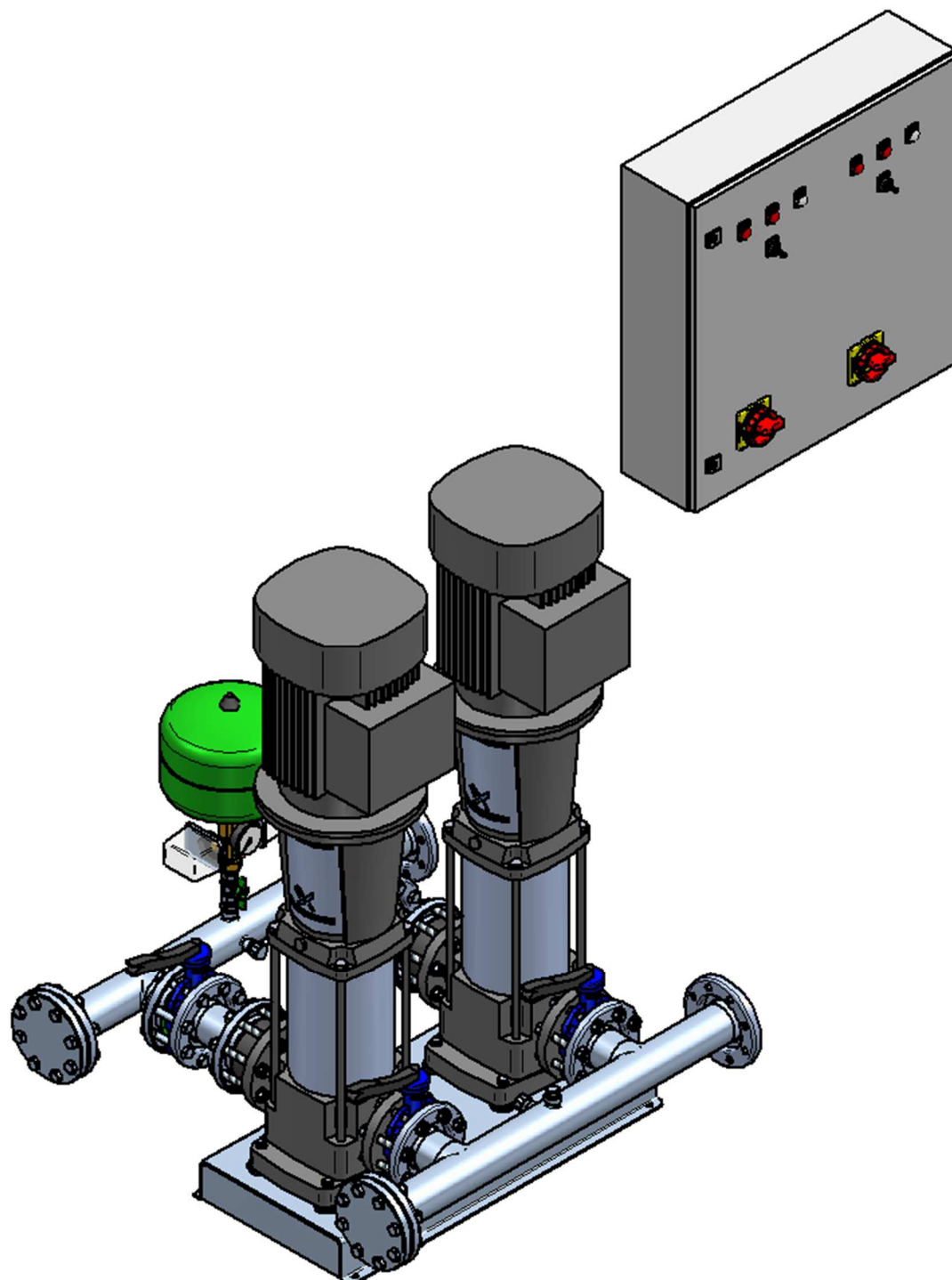


Fire Extinguishing System Fire 2 CRF

with 2 CR pumps

Installation and Operating Instructions



99018300 1119

Ersetzt: 99018300 1611

GB

EC declaration of conformity

Manufacturer: GRUNDFOS Pumpenfabrik GmbH
Willy-Pelz-Straße 1-5
D-23812 Wahlstedt

We, Grundfos, declare under our sole responsibility that the product

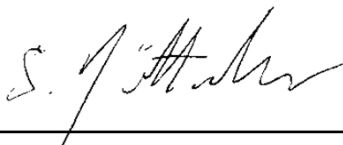
Fire 2 CRF

to which this declaration relates, is in conformity with the following Council Directive on the approximation of the laws of the EC Member States:

- Machinery Directive **(2006/42/EC)**
Standards used: **EN 809: 1998, EN 12100:2010, EN 60204-1:2006**

This product must not be put into operation before the tests postulated in the standard EN 60204-1: 2006 has been made at the installation site and are documented accordingly.

Wahlstedt, 14th March 2016



Stephan Götsche
General manager
GRUNDFOS Pumpenfabrik GmbH

Contents

1	Safety Instructions	5
1.1	General Information	5
1.2	Safety Labelling	5
1.3	Personnel qualifications and training	5
1.4	Risks of not observing the safety instructions	5
1.5	Safety-conscious working	5
1.6	Safety instructions for the operator/user	5
1.7	Safety instructions for maintenance, inspection and installation work	5
1.8	Unauthorised modification and manufacture of spare parts	5
1.9	Improper operating methods	5
2	Application	5
3	Product description	6
3.1	General construction	6
3.1.1	Pump	6
3.1.2	Control	6
3.2	Functions	7
3.2.1	Automatic mode	8
3.2.2	Manual mode	8
3.2.3	Redundant version in master/slave operation	8
3.2.4	Locking function	8
3.2.5	Test run	8
3.2.6	Motor protection	8
3.2.7	Water shortage monitoring	8
3.2.8	Overflow monitoring	8
3.2.9	Wire break and short circuit monitoring	8
3.2.10	Weekly flushing operation	9
3.2.11	Monitoring of the main switches	9
3.2.12	Protection against unauthorized actuation	9
3.2.13	Status and fault indications	9
3.3	Product identification	9
3.3.1	Nameplates	9
3.3.2	Type key	10
3.4	Technical data	10
3.4.1	Pump system	10
3.4.2	Control	10
3.4.3	Sound pressure level	11
3.5	Factory settings	11
3.5.1	Pump system	11
3.5.2	Control	11
4	Operating conditions	11
4.1	Pumped liquid	11
4.2	Minimum inlet pressure	11
4.3	Maximum inlet pressure	11
4.4	Minimum flow rate	11
4.5	Installation height	11
5	Delivery, transportation, storage	12
6	Installation	12
6.1	Mounting	12
6.1.1	Installation site	12
6.1.2	Pump system	12
6.1.3	Control	13
6.2	Electrical connection	13
6.3	Connection of the water shortage and overflow monitoring in the master control	13
6.3.1	3 rod electrode	13
6.3.2	5 rod electrode	14
6.3.3	Float switch	14
7	Start-up	14
7.1	Adjustment of the master/slave pressure switches	15
7.2	Pre-filling of diaphragm tank	15
7.3	Setting of the timer for the daily test run	16
7.4	Setting of the timer for the weekly flushing operation	16
7.5	Settings for the daily test run duration	16
7.6	Setting of the pump off-delay time	17
7.7	Settings for the flushing operation duration	17
7.8	Activation/Deactivation of the wire break and short circuit monitoring	17
7.9	Adjustment of the level relay	18
8	Operation	18
9	Shut down	18
10	Maintenance	18
10.1	Control	18
10.2	Pump system	18
10.3	Pump	18
10.4	Draining the pump	18

11	Option beacon with audible alarm	19
12	Service, spare parts, accessories	19
13	Warranty	19
14	Disposal	19
15	Enclosed documentation	19
16	Fault finding	20
	Appendix A1 – Allocation of control and pump system	21
	Appendix A2 – Operating pressure	22
	Appendix A3 – Dimensions and weights	23
	Appendix A4 – NPSH curves	24

1 Safety Instructions

1.1 General Information

This operation manual contains basic instructions which must be observed during installation, operation and maintenance. It is therefore imperative that both the installation personnel and the qualified staff/user study the manual prior to installation and startup. The manual must always be readily available at the system's point of location.

It is imperative that personnel not only comply with the general instructions listed in this section under „Safety Instructions“, but also the special safety instructions included in other sections of this manual.

1.2 Safety Labelling



Warning
If these safety instructions are not observed, it may result in personal injury.



Warning
If these instructions are not observed, it may lead to electric shock with consequent risk of serious personal injury or death.

Caution

If these safety instructions are not observed, it may result in malfunction or damage to the equipment.

Note

Notes or instructions that make the job easier and ensure safe operation.

Labels with safety advices fit at the system, such as

- direction of rotation arrow
- identification of fluid connections

must be observed in all circumstances and kept in readable conditions.

1.3 Personnel qualifications and training

Operating, maintenance, inspection and installation personnel must have the relevant qualifications. The area of responsibility, level of authority and the supervision of the personnel must be precisely defined by the operator.

1.4 Risks of not observing the safety instructions

Non-observance of the safety instructions may have dangerous consequences for persons, the environment and the pump system. If the safety instructions are not observed, all rights to claims for damages may be lost.

In detail, if safety instructions are not observed, this may cause the following damage for example:

- malfunction of essential functions of the system
- failure of specified methods for maintenance and servicing
- dangerous consequences to humans from exposure to electrical and mechanical impacts.

1.5 Safety-conscious working

The safety instructions described in these installation and operating instructions, existing national regulations for accident prevention and any internal working, operating and safety regulations of the operator must be observed.

1.6 Safety instructions for the operator/user

- Guards covering moving parts must not be removed when the system is in operation.
- Prevent hazards caused by electrical energy (for details see e. g. in the provisions of the VDE and the local power supply companies).

1.7 Safety instructions for maintenance, inspection and installation work

The operator is responsible for ensuring that all maintenance, inspection and installation work is carried out by authorized and qualified personnel who have been adequately informed through careful examination of the installation and operating instructions.

Do not work on the system and control when the system is running. Observe the procedure described in the installation and operating instructions for stopping the system.

All safety and protective equipment must be refitted or activated directly after work is complete.

1.8 Unauthorised modification and manufacture of spare parts

Modification or changes to the system and control are only permitted following agreement with the manufacturer. Original spare parts and accessories authorized by the manufacturer are safe to use. Using other parts can annul the liability for any resulting consequences.

1.9 Improper operating methods

The operational safety of the supplied system is only guaranteed if it is used in accordance with section 2. *Application* of the installation and operating instructions.

The limit values specified in the technical data must never be exceeded.

2 Application

The extinguishing water booster sets **Fire 2 CRF** described in this instruction manual are intended for the automatic water supply and pressure boosting of fire-protection appliances. It is only suitable for pumping extinguishing water without additives. The extinguishing water booster set is designed for the direct connection to the water supply network or the indirect connection via an intermediate tank. The operating limits in section 3.4 *Technical data* have to be observed.



Warning
The extinguishing water booster sets must only be used for the applications mentioned in this installation and operating instructions. Other applications are considered non-approved. Grundfos cannot be held responsible for possible consequential damage. The risk is carried solely by the operator.

The control cabinet must not be used to supply voltage to other pump systems, not even other extinguishing water booster sets or pumps of the same range.

3 Product description

3.1 General construction

The extinguishing water booster sets Fire 2 CRF are fully automatically controlled, redundantly designed single compact systems consisting of two mains-operated, 3-phase Grundfos CR pumps, where a common manifold is mounted.

A pressure control unit is fitted on the discharge manifold consisting of a delay valve for limitation of switching cycles, a diaphragm tank, an isolating valve with drain hole and a distribution piece. The distribution piece acts as retainer for the operating pressure controller with pressure gauge at the same time. To ensure the redundant use of the pumps the extinguishing water booster set has two operating pressure controller (one for each pump).

At the suction side a suction flange with ball valve or as from Fire 2 CRF 32 a suction manifold with isolating valve is mounted.

Furthermore the extinguishing water booster sets have a demand-based control for an automatic switching on and off of the pumps.

The pumps are mounted on a common base frame. For vibration dampening there are rubber disks between pump feet and base frame. The controller is placed in a separate control cabinet for wall mounting.

The basic construction of the extinguishing water booster set shows fig. 1.

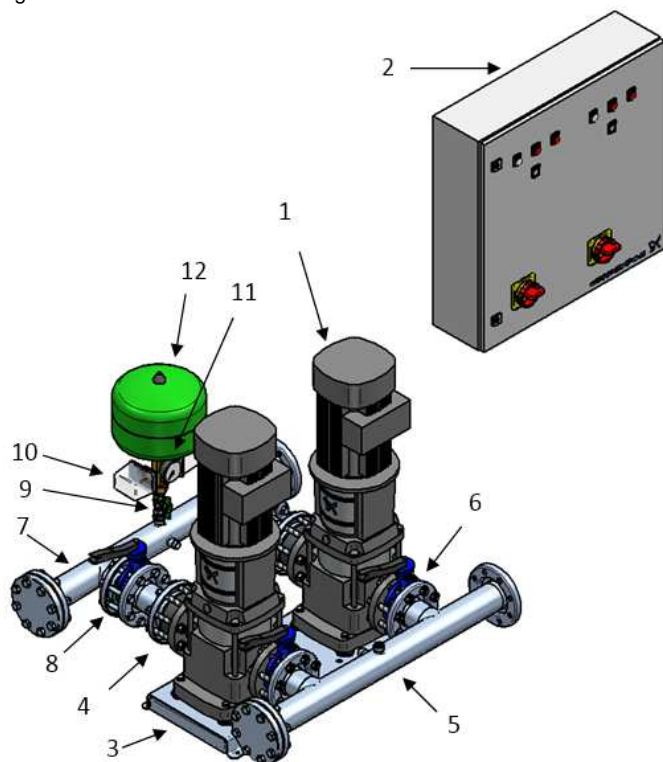


Fig. 1 Design of the extinguishing water booster set

The fire extinguishing extinguishing water booster set consists of the following components:

Pos.	Description
1	CR pumps
2	Control cabinet
3	Base frame
4	Non-return valve
5	Suction manifold
6	Ball valve, suction side
7	Pressure manifold
8	Ball valve, discharge side
9	Manifold distribution with ball valve and hydr. delay-valve
10	Pressure switch incl. resistor module
11	Pressure gauge
12	Diaphragm tank

A diaphragm tank should be installed to avoid a high frequency of operation in case of low water consumption or dripping water losses.

3.1.1 Pump

Non-selfpriming, vertical, multistage, mains-operated, three-phase centrifugal pump of the Grundfos CR range.

The stainless steel used for the inner pump parts ensures high corrosion and wear resistance. The slide bearings are lubricated by the pumped liquid.

All pumps are equipped with a maintenance-free mechanical shaft seal according to DIN 24960 (short design).

The connection to the suction line is made by a DIN flange. The discharge manifold mounted at the pump has a female threaded connection in case of smaller systems and a DIN flange in case of larger systems for the connection to the discharge line.

3.1.2 Control

The Control Fire 2 CRF is a control for an extinguishing water booster set Fire 2 CRF according to DIN 14462 that is designed as a redundant double pump system. The Control Fire 2 CRF adjusts the water supply in a master/slave duty according to the demand by switching on and off the Grundfos CR pumps in conjunction with a pressure switch. Thereby the slave pump provides for the redundancy described in the DIN 14462. In case of a faulty master pump the fault is indicated and the master pump will be stopped. Thus the slave can take over the operation in case of a request. If the slave pump is faulty the fault is indicated, but the slave pump will not be cut off.

The Control Fire 2 CRF is available in two versions that differ by the starting method:

- direct on line (DOL) up to 4.0 kW
- star-delta (SD) as from 5.5 kW.

The Control Fire 2 CRF is set and tested by factory before delivering.

Both single controls are placed in a common control cabinet for wall mounting. All required functional elements are mounted in the control cabinet. The extinguishing water booster set is operated by the control panel in the cabinet door.

The operating elements in the cabinet door shows fig. 2 and the functional elements in the control cabinet fig. 3. The figures show the cabinet for star-delta-starting. The device tags (DT) stated in the wiring diagram are indicated as well.

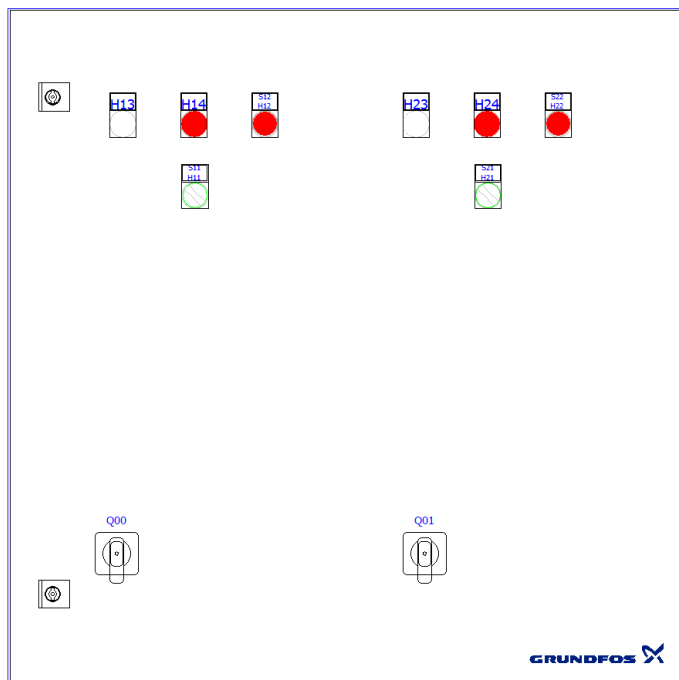


Fig. 2 Operating elements in the cabinet door

DT	Description
H13+H23	White signal lamp for motor is running
H14+H24	Red signal lamp for pump fault
S12/H12+ S22/H22	Reset button with red signal lamp for common fault
S11/H11+ S21/H21	Selector switch (manual - auto) with green signal lamp for control ready
Q00+Q01	Main switch

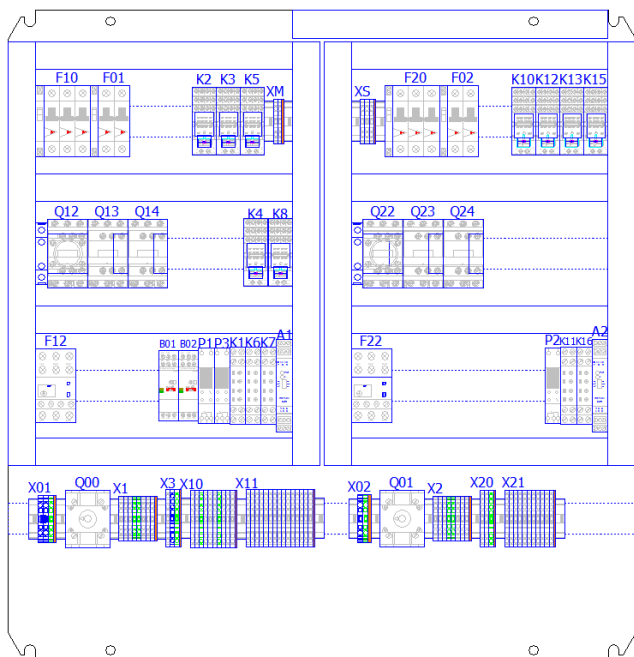


Fig. 3 Functional elements in the control cabinet

DT	Description
A1+A2	Switch amplifier wire break/short circuit for pressure switch
F01+F02	Circuit breaker for control voltage
F10+F20	Circuit breaker for motor
F12+F22	Motor protection relay
K1+K11	Multifunctional relay for off-delay
K2+K12	Alarm relay for motor protection relay and motor circuit
K3+K13	Alarm relay for wire break/short circuit
K4	Alarm relay for overflow supervision
K5+K15	Alarm relay for common fault
K6+K16	Multifunctional relay for duration of test run
K10	Auxiliary relay operation Slave-pump
K7	Multifunctional relay for duration of flush operation
K8	Alarm relay for water shortage
P1+P2	Timer for daily test run
P3	Timer for weekly flush operation
B01	Level relay for water shortage
B02	Level relay for overflow
Q12+Q22	Mains contactor, motor
Q13+Q23	Delta contactor, (for star/delta versions only)
Q14+Q24	Star contactor for motor (for star-delta version only)
Q00+Q01	Main switch

According to DIN 14462 the following modes can be chosen by the selector switch S11/S21:

- Hand:
Manual operation or short start of the pump (e.g. in case of dry run discharge side)
- Auto:
Automatically, load-dependent start/stop of the pump



The selector switches have no main switch function.
Disconnect the system from the mains power supply in case of maintenance.

In- and outputs

The in- and outputs are described in section 3.4 *Technical data*.

3.2 Functions

The principal functional diagram of the extinguishing water booster set Fire 2 CRF is shown in fig. 4.

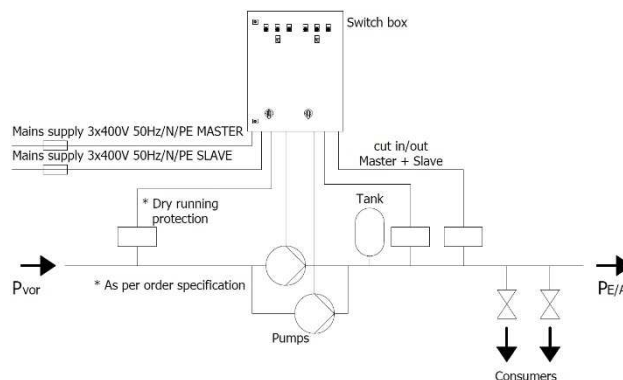


Fig. 4 Functional diagram of the extinguishing water booster set

3.2.1 Automatic mode

If the start pressure of the system is fallen below the value being set, the pump starts automatically via the pressure switch and the white signal lamp H13/23 shines.

After reaching the stop pressure being set, the pump stops automatically via the pressure switch.

3.2.2 Manual mode

For commissioning or test run the pump can be started manually by the selector switch S11/S21 under bypassing the pressure switch. Therefore the selector switch has to be turned in „Manual“ position. To stop the pump the selector switch has to be turned in „Auto“ position again.

When the pump is running, the white signal lamp H13/23 is on.

3.2.3 Redundant version in master/slave operation

The extinguishing water booster set is equipped with two pumps working in master/slave operation. Thereby the master pump serves as duty/filling pump and the slave pump as standby pump to increase the safety.

The cutting in value at the pressure switch of the master pump is set higher than the cutting in value at the pressure switch of the slave pump. Thus the master pump always starts first.

In case of a fault where the motor fuse or the motor protection relay trips or where the pressure switch of the master pump is defective, the master pump will be switched off and the operation of slave pump released. There is no switchover to the master pump again.

3.2.4 Locking function

To prevent the common start of the master and slave pump both controls are electrical locked against each other.

3.2.5 Test run

Every 24 hours the system conducts an automatic test run. The duration of the test run is set to 5 sec by factory. The setting can be changed.

In order that the function works properly, the date and the time have to be set before at the corresponding timer.

For the setting options see the wiring diagram and the instruction manual of the controls. See also section 7.3 *Setting of the timer for the daily test run* and 7.5 *Setting of the pump runtime for the daily test run*.

Caution

The test run for the master and slave pump must not be done at the same time, as the pumps are locked against each other. The factory setting for the timer P1 and P2 is shown in the wiring diagram.

3.2.6 Motor protection

Both controls have a motor protection relay. The motor protection relay is set to the rated motor current by factory. If the motor protection relay of the master pump trips, the master pump will be stopped and the operation of the slave pump will be released.

Note

Release of the slave pump in case of a fault at the master pump!

If the motor protection relay of the slave pump trips, the slave pump will NOT be switched off. The fault will only be indicated.

Note

The slave pump will not be switched off!

3.2.7 Water shortage monitoring

The master and slave control have terminals for connecting a common water shortage monitoring to the level relay B01 positioned in the master control.

The monitoring of water shortage can be realized by a level probe with rod electrodes or by a float switch. The different connection options are shown in the wiring diagram and the instruction manual of the controls.

Note

In case of water shortage a fault message is indicated only. The pump will NOT be switched off!

3.2.8 Overflow monitoring

The master and slave control have terminals for connecting a common overflow monitoring to the level relay B02 positioned in the master control.

The monitoring of overflow can be realized by a level probe with rod electrodes or by a float switch. The different connection options are shown in the wiring diagram and the instruction manual of the controls.

3.2.9 Wire break and short circuit monitoring

The input signal of the pressure switch for the master pump B1 and for the slave pump B2 is monitored against wire break and short circuit and indicated as fault according to DIN 14462.

In case of wire break and short circuit at the pressure switch for the slave pump, the slave pump will be started as demanded in the DIN 14462.

Note

In case of wire break or short circuit the slave pump will be switched on.

3.2.10 Weekly flushing operation

The master control offers the possibility of a weekly flushing operation of the pipes for the extinguishing water. By flushing the pipes it should be avoided, that odour becomes formed as the extinguishing water stands in the pipe for a longer time. See the DIN 1988-600:2010-12 (Drinking water installations in connection with fire fighting and fire protection installations).

The connection options and the setting of the date and time as well as the duration of the flushing operation are described in the wiring diagram and the instruction manual of the controls. See also 7.4 *Setting of the timer for the weekly flushing operation* and 7.7 *Setting of the duration for the flushing operation*.

3.2.11 Monitoring of the main switches

The position of the two main switches are monitored. In case of position „OFF“ the signal will be forwarded to a building management system or another host control. This status indication must not be reset.

3.2.12 Protection against unauthorized actuation

The main switches Q00 and Q01 are lockable in switched on condition according to the requirement stated in DIN 14462. The standard defines that the main switch must be protected against unauthorized actuation.

3.2.13 Status and fault indications

Each control has the following signal lamps:

- green signal lamp for operational readiness
- white signal lamp for pump is running
- red signal lamp for motor fault
- red signal lamp for collective fault.

The most important status and fault indications can be forwarded to a building management system via potential-free contacts.

An overview of the status and fault indication is given in the wiring diagram and the instruction manual of the control.

The fault indications must be reset manually by pressing the corresponding reset button.

3.3 Product identification

3.3.1 Nameplates

The extinguishing water booster set Fire 2 CRF and the Control Fire 2 CRF can be identified by the type key stated on the nameplate. See fig. 5 and 6.



Fig. 5 Nameplate of the system

Pos.	Description
1	Product type
2	Type designation
3	Product number
4	Options
5	Equipment number
6	Order number
7	Mains supply
8	Maximum flow rate [m³/h]
9	Minimal head [m]
10	Production code (year/week)
11	Medium temperature
12	Number of pumps
13	Motor power of the pump
14	Supply voltage
15	Country of origin
16	CE mark

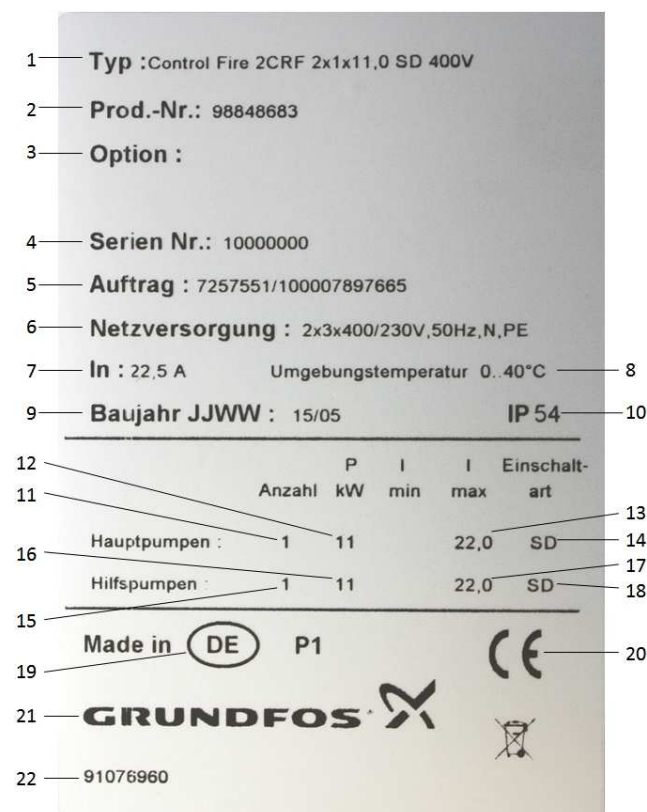
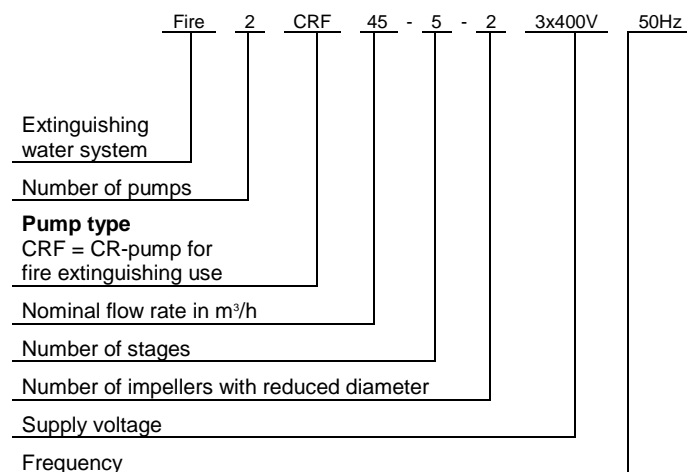


Fig. 6 Nameplate of the control

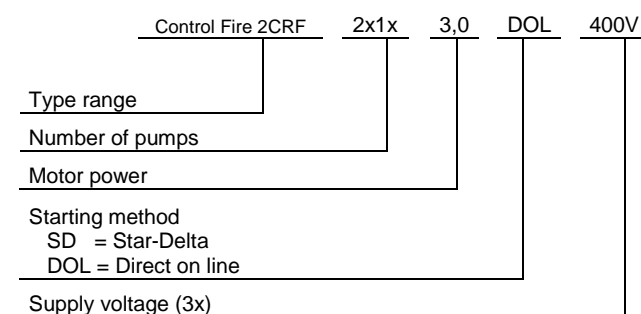
Pos.	Description
1	Type designation
2	Product number
3	Options
4	Equipment number
5	Order number
6	Mains supply
7	Rated current
8	Ambient temperature
9	Production code (year/week)
10	Protection class
11	Quantity of master pumps
12	Power of the master pump
13	Max. current consumption of master pump
14	Starting method of the master pump
15	Quantity of slave pumps
16	Power of the slave pump
17	Max. current consumption of the slave pump
18	Starting method of the slave pump
19	Country of origin
20	CE mark
21	Manufacturer
22	Product number of the nameplate

3.3.2 Type key

Type key for the system:



Type key for the control:



3.4 Technical data

3.4.1 Pump system

Dimensions:	see appendix A3*)
Weight:	see appendix A3*)
Power [kW]:	see appendix A1*)
Minimal head:	see nameplate of the system
Maximum flow rate:	see nameplate of the system
Operating pressure:	up to max. 16 bar
Maximum inlet pressure:	up to 6 bar*)
Protection class motor	IP 55
Min. medium temperature:	5 °C
Max. medium temperature:	60 °C
Country of origin:	Germany
*) subject to pump type	

3.4.2 Control

Type designation:	Control Fire 2CRF
Enclosure:	Sheet steel
Protection class:	IP 54
Dimensions H x W x D:	see enclosed wiring diagram
Supply voltage:	2 x (3 x 400 VAC, 50 Hz, N, PE)
Max. rated current:	Subject to the nominal motor power. See circuit diagram
Starting method:	up to 4.0 kW direct as from 5.5 kW Star-Delta
Ambient temperature:	0-40 °C
Country of origin:	Germany

In- and Outputs

The control has the digital inputs and outputs stated in the table below. The terminal designation is also given.

Digital inputs:

Description	Terminal
Request master pump	X10: 1, 2, PE1
Request slave pump	X20: 1, 2, PE1
Water shortage/dry running	X10: 3, 4, 5, PE2
Overflow	X10: 6, 7, 8

Digital outputs:

Description	Terminal
Fault main switch	X11+X21: 1, 2
Control ready	X11+X21: 3, 4
Pump is running	X11+X21: 5, 6
Fault pump	X11+X21: 7, 8
Collective fault	X11+X21: 9, 10, 11
Water shortage/dry running	X11: 12, 13
Overflow	X11: 14, 15

3.4.3 Sound pressure level

Depending on the pump type or motor output the following sound pressure levels apply for the system:

Motor power [kW]	Sound pressure level [dB A]
3.0	65
4.0	73
5.5	73
7.5	73
11	80
15	70
18.5	70
22	76
30	76

The stated values are maximum values including an upper tolerance of 3 dB according to ISO 4871. The values apply for a distance of 1 m from the extinguishing water booster set.

3.5 Factory settings

3.5.1 Pump system

Ex factory the cut-in pressure of the Master pressure switch is set to nominal head of the pump and the cut-out pressure to 0.5 bar below the shut-off head. The nominal head and the shut-off head are stated on the pump nameplate and for the most extinguishing water booster set in appendix A2. The nameplate is placed at the pump head.

The cut-in pressure of the Slave pressure switch is set a little bit lower as the cut-in pressure of the Master pressure switch.

The pre-load pressure in the diaphragm-type pressure tank is approx. 10% below the cut-in point p_E ($p_E \times 0.9$ = pre-load pressure in tank).

3.5.2 Control

The date and time at the timer P1+P2+P3 are set to Central European Time considering the summer and winter time by factory.

The values at the multifunctional time relays for the test run und flushing operation duration are set according to the wiring diagram and the instruction manual of the control.

4 Operating conditions

Caution

To avoid damages to the extinguishing water booster set and for safety reasons the required operating conditions have to be observed.

4.1 Pumped liquid

The extinguishing water booster set is designed for transferring and pressure boosting clean water of max. 70 °C. Other extinguishing agents or additives should only be used in consultation with the manufacturer. Prevent the freezing of the extinguishing water by appropriate installation of the system and the pipework.

4.2 Minimum inlet pressure

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

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

mit

p_b = Barometric pressure in bar.

The barometric pressure can be set to 1 bar in an open system (indirect connection). In closed systems (direct connection) p_b indicates the system pressure in bar.

NPSH = Net Positive Suction Head in metres head.

(to be read from the NPSH-curve in appendix A4 at the highest flow the pump will be delivering).

H_f = Friction loss in suction pipe in metres head at the highest flow the pump will be delivering..

H_v = Vapour pressure in metres head, for $t_{m,40}$ °C approx. 0.75 m (t_m = liquid temperature)

H_s = Safety margin = minimum 0.5 metres head.

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

If the calculated "H" is negative, an inlet pressure of minimum "H" metres head is required. There must be a pressure equal to the calculated "H" during operation.

4.3 Maximum inlet pressure

The maximum inlet pressure is stated in the table in appendix A2. The current inlet pressure and the pressure against a closed valve must always be lower than the maximum permissible operating pressure stated on the nameplate.

4.4 Minimum flow rate

To avoid overheating of the pumps, they should **not** run beneath the minimum flow. In case of an ambient temperature of 40 °C the minimum flow is 10 % of the rated flow of the pump.

Caution

The pumps are not allowed to run against a closed valve in the discharge line.

4.5 Installation height

The maximum permissible installation height (above sea level) is stated in the table below:

Motor power in [kW]	Maximum installation height above sea level in [m]
2.2 – 22	3500
30	2750

If the pump is installed at an altitude exceeding the above altitude values, the motor must not be fully loaded due to the risk of overheating. In such cases, it may be necessary to use a motor with a higher rated output.

5 Delivery, transportation, storage

Note

On delivery check if the extinguishing water booster set corresponds to the order and is not damaged.
Before installation the extinguishing water booster set has to be transported and stored correctly.

The extinguishing water booster set is delivered from factory in an open wooden box. The system and the control are packed separately.



Warning

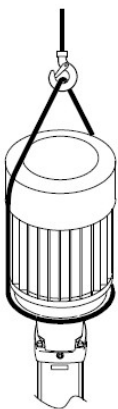
Only move the system and control in the package provided for this purpose.
For lifting the system, only use suitable lifting equipment that is in good condition.

For lifting the extinguishing water booster set only use the lifting eyes at the motor or wrap a lifting strap around the motor, see fig. 7.



Warning

When attaching the hoisting slings take care that the hoisting slings cannot slip off during lifting.
The hoisting slings have to be attached in such a way that the extinguishing water booster set cannot swing back and forth during lifting. Suitable measures have to be taken to prevent tilting, oscillating or turning during lifting.



0,37-7,5 kW



11-75 kW

Fig. 7 Lifting points of the system

To avoid damages only store the extinguishing water booster set in the packages designed for it.

Storage temperature: 0 – 40 °C
Permissible air humidity: 95 %, not condensing

6 Installation



Warning

The installation and operation in a potential explosive environment are not allowed.
The extinguishing water booster set has to be mounted and connected in accordance with local regulations.

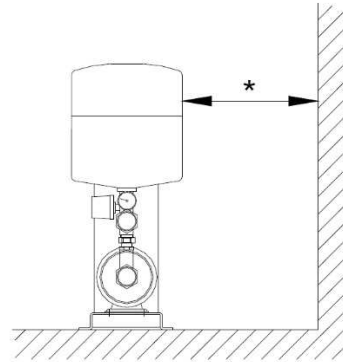
6.1 Mounting

6.1.1 Installation site

The extinguishing water booster set Fire 2 CRF with associated control Control Fire 2 CRF is only suitable for indoor installation. It must be installed in a well ventilated, dry and frost-free room. Especially the control cabinet should not be exposed to direct sunlight.

To ensure a good accessibility to the system and the control, provide a sufficient place for the installation. A distance to the wall of at least 300 mm is recommended, see fig. 8. The control should be mounted at headroom. Furthermore a sufficient venting for cooling must be ensured.

An installation directly beneath bedrooms and living rooms is not allowed.



* Clearance from wall = 300 mm

Fig. 8 Recommended wall clearance

6.1.2 Pump system

Caution

The pump system should be fixed firmly to the floor by using the holes in the base frame.

Note

When connecting the extinguishing water booster set Fire CRF to the public drinking water network the guidelines mentioned in the DIN 14462 have to be observed.

Pipework connection

An isolating valve is installed on the suction side of each pump. Another isolating valve and a non-return valve are installed on the discharge side ex factory, to prevent a backflow of the pumped liquid. Furthermore, draining of the pipes is not necessary when replacing the pump. The flow direction is marked by arrows on the base of the pump.

Install the pipes without tension and so that air locks are avoided, especially on the suction side of the pump. Anchor the pipes with suitable supports. The permissible flange forces are stated in the instruction manual of the CR pumps. Use a suitable flat gasket on the suction side and on the discharge side. To prevent noises expansion joints can be fitted on the discharge and suction side. However, the expansion joints must not be used for compensating misalignment.

Observe the minimum and maximum inlet pressure, see section **Fehler! Verweisquelle konnte nicht gefunden werden.** Operating conditions.

6.1.3 Control

Fix the control cabinet with screws on the wall near the booster set. For this purpose drill holes into the wall according to the hole pattern on the back side of the control cabinet. Use sufficiently dimensioned dowels and screws for the mounting.



Warning
When drilling the holes, attention should be paid to not damaging electric cables or water and gas pipework. Furthermore, ensure a safe installation.



Warning
Place the control cabinet in such a way that possibly escaping water from the pump or pipework cannot destroy control.



Warning
The control cabinet should be lifted using a suitable lifting device. Close the cabinet door before transporting it. Pinch hazard!
If no suitable lifting device is available on site the official rules for lifting and carrying of loads have to be observed.

6.2 Electrical connection



Warning
The electrical connection should only be carried out by qualified personnel in accordance with local specifications and regulations.
Make sure that the extinguishing water booster set is suitable for the electricity supply to which it is connected. The data for the electrical connection are stated on the nameplate.



Warning
Make sure that the supply voltage cannot be switched on accidentally during the electrical connection.

Note

Pay attention to an EMC-compatible installation according to the general regulations.

Make sure that the controller is suitable for the voltage and frequency being available at the installation site. The electrical data are stated on the nameplate. The electrical connection has to be made according to the wiring diagram delivered with control cabinet. The mains line must be dimensioned and fused at site according to their cross section as described in the local regulations.

Note

According to the DIN 14462 the electrical connections have to be done in such a way that the electricity supply of the pump control cabinet will not be switched off, if other electrical loads will be disconnected.
An earth leakage circuit breaker must not be installed in the electric circuit.
The feed line to the control cabinet of the extinguishing water booster set has to be fused in the low voltage main distribution board. Before this fusing it is only allowed to fuse once again until the feed point on the low voltage side.

Procedure

- Connect the mains line to the main switch Q00/Q01 in the control cabinet. Connect the corresponding N and PE to the terminal block X01/X02.
- Connect the motor to the terminal block X1/X2.
- Connect the pressure switch, the limit switch or external instructional transducer to the terminal block X10/X20: terminal 1,2. Connect the corresponding protective earth conductor to the PE terminal.
- For the water shortage and overflow monitoring connect the corresponding contacts of the evaluation units to the terminals 3-8 of the terminal block X10.
- Connect the external solenoid valve for the flushing device to the terminal block X3: terminal 1, 2. Connect the corresponding protective earth conductor to the PE terminal.

If status and fault indications should be forwarded to a building management system, the following signals can be sent via the digital outputs of terminal block X11/X21:

Signal	Terminal
Main switch ON	1 + 2
Control fuse ON (Control READY)	3 + 4
Pump is running	5 + 6
Fault pump	7 + 8
Collective fault	9 - 11
Water shortage (master only)	12 + 13
Overflow (master only)	14 + 15

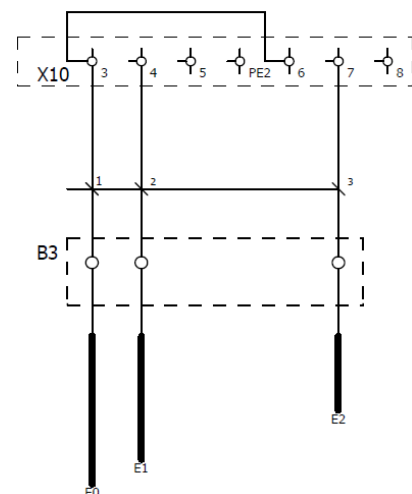
6.3 Connection of the water shortage and overflow monitoring in the master control

6.3.1 3 rod electrode

When using a 3 rod electrode the electrode E1 is for the water shortage monitoring and the electrode E2 for the overflow monitoring.

The level relay B01/B02 energizes, when E1/E2 is submerged and deenergizes, when E1/E2 is outside the liquid.

Connect the electrodes to the terminal block X10 as follows:



- E0 reference electrode to terminal 3
- E1 water shortage electrode to terminal 4
- E2 overflow electrode to terminal 7

7 Start-up

Before start-up the electrodes have to be shortened as follows:

- E0 shortly above the tank bottom.
- E1 in a desired distance above the tank bottom that allows a backfeed on time, if an electrode is not submerged in the water anymore.
- E2 approximate 1-2 cm below the overflow edge of the tank.

Note

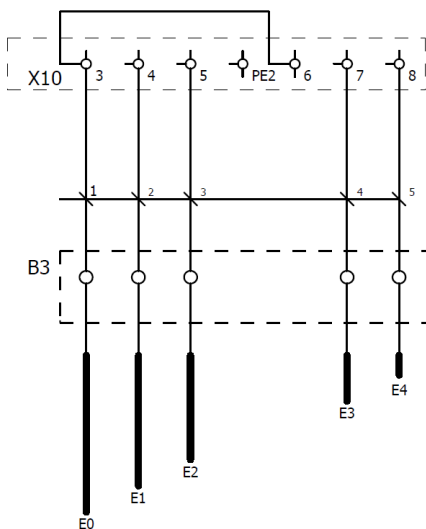
The electrode E2 must be submerged in the water, before the tank overfills.

6.3.2 5 rod electrode

Alternatively a 5 rod electrode can be used, if a hysteresis is required in case of water shortage or overflow. The hysteresis for water shortage is the distance between E1 and E2. The hysteresis for overflow is the distance between E3 and E4.

The level relay B01/B02 energizes, when E2/E4 is submerged and deenergizes, when E1/E3 is outside the liquid.

Connect the electrodes to the terminal block X10 as follows:



- E0 reference electrode to terminal 3
- E1 Minimum level electrode for water shortage at terminal 4
- E2 Maximum level electrode for water shortage at terminal 5
- E3 Minimum level electrode for overflow at terminal 7
- E4 Maximum level electrode for overflow at terminal 8

Before start-up the electrodes have to be shortened as follows:

- E0 shortly above the tank bottom.
- E1 in a desired distance above the tank bottom that allows a backfeed on time, if an electrode is not submerged in the water anymore.
- E2 above E1, according to the required water shortage hysteresis.
- E3 below E4, according to the required overflow hysteresis.
- E4 approximate 1-2 cm below the overflow edge of the tank.

Note

The electrode E4 must be submerged in the water, before the tank overfills.

6.3.3 Float switch

Connect the flow switch for water shortage to the terminal 3, 4 and the corresponding protective earth conductor to the PE terminal.

Connect the flow switch for water shortage to the terminal 6, 7 and the corresponding protective earth conductor to the PE terminal.

If no liquid is in the tank, the contacts of both float switches are open.

Warning

Start-up must only be carried out by authorized and qualified personnel.



Do not touch any live parts, if the control cabinet is open. Avoid body contact with earthed metal parts (pipes, frame, etc.). Danger!

Warning

As part of the commissioning the required tests according to DIN 60204-1 (such as visual check, functional check, checking the consistency of the protective earth conductors, etc.) has to be done.



For start-up it is required that the extinguishing water booster set is installed electrically, mechanically and hydraulically in a correct way according to section 6 Installation.

Caution

Do not start the extinguishing water booster set until the pumps and the suction pipe have been filled with liquid. In case of dry running the pump bearings and mechanical shaft seal can be damaged.

Note

Prior commissioning of the extinguishing water booster set check, if all connections with screwing terminals in the control cabinet and at the signal transmitters are tightened firmly.

To start up the extinguishing water booster set, proceed as follows:

1. Set the pressure switch to the correct values (see the instruction manual of the pressure switch and section 7.1 *Setting of the pressure switch*).
2. Fill and vent the pump and the suction pipe.

Systems with positive inlet pressure

In case of systems with a positive inlet pressure close the isolating valve on the discharge side. Then remove the filling plug at the pump head until water runs out of the hole, see fig. 10. Open the isolating valve on the suction side slowly, if any. If the liquid runs out of the hole, screw in the filling plug again. Afterwards open both isolating valves completely.

Systems without positive inlet pressure

In case of systems without a positive inlet pressure close the isolating valve on the discharge side and open the isolating valve on the suction side. Then remove the filling plug at the pump head until water runs out of the hole and fill the pump slowly with the pump liquid, see fig. 9.



Fig. 9 Priming the pump

TM01 1404 4497

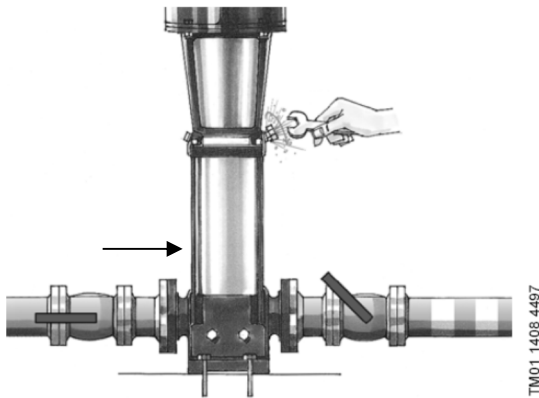


Fig. 10 Venting the pump

Caution

Pay attention where the venting screw is placed to ensure, that no persons are hurt or the motor or other components are damaged by escaping liquid.

3. Switch on the system by means of the main switch.
4. Turn the corresponding selector switch in „Hand“ position.
5. Check the direction of rotation. The correct direction of rotation is stated on the fan cover of the motor. In case of a wrong direction of rotation change two phases in the control cabinet.
6. Vent the pump via the filling plug again, see fig. 10. After venting the pump fasten the filling plug again.
7. Turn the selector switches S11+S21 in „Auto“ position.
8. Open the tap or close the corresponding contact in the control cabinet: The master pump starts.
9. Close the tap or open the corresponding contact in the control cabinet: The master pump stops.
10. Check the switch-points of the pressure switch and adjust them, if necessary. See section 7.1 *Setting of the pressure switch*.

Note

The timers P1+P3 have a back-up battery. Nevertheless the date and time have to be checked and changed, if necessary.

7.1 Adjustment of the master/slave pressure switches



Adjusting by specialist personnel only. The entire system should be disconnected from the supply and secured (main switches Q00 and Q01 in position “0”).

The cut-in and cut-out pressure set at the pressure switch has to be checked and adapted, if necessary.

For extinguishing water booster sets the cut-in pressure should be set approximately to the nominal head H_{nom} (pump head at nominal flow) or approximately 0.5 bar lower. The cut-out pressure should be as near to the shut-off head H_0 as possible. The nominal head and the shut-off head are stated on the pump nameplate and for the most extinguishing water booster sets in appendix A2. The nameplate is placed at the pump head.

To set the upper switching pressure turn after removing the cover the adjusting screw 2 until the desired value is shown at the pointer 3. To set the lower switching pressure turn the adjusting screw 4 until the desired value is shown at the pointer 5. See fig. 11. Then mount the cover again.

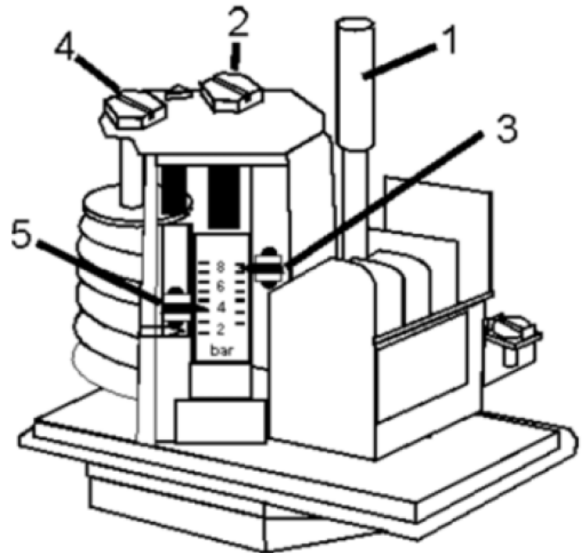


Fig. 11 Setting of the pressure switch

To adjust the pressure switch see also the user manual of the switches. For on-site installed pressure switches the settings of section 3.5 *Factory settings* are recommended.

After adjustment the switch points must be checked. The cut-in point of the Slave pressure switch has to be lower than the cut-in point of the Master pressure switch! If not: the redundancy of the whole system can't be ensured!

Caution

The cut-in point of the slave pressure switch has to be lower than the cut-in point of the Master pressure switch!

Caution

The max. operating pressure stated in appendix A2 must not be exceeded.

Note

A change of the cut-in and cut-out pressure requires a new pre-pressure in the diaphragm tank. See section 7.2 *Pre-filling of diaphragm tank*.

7.2 Pre-filling of diaphragm tank

The diaphragm tank acts as a pressure reservoir on the discharge side. A nitrogen charge above the diaphragm at corresponding pre-load pressure provides the necessary cushion of pressure.

If the cut-in pressure p_E will be changed, the pre-pressure of the diaphragm tank has to be changed as follows:

$$p_{vor} = 0,9 \times p_E$$

Therefore remove the valve cap of the charging valve and deflate pressure or fill up nitrogen (see fig. 12) and user manual of the diaphragm tank. Check the pressure with a test pressure gauge and change if necessary.

Caution

It is important to use nitrogen to avoid corrosion. Filling only by qualified personnel.

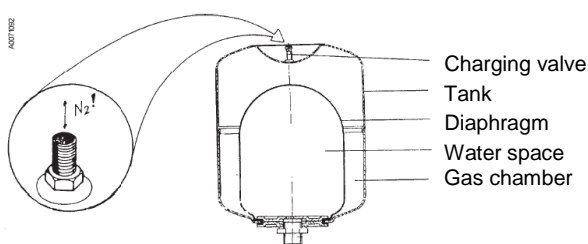


Fig. 12 Filling of the diaphragm expansion vessel

7.3 Setting of the timer for the daily test run

To ensure a correct test run, the date and the time have to be set at the timer P1 and P2 first (see fig. 13). Furthermore, the time for the test run has to be set. The minimum switching time in the timer is 1 minute. The setting of the timer is described in the attached instruction manual.



Fig. 13 Digital timer

Caution

Avoid a test run of the master and slave pump at the same time because the pumps are locked against each other. For the factory setting of the timer P1 and P2 see the wiring diagram and the table below.

Function	Factory setting
Master-timer P1 „ON“	Monday-Sunday 11:00 h
Master-timer P1 „OFF“	Monday-Sunday 11:01 h
Slave-timer P2 „ON“	Monday-Sunday 11:30 h
Slave-timer P2 „OFF“	Monday-Sunday 11:31 h

7.4 Setting of the timer for the weekly flushing operation

To ensure a weekly flushing operation the digital time switch P3 (see fig. 13) must be set to the right date and time.

Additionally the ON switching followed by an OFF switching has to be set once a week.

The settings are described in the attached user manual of the digital time switch.

The on/off switching of the digital timer P2 (10 min.) ensures the maximum flushing time of 10 minutes (see chart below).

Function	Factory setting
„ON“	Monday 9:00 h
„OFF“	Monday 9:10 h

7.5 Settings for the daily test run duration

The duration of the test run has to be adjusted at the multifunctional time relay K6/K16, see fig. 14. The setting is made by the upper setting screw 1.

Function	Factory setting
1 Adjustment range	.5
2 Time range	10 s
3 Function	Wu (Single shot leading edge voltage controlled)

The values in the upper table show a test run time of 5 seconds.



Fig. 14 Multifunctional timer

Caution

It's not allowed to change the function (setting screw 3)

7.6 Setting of the pump off-delay time

The duration of the off-delay time has to be adjusted at the multifunctional time relay K1/K11, see fig. 14. The setting is made by the upper setting screw 1.

Function	Factory setting
1 Adjustment range	.1
2 Time range	10 s
3 Function	R (Off delay)

The values in the upper chart show an off-delay time of 1 second and can be changed with the setting screw 1 between 500 milliseconds and 10 seconds.

To change the off-delay time the chart below can be used:

2 Time range	1 Adjustment range	
1 s	50 ms	1 s
10 s	500 ms	10 s
1 min	3 s	1 min
10 min	30 s	10 min
1 h	3 min	1 h
10 h	30 min	10 h
100 h	5 h	100 h

Caution

It's not allowed to change the function (setting screw 3)

7.7 Settings for the flushing operation duration

The duration of the flushing operation has to be adjusted at the multifunctional time relay K7, see fig.14. The setting is made by the upper setting screw.

Function	Factory setting
1 Adjustment range	.1
2 Time range	10 min
3 Function	Wu (Single shot leading edge voltage controlled)

The values in the upper chart show a flushing time of 1 Minute and can be changed with the setting screw 1 between 30 seconds und 10 minutes.

The on/off setting in the digital timer P2 (10 min.) ensures the maximum flush time of 10 minutes.

Caution

*It's not allowed to change the function (setting screw 3)
The time range (setting screw 2) might not be changed*

7.8 Activation/Deactivation of the wire break and short circuit monitoring

The 1-channel isolating switching amplifier IM1-121EX-R is responsible for the wire-break and short circuit monitoring of the connected demand device. Sensors according to EN 60947-5-6 (NAMUR) or potential-free contact transmitters can be connected to the device. The output circuits feature two relays each with NO contact, one of which works as alarm output (terminal 8, 9). When using mechanical contacts, wire-break and short-circuit monitoring the contacts must be wired to resistors. Therefore special resistor modules R1+R2 are included in the scope of delivery, to be connected to the demand device. When a complete system will be delivered the resistor modules are already connected to the pressure switches B1+B2 of the system. For a delivery of a control without a system the resistor modules are attached in the enclosure.

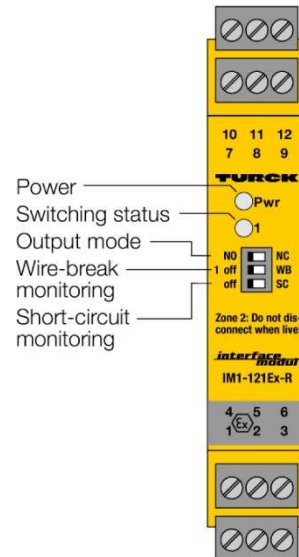


Fig. 15 Isolating switching amplifier

Factory setting:

The wire break and short-circuit monitoring is activated. See following adjustment:



Fig. 16 Switch position

For deactivation of the wire-break and short-circuit monitoring both lower switches must be set in OFF position.

Caution

It's not allowed to change the position of the upper switch (NO und NC).

7.9 Adjustment of the level relay

The factory setting of the level relays B01 and B02 is set to "empty function". A change of this function is not necessary.

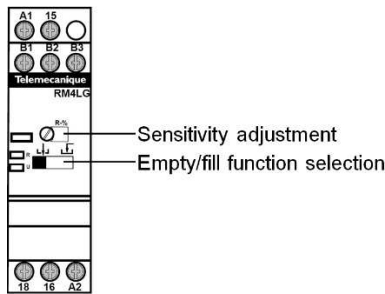


Fig. 17 Level relay

With all electrodes immersed both relays must be switched on. If not, the sensitivity has to be adjusted. The adjustment is described in the attached user manual of the relay.

8 Operation

The extinguishing water booster set runs automatically via a start request of the pumps by the pressure switches.

The operational readiness is indicated by the green signal lamps H11/H21.

If a fault occurs, the signal lamp H12/H22 and/or H14/H24 is on. After remedying the fault, the collective fault alarm must be reset manually by the push button S12/S22.



In case of a fault the extinguishing water booster set will not be switched off.

For the manual operation, for example for a test run or short switching on and off the pump during start-up or service work, turn the selector switch S11/ S21 of the corresponding control in „HAND“ position. The mains switch must be in position „I“. To stop the pump, turn the selector switch S11/S21 in position „AUTO“ again.

9 Shut down

Procedure:

1. Turn the main switch Q00 and Q01 in „0“ position and ensure that it cannot be accidentally switched on.
2. Close the isolating valve on the discharge side at first and then on the suction side.

In case of longer standstill time drain the system, see section 10.4 *Draining the pump*. Protect the pump system against corrosion by applying an anticorrosive inside and outside the pump.

10 Maintenance



Maintenance work must only be done by qualified personnel.
Before starting work on the pumps, make sure that the electricity supply has been switched off. Lock the main switch with a padlock to ensure that it cannot be accidentally switched on.

Note

To ensure a proper function and long lifetime of the extinguishing water booster set, it is recommended to close a maintenance contract with Grundfos.

Note

In addition to the maintenance work stated below the maintenance procedures according to DIN 14462 have to be observed.

10.1 Control



Opening the door of the control cabinet is only allowed by qualified persons. Danger in case of switched on power!

To ensure a long lifetime and an optimal operation the following inspection work should be done at least every half year:

Check and retighten all screws at the terminals and the ground connections in the control cabinet. Check cables for damages and replace, if necessary.

10.2 Pump system

Make the following inspections at the complete pump system at least every half year:

- Check pipe work for leakages, correct fitting and damages.
- Check all fittings (isolating valves and control fittings) for correct function and position.
- Monitor the head and flow for deviation of setpoints.
- Check the start and stop pressure of the pumps and the precharge pressure of the diaphragm tank.

10.3 Pump

Pump parts:

Pump bearings and shaft seals are maintenance-free.

Motor bearings:

Motors without grease nipples are maintenance-free. It is recommended to change the bearings every 18,000 operating hours.

Motors with grease nipples should be lubricated every 4,000 operating hours with a high-temperature lithium-based grease. See the instructions on the fan cover of the motor.

In the case of seasonal operation (motor is idle for more than 6 months of the year), it is recommended to grease the motor when the pump is taken out of operation.

10.4 Draining the pump

Drain the pump by loosening the vent screw in the pump head and by removing the drain plug from the base.

Do not tighten the vent screw and replace the drain plug until the pump is to be used again.

11 Option beacon with audible alarm

The control can be delivered with the following optional accessory:

- Beacon and audible alarm Fire 2 CRF

The red beacon mounted on top of the control cabinet and the audible alarm in the cabinet door are connected with the collective fault alarm of the master control.

Caution

If the supply voltage or control voltage of the master control fails, the option is also out of order.

Technical data:

Beacon: red colour, flash frequency 1 Hz.

Audible alarm: sound level 80 dB.

Audio frequency: approx. 2.4 kHz.

Surplus price for the option on request.

12 Service, spare parts, accessories

Note

Spare parts and accessories not delivered by Grundfos, are not tested or authorised by Grundfos as well.

The installation and/or use of such products may negatively alter and thus impair specified properties of the extinguishing water booster set.

For damages caused by using non-genuine spare parts and accessories, any liability and warranty on the part of Grundfos is excluded.

Any malfunctions which cannot be repaired by the operator/owner should only be corrected by Grundfos or authorised specialist companies.

Please provide an exact description in the event of a malfunction so that our service technician can prepare himself and provide the appropriate spare parts.

Please obtain the technical data for the extinguishing water booster set or controller from the nameplate.

13 Warranty

The warranty is governed by the framework of our general terms of delivery. Liability for any damage which is a result of errors during installation, electrical connection or incorrect use is excluded. Liability for consequential damage is excluded. The start of the warranty period is to be verified.

14 Disposal

This product or parts of it must be disposed of in an environmentally sound way:

1. Please use the public or private waste collection service.
2. If this is not possible or if the receipt of the materials used for the product will be denied, the product or any potentially environmental hazardous material of it can be returned to the next INTERSEROH agency.

15 Enclosed documentation

Use this instruction manual in combination with the following enclosed documentation:

- Wiring diagram of the control
- Instruction manual of the CR pump
- Instruction manual of the pressure switch
- Instruction manual of the diaphragm tank
- Instruction manual of the multifunctional time relay
- Instruction manual of the switch amplifier
- Instruction manual of the level relay
- Instruction manual of the timer.

The instruction manual of the multifunctional time relay can be downloaded on <http://www.tele-online.com/>.

16 Fault finding



Warning

Service work must only be done by qualified personnel.

Before starting work on the pumps, make sure that the electricity supply has been switched off. Lock the main switch with a padlock to ensure that it cannot be accidentally switched on.

Fault	Possible cause	Remedy
1. The pump does not start after a request.	a) Electricity supply disconnected or wrong.	Check the electricity supply to the control cabinet and the motor.
	b) Motor circuit breaker F10 / F20 and/or control circuit breaker F11 / F21 have tripped.	Remedy the fault and switch on the circuit breaker again.
	c) Contact fault at the contactors Q12 to Q24 and Q22 to Q24, respectively.	Check the contactors and replace them, if necessary.
	d) Motor faulty.	Check the motor and replace it, if necessary.
	e) Control faulty.	Check the control and replace it, if necessary.
	f) Blocked pump.	Clean the pump.
	g) Start pressure set at the pressure switch will not be reached.	Check the setting of the pressure switch.
	h) Pressure switch faulty.	Check the pressure switch and replace it, if necessary.
2. Pump is running, but deliver no or not enough water or the flow is not constant.	a) Suction pipe/pump partly blocked by impurities.	Clean the suction pipe and pump.
	b) The isolating valves are closed on the discharge and/or suction side.	Open the isolating valves.
	c) Air in pump due to faulty suction pipe.	Check the suction pipe for leakages.
	d) Non-return valve blocked in closed position.	Check the non-return valve and replace it, if necessary.
	e) Inlet pressure too low (cavitation).	Check inlet conditions.
3. Pump is running continuously and does not stop.	a) Stop pressure is not reached.	Check switching points at the pressure switch and change them, if necessary.
	b) Pressure switch faulty.	Check the pressure switch and replace it, if necessary.
	c) Selector switch S11 / S21 is in „MANUAL“ position.	Check the switch position and change to „AUT“, if necessary.
4. Pump is running backwards when switched off.	a) Non-return valve blocked or faulty.	Clean or replace the non-return valve.
5. Pumps are running with noise.	a) The pumps are cavitating.	Check the suction conditions.
	b) Pump and/or motor bearings defective.	Check and replace bearings, if necessary.
6. Shaft seal leakage.	a) Mechanical shaft seal defective.	Replace the mechanical shaft seal.
7. Control without function.	a) Wrong electricity supply to control cabinet.	Check electricity supply.
	b) Control defective.	Check and replace control, if necessary.
8. No request.	a) Inputs wrong connected.	Check configuration of inputs and change it, if necessary.
	b) Pressure switch faulty or cable damaged.	Check pressure switch and cables.
	c) Wrong setting of pressure switch.	Change pressure switch settings.

Subjects to alterations.

Appendix A1 – Allocation of control and pump system

Product number	Designation	Rated voltage	P2 [kW]	Q [m³/h]	H [bar]	Pump type	Control
	Fire 2CRF 15-3	3x 400 V	3	18	3.2	CR 15-3	98848679
	Fire 2CRF 15-4	3x 400 V	4	18	4.4	CR 15-4	98848680
	Fire 2CRF 15-5	3x 400 V	4	18	5.4	CR 15-5	98848680
98876777	Fire 2CRF 15-6	3x 400 V	5.5	18	6.7	CR 15-6	98848681
	Fire 2CRF 15-7	3x 400 V	5.5	18	7.5	CR 15-7	98848681
	Fire 2CRF 20-3	3x 400 V	4	24	3	CR 20-3	98848680
	Fire 2CRF 20-4	3x 400 V	5.5	24	4.1	CR 20-4	98848681
98876776	Fire 2CRF 20-5	3x 400 V	5.5	24	5.1	CR 20-5	98848681
98876775	Fire 2CRF 20-6	3x 400 V	7.5	24	6.3	CR 20-6	98848682
	Fire 2CRF 20-7	3x 400 V	7.5	24	7.3	CR 20-7	98848682
	Fire 2CRF 32-3	3x 400 V	5.5	36	3.6	CR 32-3	98848681
	Fire 2CRF 32-4-2	3x 400 V	7.5	36	4.2	CR 32-4-2	98848682
98876630	Fire 2CRF 32-4	3x 400 V	7.5	36	4.9	CR 32-4	98848682
	Fire 2CRF 32-5-2	3x 400 V	11	36	5.6	CR 32-5-2	98848683
98876627	Fire 2CRF 32-5	3x 400 V	11	36	6.3	CR 32-5	98848683
	Fire 2CRF 32-6-2	3x 400 V	11	36	7	CR 32-6-2	98848683
	Fire 2CRF 32-6	3x 400 V	11	36	7.5	CR 32-6	98848683
	Fire 2CRF 32-7-2	3x 400 V	15	36	8.2	CR 32-7-2	98848684
	Fire 2CRF 32-7	3x 400 V	15	36	8.8	CR 32-7	98848684
	Fire 2CRF 32-8-2	3x 400 V	15	36	9.5	CR 32-8-2	98848684
	Fire 2CRF 32-8	3x 400 V	15	36	10	CR 32-8	98848684
98876625	Fire 2CRF 45-2	3x 400 V	7.5	48	3.7	CR 45-2	98848682
	Fire 2CRF 45-3-2	3x 400 V	11	48	4.9	CR 45-3-2	98848683
98876624	Fire 2CRF 45-3	3x 400 V	11	48	5.6	CR 45-3	98848683
98876622	Fire 2CRF 45-4-2	3x 400 V	15	48	6.8	CR 45-4-2	98848684
98863855	Fire 2CRF 45-4	3x 400 V	15	48	7.5	CR 45-4	98848684
98876606	Fire 2CRF 45-5-2	3x 400 V	18.5	48	8.7	CR 45-5-2	98848685
98876609	Fire 2CRF 45-5	3x 400 V	18.5	48	9.5	CR 45-5	98848685
	Fire 2CRF 45-6-2	3x 400 V	22	48	10.7	CR 45-6-2	98848686
98876621	Fire 2CRF 45-6	3x 400 V	22	48	11	CR 45-6	98848686

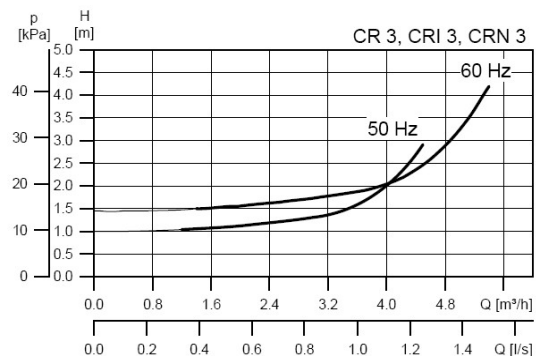
Appendix A2 – Operating pressure

Product number	Designation	H _{nom} [bar]	H ₀ [bar]	Max. operating pressure [bar]	Max. inlet pressure [bar]	Volume diaphragm tank [l]	Pump type
	Fire 2CRF 15-3	3.3	4.3	10	5.7	18	CR 15-3
	Fire 2CRF 15-4	4.5	5.7		4.3		CR 15-4
	Fire 2CRF 15-5	5.5	7.1		2.9		CR 15-5
98876777	Fire 2CRF 15-6	6.7	8.5	16	7.5	12	CR 15-6
	Fire 2CRF 15-7	8.0	9.9		6.1		CR 15-7
	Fire 2CRF 20-3	3.5	4.4	10	5.6	18	CR 20-3
	Fire 2CRF 20-4	4.7	5.9		4.1		CR 20-4
98876776	Fire 2CRF 20-5	5.8	7.3		2.7		CR 20-5
98876775	Fire 2CRF 20-6	7.0	8.8	16	7.2	12	CR 20-6
	Fire 2CRF 20-7	8.2	10.3		5.7		CR 20-7
	Fire 2CRF 32-3	4.4	5.9	10	4.1	18	CR 32-3
	Fire 2CRF 32-4-2	5.3	7.0		3.0		CR 32-4-2
98876630	Fire 2CRF 32-4	5.9	7.8		2.2		CR 32-4
	Fire 2CRF 32-5-2	7.0	9.0	16	7.0	12	CR 32-5-2
98876627	Fire 2CRF 32-5	7.6	9.8		6.2		CR 32-5
	Fire 2CRF 32-6-2	8.4	10.9		5.1		CR 32-6-2
	Fire 2CRF 32-6	9.0	11.7		4.3		CR 32-6
	Fire 2CRF 32-7-2	10.0	12.9		3.1		CR 32-7-2
	Fire 2CRF 32-7	10.7	13.7		2.3		CR 32-7
	Fire 2CRF 32-8-2	11.5	14.8		1.2		CR 32-8-2
	Fire 2CRF 32-8	12.1	15.6		0.4		CR 32-8
98876625	Fire 2CRF 45-2	3.9	5.2	10	4.8	18	CR 45-2
	Fire 2CRF 45-3-2	5.2	6.7		3.2		CR 45-3-2
98876624	Fire 2CRF 45-3	5.9	7.7		2.3		CR 45-3
98876622	Fire 2CRF 45-4-2	7.2	9.2	16	6.8	12	CR 45-4-2
98863855	Fire 2CRF 45-4	8.0	10.2		5.8		CR 45-4
98876606	Fire 2CRF 45-5-2	9.3	11.8		4.2		CR 45-5-2
98876609	Fire 2CRF 45-5	10.0	12.8		3.2		CR 45-5
	Fire 2CRF 45-6-2	11.3	14.3		1.7		CR 45-6-2
98876621	Fire 2CRF 45-6	12.1	15.3		0.7		CR 45-6

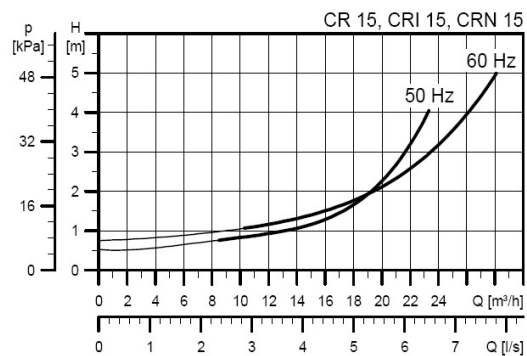
Appendix A3 – Dimensions and weights

Product number	Designation	Dimensions W x L x H [mm]	Axial- dimen- sions [mm]	Conne- ction height [mm]	Weight [kg]	Connection Suction-/ Discharge side	Dimensions enclosure W x H x D [mm]	Pump type
	Fire 2CRF 15-3	1193 x 720 x 868	950	160	244	Inlet- and outlet manifold DN 80 / DN80 (PN16)	760x760x210	CR 15-3
	Fire 2CRF 15-4	1193 x 720 x 950			266		760x760x210	CR 15-4
	Fire 2CRF 15-5	1193 x 720 x 995			268		760x760x210	CR 15-5
98876777	Fire 2CRF 15-6	1193 x 720 x 1091			312		760x760x210	CR 15-6
	Fire 2CRF 15-7	1193 x 720 x 1136			316		760x760x210	CR 15-7
	Fire 2CRF 20-3	1193 x 720 x 907			262		760x760x210	CR 20-3
	Fire 2CRF 20-4	1193 x 720 x 1003			306		760x760x210	CR 20-4
98876776	Fire 2CRF 20-5	1193 x 720 x 1048			310		760x760x210	CR 20-5
98876775	Fire 2CRF 20-6	1193 x 720 x 1081			336		760x760x210	CR 20-6
	Fire 2CRF 20-7	1193 x 720 x 1126			340		760x760x210	CR 20-7
	Fire 2CRF 32-3	1168 x 1000 x 1134	930	175	332		760x760x210	CR 32-3
	Fire 2CRF 32-4-2	1168 x 1000 x 1192			362		760x760x210	CR 32-4-2
98876630	Fire 2CRF 32-4	1168 x 1000 x 1192			362		760x760x210	CR 32-4
	Fire 2CRF 32-5-2	1168 x 1000 x 1504	930	215	458		760x760x210	CR 32-5-2
98876627	Fire 2CRF 32-5	1168 x 1000 x 1504			458		760x760x210	CR 32-5
	Fire 2CRF 32-6-2	1168 x 1000 x 1574			464		760x760x210	CR 32-6-2
	Fire 2CRF 32-6	1168 x 1000 x 1574			464		760x760x210	CR 32-6
	Fire 2CRF 32-7-2	1168 x 1000 x 1644			494		760x760x210	CR 32-7-2
	Fire 2CRF 32-7	1168 x 1000 x 1644			494		760x760x210	CR 32-7
	Fire 2CRF 32-8-2	1168 x 1000 x 1714			506		760x760x210	CR 32-8-2
	Fire 2CRF 32-8	1168 x 1000 x 1714			506		760x760x210	CR 32-8
98876625	Fire 2CRF 45-2	1165 x 1000 x 1128	925	210	384		760x760x210	CR 45-2
	Fire 2CRF 45-3-2	1165 x 1000 x 1410		250	478		760x760x210	CR 45-3-2
98876624	Fire 2CRF 45-3	1165 x 1000 x 1410			478		760x760x210	CR 45-3
98876622	Fire 2CRF 45-4-2	1165 x 1000 x 1490			512		760x760x210	CR 45-4-2
98863855	Fire 2CRF 45-4	1165 x 1000 x 1490			512		760x760x210	CR 45-4
98876606	Fire 2CRF 45-5-2	1165 x 1000 x 1614			546		760x760x210	CR 45-5-2
98876609	Fire 2CRF 45-5	1165 x 1000 x 1614			546		760x760x210	CR 45-5
	Fire 2CRF 45-6-2	1165 x 1000 x 1720			586		760x760x210	CR 45-6-2
98876621	Fire 2CRF 45-6	1165 x 1000 x 1720			586		760x760x210	CR 45-6

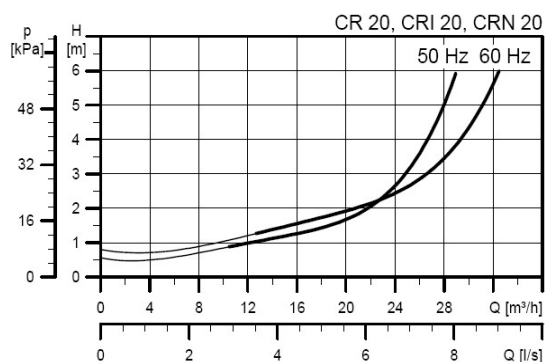
Appendix A4 – NPSH curves



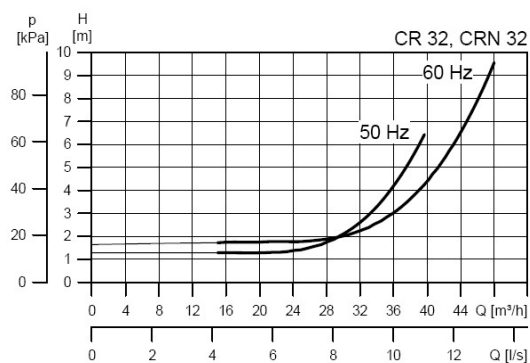
TM01 9883 3300



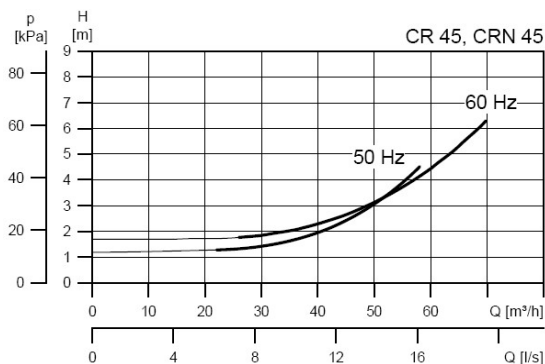
TM02 7126 2703



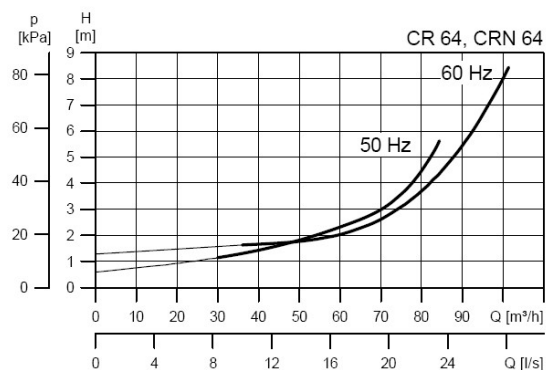
TM02 7127 2703



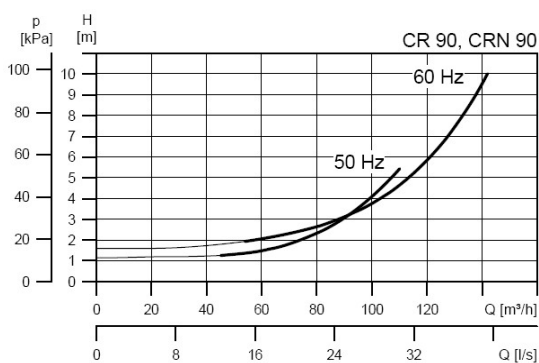
TM01 1934 0899



TM01 1935 0899



TM01 1936 0899



TM01 1937 0899

Argentina

Bombas GRUNDFOS de Argentina
S.A.
Ruta Panamericana km. 37.500
Lote 34A
1619 - Garin
Pcia. de Buenos Aires
Phone: +54-3327 414 444
Telefax: +54-3327 411 111

Australia

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

Austria

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

Belgium

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

Belorussia

Представительство ГРУНДФОС в
Минске
220123. Минск.
ул. В. Хоружей. 22. оф. 1105
Тел.: +(37517) 233 97 65.
Факс: +(37517) 233 97 69
E-mail: grundfos_minsk@mail.ru
Bosnia/Herzegovina
GRUNDFOS Sarajevo
Trg Heroja 16.
BiH-71000 Sarajevo
Phone: +387 33 713 290
Telefax: +387 33 659 079
e-mail: grundfos@bih.net.ba

Brazil

Mark GRUNDFOS Ltda.
Av. Humberto de Alencar Castelo
Branco.
630
CEP 09850 - 300
São Bernardo do Campo - SP
Phone: +55-11 4393 5533
Telefax: +55-11 4343 5015

Bulgaria

GRUNDFOS Pumpen Vertrieb
Representative Office - Bulgaria
Bulgaria. 1421 Sofia
Lozenetz District
105-107 Arsenalski blvd.
Phone: +359 2963 3820. 2963 5653
Telefax: +359 2963 1305

Canada

GRUNDFOS Canada Inc.
2941 Brighton Road
Oakville. Ontario
L6H 6C9
Phone: +1-905 829 9533
Telefax: +1-905 829 9512

China

GRUNDFOS Pumps (Shanghai)
Co. Ltd.
51 Floor. Raffles City
No. 268 Xi Zang Road. (M)
Shanghai 200001
PRC
Phone: +86-021-612 252 22
Telefax: +86-021-612 253 33

Croatia

GRUNDFOS CROATIA d.o.o.
Cebini 37. Buzin
HR-10010 Zagreb
Phone: +385 1 6595 400
Telefax: +385 1 6595 499
www.grundfos.hr

Czech Republic

GRUNDFOS s.r.o.
Čajkovského 21
779 00 Olomouc
Phone: +420-585-716 111
Telefax: +420-585-716 299

Denmark

GRUNDFOS DK A/S
Martin Bachs Vej 3
DK-8850 Bjerringbro
Tlf.: +45-87 50 50 50
Telefax: +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
Mestarintie 11
FIN-01730 Vantaa
Phone: +358-3066 5650
Telefax: +358-3066 56550

France

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

Germany

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

Greece

GRUNDFOS Hellas A.E.B.E.
20th km. Athinon-Markopoulou Av.
P.O. Box 71
GR-19002 Pania
Phone: +0030-210-66 83 400
Telefax: +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
Phone: +852-27861706 / 27861741
Telefax: +852-27858664

Hungary

GRUNDFOS Hungária Kft.
Park u. 8
H-2045 Törökbálint.
Phone: +36-23 511 110
Telefax: +36-23 511 111

India

GRUNDFOS Pumps India Private
Limited
118 Old Mahabalipuram Road
Thoraipakkam
Chennai 600 096
Phone: +91-44 2496 6800

Indonesia

PT GRUNDFOS Pompa
Jl. Rawa Sumur III. Blok III / CC-1
Kawasan Industri. Pulogadung
Jakarta 13930
Phone: +62-21-460 6909
Telefax: +62-21-460 6910 / 460 6901

Ireland

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

Italy

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

Japan

GRUNDFOS Pumps K.K.
Gotanda Metalion Bldg.. 5F.
5-21-15. Higashi-gotanda
Shiagawa-ku. Tokyo
141-0022 Japan
Phone: +81 35 448 1391
Telefax: +81 35 448 9619

Korea

GRUNDFOS Pumps Korea Ltd.
6th Floor. Aju Building 679-5
Yeoksam-dong. Kangnam-ku. 135-
916

Seoul. Korea

Phone: +82-2-5317 600
Telefax: +82-2-5633 725

Latvia

SIA GRUNDFOS Pumps Latvia
Deglava biznesa centrs
Augusta Deglava ielā 60. LV-1035.
Rīga.

Tālr.: + 371 714 9640. 7 149 641
Fakss: + 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
Phone: +60-3-5569 2922
Telefax: +60-3-5569 2866

México

Bombas GRUNDFOS de México
S.A. de
C.V.

Boulevard TLC No. 15
Parque Industrial Stiva Aeropuerto
Apodaca. N.L. 66600
Phone: +52-81-8144 4000
Telefax: +52-81-8144 4010

Netherlands

GRUNDFOS Netherlands
Veluwezoom 35
1326 AE Almere
Postbus 22015
1302 CA ALMERE
Tel.: +31-88-478 6336
Telefax: +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
Phone: +64-9-415 3240
Telefax: +64-9-415 3250

Norway

GRUNDFOS Pumper A/S
Strømsveien 344
Postboks 235. Leirdal
N-1011 Oslo
Tlf.: +47-22 90 47 00
Telefax: +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
Telefax: +351-21-440 76 90

Romania

GRUNDFOS Pompe România SRL
Bd. Biruintei. nr 103
Pantelimon county Ilfov
Phone: +40 21 200 4100
Telefax: +40 21 200 4101
E-mail: romania@grundfos.ro

Russia

ООО Грундфос
Россия. 109544 Москва. ул.
Школьная 39
Тел. (+7) 495 737 30 00. 564 88 00
Факс (+7) 495 737 75 36. 564 88 11
E-mail
grundfos.moscow@grundfos.com

Serbia

GRUNDFOS Predstavništvo
Beograd
Dr. Milutina Ivkovića 2a/29
YU-11000 Beograd
Phone: +381 11 26 47 877 / 11 26 47 496
Telefax: +381 11 26 48 340

Singapore

GRUNDFOS (Singapore) Pte. Ltd.
24 Tuas West Road
Jurong Town
Singapore 638381
Phone: +65-6865 1222
Telefax: +65-6861 8402

Slovenia

GRUNDFOS PUMPEN VERTRIEB
Ges.m.b.H..
Podružnica Ljubljana
Šlandrova 8b. SI-1231 Ljubljana-
Črnuče
Phone: +386 1 568 0610
Telefax: +386 1 568 0619
E-mail: slovenia@grundfos.si

Spain

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

Sweden

GRUNDFOS AB
Box 333 (Lunnagårdsgatan 6)
431 24 Mölndal
Tel.: +46(0)771-32 23 00
Telefax: +46(0)31-331 94 60

Switzerland

GRUNDFOS Pumpen AG
Bruggacherstrasse 10
CH-8117 Fällanden/ZH
Tel.: +41-1-806 8111
Telefax: +41-1-806 8115

Taiwan

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

Thailand

GRUNDFOS (Thailand) Ltd.
92 Chaloeam Phrakiat Rama 9
Road.
Dokmai. Pravej. Bangkok 10250
Phone: +66-2-725 8999
Telefax: +66-2-725 8998

Turkey

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

Ukraine

ТОВ ГРУНДФОС УКРАЇНА
01010 Київ. Вул. Московська 86.
Тел.: (+38 044) 390 40 50
Факс.: (+38 044) 390 40 59
E-mail: ukraine@grundfos.com

United Arab Emirates

GRUNDFOS Gulf Distribution
P.O. Box 16768
Jebel Ali Free Zone
Dubai
Phone: +971-4- 8815 166
Telefax: +971-4-8815 136

United Kingdom

GRUNDFOS Pumps Ltd.
Grovebury Road
Leighton Buzzard/Beds. LU7 8TL
Phone: +44-1525-850000
Telefax: +44-1525-850011

U.S.A.

GRUNDFOS Pumps Corporation
17100 West 118th Terrace
Olathe. Kansas 66061
Phone: +1-913-227-3400
Telefax: +1-913-227-3500

Uzbekistan

Представительство ГРУНДФОС в
Ташкенте
700000 Ташкент ул.Усмана
Носира 1-й
тулик 5
Телефон: (3712) 55-68-15
Факс: (3712) 53-36-35
Addresses