
Fax: +351-21-440 76 90

Romania
GRUNDFOS Pompe România SRL
S-PARK BUSINESS CENTER, Clădirea A2, etaj 2
Str. Tipografilor, Nr. 11-15, Sector 1, Cod 013714
Bucuresti, Romania
Tel.: 004 021 2004 100
E-mail: romania@grundfos.ro

Serbia
Grundfos Srbija d.o.o.
Omladinskih brigada 90b
11070 Novi Beograd
Tel.: +381 11 2258 740
Fax: +381 11 2281 769
www.rs.grundfos.com

Singapore
GRUNDFOS (Singapore) Pte. Ltd.
25 Jalan Tukang
Singapore 619264
Tel.: +65-6681 9688
Faxax: +65-6681 9689

Slovakia
GRUNDFOS s.r.o.
Prievozská 4D 821 09 BRATISLAVA
Tel.: +421 2 5020 1426
sk.grundfos.com

Slovenia
GRUNDFOS LJUBLJANA, d.o.o.
Leskoškova 9e, 1122 Ljubljana
Tel.: +386 (0) 1 568 06 10
Fax: +386 (0)1 568 06 19
E-mail: tehnika-si@grundfos.com

South Africa
GRUNDFOS (PTY) LTD
16 Lascelles Drive, Meadowbrook Estate
1609 Germiston, Johannesburg
Tel.: (+27) 10 248 6000
Fax: (+27) 10 248 6002
E-mail: lgradidge@grundfos.com

Spain
Bombas GRUNDFOS España S.A.
Camino de la Fuentecilla, s/n
E-28110 Algete (Madrid)
Tel.: +34-91-848 8800
Fax: +34-91-628 0465

Sweden
GRUNDFOS AB
Box 333 (Lunnagårdsgatan 6)
431 24 Mölndal
Tel.: +46 31 332 23 000
Fax: +46 31 331 94 60

Switzerland
GRUNDFOS Pumpen AG
Bruggacherstrasse 10
CH-8117 Fällanden/ZH
Tel.: +41-44-806 8111
Fax: +41-44-806 8115

Taiwan
GRUNDFOS Pumps (Taiwan) Ltd.
7 Floor, 219 Min-Chuan Road
Taichung, Taiwan, R.O.C.
Tel.: +886-4-2305 0868
Fax: +886-4-2305 0878

Thailand
GRUNDFOS (Thailand) Ltd.
92 Chaloem Phrakiat Rama 9 Road
Dokmai, Pravej, Bangkok 10250
Tel.: +66-2-725 8999
Fax: +66-2-725 8998

Turkey
GRUNDFOS POMPA San. ve Tic. Ltd. Sti.
Gebze Organize Sanayi Bölgesi
Ihsan dede Caddesi
2. yol 200. Sokak No. 204
41490 Gebze/ Kocaeli
Tel.: +90 - 262-679 7979
Fax: +90 - 262-679 7905
E-mail: satis@grundfos.com

Ukraine
ТОВ "ГРУНДФОС УКРАЇНА"
Бізнес Центр Європа
Столичне шосе, 103
м. Київ, 03131, Україна
Tel.: (+38 044) 237 04 00
Fax: (+38 044) 237 04 01
E-mail: ukraine@grundfos.com

United Arab Emirates
GRUNDFOS Gulf Distribution
P.O. Box 16768
Jebel Ali Free Zone, Dubai
Tel.: +971 4 8815 166
Fax: +971 4 8815 136

United Kingdom
GRUNDFOS Pumps Ltd.
Grovebury Road
Leighton Buzzard/Beds. LU7 4TL
Tel.: +44-1525-850000
Fax: +44-1525-850011

U.S.A.
Global Headquarters for WU
856 Koomey Road
Brookshire, Texas 77423 USA
Phone: +1-630-236-5500

Uzbekistan
Grundfos Tashkent, Uzbekistan
The Representative Office of Grundfos Kazakhstan in Uzbekistan
38a, Oybek street, Tashkent
Tel.: (+998) 71 150 3290 / 71 150 3291
Fax: (+998) 71 150 3292

99001958 **04.2024**
ECM: 1393221

GRUNDFOS Holding A/S
Poul Due Jensens Vej 7
DK-8850 Bjerringbro
Tel: +45 87 50 14 00
www.grundfos.com

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