

# Hydro Dome

- Ⓜ Installation and operating instructions
- Ⓜ Montage- und Betriebsanleitung
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## Declaration of Conformity

We **GRUNDFOS** declare under our sole responsibility that the products **Hydro Dome**, to which this declaration relates, are in conformity with the Council Directives on the approximation of the laws of the EC Member States relating to

- Machinery (98/37/EC).  
Standard used: EN 292.
- Electromagnetic compatibility (89/336/EEC).  
Standards used: EN 61 000-6-2 and EN 61 000-6-3.
- Electrical equipment designed for use within certain voltage limits (73/23/EEC) [95].  
Standard used: EN 60 204-1.

## Déclaration de Conformité

Nous **GRUNDFOS** déclarons sous notre seule responsabilité que les produits **Hydro Dome** auxquels se réfère cette déclaration sont conformes aux Directives du Conseil concernant le rapprochement des législations des Etats membres CE relatives à

- Machines (98/37/CE).  
Standard utilisé: EN 292.
- Compatibilité électromagnétique (89/336/CEE).  
Standards utilisés: EN 61 000-6-2 et EN 61 000-6-3.
- Matériel électrique destiné à employer dans certaines limites de tension (73/23/CEE) [95].  
Standard utilisé: EN 60 204-1.

## Declaración de Conformidad

Nosotros **GRUNDFOS** declaramos bajo nuestra única responsabilidad que los productos **Hydro Dome** a los cuales se refiere esta declaración son conformes con las Directivas del Consejo relativas a la aproximación de las legislaciones de los Estados Miembros de la CE sobre

- Máquinas (98/37/CE).  
Norma aplicada: EN 292.
- Compatibilidad electromagnética (89/336/CEE).  
Normas aplicadas: EN 61 000-6-2 y EN 61 000-6-3.
- Material eléctrico destinado a utilizarse con determinados límites de tensión (73/23/CEE) [95].  
Norma aplicada: EN 60 204-1.

## Δήλωση Συμμόρφωσης

Εμείς η **GRUNDFOS** δηλώνουμε με αποκλειστικά δική μας ευθύνη ότι τα προϊόντα **Hydro Dome** συμμορφώνονται με την Οδηγία του Συμβουλίου επί της σύγκλισης των νόμων των Κρατών Μελών της Ευρωπαϊκής Ένωσης σε σχέση με τα

- Μηχανήματα (98/37/ΕΚ).  
Πρότυπο που χρησιμοποιήθηκε: EN 292.
- Ηλεκτρομαγνητική συμβατότητα (89/336/ΕΕΚ).  
Πρότυπα που χρησιμοποιήθηκαν: EN 61 000-6-2 και EN 61 000-6-3.
- Ηλεκτρικές συσκευές σχεδιασμένες για χρήση εντός ορισμένων ορίων ηλεκτρικής τάσης (73/23/ΕΕΚ) [95].  
Πρότυπο που χρησιμοποιήθηκε: EN 60 204-1.

## Försäkran om överensstämmelse

Vi **GRUNDFOS** försäkrar under ansvar, att produkterna **Hydro Dome**, som omfattas av denna försäkran, är i överensstämmelse med Rådets Direktiv om inbördes närmande till EU-medlemsstaternas lagstiftning, avseende

- Maskinell utrustning (98/37/EC).  
Använd standard: EN 292.
- Elektromagnetisk kompatibilitet (89/336/EC).  
Använda standarder: EN 61 000-6-2 och EN 61 000-6-3.
- Elektrisk material avsedd för användning inom vissa spänningsgränser (73/23/EC) [95].  
Använd standard: EN 60 204-1.

## Overensstemmelseserklæring

Vi **GRUNDFOS** erklærer under ansvar, at produkterne **Hydro Dome**, som denne erklæring omhandler, er i overensstemmelse med Rådets direktiver om indbyrdes tilnærmelse til EF medlemsstaternes lovgivning om

- Maskiner (98/37/EF).  
Anvendt standard: EN 292.
- Elektromagnetisk kompatibilitet (89/336/EØF).  
Anvendte standarder: EN 61 000-6-2 og EN 61 000-6-3.
- Elektrisk materiel bestemt til anvendelse inden for visse spændingsgrænser (73/23/EØF) [95].  
Anvendt standard: EN 60 204-1.

## Konformitätserklärung

Wir **GRUNDFOS** erklären in alleiniger Verantwortung, daß die Produkte **Hydro Dome**, auf die sich diese Erklärung bezieht, mit den folgenden Richtlinien des Rates zur Angleichung der Rechtsvorschriften der EG-Mitgliedstaaten übereinstimmen:

- Maschinen (98/37/EG).  
Norm, die verwendet wurde: EN 292.
- Elektromagnetische Verträglichkeit (89/336/EWG).  
Normen, die verwendet wurden: EN 61 000-6-2 und EN 61 000-6-3.
- Elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen (73/23/EWG) [95].  
Norm, die verwendet wurde: EN 60 204-1.

## Dichiarazione di Conformità

Noi **GRUNDFOS** dichiariamo sotto la nostra esclusiva responsabilità che i prodotti **Hydro Dome**, ai quali questa dichiarazione si riferisce, sono conformi alle Direttive del consiglio concernenti il ravvicinamento delle legislazioni degli Stati membri CE relative a

- Macchine (98/37/CE).  
Standard usato: EN 292.
- Compatibilità elettromagnetica (89/336/CEE).  
Standard usati: EN 61 000-6-2 e EN 61 000-6-3.
- Materiale elettrico destinato ad essere utilizzato entro certi limiti di tensione (73/23/CEE) [95].  
Standard usato: EN 60 204-1.

## Declaração de Conformidade

Nós **GRUNDFOS** declaramos sob nossa única responsabilidade que os produtos **Hydro Dome** aos quais se refere esta declaração estão em conformidade com as Directivas do Conselho das Comunidades Europeias relativas à aproximação das legislações dos Estados Membros respeitantes à

- Máquinas (98/37/CE).  
Norma utilizada: EN 292.
- Compatibilidade electromagnética (89/336/CEE).  
Normas utilizadas: EN 61 000-6-2 e EN 61 000-6-3.
- Material eléctrico destinado a ser utilizado dentro de certos limites de tensão (73/23/CEE) [95].  
Norma utilizada: EN 60 204-1.

## Overeenkomstigheidsverklaring

Wij **GRUNDFOS** verklaren geheel onder eigen verantwoordelijkheid dat de producten **Hydro Dome** waarop deze verklaring betrekking heeft in overeenstemming zijn met de Richtlijnen van de Raad inzake de onderlinge aanpassing van de wetgevingen van de Lid-Staten betreffende

- Machines (98/37/EG).  
Norm: EN 292.
- Elektromagnetische compatibiliteit (89/336/EEG).  
Normen: EN 61 000-6-2 en EN 61 000-6-3.
- Elektrisch materiaal bestemd voor gebruik binnen bepaalde spanningsgrenzen (73/23/EEG) [95].  
Norm: EN 60 204-1.

## Vastaavuusvakuutus

Me **GRUNDFOS** vakuutamme yksin vastuullisesti, että tuotteet **Hydro Dome**, jota tämä vakuutus koskee, noudattavat direktiivejä jotka käsittelevät EY:n jäsenvaltioiden koneellisia laitteita koskevien lakien yhdenmukaisuutta seur.:

- Koneet (98/37/EY).  
Käytetty standardi: EN 292.
- Elektromagneettinen vastaavuus (89/336/EY).  
Käytetyt standardit: EN 61 000-6-2 ja EN 61 000-6-3.
- Määrättyjen jänniterajoitusten puitteissa käytettävät sähköiset laitteet (73/23/EY) [95].  
Käytetty standardi: EN 60 204-1.

Bjerringbro, 1st September 2003



Kenth Hvid Nielsen  
Technical Manager

# Hydro Dome

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Before beginning installation procedures, these installation and operating instructions should be studied carefully. The installation and operation should also be in accordance with local regulations and accepted codes of good practice.

## 1. General

### 1.1 Applications

GRUNDFOS Hydro Dome booster sets are designed for the transfer and pressure boosting of clean water in waterworks, blocks of flats, hotels, industry, hospitals, schools, etc.

### 1.2 Operating conditions

<b>Liquid temperature:</b>	0°C to +40°C.
<b>Ambient temperature:</b>	0°C to +40°C.
<b>Operating pressure:</b>	Maximum 10 bar.
<b>Minimum inlet pressure:</b>	In accordance with the NPSH curve plus other losses and a safety margin of at least 0.5 metres (1.64 feet) when pumping airless water. The safety margin should be increased when air-containing water is pumped.
<b>Maximum inlet pressure:</b>	The actual inlet pressure plus the pressure when the pump is operating against a closed valve should always be lower than the maximum operating pressure, i.e. 10 bar.
<b>Start/stop frequency:</b>	Maximum 100 per hour.

Liquid temperature and operating pressure may be limited by the diaphragm tank (or bladder tank).

## 2. Product description

The Hydro Dome booster set consists of two identical GRUNDFOS CHV pumps connected in parallel and mounted on a common base frame, suction and discharge manifolds, isolating valves, non-return valves, pressure gauge, pressure switches and the controller CS 201 (single-phase) or CS 203b (three-phase).

A diaphragm tank (or bladder tank) must be included in the installation. One 24-litre tank can be installed on the discharge manifold. If two 24-litre tanks are installed, the manifold must be properly supported. Additional tanks can be placed on the floor/wall to fulfil the system requirement, see section 4.6.

## 3. Operation and functions

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

Function:

- When a tap is opened, water is drawn from the diaphragm tank (or bladder tank).
- When the pressure drops to the first cut-in pressure, the first pump will start.
- If the consumption is still rising and the pressure drops to the next cut-in pressure, the other pump will start.
- When the water consumption falls, the discharge pressure rises to the first cut-out pressure and the controller will cut out one pump.
- If the consumption is still falling, the last pump will finally fill the tank and then stop.

### 3.1 Single-phase versions

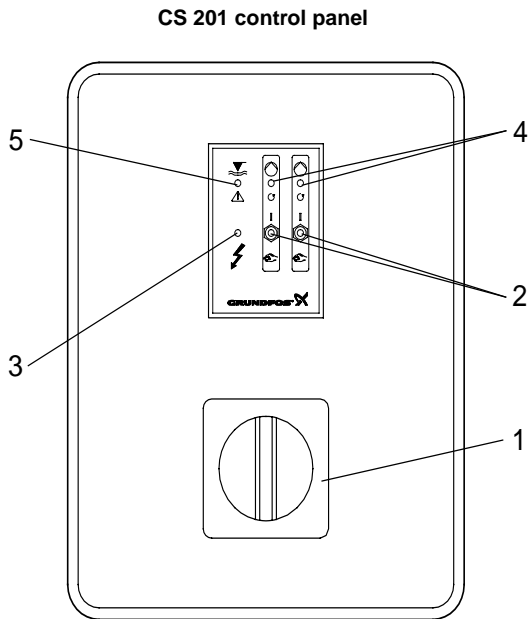
The single-phase versions are controlled by the CS 201 controller.

The CS 201 offers the following functions:

- Automatic cascade control of pumps by means of two pressure switches.
- Automatic pump changeover at any start/stop cycle.
- Pump and system monitoring functions:
  - short-circuit protection by means of fuses,
  - motor overload protection by means of a thermal switch built into the motor,
  - dry-running protection by means of an additional pressure switch or level switch (accessory), see section 4.4.

Figure 1 shows the control panel of the CS 201 controller.

Fig. 1



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Key to the symbols in fig. 1:

Pos.	Description
1	Main switch.
2	Selector switch for each pump: Manual operation/off/automatic operation.
3	Green indicator light, indicating that the electricity supply has been switched on.
4	One green indicator light for each pump, indicating pump operation.
5	Red indicator light, indicating dry-running alarm.

### 3.2 Three-phase versions

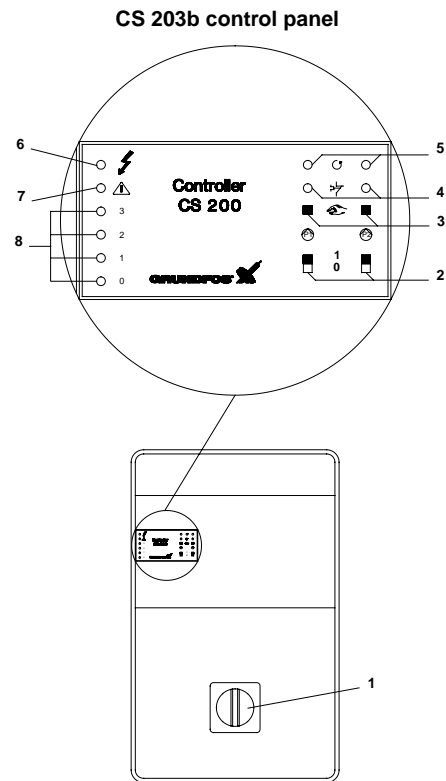
The three-phase versions are controlled by the CS 203b controller.

The CS 203b offers the following functions:

- Automatic cascade control of pumps by means of two pressure switches.
- Automatic pump changeover at any start/stop cycle.
- Start and stop delays to prevent simultaneous starting/stopping of the two pumps.
- Stop delay after reaching the respective cut-out pressure.
- Output for external alarm device (the alarm device is an accessory).
- Emergency operation in case of damaged electronics (the emergency kit is an accessory).
- Pump and system monitoring functions:
  - short-circuit and overload protection by means of an automatic circuit breaker,
  - dry-running protection by means of an additional pressure switch or level switch (accessory), see section 4.4,
  - overpressure protection by means of an additional pressure switch (accessory), see section 4.5.

Figure 2 shows the control panel of the CS 203b controller.

Fig. 2



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Key to the symbols in fig. 2:

Pos.	Description
1	Main switch.
2	Selector switch for each pump: Off/automatic operation.
3	Push-button for each pump: Manual operation or alarm resetting.
4	One red indicator light for each pump, indicating pump fault.
5	One green indicator light for each pump, indicating pump operation.
6	Green indicator light, indicating that the electricity supply has been switched on.
7	Red indicator light, indicating dry-running alarm (light is on) <b>or</b> overpressure alarm (light is on) <b>or</b> alarm for failing pressure switch at start/stop (light is flashing).
8	Orange indicator lights: "3" is off in case of overpressure alarm, "1" and "2" are on or off according to the respective pressure switches for starting and stopping of the pumps, "0" is off in case of dry-running alarm.

## 4. Installation

### 4.1 Location

The booster set should be placed in a well-ventilated room to ensure adequate cooling of the pump motors. It should be placed with a 0.5 metre clearance in front and on the two sides.

The tanks can be placed on the discharge manifold or on the floor/wall anywhere around the booster set.

### 4.2 Foundation

The booster set does not require a special foundation, but it should be positioned on a plane and solid surface, e.g. a concrete floor.

### 4.3 Pipework

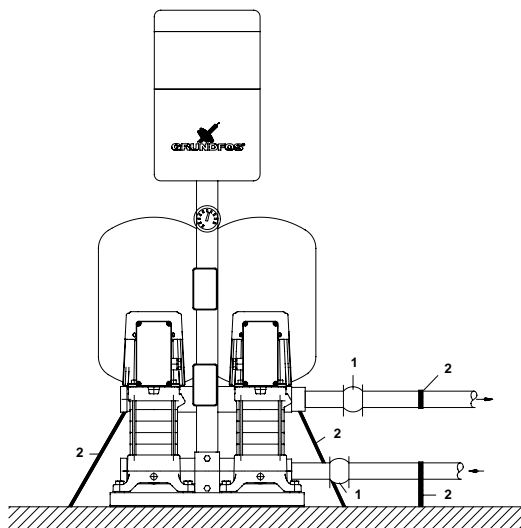
The pipes connected to the booster set must be of adequate size (2"). To avoid resonance, expansion joints should be fitted in the suction and discharge pipes/manifolds, see fig. 3. Either end of the manifolds can be used for pipe connections.

In the case of suction lift installation, the suction manifold must be removed and each pump must be fitted with its own suction pipe and non-return valve.

**Note:** The booster set is not designed to support more than one 24-litre tank mounted on the discharge manifold. One more 24-litre tank on the discharge manifold is optional. If two tanks are mounted on the manifold, additional supports/pipe hangers are required. Additional tanks have to be placed on the floor/wall anywhere around the booster set. The pipes must be fastened to parts of the building to ensure that they cannot move or be twisted, see fig. 3.

The booster set should be tightened up before start-up.

Fig. 3



1. Expansion joint.
2. Pipe hanger.

The tanks, expansion joints and pipe hangers shown in fig. 3 are not included in the standard booster set.

### 4.4 Dry-running protection

**Accessory:** It is possible to install a pressure switch (normally open (NO)) on the suction side of the booster set to monitor the inlet pressure and to prevent the booster set from running dry (a level switch can be used if the suction side is connected to an open tank).

When the inlet pressure/level drops below the set value (0.4 bar), the pumps are cut out and the alarm is activated. When the correct pressure/level is restored (1.2 bar), the pumps are cut in automatically. In the case of three-phase versions, the alarm must be reset manually.

### 4.5 Overpressure protection

**Accessory for three-phase versions only:** An additional pressure switch can be installed on the discharge side of the booster set to protect the discharge pipes and components against overpressure. This pressure switch can be set to the maximum operating pressure or lower according to system condition.

When the maximum pressure is reached, the pumps will be cut out and the alarm is activated. When the correct pressure is restored, the pumps are cut in automatically. The alarm must be reset manually.

### 4.6 Tank selection

To ensure reliable operation, the booster set must be connected to a diaphragm tank (or bladder tank). The tank volume can be optimized according to the pumping condition. Furthermore, the volume can be distributed on several tanks, e.g. two 24-litre tanks on the discharge manifold and a customized tank on the floor.

The optimized tank volume can be calculated from the following formula:

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

- V = Tank volume [litres].  
 Q = Mean flow for one pump [m<sup>3</sup>/h].  
 Δp = Difference between cut-in and cut-out pressures.  
 Cut-in = Cut-in pressure [bar].  
 n<sub>max.</sub> = Maximum number of starts/stops per hour:  
           n<sub>max.</sub> = 100.  
 k = Constant for diaphragm tank (or bladder tank)  
       precharge pressure: k = 0.9.

### 4.7 Priming

Do not start the pumps until they have been filled with liquid. See installation and operating instructions for CHV pumps.

Start-up is carried out according to section 6.

### 4.8 Electrical connection

The electrical connection should be carried out by an authorized electrician in accordance with local regulations.



Before making any connections in pumps, terminal boxes or control cabinet, the electricity supply must be switched off.

The wiring diagram and motor labels show required values for the electricity supply.

#### Single-phase versions:

In single-phase versions, a built-in thermal switch protects the motor. If required according to local regulations, an additional motor protection must be installed.

The mains supply cable with the leads L1, N and PE must be connected to the CS 201 controller:

- L1 and N to main switch terminals and
- PE to terminal  $\oplus$ .

#### Three-phase versions:

No additional motor protection is required as the CS 203b controller incorporates an automatic circuit breaker.

The mains supply cable with the leads L1, L2, L3 and PE must be connected to the CS 203b controller:

- L1, L2 and L3 to main switch terminals and
- PE to the terminal located at the earth bar/plate.

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## 5. Settings

### 5.1 Pressure switch operation

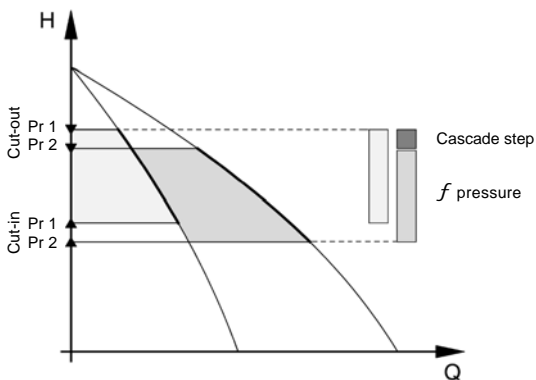
The pumps are cut in and out according to the pressures set on the pressure switches. Each pressure switch is related to one pump only and not necessarily to the same pump because of the automatic pump changeover.

A common differential ( $f$ ) pressure (cut-out pressure – cut-in pressure =  $f$  pressure) must be set on the pressure switches. The cut-out and cut-in pressures differ 0.3 to 0.5 bar (cascade step).

Figure 4 shows the cooperation between the two pressure switches.

- When a tap is opened, water is drawn from the diaphragm tank (or bladder tank).
- When the pressure drops to the first cut-in pressure, Pr 1, the first pump will start.
- If the consumption is still rising and the pressure drops to the next cut-in pressure, Pr 2, the other pump will start.
- When the water consumption falls, the discharge pressure rises to the first cut-out pressure, Pr 2, and the controller will cut out one pump.
- If the consumption is still falling, the last pump will finally fill the tank and then stop.

Fig. 4

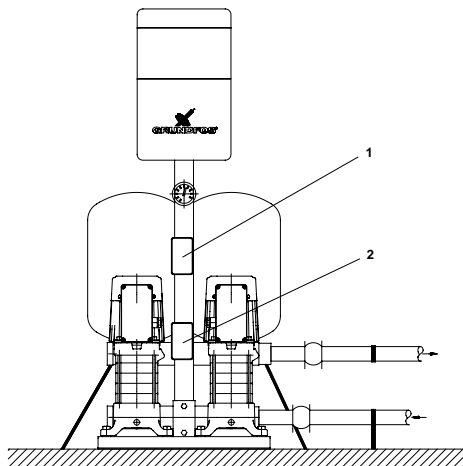


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### 5.2 Pressure switch

The pressure switches are located as shown in fig. 5.

Fig. 5



1. Pressure switch, Pr 1.
2. Pressure switch, Pr 2.

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The pressure switches are factory-set to a zero bar inlet pressure, see the following table.

Hydro Dome	Factory settings				Tank pre-charge pressure* [bar]
	Pressure switch, Pr 1		Pressure switch, Pr 2		
	Cut-in pressure [bar]	Cut-out pressure [bar]	Cut-in pressure [bar]	Cut-out pressure [bar]	
CHV 2-50	2.5	4.0	2.2	3.7	1.9
CHV 2-60	3.5	5.0	3.2	4.7	2.8
CHV 2-80	5.4	6.9	5.1	6.6	4.5**
CHV 2-100	7.4	8.9	7.0	8.5	6.3**
CHV 4-40	1.7	3.2	1.3	2.8	1.1
CHV 4-50	2.7	4.2	2.3	3.8	2.0
CHV 4-60	3.4	4.9	3.1	4.6	2.7
CHV 4-80	5.3	6.8	4.9	6.4	4.4**
CHV 4-100	7.0	8.5	6.7	8.2	6.0**

\* Recommended tank precharge pressure when using the factory settings.

\*\* Check that this pressure does not exceed the maximum tank precharge pressure.

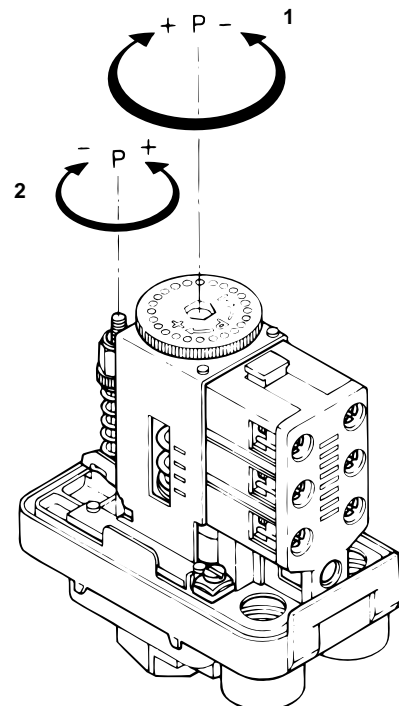
The setting can be changed according to the hydraulic conditions of the pumping system, e.g. when the booster set is connected to a municipal waterworks or a tank located below the pump.

If pressure switch settings should be changed, the following settings must be made:

- Cut-out pressure.
- $f$  pressure ( $f$  pressure = cut-out pressure – cut-in pressure).

**Note:** The cut-in pressure is set as the cut-out pressure minus  $f$  pressure.

Fig. 6



1. Cut-out pressure:
  - + to increase.
  - to decrease.
2.  $f$  pressure (differential pressure):
  - + to increase.
  - to decrease.

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## 5.3 Tank precharge pressure

The precharge pressure of the diaphragm tank (or bladder tank) should be set to 0.9 x lowest cut-in pressure. See recommended precharge pressure in section 5.2 when the factory settings of the pressure switches are used.

## 5.4 Setting procedure

To change the factory settings, proceed as follows:

1. Open the discharge valves between pumps and manifold (pos. 4, fig. 7).
2. Open the valves on the suction side (pos. 9, fig. 7).
3. Open the valves between discharge manifold and diaphragm tank (pos. 5, fig. 7).
4. Close all taps on the discharge side, start the pumps and note the pressure at zero flow ( $p_{\max}$  [bar]).
5. **Pressure switch, Pr 1** (pos. 12, fig. 7):
  - 5.1. Calculate the cut-out pressure:  
Cut-out pressure,  $Pr 1 = p_{\max} - 0.3$  up to 0.5 bar.
  - 5.2. Calculate the cut-in pressure:  
Cut-in pressure,  $Pr 1 = \text{cut-out pressure, } Pr 1 - 1.5$  bar.  
**Note:**
    - $\Delta p < 1.5$  bar decreases the drawdown volume of the tank and increases the number of starts/stops per hour.
    - $\Delta p > 1.5$  bar makes it uncomfortable for the user.
6. **Pressure switch, Pr 2** (pos. 11, fig. 7):
  - 6.1. Calculate the cut-out pressure:  
Cut-out pressure,  $Pr 2 = \text{cut-out pressure, } Pr 1 - 0.3$  up to 0.5 bar.
  - 6.2. Calculate the cut-in pressure:  
Cut-in pressure,  $Pr 2 = \text{cut-out pressure, } Pr 2 - 1.5$  bar.  
**Note:**
    - $\Delta p < 1.5$  bar decreases the drawdown volume of the tank and increases the number of starts/stops per hour.
    - $\Delta p > 1.5$  bar makes it uncomfortable for the user.
7. Calculate the tank precharge pressure:  
Precharge pressure = 0.9 x cut-in pressure,  $Pr 2$  [bar].  
**Note:**  
The maximum precharge pressure can be limited, depending on type of tank.
8. Stop the pumps, open the taps on the discharge side and drain the pipes, pumps and tank (making the discharge pressure = 0).
9. Set the calculated tank precharge pressure.
10. **Cut-out pressure settings:**
  - 10.1. Start the pumps in automatic operation. When the maximum pressure ( $Pr 1$ ) is reached, the pumps will stop automatically.
  - 10.2. Adjust the cut-out pressures if they are not at the desired levels (pos. 1, fig. 6).
  - 10.3. Open the drain valve (pos. 8, fig. 7) until both pumps start. Close the drain valve. When the new maximum pressure is reached the pumps will stop automatically.
  - 10.4. Repeat from point 10.2 until the desired cut-out pressures are obtained.
11. **Cut-in pressure settings:**
  - 11.1. Start the pumps in automatic operation. When the maximum pressure ( $Pr 1$ ) is reached, the pumps will stop automatically.
  - 11.2. Open the drain valve (pos. 8, fig. 7) and note the cut-in pressures. Close the drain valve.
  - 11.3. Adjust the cut-in pressures if they are not at the desired levels (pos. 2, fig. 6).
  - 11.4. Repeat from point 11.2 until the desired cut-in pressures are obtained.

12. Perform a final test to make sure that the cut-in and cut-out pressures are correct.

## 6. Start-up

To start up a Hydro Dome booster set, proceed as follows:

1. Connect water and electricity supplies.
2. Check that the tank precharge pressure is equal to 0.9 x cut-in pressure,  $Pr 2$ .
3. Close the pump discharge valves, prime the booster set and the suction pipe.
4. Check that the settings have been carried out according to section 5.
5. **Three-phase versions only:** Set the automatic circuit breaker to the rated current stated on the motor nameplate.
6. Switch on the electricity supply, i.e. main switch, automatic circuit breaker, etc.
7. Start the first pump.
8. **Three-phase versions only:** Check the direction of rotation of the pump. In case of incorrect rotation, interchange two phases of the electricity supply.
9. Vent the pump by slowly opening its discharge valve.
10. Repeat from point 6. for the other pump.
11. Release the booster set for operation by pushing both selector switches into position "I".

The Hydro Dome is now ready for operation.

## 7. Maintenance

### 7.1 Maintenance of booster set

See installation and operating instructions for CHV pumps.

### 7.2 Maintenance of CS 201 and CS 203b

The CS 201 and CS 203b controllers are maintenance-free.

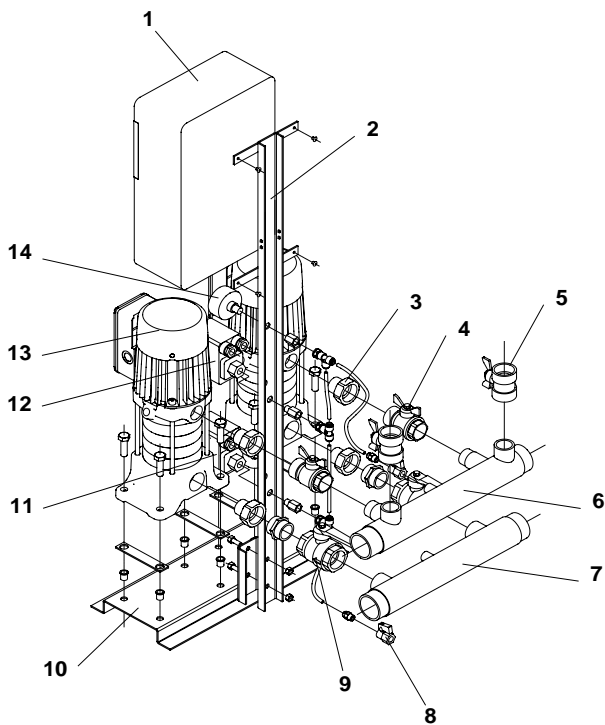
### 7.3 Checking the precharge pressure

To ensure reliable and correct operation, including the frequency of starts and stops, the precharge pressure of the diaphragm tank (or bladder tank) should be checked regularly (at least once a year).

## 8. Parts list

Pos.	Component	Number
1	Controller	1
2	Stand	1
3	Fitting	4
4	Isolating valve	2
5	Ball valve for tank	2
6	Discharge manifold (2")	1
7	Suction manifold (2")	1
8	Drain valve	1
9	Non-return valve	2
10	Base frame	1
11	Pressure switch, <i>Pr 2</i>	1
12	Pressure switch, <i>Pr 1</i>	1
13	CHV pump	2
14	Pressure gauge	1

Fig. 7



TM01 7880 4999

## 9. Technical data

### Voltage variants, nominal voltages

1 x 220-240 V.  
3 x 380-415 V.

### Voltage tolerances

-10%/+6% of nominal voltage.

### Mains frequency

50 Hz.

### Enclosure class

CHV pump motor: IP 54.  
Pressure switch: IP 54.

### Sound pressure level

The sound pressure level of the pump is below 70 dB(A).

The sound pressure for two pumps can be calculated as follows:

$$L_{\max} = L_{\text{pump}} + 3.$$

### Liquid temperature

0°C to +40°C.

### Ambient temperature

0°C to +40°C.

### Operating pressure

Maximum 10 bar.

### Minimum inlet pressure

In accordance with the NPSH curve plus other losses and a safety margin of at least 0.5 metres (1.64 feet) when pumping air-less water.

The safety margin should be increased when air-containing water is pumped.

### Maximum inlet pressure

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

### Start/stop frequency

Maximum 100 per hour.

Liquid temperature and operating pressure may be limited by the diaphragm tank (or bladder tank).

For further technical details, see installation and operating instructions for CHV pumps.

### CS 201 controller

- Enclosure class: IP 54.
- Insulation: Double-insulated cabinet.
- The controller must not be exposed to direct sunlight.
- Fuses:
  - 8 A, aM, 10.3 x 38 mm.
  - 5 x 20-100 mA.
- Transformer: 230 V / 24 V.
- Power consumption: Maximum 25 W.
- Auxiliary voltage: 24 V.

### CS 203b controller

- Enclosure class: IP 54.
- Insulation: Double-insulated cabinet.
- The controller must not be exposed to direct sunlight.
- Output for alarm device: Maximum 250 V / 3 A.
- Fuses: 2 A, 10.3 x 38 mm.
- Transformer: 40-50 VA / 230-400 V / 24 V.
- Power consumption: Maximum 23 W.
- Auxiliary voltage: 24 V.

## 10. Fault finding chart



Before making any connections in pumps, terminal boxes or control cabinet, the electricity supply must be switched off.

GB

Fault	Cause	Remedy
1. Motor does not run when started.	a) Electricity supply disconnected.	Connect the electricity supply.
	b) Motor protection cut out. Single-phase: Via built-in thermal switch or fuses. Three-phase: Via automatic circuit breaker.	Correct the fault. Await automatic resetting of the built-in thermal switch, replace fuses (single-phase) or cut in the automatic circuit breaker.
	c) Motor defective.	Repair/replace the motor.
2. Motor starts, but stops immediately afterwards.	a) Incorrect setting of pressure switch.	Increase the cut-out pressure and/or differential pressure ( $\Delta p$ ).
	b) Incorrect tank precharge pressure.	Check the tank precharge pressure.
3. Frequent starts and stops.	a) Incorrect setting of pressure switch.	Increase the cut-out pressure and/or differential pressure ( $\Delta p$ ).
	b) Tank defective.	Repair the tank.
4. Pump is running but delivers no water.	a) Suction pipe/pump or discharge pipe blocked by impurities.	Clean the suction pipe/pump or discharge pipe.
	b) Non-return valve blocked in closed position.	Clean the non-return valve.
	c) Suction pipe leaky.	Repair the suction pipe.
	d) Pump/suction pipe is not filled with water.	Refill the pump/suction pipe.
	e) Air in suction pipe/pump.	Vent the pump. Check the suction pipe for leakages.
	f) Suction head is too high.	Check the NPSH value and modify the installation, if necessary.
	g) Three-phase versions: Motors running with the wrong direction of rotation.	Change the direction of rotation.
5. Leakage from the shaft seal.	a) Shaft seal defective.	Replace the shaft seal.
6. Noise.	a) The pump is cavitating.	Clean the suction pipe/pump and possibly the suction strainer.
	b) The pump does not rotate freely.	Support the manifolds/pipes with strong and appropriate support.
	c) Back flow when the pump stops.	Change or clean the non-return valve.
7. Leakage from hydraulic chambers.	a) Mechanical stress on the pump. The manifolds/pipes are not supported.	Support the manifolds/pipes with strong and appropriate support.

## 11. Disposal

Disposal of this product or parts of it must be carried out according to the following guidelines:

1. Use the local public or private waste collection service.
2. In case such waste collection service does not exist or cannot handle the materials used in the product, please deliver the product or any hazardous materials from it to your nearest GRUNDFOS company or service workshop.

Subject to alterations.

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