

CHV booster

Hydro Pack, Hydro Dome
50 Hz



Contents

Hydro Pack

General data

Performance range	Page	3
Applications	Page	4
General description	Page	4
Operating conditions	Page	4
Type key	Page	4
Technical data	Page	4
Product range	Page	5
Function	Page	5
Operation	Page	5

Performance curves, technical data

CHV 2	Page	6
CHV 4	Page	7
Main components, single-phase	Page	8
Main components, three-phase	Page	8

Accessories

Page	9
------	---

Hydro Dome

General data

Performance range	Page	10
Applications	Page	11
General description	Page	11
Operating conditions	Page	11
Type key	Page	11
Technical data	Page	11
Product range	Page	12
Function	Page	12
Operation	Page	12

Performance curves, technical data

CHV 2	Page	14
CHV 4	Page	17
Materials	Page	18

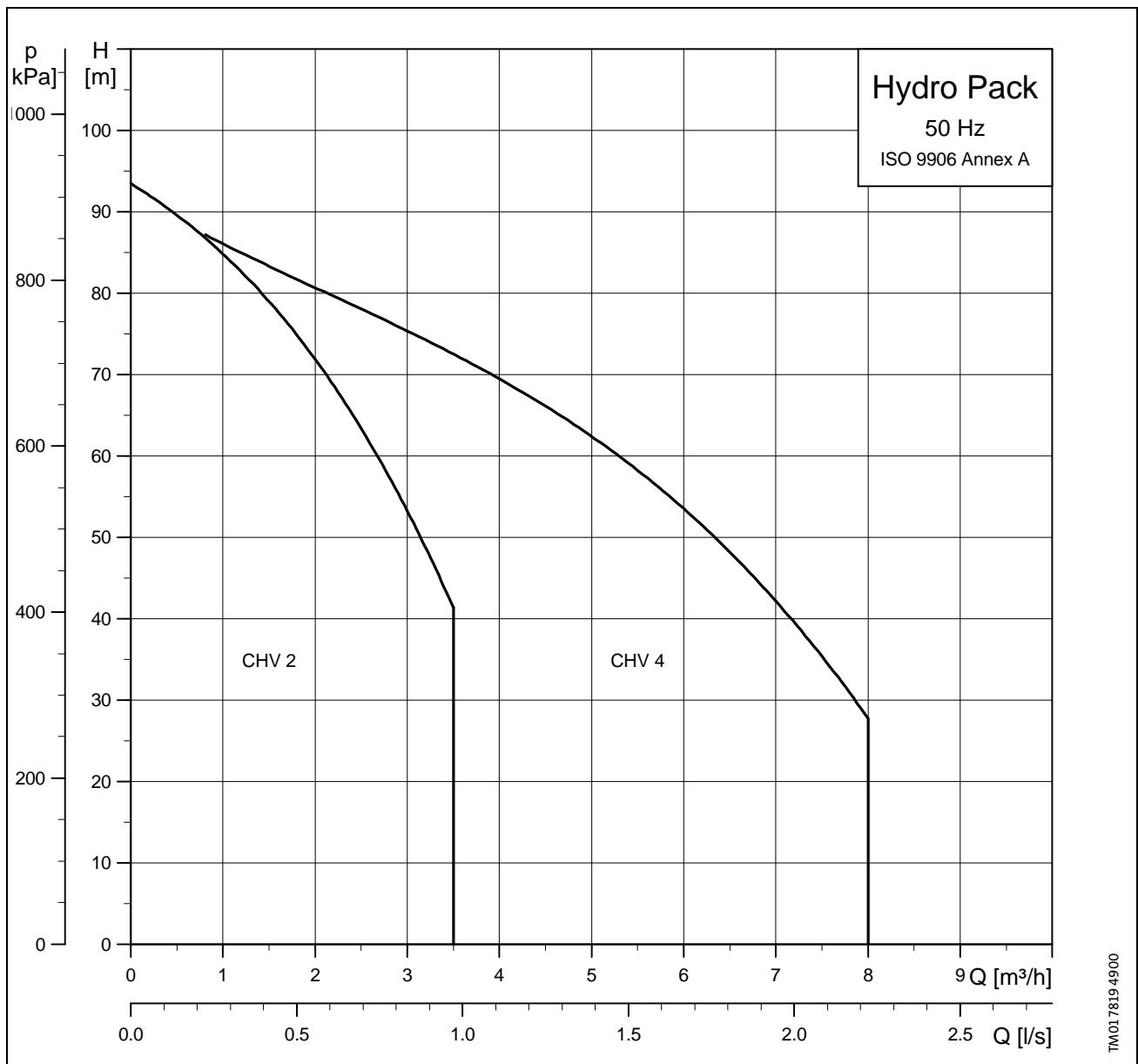
Accessories

Page	19
------	----

Tank selection

Hydro Pack	
Hydro Dome	Page 20

Performance range



Applications

Grundfos Hydro Pack booster sets are designed for boosting of clean water in

- small waterworks
- small blocks of flats
- hotels
- stores
- industrial plants,
- hospitals
- schools
- large houses.

General description

The Grundfos Hydro Pack booster set consists of a Grundfos CHV pump mounted on a base frame, and a controller incorporating motor protection (three-phase only). A separate diaphragm tank must be installed in connection with the booster set.

The pump operates automatically according to the system requirement by means of a pressure switch. The pressure switch is factory-set to zero bar inlet pressure and can be adjusted according to the hydraulic conditions of the pumping system.

The Hydro Pack booster set is supplied as a complete, pre-assembled and tested system (without tank).

Hydro Pack booster set includes

- discharge components,
- five-way fitting,
- pressure switch and
- controller (three-phase only).

Tank and dry-running protection are available as accessories.

To ensure stable operation, the booster set must be connected to a separate diaphragm tank of a suitable size, installed on the floor, see "Pressure tank" page 9 and "Tank selection" page 20.

If water is drawn from a reservoir below the pump, a non-return valve in the suction pipe is required.

Operating conditions

Liquid temperature: 0°C to +40°C.

Ambient temperature: 0°C to +40°C.

Maximum operating pressure: 10 bar.

Maximum operating pressure = maximum inlet pressure + pump head. The maximum operating pressure is limited by the characteristics of the booster set. The maximum operating pressure may also be limited by the tank installed.

Number of starts/stops per hour: 100.

Minimum inlet pressure:

The minimum inlet pressure H in meters head required to avoid cavitation of the booster is calculated as follows:

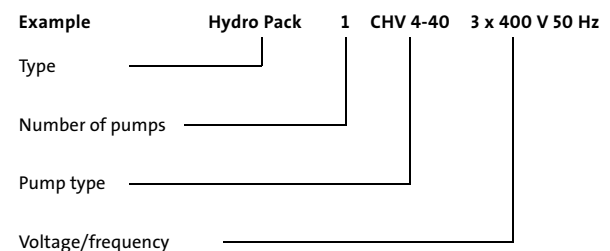
$$H = P_b \times 10.2 - \text{NPSH} - H_f - H_v - H_s$$

P_b = Barometric pressure
 NPSH = Net Positive Suction Head in metres head
 H_f = Friction loss in suction pipe
 H_s = Safety margin of minimum 0.5 m.

Maximum inlet pressure:

The actual inlet pressure plus the pressure against closed valve should always be lower than the maximum operating pressure, i.e. 10 bar.

Type key



Technical data

Power supply: 1 x 220-240 V, 50 Hz
3 x 380-415 V, 50 Hz.

Power range: Up to 2.1 kW for each pump,
Direct-on-line starting

Enclosure class: Motor: IP 54
Control CS 103
for three-phase motor: IP 65
Pressure switch: IP 54

Pump type: CHV.

Product range

Hydro Pack, CHV 2

Hydro Pack	Voltage	Power P_1 [W]	Product no.
CHV 2-40	1 x 220-240 V	600	96 04 88 77
CHV 2-50	1 x 220-240 V	700	96 04 88 78
CHV 2-60	1 x 220-240 V	870	96 04 88 79
CHV 2-40	3 x 380-415 V	580	96 04 88 87
CHV 2-50	3 x 380-415 V	700	96 04 88 88
CHV 2-60	3 x 380-415 V	860	96 04 88 89
CHV 2-80	3 x 380-415 V	1120	96 04 88 90
CHV 2-100	3 x 380-415 V	1270	96 04 88 91

Hydro Pack, CHV 4

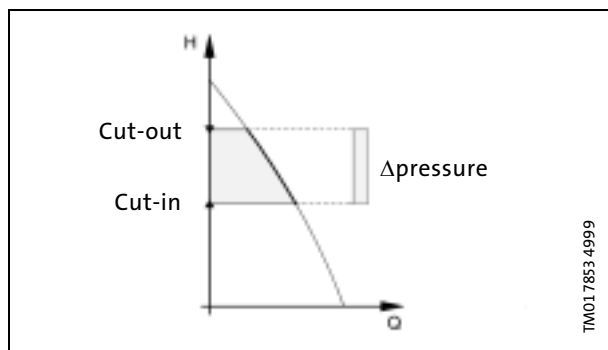
Hydro Pack	Voltage	Power P_1 [W]	Product no.
CHV 4-40	1 x 220-240 V	950	96 04 88 82
CHV 4-50	1 x 220-240 V	1240	96 04 88 83
CHV 4-60	1 x 220-240 V	1450	96 04 88 84
CHV 4-40	3 x 380-415 V	960	96 04 88 92
CHV 4-50	3 x 380-415 V	1240	96 04 88 93
CHV 4-60	3 x 380-415 V	1500	96 04 88 94
CHV 4-80	3 x 380-415 V	1770	96 04 88 95
CHV 4-100	3 x 380-415 V	2070	96 04 88 96

Function

The pump operates automatically according to system requirement by means of a pressure switch.

When the tap is opened, water is drawn from the diaphragm tank. When, consequently, the pressure drops to the cut-in pressure level, the pump will be cut in until the performance of the pump corresponds to the requirement.

When the water consumption falls and the discharge pressure reaches the cut-out pressure level, the pressure switch will cut out the pump.



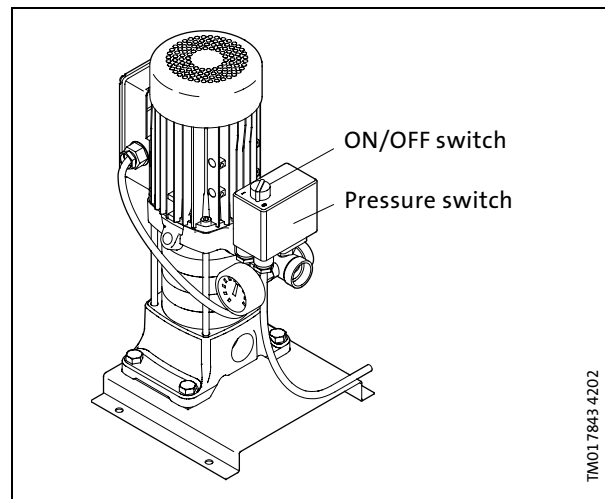
TM017853 4999

Operation

Single-phase versions

The pressure switch of the single-phase variants has an on/off switch.

Motors have built-in thermal switch



TM017843 4202

Three-phase versions

Apart from the pressure switch for automatic operation, the three-phase versions incorporate a CS 103 controller with the following operating buttons:

- main switch
- start and stop push buttons

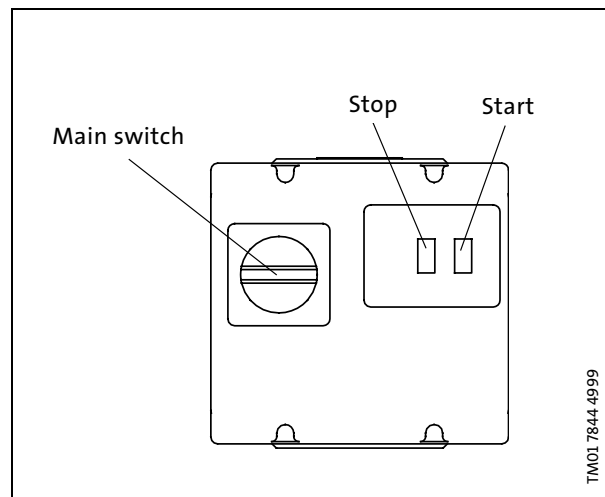
Furthermore, the Hydro Pack booster sets feature:

- Automatic circuit breaker protecting the motor against short circuit and overload.

In addition, the following is available as accessory. See "Accessories" page 9.

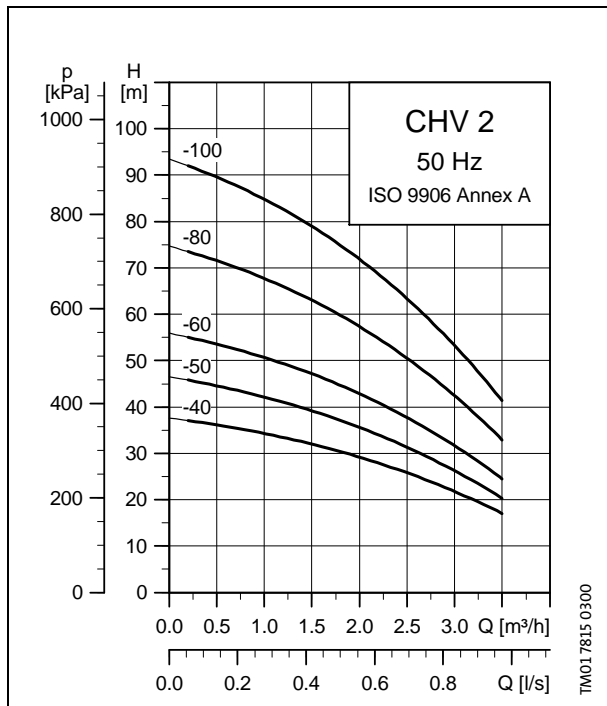
-dry-running protection by means of an additional pressure switch or level switch.

CS 103 controller

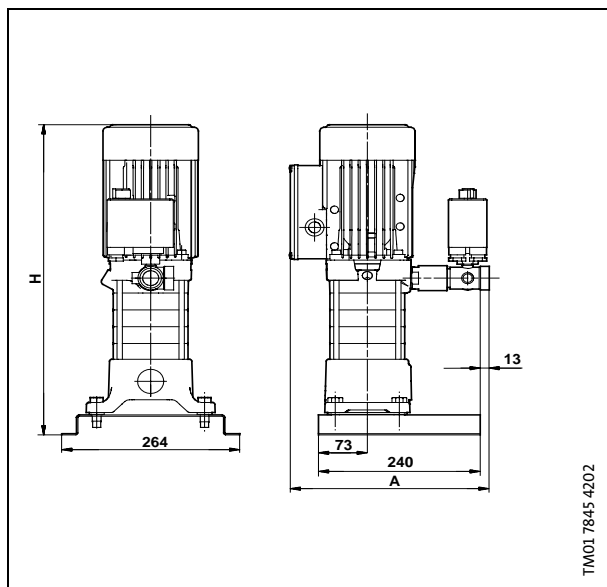


TM017844 4999

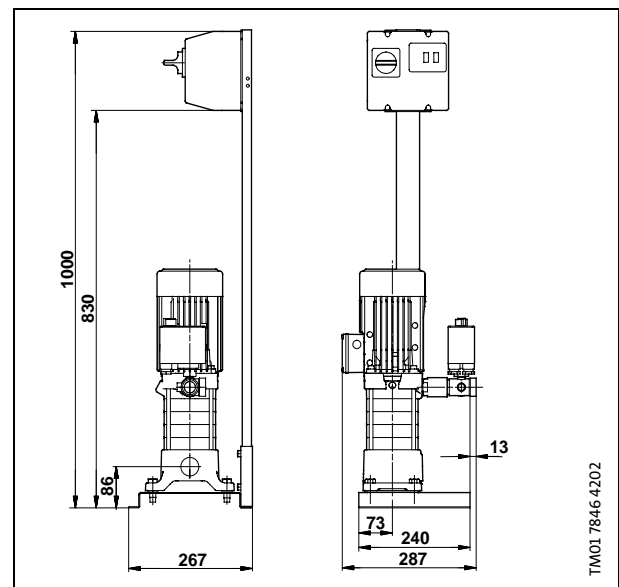
CHV 2



Single-phase



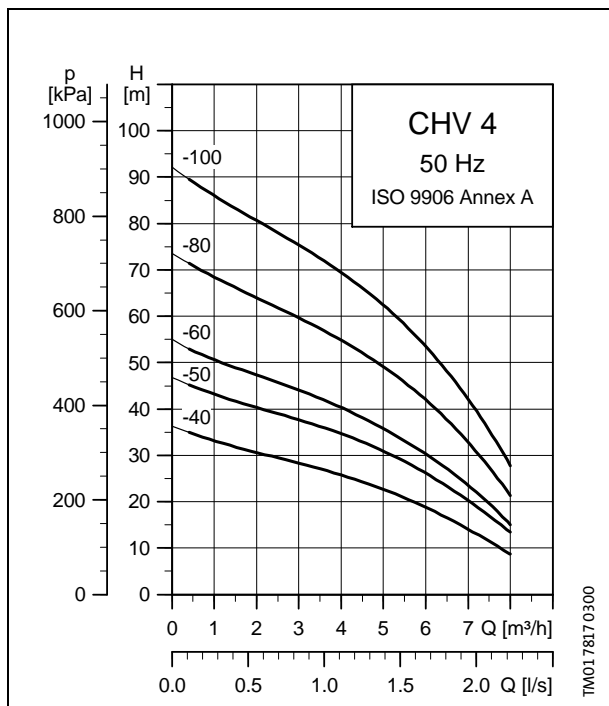
Three-phase



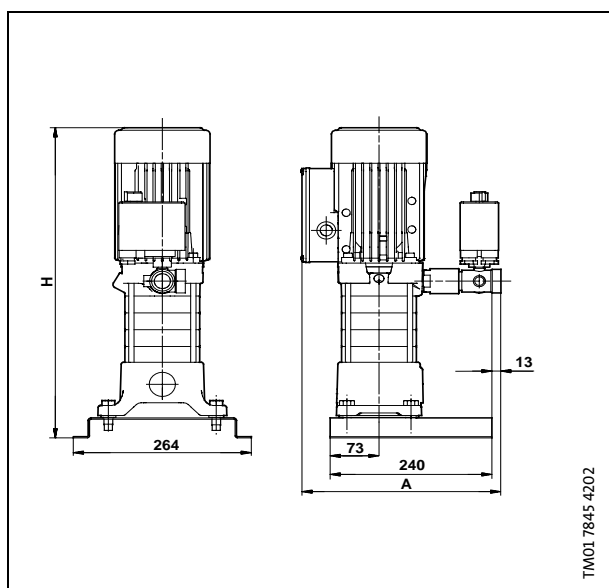
Electrical data, dimensions and weights

Pump type	Motor P ₁ /P ₂ [W]		I _{1/1} [A]		I _{st} [A]		H [mm]	A [mm]	Weight [kg]	
	1~	3~	1~	3~	1~	3~			1~	3~
CHV 2-40	600/400	580/420	3	1.1	10	7.5	427	294	15.2	18
CHV 2-50	700/470	700/500	3.4	1.3	10	7.5	445		15.5	18.3
CHV 2-60	870/600	860/620	4.1	1.5	11	7.5	463		16.4	19.3
CHV 2-80		1120/800		2.0		11				20.9
CHV 2-100		1270/970		2.4		17				22.9

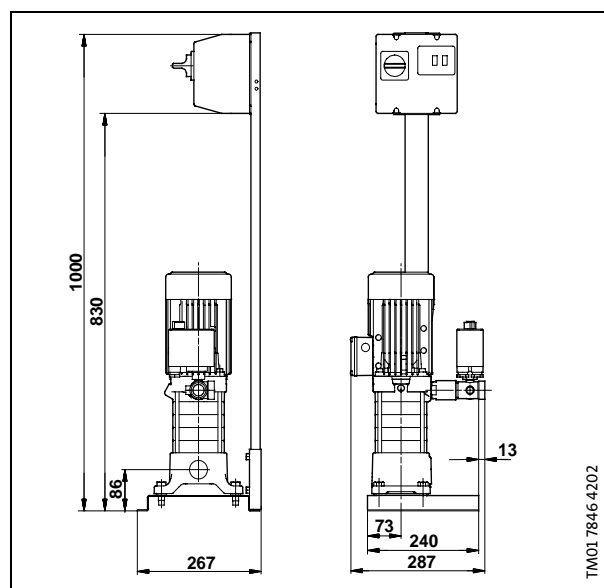
CHV 4



Single-phase



Three-phase



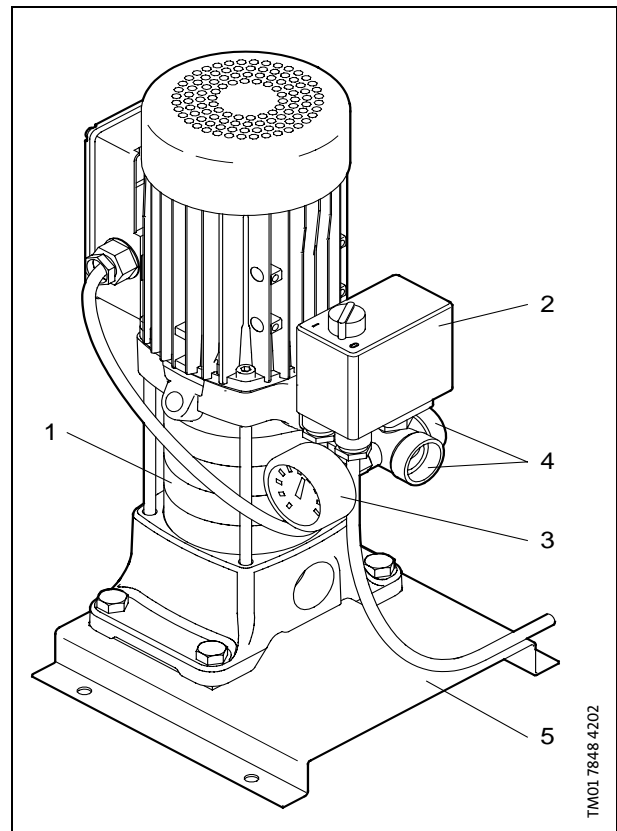
Electrical data, dimensions and weights

Pump type	Motor P ₁ /P ₂ [W]		I _{1/1} [A]		I _{st} [A]		H [mm]	A [mm]	Weight [kg]	
	1~	3~	1~	3~	1~	3~	1~	1~	1~	3~
CHV 4-40	950/660	960/660	4.4	1.7	11	7.5	463	294	16.1	18.9
CHV 4-50	1240/870	1240/910	6.0	2.3	21	17	523		19.1	21.9
CHV 4-60	1450/1010	1500/1070	6.9	2.7	21	17	550	312	19.5	22.2
CHV 4-80		1770/1450		3.6		25				27.7
CHV 4-100		2070/1680		3.9		25				28.5

Main components, single-phase

Pos.	Component	Description
1	CHV pump	See CHV data booklet
2	Pressure switch	Telemecanique 0 - 12 bar
3	Pressure gauge, ø63 mm	0-10 bar
4	Five-way fitting Connection for discharge and tank	Rp 1
5	Base plate	Stainless steel AISI 304

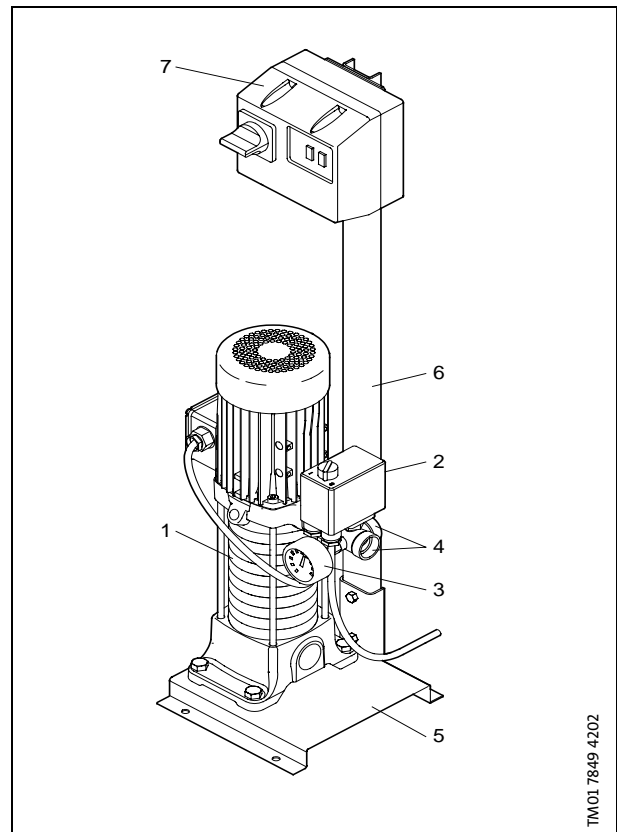
Single-phase



Main components, three-phase

Pos.	Component	Description
1	CHV pump	See CHV data booklet
2	Pressure switch	Telemecanique 0 - 12 bar
3	Pressure gauge, ø63 mm	0-10 bar
4	Five-way fitting Connection for discharge and tank	Rp 1
5	Base plate	Stainless steel AISI 304
6	Stand	Stainless steel AISI 304
7	Controller	CS 103

Three-phase



Pressure tank

The tank must always be installed on the pressure side of the system.

Description	Capacity [litres]	Product no.
Diaphragm tank	80	96 43 66 67
Bladder tank	80	96 43 66 09
Diaphragm tank or bladder tank	Other	Please contact Grundfos

Non-return valve

Description	Dimension	Product no.
Non-return valve	Rp 1"	95 60 10

Accessories for three-phase only

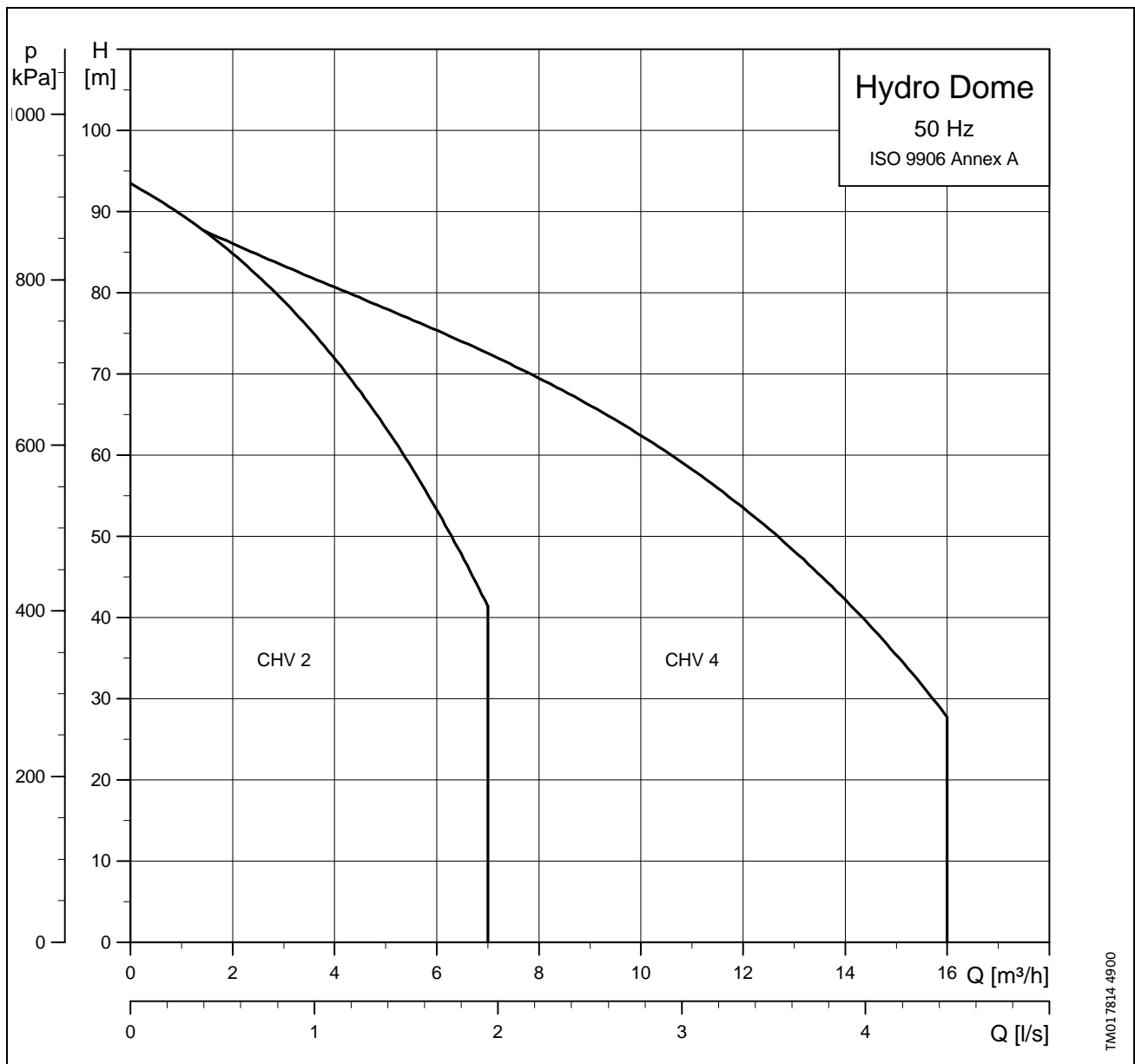
Dry-running protection kit

For protecting the pump against dry-running.

Dry-running protection kit is to be installed on the suction side of the system.

Description	Dimensions/range	Product no.
Pressure switch kit includes: Pressure switch, cable, support, pipe and vane.	0.4 - 1.2 bar	96 04 90 09
Level switch Maximum temperature : +50°C.	5 m cable	GF 25 38
	10 m cable	GF 25 39
	20 m cable	GF 25 40

Performance range



Applications

Grundfos Hydro Dome booster sets are designed for boosting of clean water in

- small waterworks
- small blocks of flats
- hotels
- stores
- industrial plants
- hospitals
- schools
- large houses

General description

The Grundfos Hydro Dome booster set consists of two identical Grundfos CHV pumps mounted in parallel on a common base frame and a control cabinet incorporating motor protection and controller.

The pumps operate automatically according to system requirement by means of two pressure switches. The pressure switches are factory-set to zero bar inlet pressure and can be adjusted according to the hydraulic conditions of the pumping system.

Hydro Dome booster sets are supplied as complete, pre-assembled and tested systems (without tank).

The Hydro Dome booster set includes

- suction and discharge manifolds,
- isolating valves,
- pressure gauge,
- non-return valves,
- pressure switches and
- controller.

Tank, dry-running protection and overpressure protection, alarm and emergency kit are available as accessories.

To ensure stable operation, the booster set must be connected to a diaphragm tank of a suitable size. See "Pressure tank" page 19 and "Tank selection" page 20.

The booster set is designed for two tanks each of 24 litres connected to the discharge manifold. An additional diaphragm tank can be installed on the floor in order to fulfil the operating conditions of the pumping system.

Operating conditions

Liquid temperature: 0°C to +40°C.

Ambient temperature: 0°C to +40°C.

Maximum operating pressure: 10 bar.

Maximum operating pressure = maximum inlet pressure + pump head. The maximum operating pressure is limited by the characteristics of the booster set. The maximum operating pressure may also be limited by the tank installed.

Minimum inlet pressure:

The minimum inlet pressure H in metres head required to avoid cavitation of the booster is calculated as follows:

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

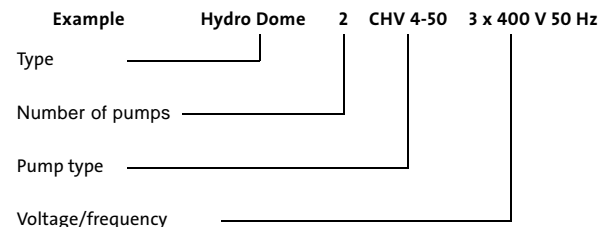
P_b = Barometric pressure
 $NPSH$ = Net Positive Suction Head in metres head
 H_f = Friction loss in suction pipe
 H_s = Safety margin of minimum 0.5 m.

Maximum inlet pressure:

The actual inlet pressure plus the pressure against closed valve should always be lower than the maximum operating pressure, i.e. 10 bar.

Number of starts/stops per hour: 100.

Type key



Technical data

- Power supply : 1 x 220-240 V , 50 Hz
 3 x 380-415 V , 50 Hz
- Power range : Up to 2.1 kW for each pump,
 Direct-on-line starting.
- Enclosure class : Motor: IP 54
 Control CS 201:IP 54
 Control CS 203b:IP 54
 Pressure switch:IP 54
- Pump type: CHV.

Product range

Hydro Dome, CHV 2

Hydro Dome	Voltage	Power P ₁ [W]	Product no.
CHV 2-50	1 x 220-240 V	700	96 04 88 61
CHV 2-60	1 x 220-240 V	870	96 04 88 62
CHV 2-80	1 x 220-240 V	1090	96 04 88 63
CHV 2-50	3 x 380-415 V	700	96 04 88 69
CHV 2-60	3 x 380-415 V	860	96 04 88 70
CHV 2-80	3 x 380-415 V	1120	96 04 88 71
CHV 2-100	3 x 380-415 V	1270	96 04 88 72

Hydro Dome, CHV 4

Hydro Dome	Voltage	Power P ₁ [W]	Product no.
CHV 4-40	1 x 220-240 V	950	96 43 63 59
CHV 4-50	1 x 220-240 V	1240	96 04 88 65
CHV 4-60	1 x 220-240 V	1450	96 04 88 66
CHV 4-80	1 x 220-240 V	1700	96 04 88 67
CHV 4-40	3 x 380-415 V	960	96 43 63 60
CHV 4-50	3 x 380-415 V	1240	96 04 88 73
CHV 4-60	3 x 380-415 V	1500	96 04 88 74
CHV 4-80	3 x 380-415 V	1770	96 04 88 75
CHV 4-100	3 x 380-415 V	2070	96 04 88 76

Function

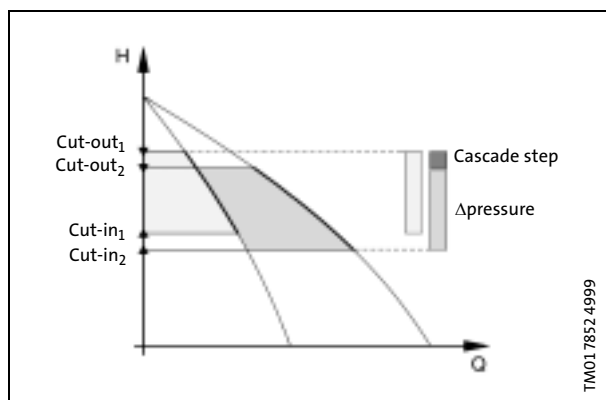
The pumps operate automatically according to system requirement by means of two pressure switches.

When a tap is opened, water is drawn from the diaphragm tank. When the pressure drops to the first cut-in pressure level, the first pump is cut-in.

As the consumption rises, the second pump will be cut in until the performance of the two pumps in operation corresponds to the requirement.

When the water consumption falls and the discharge pressure reaches the cut-out pressure level, the controller will stop the pump which was cut-in first.

As the consumption falls, the second pump will be cut-out.



Operation

Single-phase versions

The single-phase versions are controlled by the CS 201 controller.

The CS 201 controller features the following functions:

- Automatic cascade control of pumps by means of two pressure switches
- Automatic change-over at any start/stop cycle
- Main switch, pos. 1.
- Selector switch with three positions: Manual operation/off/automatic operation, pos. 2.

Furthermore the Hydro Dome features:

- Short circuit protection by means of fuses
- Motors have built-in thermal switch
- Indicator lights for:

-Power on, pos. 3.

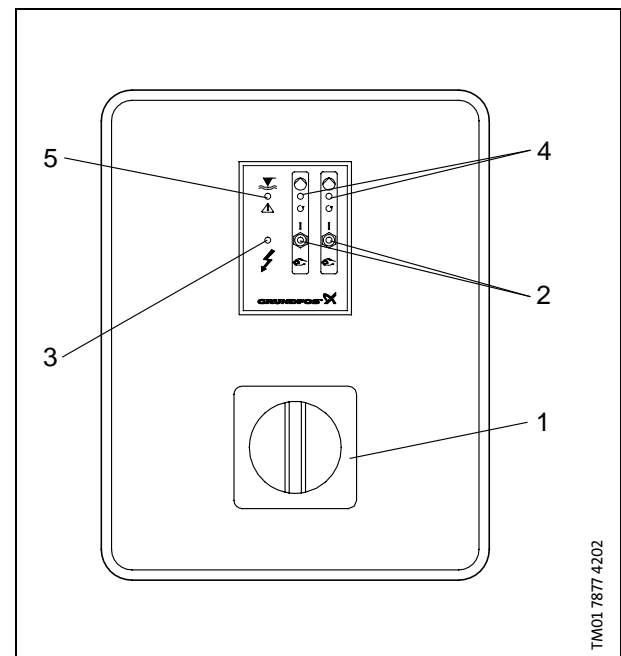
-Pump running, pos. 4.

-Dry-running alarm, pos. 5.

In addition, the following is available as accessory. See "Accessories" page 19.

- Dry-running protection by means of an additional pressure switch.

CS 201 controller



Three-phase versions

The three-phase versions are controlled by the CS 203b controller, featuring the following functions:

- Automatic cascade control of pumps by means of two pressure switches.
- Automatic change-over at any start/stop cycle.
- Main switch, pos. 1.
- Selector switch for each pump with two positions: Off/automatic operation, pos. 2.
- Push-button for each pump: Manual operation or re-setting of alarm, pos. 3.
- Time control:
 - Stop delay of the last pump: Keeps the last pump in operation 1.5 sec. after cut-out pressure is reached in order to avoid a simultaneous stop of the two pumps.
 - After-run delay: Keeps pumps in operation 1.5 sec. when the cut-out pressure is reached.
 - Start delay: Prevents simultaneous start of the two pumps.

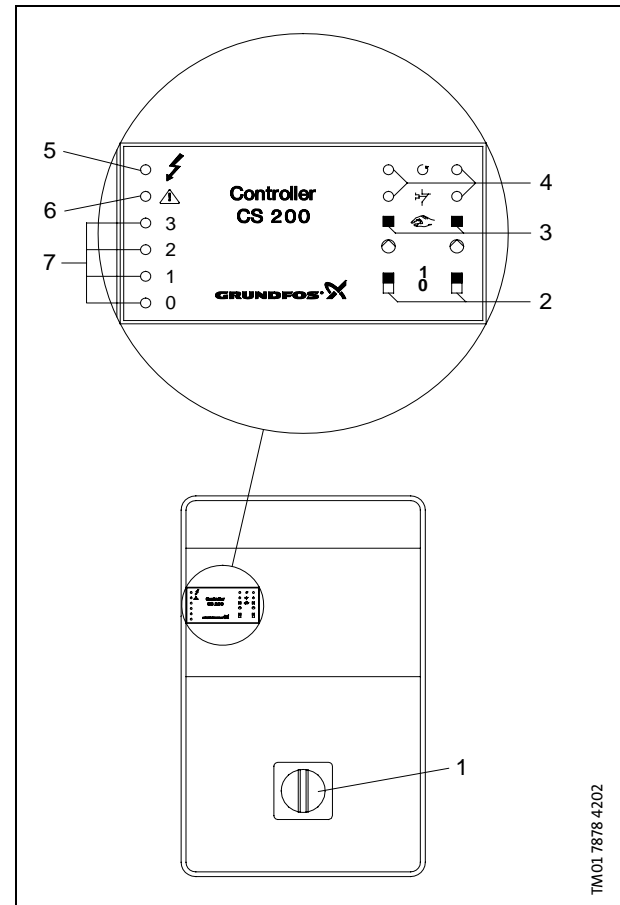
Futhermore the Hydro Dome features:

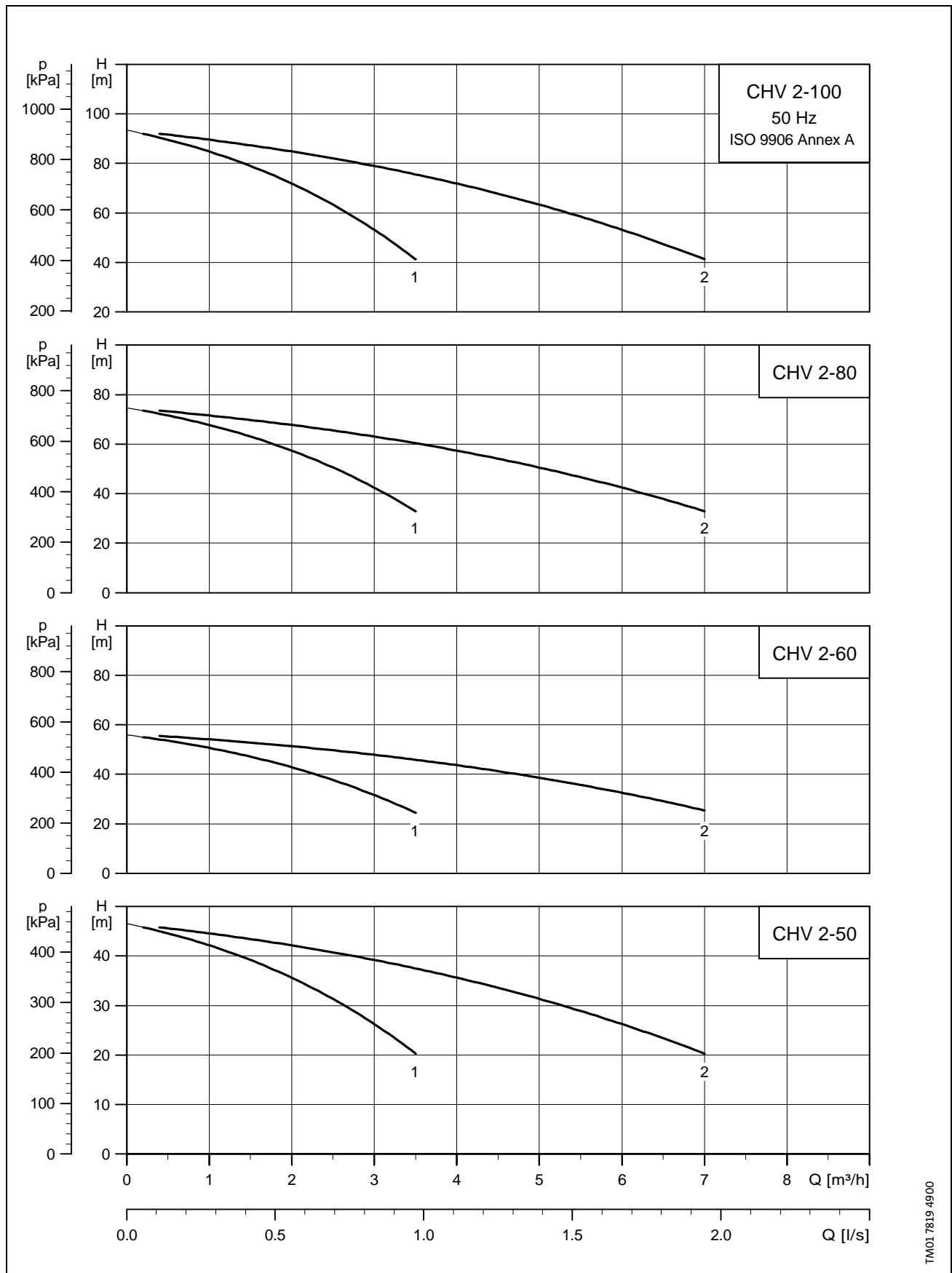
- Automatic circuit breaker protecting the motor against short circuit and overload.
- Indicator lights for:
 - Operation and fault, pos. 4.
 - Power on, pos. 5.
 - Dry-running alarm, pos. 6.
 - Overpressure alarm, pos. 6.
 - Faulty pressure switches at start/stop, pos. 6.
 - Pressure switch operation (dry running, overpressure, start/stop), pos. 7.

In addition, the following are available as accessories. See "Accessories" page 19.

- Dry-running protection by means of an additional pressure switch or level switch.
- Overpressure protection by means of an additional pressure switch.
- Potential-free contact for external alarm.
- Emergency operation in case of damage of electronics.

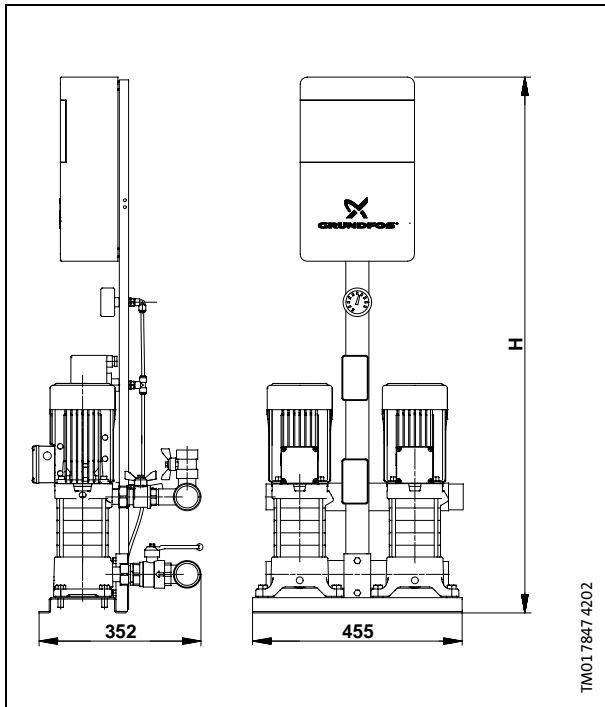
CS 203b controller





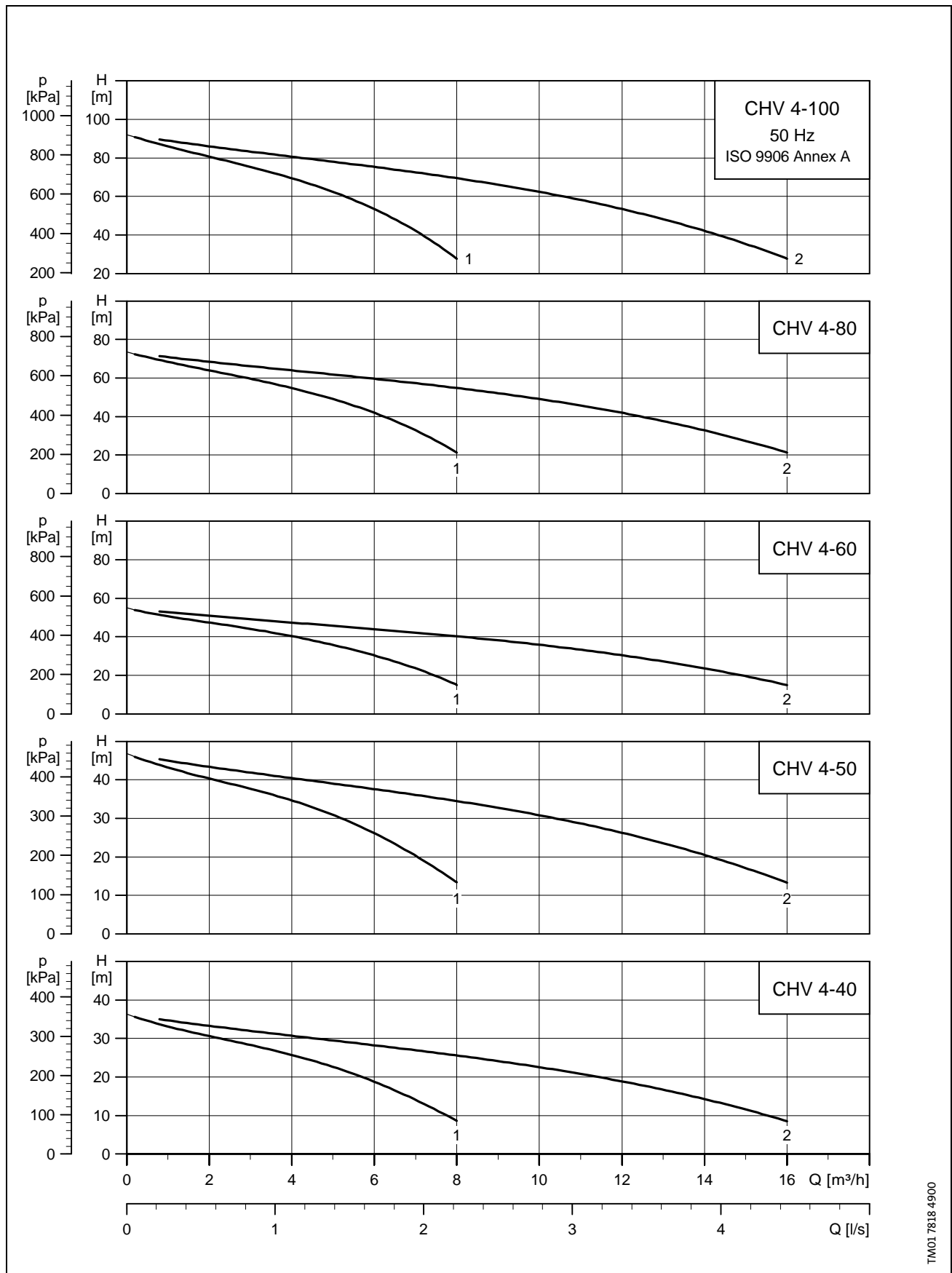
TM01 7819 4900

CHV 2



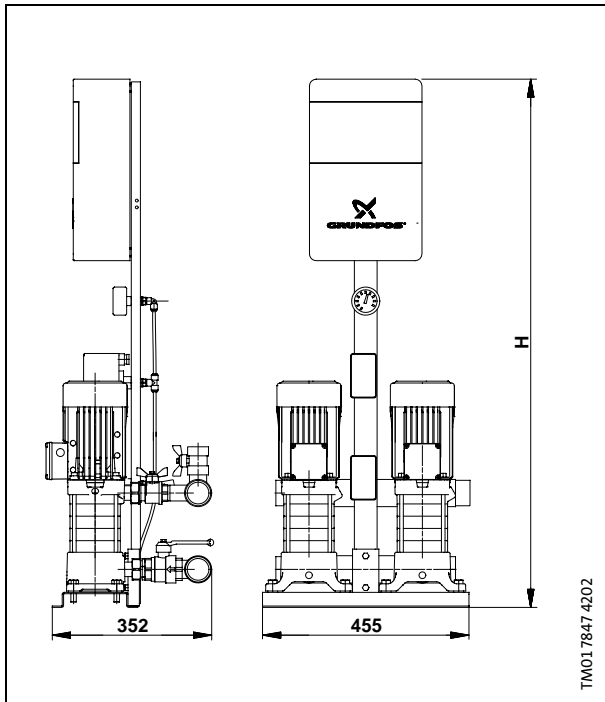
Electrical data, dimensions and weights

Pump type	Motor P ₁ /P ₂ [W]		I _{1/1} [A]		I _{st} [A]		H [mm]		Weight [kg]	
	1~	3~	1~	3~	1~	3~	1~	3~	1~	3~
CHV 2-50	700/470	700/500	3.4	1.3	10	7.5	1010	1190	50.1	53.6
CHV 2-60	870/600	860/620	4.1	1.5	11	7.5	1010	1190	51.8	55.6
CHV 2-80	1090/760	1120/800	4.9	2.0	12	11	1010	1190	55.4	58.8
CHV 2-100		1270/970		2.4		17		1190		62.8



TM01 7818 4900

CHV 4

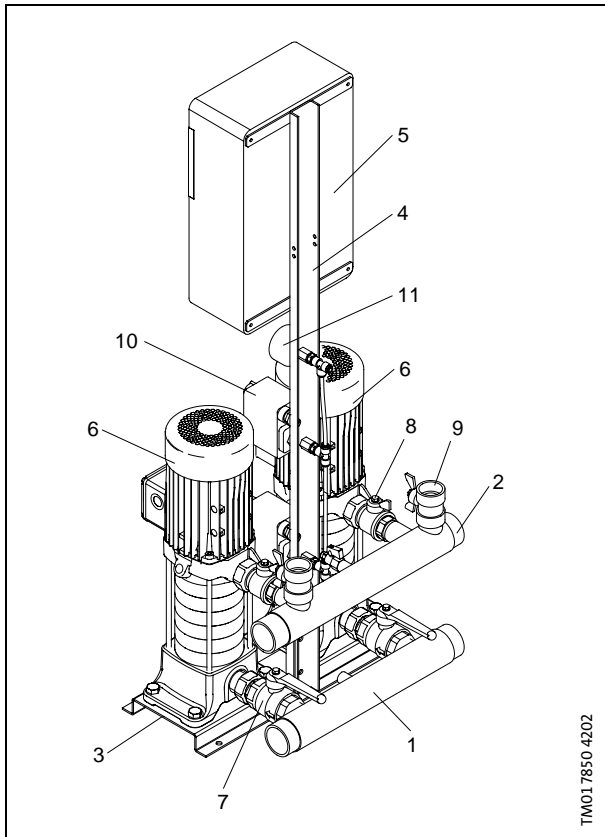


Electrical data, dimensions and weights

Pump type	Motor P ₁ /P ₂ [W]		I _{1/1} [A]		I _{st} [A]		H [mm]		Weight [kg]	
	1~	3~	1~	3~	1~	3~	1~	3~	1~	3~
CHV 4-40	950/660	950/660	4.4	1.7	11	7.5	1010	1190	51.2	53.4
CHV 4-50	1240/870	1240/910	6.0	2.3	21	17	1010	1190	57.2	60.6
CHV 4-60	1450/1010	1450/1070	6.9	2.7	21	17	1010	1190	58.0	61.4
CHV 4-80		1700/1450		3.6		25		1190		72.4
CHV 4-100		2050/1680		3.9		25		1190		74.0

Materials

Pos.	Component	Number	Material/ other information
1	Suction manifold (2")	1	Stainless steel AISI 304
2	Discharge manifold (2")	1	Stainless steel AISI 304
3	Base plate	1	Stainless steel AISI 304
4	Stand	1	Stainless steel AISI 304
5	Controller	1	Single-phase: CS 201 Three-phase: CS 203b
6	CHV pump	2	See CHV data booklet
7	Ball valve and non-return valve 1½"	2	Brass, chrome plated
8	Isolating valve	2	Brass, chrome plated
9	Ball valve for tank connection 1"	2	Brass, chrome plated
10	Pressure switch	2	Telemecanique 0-12 bar
11	Pressure gauge ø63	1	0-10 bar



Dry-running protection kit

Dry-running protection kit is to be installed on the suction side of the system.

Description	Dimensions/range	Product no.
Pressure switch kit includes: Pressure switch, cable, support, pipe and vane.	0.4 - 1.2 bar	96 04 90 09
Level switch Maximum temperature : +50°C	5 m cable	GF 25 38
	10 m cable	GF 25 39
	20 m cable	GF 25 40

Pressure tank

The pressure tank must always be installed on the pressure side of the system.

Description	Capacity (litres)	Product no.
Diaphragm tank	24	96 43 66 64
Bladder tank	24	96 43 66 38
Diaphragm tank or bladder tank	Other	Please contact Grundfos

Note: Two 24-litre tanks can be mounted on the discharge manifold. Tanks with other capacities can be mounted separately.

Accessories for three-phase only

Overpressure protection kit

For protecting the discharge pipes against high pressure in case of malfunction of the pump pressure switches.

The overpressure protection kit is to be installed on the pressure side of the system.

Description	Dimensions/range	Product no.
Overpressure switch kit includes: Pressure switch, cable, support, pipe and vane.	8 - 10 bar	96 04 90 08

Alarm

Description	Dimensions/range	Product no.
C.A.N. alarm	Acoustic alarm with internal battery	91 19 93 51

Emergency operation kit

Product	Description	Product no.
Emergency operation kit	By-pass the electronic module	96 04 90 10

Pressure tanks

To ensure stable operation, the booster sets must be installed in combination with a diaphragm or bladder tank.

Hydro Pack

The five-way fitting has two Rp 1 threads. One is for the tank and one is for the discharge pipe.

An 80-litre tank is recommended but this capacity can be optimized according to the system conditions.

Hydro Dome

The discharge manifold is equipped with two 1" ball valves for installation of two 24-litre diaphragm tanks, each of a maximum diameter of 330 mm.

If this type of installation is not used a bigger tank must be installed on the floor in combination with the booster set.

The tank capacity can be calculated as follows:

Capacity

$$V = \frac{Q \times 1000 \times (1 + (\text{Cut in}) + \Delta p)}{4 \times n_{\max} \times \Delta p} \times \frac{1}{k}$$

- V = Tank volume (litres).
- Q = Mean flow (m³/h) of one pump only.
- Δp = Difference between cut-in and cut-out pressure.
- Cut-in = Cut-in pressure (lowest) (bar).
- n_{max} = Max starts/stops per hour : 100.
- k = Constant for diaphragm tank pre-charge pressure : k = 0.9.

V7 15 61 33 11 02	GB
Repl. V7 15 61 33 05 01	

Subject to alterations.