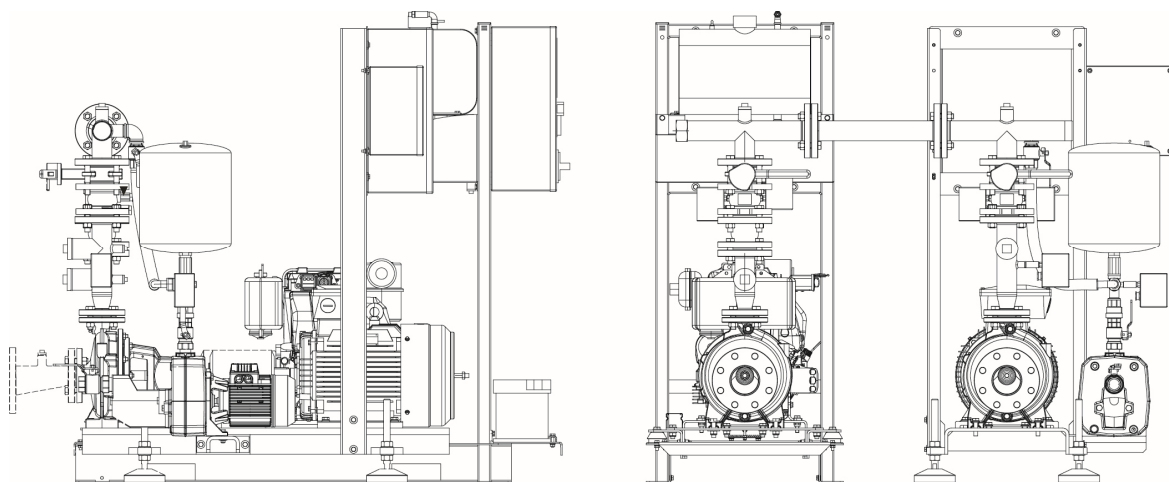


ISTRUZIONI PER L'INSTALLAZIONE E LA MANUTENZIONE
INSTRUCTIONS POUR L'INSTALLATION ET LA MAINTENANCE
INSTRUCTIONS FOR INSTALLATION AND MAINTENANCE
INSTALLATIONS- UND WARTUNGSANLEITUNGEN
INSTRUCTIES VOOR INSTALLATIE EN ONDERHOUD
INSTRUCCIONES PARA LA INSTALACIÓN Y EL MANTENIMIENTO
KURMA VE BAKIM BİLGİLERİ
РУКОВОДСТВО ПО МОНТАЖУ И ТЕХНИЧЕСКОМУ ОБСЛУЖИВАНИЮ
INSTALLÁCIÓS ÉS KARBANTARTÁSI KÉZIKÖNYV
INSTRUKCJA INSTALACJI I KONSERWACJI
INSTRUÇÕES PARA A INSTALAÇÃO E A MANUTENÇÃO
INSTRUCȚIUNI PENTRU INSTALARE ȘI ÎNTREȚINERE

1 KDN EN 12845

GRUPPI POMPE ANTINCENDIO A NORME EN 12845 – UNI 10779
GROUPES POMPES ANTI-INCENDIE CONFORMES À LA NORME EN 12845 – UNI 10779
SETS OF FIRE-FIGHTING PUMPS TO STANDARD EN 12845 – UNI 10779
FEUERLÖSCHPUMPEN-GRUPPEN GEMÄSS EN 12845 – UNI 10779
GROEPEN BRANDBLUSPOMPEN VOLGENS EN 12845 – UNI 10779 NORMEN
GRUPOS DE BOMBAS CONTRA INCENDIOS SEGÚN NORMAS EN 12845 – UNI 10779
EN 12845 – UNI 10779 STANDARDINA UYGUN YANGIN SÖNDÜRME POMPA GRUPLARI
ПРОТИВОПОЖАРНЫЕ НАСОСЫЕ УСТАНОВКИ ПО СТАНДАРТУ EN 12845 – UNI 10779
EN 12845 – UNI 10779 SZABVÁNY SZERINTI TŰZVÉDELMI SZIVATTYÚEGYSÉGEK
ZESTAWY POMP PRZECIWPÓŻAROWYCH ZGODNYCH ZE STANDARDAMI EN 12845 – UNI 10779
GRUPOS DE BOMBAS ANTI-INCÊNDIO SEGUNDO AS NORMAS EN 12845 – UNI 10779
GRUPURI POMPE ANTIINCENDIU CONFORM EN 12845 – UNI 10779



DICHIARAZIONI DI CONFORMITÀ

MARCATURA UE

La Ditta DAB PUMPS s.p.a. - Via M. Polo, 14 - Mestrino (PD) - ITALY - sotto la propria esclusiva responsabilità dichiara che i prodotti sotto menzionati sono conformi a:

- 2006/42/EC (Machinery)
- 2014/30/EU (Electromagnetic Compatibility Directive)
- 2014/35/EU (Low Voltage)

NORMATIVA EN 12845 – UNI 10779 ANTINCENDIO

Si dichiara che il gruppo d'alimentazione idrica per impianto antincendio sotto riportato è stato fornito in conformità alla normativa EN 12845 – UNI 10779 per quanto concerne i componenti idraulici e loro disposizione e le apparecchiature di comando e controllo.

DÉCLARATIONS DE CONFORMITÉ

MARQUAGE EU

La société DAB PUMPS s.p.a. - Via M. Polo, 14 - Mestrino (PD) - ITALY – sous sa propre responsabilité exclusive, déclare que les produits mentionnés ci-après sont conformes à :

- 2006/42/EC (Machinery)
- 2014/30/EU (Electromagnetic Compatibility Directive)
- 2014/35/EU (Low Voltage)

NORME EN 12845 – UNI 10779 ANTI-INCENDIE

Nous déclarons que le groupe d'alimentation hydraulique pour installation anti-incendie indiqué ci-dessous a été fourni en conformité avec la norme EN 12845 – UNI 10779 en ce qui concerne les composants hydrauliques et leur disposition et les appareils de commande et de contrôle.

DECLARATION OF CONFORMITY

EU MARKING

The Company DAB PUMPS s.p.a. - Via M. Polo, 14 - Mestrino (PD) - ITALIA - under its own exclusive responsibility declares that the products listed below comply with:

- 2006/42/EC (Machinery)
- 2014/30/EU (Electromagnetic Compatibility Directive)
- 2014/35/EU (Low Voltage)

FIRE-FIGHTING STANDARD EN 12845 – UNI 10779

It is declared that the water supply set for a fire-fighting system listed below has been supplied in conformity with standard EN 12845 – UNI 10779 as regards the hydraulic components and their arrangement and the command and control equipment.

KONFORMITÄTSERKLÄRUNG

EU-KENNZEICHNUNG

Die Firma DAB PUMPS s.p.a. - Via M. Polo, 14 - Mestrino (PD) - ITALIEN – erklärt eigenverantwortlich, dass die vorstehend angeführten Produkte den folgenden Richtlinien entsprechen:

- 2006/42/EC (Machinery)
- 2014/30/EU (Electromagnetic Compatibility Directive)
- 2014/35/EU (Low Voltage)

NORM EN 12845 – UNI 10779 ZUR BRANDBEKÄMPFUNG

Wir erklären, dass die Wasserversorgungseinheit der nachstehend beschriebenen Feuerlöschanlage hinsichtlich der Hydraulikkomponenten und deren Anordnung, sowie der Steuer- und Kontrollegehäte der Norm EN 12845 – UNI 10779 entspricht.

OVEREENKOMSTIGHEIDSVKRLARING

EU-MARKERING

De firma DAB PUMPS s.p.a. - Via M. Polo, 14 - Mestrino (PD) - ITALY – verklaart onder haar eigen, exclusieve verantwoording dat de hieronder genoemde producten voldoen aan:

- 2006/42/EC (Machinery)
- 2014/30/EU (Electromagnetic Compatibility Directive)
- 2014/35/EU (Low Voltage)

EN 12845 - UNI 10779 NORMEN MET BETREKKING TOT BRANDBEVEILIGING

Hierbij verklaren wij dat de hieronder vermelde watertoevoereenheid voor brandblussysteem bij de aflevering voldoet aan de EN 12845 – UNI 10779 normen met betrekking tot de hydraulische componenten en hun plaatsing en de bedienings- en regelapparatuur.

DECLARACIÓN DE CONFORMIDAD

MARCADO EU

La empresa DAB PUMPS s.p.a. - Via M. Polo,14 - Mestrino (PD) - ITALY - declara bajo su exclusiva responsabilidad que los productos mencionados anteriormente cumplen la:

- 2006/42/EC (Machinery)
- 2014/30/EU (Electromagnetic Compatibility Directive)
- 2014/35/EU (Low Voltage)

NORMATIVA EN 12845 – UNI 10779 CONTRA INCENDIOS

Se declara que el grupo de alimentación hídrica para la instalación contra incendios presentado a continuación se ha suministrado en conformidad a la normativa EN 12845 – UNI 10779 en relación a los componentes hidráulicos y a la disposición de los aparatos de mando y control.

UYGUNLUK BEYANNAMESİ

EU MARKASI

DAB PUMPS s.p.a. şirketi - Via M. Polo, 14 - Mestrino (PD) - İTALYA - münhasıran kendi şahsi mesuliyeti altında yukarıda söz konusu edilen ürünlerin aşağıdaki direktiflere uygun olduklarını beyan eder:

- 2006/42/EC (Machinery)
- 2014/30/EU (Electromagnetic Compatibility Directive)
- 2014/35/EU (Low Voltage)

EN 12845 YANGIN SÖNDÜRME STANDARDI

Aşağıda belirtirken yangın söndürme tesisi için su besleme grubunun, hidrolik bileşimler ve bunların konumlandırılması ve kumanda ve kontrol aparatlarına ilişkin olarak EN 12845 – UNI 10779 standardına uygun olarak tedarik edilmiş olduğu beyan edilir.

ЗАЯВЛЕНИЕ О СООТВЕТСТВИИ

МАРКИРОВКА EU

Компания DAB PUMPS s.p.a. - Via M. Polo,14 - Mestrino (PD) - ITALY – под собственную исключительную ответственность заявляет, что перечисленные ниже изделия соответствуют:

- 2006/42/EC (Machinery)
- 2014/30/EU (Electromagnetic Compatibility Directive)
- 2014/35/EU (Low Voltage)

СТАНДАРТ EN 12845 – UNI 10779 ПРОТИВОПОЖАРНЫЕ МЕРЫ

Заявляется, что узел подачи воды к противопожарной установке, описанный далее, соответствует стандарту EN 12845 – UNI 10779, в том, что касается гидравлических компонентов, их расположения, оборудования по управлению и контролю.

KONFORMITÁSI (SZABVÁNY MEGFELELŐSÉGI) NYILATKOZAT

EU MÁRKAJELZÉS

A DAB PUMPS s.p.a. - Via M. Polo,14 - Mestrino (PD) - ITALY - cég, kizárólagos felelősségvállalás mellett kijelenti, hogy az alábbiakban megnevezett termékek megfelelnek a következő Direktíváknak ill. szabványoknak:

- 2006/42/EC (Machinery)
- 2014/30/EU (Electromagnetic Compatibility Directive)
- 2014/35/EU (Low Voltage)

EN 12845 – UNI 10779 SZÁMÚ TŰZVÉDELMI SZABVÁNY

Kijelentjük, hogy az alábbiakban ismertetett, tűzvédelmi berendezéshez való hidraulikus egységet az EN 12845 – UNI 10779 szabványnak megfelelően szállítjuk a hidraulikus alkatrészeket, azok rendeltetését, valamint a vezérlő, ellenőrző készülékeket tekintve.

DEKLARACJE ZGODNOŚCI

OZNAKOWANIE EU

Spółka DAB PUMPS s.p.a. - Via M. Polo,14 - Mestrino (PD) - WŁOCHY - z pełną odpowiedzialnością oświadcza, iż wymienione poniżej produkty spełniają wymogi:

- 2006/42/EC (Machinery)
- 2014/30/EU (Electromagnetic Compatibility Directive)
- 2014/35/EU (Low Voltage)

NORM PRZECIWOŻAROWYCH EN 12845 – UNI 10779

Oświadcza się, iż zestaw hydroforowy do systemu przeciwpożarowego, o którym mowa poniżej, został wyprodukowany zgodnie z wymogami normy EN 12845 – UNI 10779 w odniesieniu do komponentów hydraulicznych oraz ich instalacji, jak również urządzeń do sterowania i kontroli.

DECLARAÇÕES DE CONFORMIDADE

MARCAÇÃO EU

A Firma DAB PUMPS s.p.a. - Via Marco Polo, 14 – Mestrino (PD) – ITÁLIA – sob sua exclusiva responsabilidade declara que os produtos referidos a seguir estão em conformidade com:

- 2006/42/EC (Machinery)
- 2014/30/EU (Electromagnetic Compatibility Directive)
- 2014/35/EU (Low Voltage)

NORMA EN 12845 – UNI 10779 ANTI-INCÊNDIO

Declara-se que o grupo de alimentação hídrica para o sistema anti-incêndio referido a seguir foi fornecido em conformidade com a norma EN 12845 - UNI 10779 pelo que diz respeito aos componentes hidráulicos e sua localização e aos equipamentos de comando e controlo.

DECLARAȚIE DE CONFORMITATE

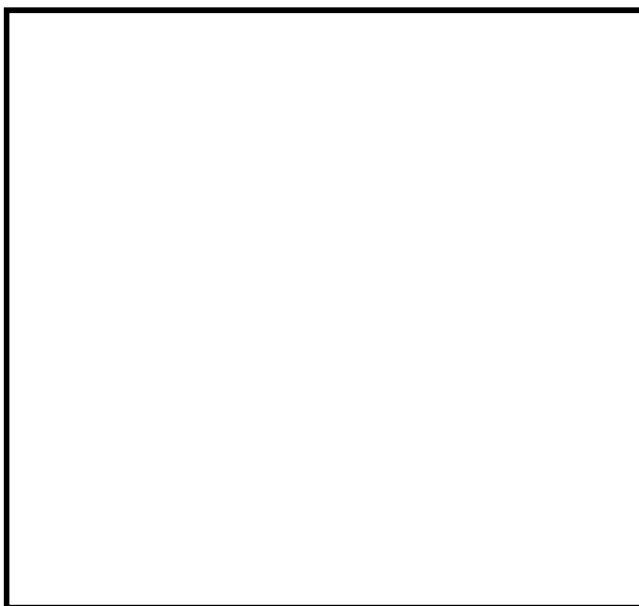
MARCATURA EU

Întreprinderea DAB PUMPS s.p.a. - Via M. Polo, 14 - Mestrino (PD) - ITALIA – declară pe propria răspundere că produsele mai jos menționate sunt conforme cu:

- 2006/42/EC (Machinery)
- 2014/30/EU (Electromagnetic Compatibility Directive)
- 2014/35/EU (Low Voltage)

NORMATIVA EN 12845 – UNI 10779 ANTIINCENDIU

Se declară că grupul de alimentare hidrică a instalației antiincendiu raportată mai jos a fost furnizat în conformitate cu normativa EN 12845 - UNI 10779 privind componentele hidraulice și dispunerea lor, precum și aparaturile de comandă și control.

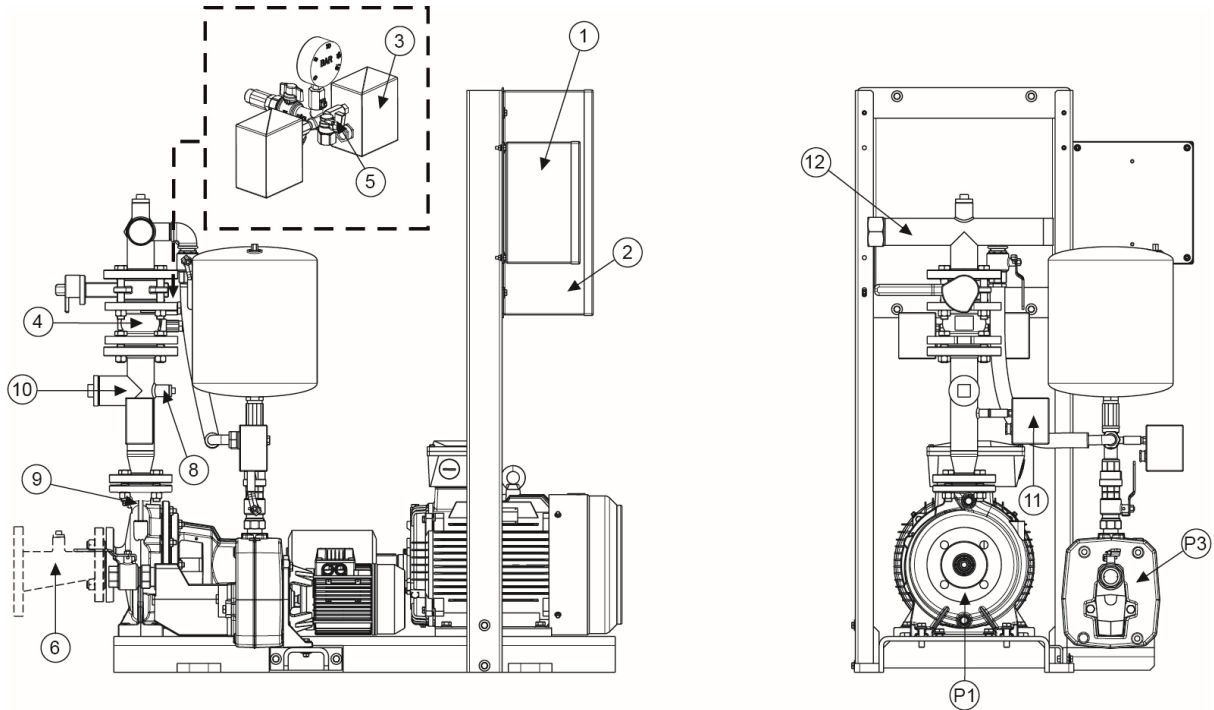


Mestrino (PD), 11/01/2019

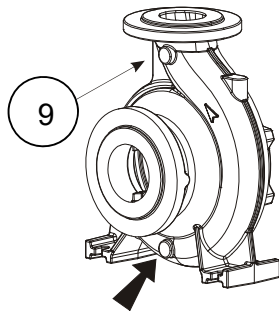

Francesco Sinico
Group R&D Director

FIRE-FIGHTING SET TO STANDARD EN 12845 – UNI 10779

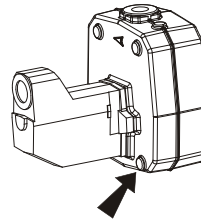
1 KDN Electropump + Pilot Pump



Main Electropump



Pilot Electropump

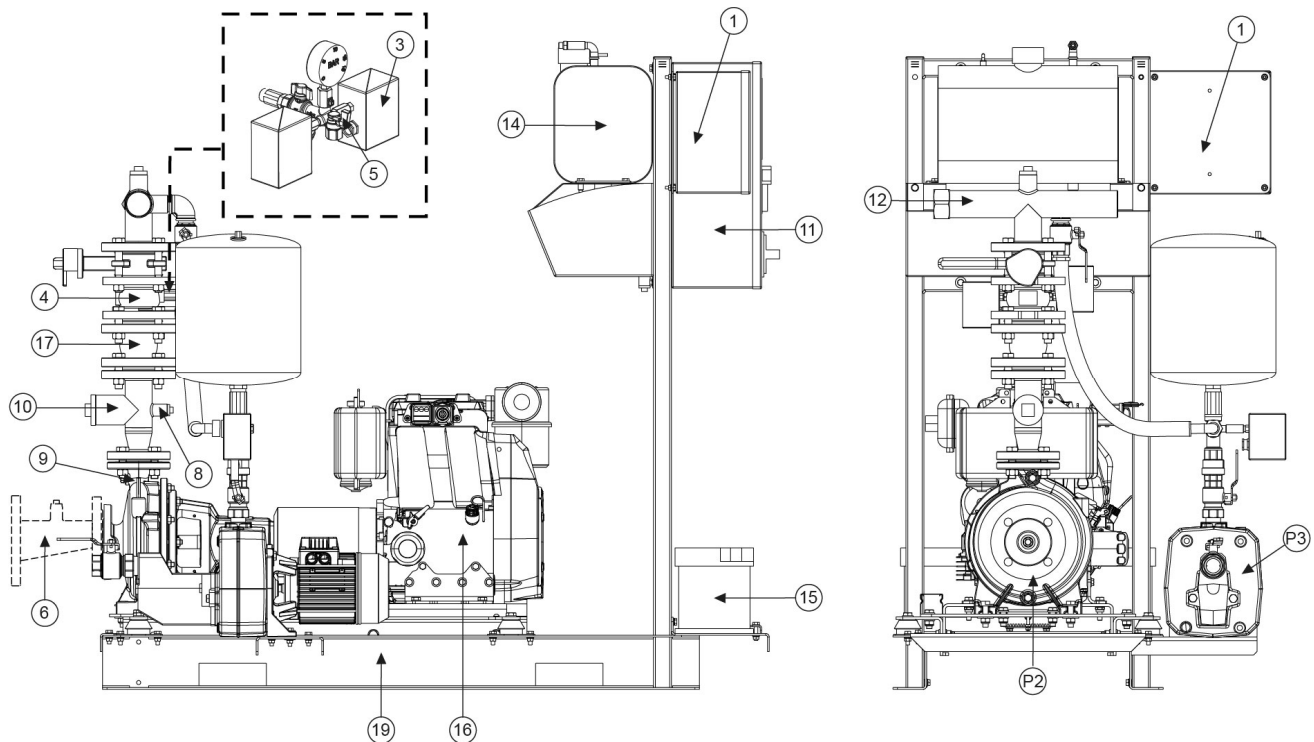


ATTENTION!

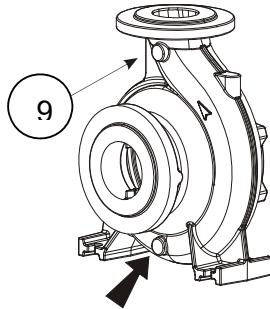
WHEN THE SET IS SUPPLIED, THE PUMP BODY DRAINAGE CAP IS UNSCREWED!
THE DRAINAGE CAP IS IN THE BAG ATTACHED TO THE SET!

- | | |
|--|---|
| P1 Electropump | 6 Eccentric suction pipe (OPTIONAL) |
| P3 Pilot Pump | 8 1/2" connection – check valve test |
| 1 Pilot Pump electric panel | 9 Pump air and recirculating vent 3/8" |
| 2 Electropump electric panel | 10 2" connection to be connected to the bottom of the priming tank |
| 3 Pressure switches for starting pump | 11 Pump running pressure switch |
| 4 Check valve | 12 Delivery manifold |
| 5 Manual start valve | |

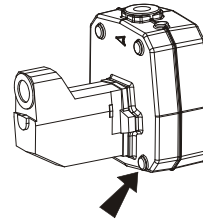
FIRE-FIGHTING SET TO STANDARD EN 12845 – UNI 10779 **Up to 11 kW** **1 KDN Diesel Motor Pump + Pilot Pump**



Main Electropump



Pilot Electropump



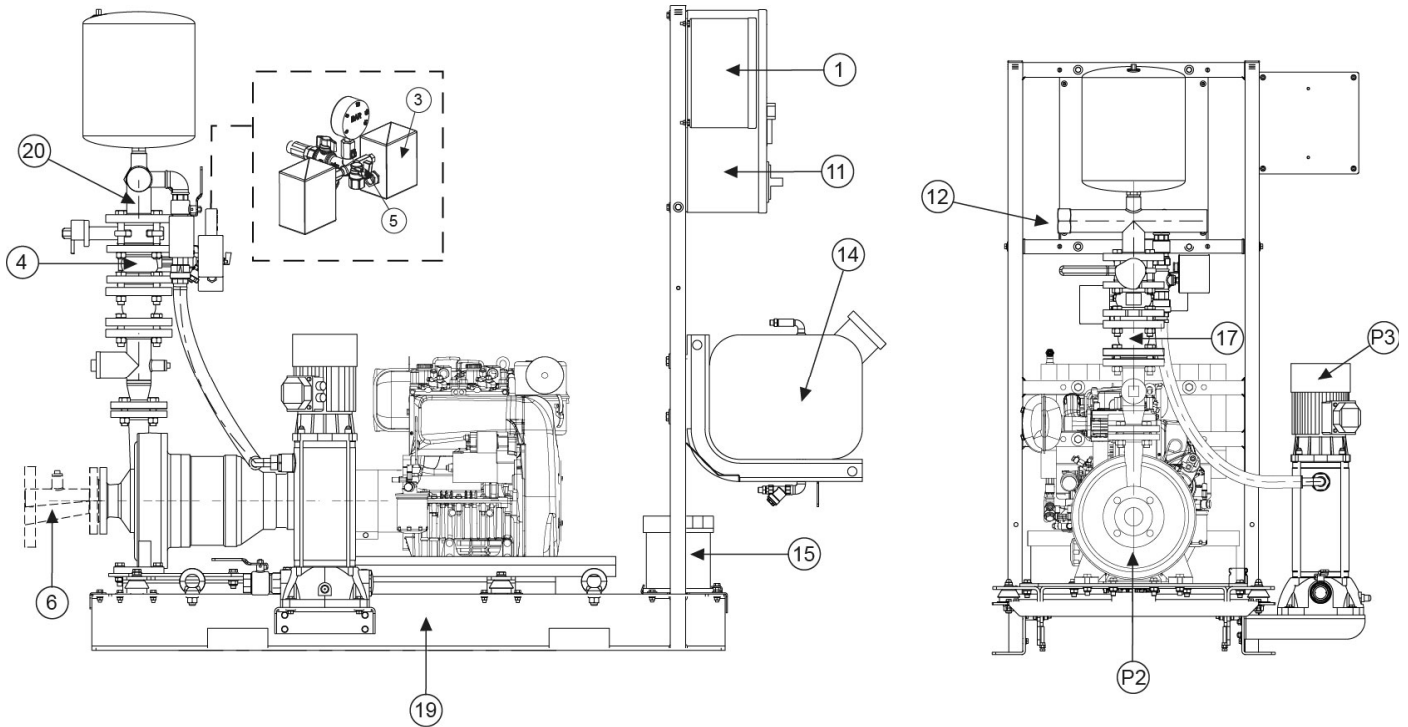
ATTENTION!

**WHEN THE SET IS SUPPLIED, THE PUMP BODY DRAINAGE CAP IS UNSCREWED!
 THE DRAINAGE CAP IS IN THE BAG ATTACHED TO THE SET!**

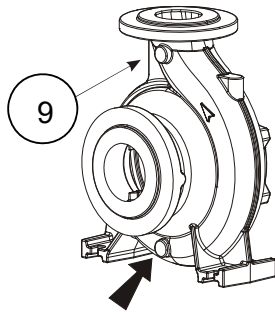
- | | |
|---|--|
| P2 Diesel Motor Pump | 10 2" connection
to be connected to the bottom of the priming tank |
| P3 Pilot Pump | 11 Diesel Motor Pump electric panel |
| 1 Pilot pump electric panel | 12 Delivery manifold |
| 3 Pressure switches for starting pump | 14 Diesel Motor Pump tank |
| 4 Check valve | 15 Diesel Motor Pump starting batteries |
| 5 Manual start valve | 16 Diesel Motor |
| 6 Eccentric suction pipe (OPTIONAL) | 17 Vibration-damping coupling |
| 8 1/2" connection – check valve test | 19 Base (may be fixed to the ground) |
| 9 Pump air and recirculating vent 3/8" | |

FIRE-FIGHTING SET TO STANDARD EN 12845 – UNI 10779

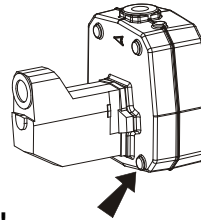
1 Diesel Motor Pump + Pilot Pump



Main Electropump



Pilot Electropump



ATTENTION!

WHEN THE SET IS SUPPLIED, THE PUMP BODY DRAINAGE CAP IS UNSCREWED!
THE DRAINAGE CAP IS IN THE BAG ATTACHED TO THE SET!

P2 Diesel Motor Pump

P3 Pilot Pump

1 Pilot Pump electric panel

3 Pressure switches for starting pump

4 Check valve

5 Manual start valve

6 Eccentric suction pipe (OPTIONAL)

10 2" connection
to be connected to the bottom of the priming tank

11 Diesel Motor Pump electric panel

12 Delivery manifold

14 Diesel Motor Pump Tank, 50 litres (Over 50 litres, installed separate from the chassis)

15 Diesel Motor Pump starting batteries

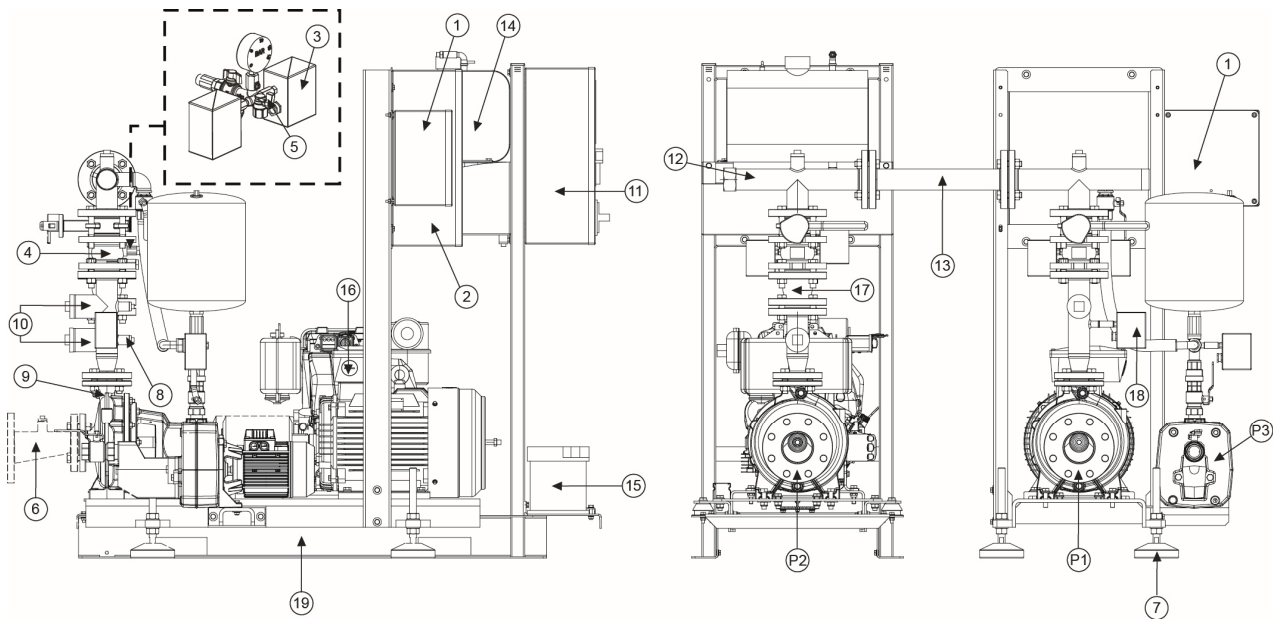
17 Vibration-damping coupling

19 Base (may be fixed to the ground)

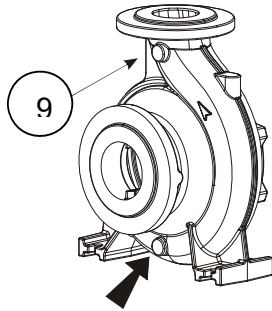
20 Butterfly stop valve

FIRE-FIGHTING SET TO STANDARD EN 12845 – UNI 10779

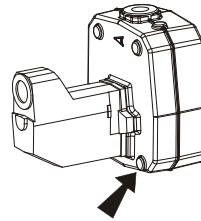
1 Diesel Motor Pump + 1 KDN Electropump + Pilot Pump



Main Electropump



Pilot Electropump



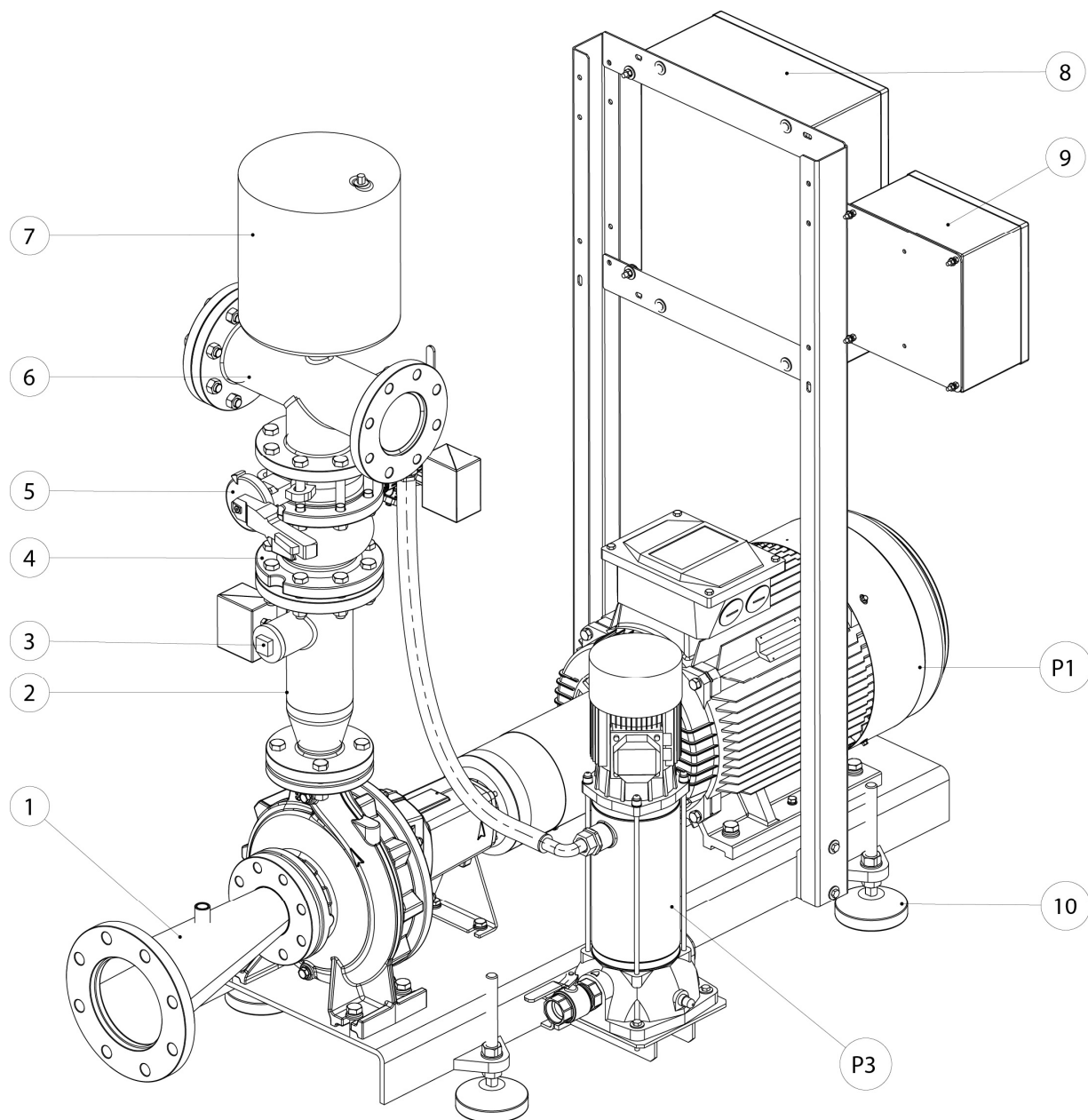
ATTENTION!

WHEN THE SET IS SUPPLIED, THE PUMP BODY DRAINAGE CAP IS UNSCREWED!
THE DRAINAGE CAP IS IN THE BAG ATTACHED TO THE SET!

- | | |
|---|---|
| P1 Electropump | 9 Pump air and recirculating vent 3/8" |
| P2 Diesel Motor Pump | 10 2" connection |
| P3 Pilot Pump | 10 to be connected to the bottom of the priming tank |
| 1 Pilot Pump electric panel | 11 Diesel Motor Pump electric panel |
| 2 Electropump electric panel | 12 Delivery manifold |
| 3 Pressure switches for starting pump | 13 Manifold joining the Diesel Motor Pump to the Electropump |
| 4 Check valve | 14 Diesel Motor Pump tank |
| 5 Manual start valve | 15 Diesel Motor Pump starting batteries |
| 6 Eccentric suction pipe (OPTIONAL) | 16 Diesel Motor |
| 7 Regulating feet (may be fixed to the ground) | 17 Vibration-damping coupling |
| 8 1/2" connection – check valve test | 18 Pump running pressure switch |
| | 19 Base (may be fixed to the ground) |

FIRE-FIGHTING SET TO EN 12845 - UNI 10779

Electropump + Pilot Pump



P1 KD electropump with spacer coupling

P3 Pilot Pump (ON REQUEST)

1 Eccentric suction pipe

2 Delivery pipe

3 Priming tank connection

4 Check valve

5 Butterfly stop valve

6 Delivery manifold

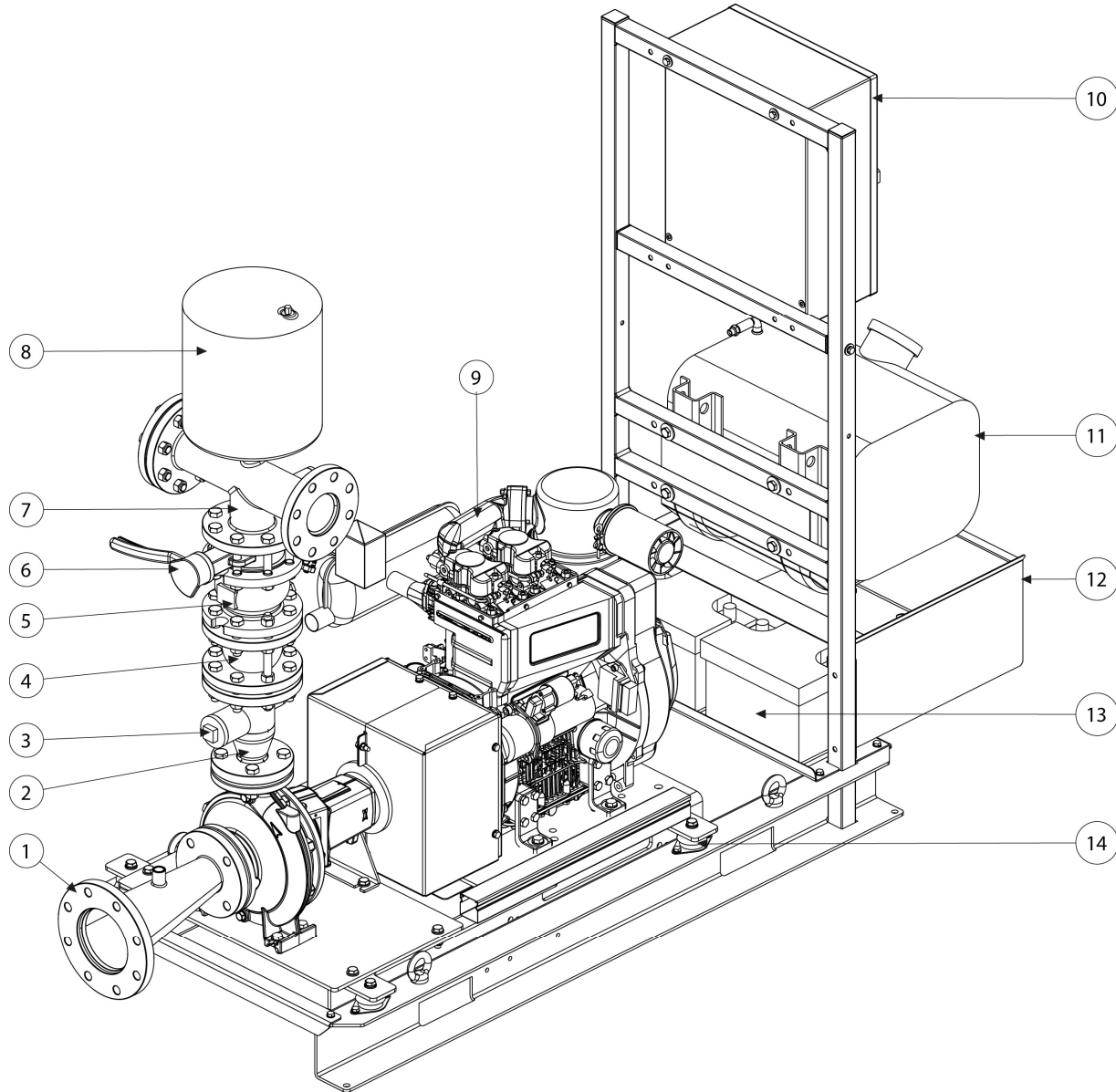
7 Expansion tank

8 Electropump electric panel

9 Pilot pump electric panel

10 Regulating feet

Motor Pump

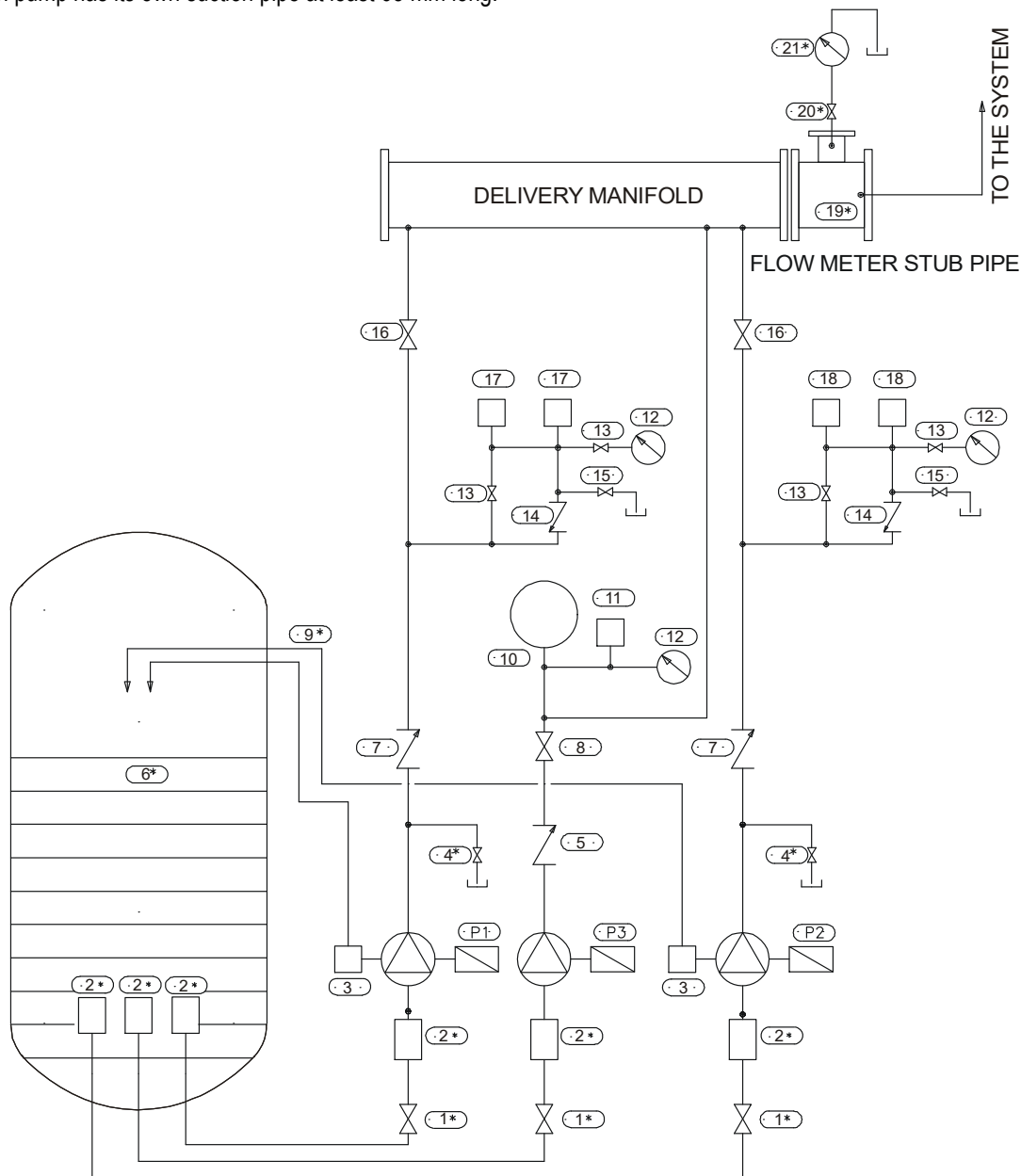


- | | | | |
|---|-------------------------|----|---|
| 1 | Eccentric suction pipe | 8 | Expansion tank |
| 2 | Delivery pipe | 9 | Diesel motor |
| 3 | Priming tank connection | 10 | Electric panel |
| 4 | Flexible coupling | 11 | Diesel Motor Pump Tank, 50 litres (Over 50 litres, installed separate from the chassis) |
| 5 | Check valve | 12 | Diesel fuel sump (OPTIONAL) |
| 6 | Butterfly stop valve | 13 | Starting batteries |
| 7 | Delivery manifold | 14 | Vibration-damping foot |
| 6 | Diesel motor | | |

FIRE-FIGHTING SET TO STANDARD EN 12845 – UNI 10779

HYDRAULIC DIAGRAM OF FEED BELOW HEAD

EN 12845 recommends installation below water level, with at least 2/3 of the level of water in the tank above the pumps' suction port. Each pump has its own suction pipe at least 65 mm long.



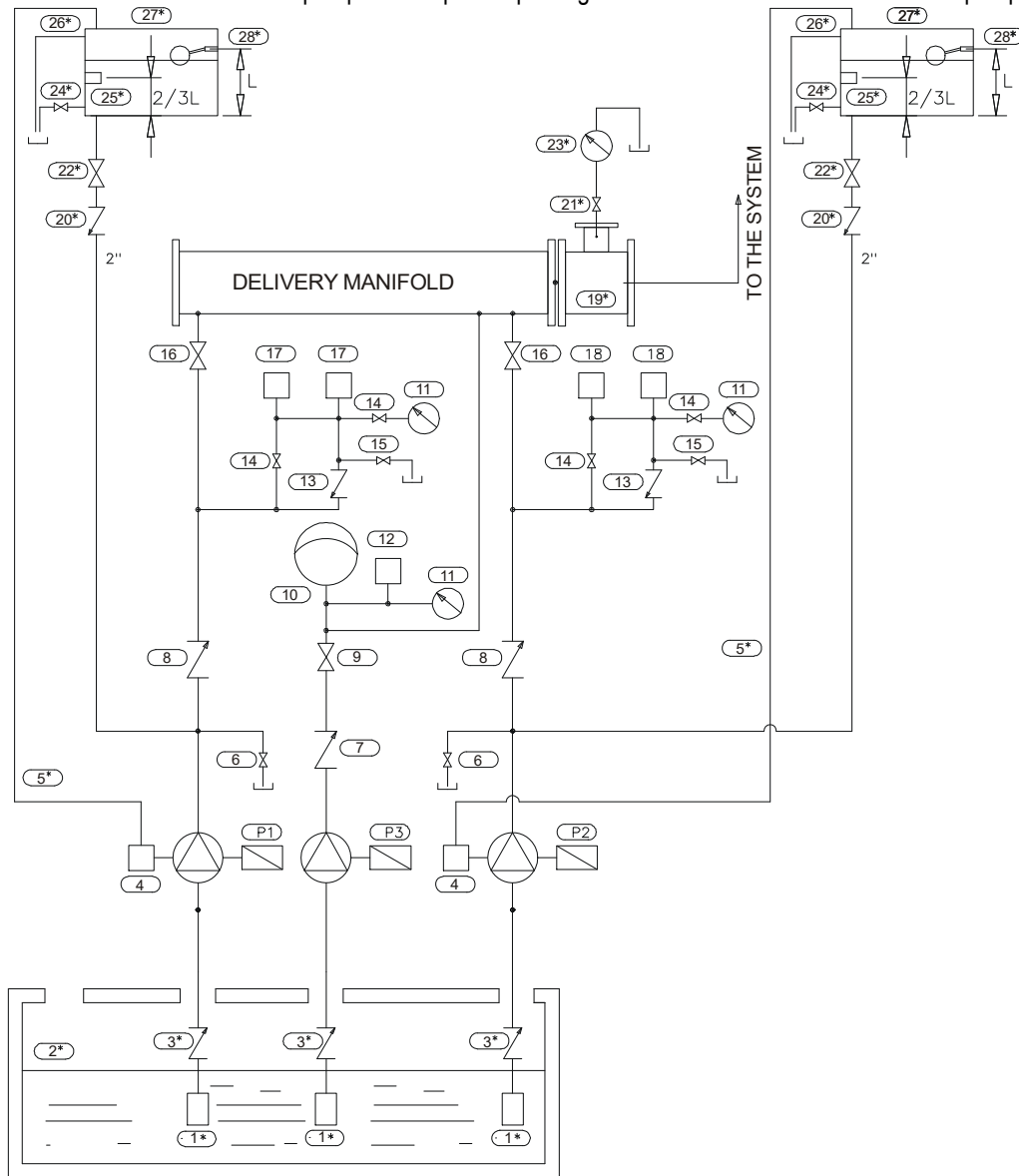
* Components and materials NOT included in the supply of the fire-fighting pumps set

P1	Supply pump no. 1	12	Pressure gauge
P2	Supply pump no. 2	13	Pressure switch interception valve
P3	Pilot Pump	14	Manual test circuit non return valve
1*	Suction interception valve	15	Main pump manual test valve
2*	Suction filter	16	Interception valve on delivery
3	Pump air and recirculating	17	Pressure switch for starting electropump no. 1
4*	Test valve / non return valve	18	Pressure switch for starting electropump no. 2
5	Non return valve	19*	Flow meter stub pipe
6*	Water reserve	20*	Flow meter interception valve
7	Non return valve	21*	Flow meter
8	Interception valve on delivery		
9*	Pipe for pump air and recirculating		
10	Diaphragm expansion tank		
11	Pilot pump pressure switch		

FIRE-FIGHTING SET TO STANDARD EN 12845 – UNI 10779

S HYDRAULIC DIAGRAM OF FEED ABOVE HEAD

In installations below water level, the distance between the pump suction port and the tank minimum level must be less than 3.2 m. A foot valve must be installed for each pump suction port. A priming tank must be installed for each main pump.

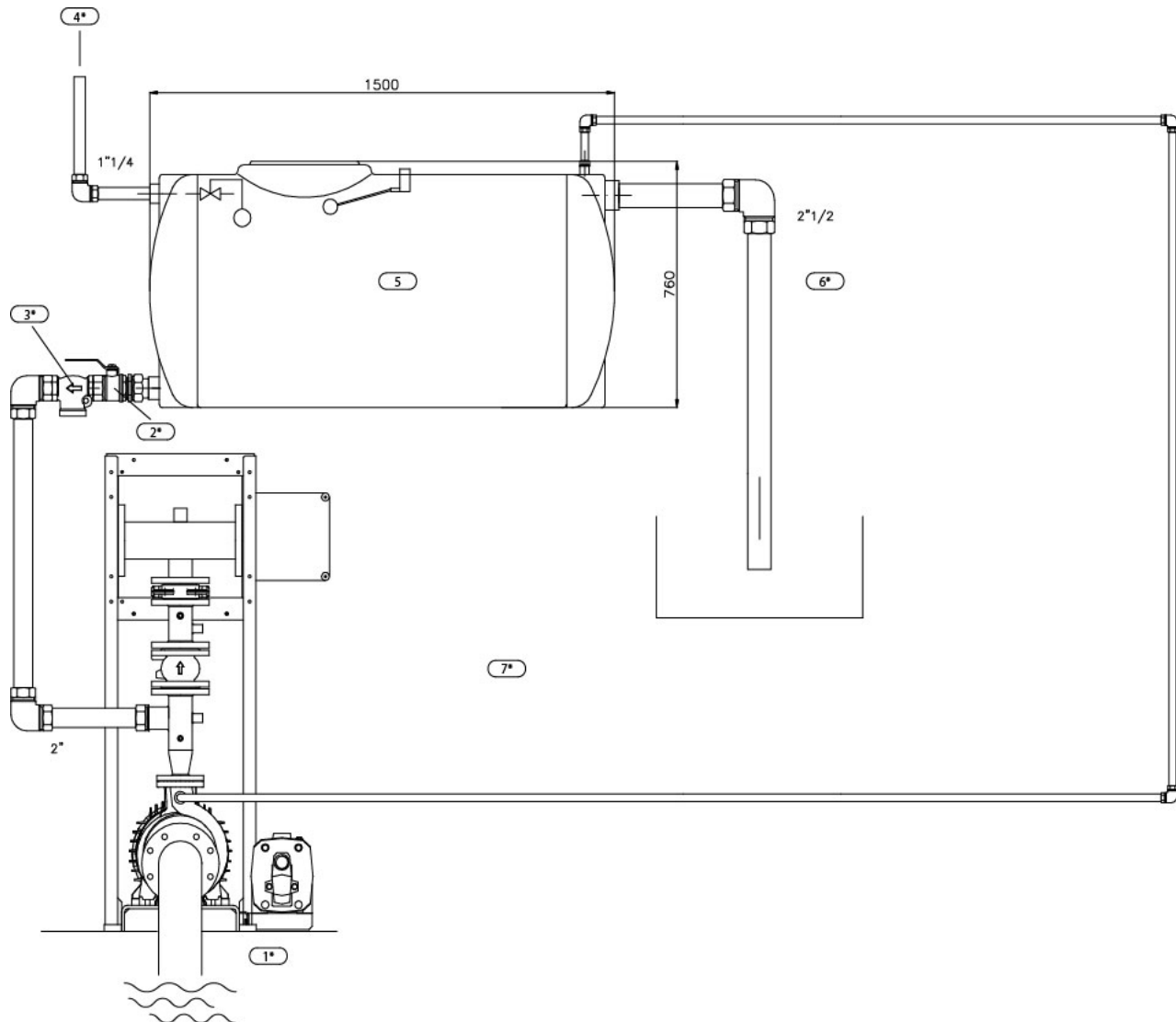


* Components and materials NOT included in the supply of the fire-fighting pumps set

- | | | | |
|-----------|--------------------------------------|------------|--|
| P1 | Supply pump no. 1 | 14 | Pressure switch interception valve |
| P2 | Supply pump no. 2 | 15 | Main pump manual test valve |
| P3 | Pilot Pump | 16 | Interception valve on delivery |
| 1* | Suction filter | 17 | Pressure switch for starting electropump no. 1 |
| 2* | Water reserve | 18 | Pressure switch for starting electropump no. 2 |
| 3* | Foot valve | 19* | Flow meter stub pipe |
| 4 | Pump air and recirculating | 20* | Priming line non return valve |
| 5* | Pipe for pump air and recirculating | 21* | Flow meter interception valve |
| 6* | Test valve / non return valve | 22* | Priming line interception valve |
| 7 | Non return valve | 23* | Flow meter |
| 8 | Non return valve | 24* | Tank discharge valve |
| 9 | Interception valve on delivery | 25* | Tank float |
| 10 | Diaphragm expansion tank | 26* | Overflow discharge |
| 11 | Pressure gauge | 27* | Priming tank |
| 12 | Pilot pump pressure switch | 28* | Tank topping up |
| 13 | Manual test circuit non return valve | | |

FIRE-FIGHTING SET TO EN 12845 - UNI 10779

PRIMING TANK FOR INSTALLATIONS BELOW WATER LEVEL (BELOW HEAD)



* Components and materials NOT included in the supply of the fire-fighting pumps set

- | | | | |
|----|-------------------------|----|---|
| 1* | Filling pipe 2" | 5 | Electric float switch to start the pump when tank is 2/3 empty. |
| 2* | Ball valve 2" | 6* | Overflow |
| 3* | Check valve 2" | 7* | Pump air and recirculating - 3/8" |
| 4* | Filling from water main | | |

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1. GENERAL



Read this documentation carefully before installation.

Keep this manual with care for further consultation even after the first installation.

2. INSTALLATION



The set must be fitted in a well ventilated place, protected from unfavourable weather conditions, and with an environment temperature not less than 4°C (10°C if motor pumps are installed too), and not exceeding 40°C. Position the set in such a way that any maintenance jobs can be carried out without difficulty.



Provide a raised and flat (levelled) support base suitable for supporting the unit and damping the vibrations: the manufacturer is not liable for any damage caused by vibrations resulting from incorrect installation. If necessary, provide an anti-vibration mat between the unit and the support base. The unit must not be installed on a slope or only partially in contact with the support base: if necessary, provide additional supports along the entire length of the frame.



The means of fixing the unit to the support base (screws, bolts) must have suitable characteristics for fixing the unit. The unit must be fixed avoiding stress and/or twisting on the frame.



The hydraulic connections must have autonomous supports in order not to burden the unit and not to transmit mechanical stress after fixing.



Ensure that the system pipes are independently supported and do not weigh down on the set manifolds so as to avoid deformation or breaking of any of its components.

It is advisable to insert vibration-damping couplings when connecting the suction and delivery pipes to the system, **especially when installing Diesel motor pumps.**



Ensure that the characteristics of the water supply source are such as always to guarantee the flow rate required in the expected operating conditions.

Make the intake section following all the precautions necessary to keep load losses to a minimum and to avoid the formation of air pockets, for example:

- Position the set as close as possible to the water supply source.
- Provide each pump with its own intake pipe (EN 12845 – UNI 10779).
- Lay the suction pipes horizontally or sloping slightly upwards towards the set.
- Avoid using elbows or couplings that cause sudden changes in direction. If necessary, use bends with a wide radius.



Avoid the “siphon” effect at intake: it risks unpriming the pumps!

The vertical distance between the pump intake and the minimum water level must not exceed 3.2 metres. (EN 12845 point 10.6.2.3 – UNI 10779)

2.1 OPERATIONS NECESSARY FOR STARTING THE DIESEL MOTOR PUMP



ALL THE DIESEL MOTOR PUMP SETS ARE DELIVERED DRY, WITHOUT DIESEL FUEL, MOTOR OIL AND COOLING FLUID! THE SET MUST NOT BE STARTED UNTIL IT HAS BEEN FILLED WITH DIESEL FUEL, MOTOR OIL AND COOLING FLUID!



IF THE FIRST START-UP OF THE DIESEL MOTOR PUMP SET IS CARRIED OUT MORE THAN 6 MONTHS AFTER THE INSPECTION DATE, SPECIAL MAINTENANCE MUST BE PERFORMED (AS SPECIFIED IN THE MANUAL OF THE DIESEL MOTOR IF SUPPLIED WITH THE MOTOR PUMP) BEFORE STARTING THE SET FOR THE FIRST TIME, SO AS TO ENSURE THAT THERE IS NO DAMAGE CAUSED BY THE LONG PERIOD OF INACTIVITY.

Fill the tank of the Diesel motor pump with diesel fuel up to the maximum level to ensure 3-4-6 hours of autonomy depending on the risk classes of the system (EN 12845 point 10.9.6 – UNI 10779). **DAB motor pump sets guarantee 6 hours of autonomy.**

- FILL THE MOTOR WITH LUBRICATING OIL, as indicated in the table below.**
(check the level of the motor lubricating oil with the dipstick provided).
- Fill the air suction filter with special oil according to the instructions supplied with the Diesel motor (where supplied).

DIESEL MOTOR	TYPE OF COOLING	TYPE OF LUBRICATING OIL	OIL QUANTITY	TYPE OF COOLING FLUID	SILENCER DIMENSIONS fumes outlet (mm)
7.1 kW (15LD500 4230020-G00000)	AIR-AIR	5W-40 / 10W-40	1.5 litres	NO	35 mm
11 kW (25LD 425/2 4250020-G00000-1)	AIR-AIR	15W-40	2 litres	NO	40 mm
15 kW (12LD 477/2 4260010-G00000-1)	AIR-AIR	15W-40	3 litres	NO	43 mm
19 kW (9LD 625/2 4090010-G00000-1)	AIR-AIR	15W-40	2.8 litres	NO	43 mm

26 kW (11LD 626/3 4110010-G00000-1)	AIR-AIR	15W-40	5 litres	NO	43 mm
35 kW (D703 E0)	AIR-WATER RADIATOR or WATER-WATER EXCHANGER	15W-40	5 litres	3,7 litres (1,5 antifreeze + 2,2 water)	45 mm
53 kW (D703 TE0)	AIR-WATER RADIATOR or WATER-WATER EXCHANGER	15W-40	8 litres	3,7 litres (1,5 antifreeze + 2,2 water)	45 mm
73,5 kW (D754 TPE2)	AIR-WATER RADIATOR or WATER-WATER EXCHANGER	10W-40	8,8 litres	5 litres (2 antifreeze + 3 water)	45 mm
110,3 kW (D756 IPE2)	AIR-WATER RADIATOR or WATER-WATER EXCHANGER	10W-40	12,3 litres	7,5 litres (3 antifreeze + 4,5 water)	45 mm
145 kW (N45 MNTF 41.10 145KW)	AIR-WATER RADIATOR or WATER-WATER EXCHANGER	10W-40	9,5 litres	9,5 litres (4 antifreeze + 5,5 water)	60 mm
164 kW (N45 MNTF 40.10 164KW)	AIR-WATER RADIATOR or WATER-WATER EXCHANGER	10W-40	9,5 litres	9,5 litres (4 antifreeze + 5,5 water)	60 mm
197 kW (N67 MNT F42 197KW)	AIR-WATER RADIATOR or WATER-WATER EXCHANGER	10W-40	12,8 litres	8,5 litres (3 antifreeze + 5,5 water)	80 mm
22.3 kW (YANMAR 3TNV82A-BDYED-FRP) RADIATOR	AIR-WATER RADIATOR	15W-40	5,5 litres	4,3 litres (1,5 antifreeze + 2,8 water)	45 mm
23 kW (YANMAR 3TNV82A-BDYED-F3S) HEAT EXCHANGE	WATER-WATER EXCHANGER	15W-40	5,5 litres	3,1 litres (1 antifreeze + 2,1 water)	45 mm
26.8 kW (YANMAR 3TNV88-BDYED-FRP) RADIATOR	AIR-WATER RADIATOR	15W-40	6,7 litres	4,8 litres (1,5 antifreeze + 3,3 water)	45 mm
28 kW (YANMAR 3TNV88-BDYED-F3S) HEAT EXCHANGE	WATER-WATER EXCHANGER	15W-40	6,7 litres	3,3 litres (1 antifreeze + 2,3 water)	45 mm
35 kW (YANMAR 4TNV88-BDYED-FRP) RADIATOR	AIR-WATER RADIATOR	15W-40	7,4 litres	6 litres (2 antifreeze + 4 water)	45 mm
36.4 kW (YANMAR 4TNV88-BDYED-F3S) HEAT EXCHANGE	WATER-WATER EXCHANGER	15W-40	7,4 litres	4 litres (1 antifreeze + 3 water)	45 mm

DAB reserves the right to change motors or their parts without notice; reference should therefore always be made to the manual of the Diesel motor supplied with the motor pump.

Though the Diesel motor pump is more reliable than the electropump (it works even during a black out), it needs particular precautions to avoid excessive noise, vibrations, contamination by exhaust gas, overheating.

Below are listed some measures to adopt to obtain maximum efficiency during operation.

2.2 DIESEL MOTOR PUMP EXHAUST GASES

Convey the exhaust gases outside the pump room using a specific pipeline (not supplied) connected to the silence exhaust pipe supplied with the Diesel motor pump.

We recommend the use of an insulated steel pipe to prevent accidental contact during operation. The pipe must be fixed firmly to the ceiling or to other supports in order not to burden the motor pump; it is advisable to provide an anti-vibration joint in the connection to the motor to avoid the propagation of vibrations. The pipe must be left free to run through the hole in the wall to allow proper expansion during operation.

It must be protected against unfavourable weather conditions and provided with drainage for emptying any condensate.

To avoid exceeding the maximum value of back pressure at discharge (600 mm H₂O for air-cooled motors and 100 mm H₂O for supercharged air-cooled motors), it is also recommended to adopt the following measures:

- Preferably, the exhaust pipeline should not be more than 10 metres long with a straight pipe.
- If the exhaust pipeline is no more than 10 metres long, its diameter can be the same as or larger than the diameter of the exhaust pipe of the Diesel motor with a straight pipe.
- If the exhaust pipeline is more than 10 metres long, its diameter must be the same as the diameter of the motor exhaust pipe (in mm) multiplied by the length of the pipeline (in metres), divided by 8.

- For example: 12 metre pipelines with Diesel engine exhaust pipe of 45 mm = (45 mm X 12 m):8 = 68 mm. The pipeline, 12 metres long, must therefore be at least 68 mm in diameter.
- In any case, reduce the number of bends used in the pipe and opt for the use of bends with a wide radius. If a pipe with bends has to be used, special attention must be paid to the average bend radius, which must be 2.5 times the diameter of the pipe. The resistance to the exhaust flow of the 90° pipe, higher than that of the straight pipe, affects the total length of the exhaust system as shown in the attached table:

Pipe diameter in mm	40	50	65	80	100	125
Pipe length (L) in metres	0,5	0,7	0,9	1,2	1,7	2,2

2.3 DIESEL MOTOR VENTILATION

For optimum operation the heat given off by the motor and by the exhaust pipes must be discharged outside the pump room and a sufficient flow of combustion air must be guaranteed.

In most cases the natural circulation caused by the difference in temperature between the inside and outside air is not enough. You must therefore:

- guarantee the input of air through an opening suitably protected by a fixed grid,
- use a fan to extract air from the pump room.

In the case of water-cooled motors, the surface of the air inlet and outlet holes must have **at least the same dimensions as the surface of the radiator.**

In the case of air-cooled motors, the surface of the holes must be able to **drain an air flow rate of at least 50.000 litres/min.** (technical data for the largest air-cooled Diesel motor used by DAB PUMPS).

2.4 EXTERNAL TANK



If an external tank is supplied, it must be installed at least 1 metre away and on one of the two motor sides of the motor pump. The tank must not be installed on a slope; the fixing means (screws, bolts, expansion plugs) must have adequate dimensions, length and capacity.

3. BRANCHEMENT ÉLECTRIQUE

ATTENTION: RESPECT THE SAFETY REGULATIONS IN FORCE



The electrical installation must be carried out by a qualified, skilled electrician in compliance with the Safety Regulations in force in the country where the product is installed.



Check the power supply voltage and frequency. Values differing from those on the motor plate could cause irremediable damage.



Connect the leads of the power supply cable to the terminal board on the control panel, **giving priority to the earth lead.**

For the wiring diagram of the control panel and the respective informative notes, see the enclosed documentation.

4. DIESEL MOTOR PUMP CONNECTIONS

Connect the two cables with the red terminal cover to the positive poles of the two batteries for starting the Diesel motor pump, using the terminal clamps provided.



FROM THIS MOMENT THE DIESEL MOTOR PUMP MAY START AUTOMATICALLY IN THE EVENT OF A FALL IN PRESSURE IN THE SYSTEM!!! KEEP THE SELECTOR ON THE MOTOR PUMP PANEL IN ZERO POSITION – 0.

5. CHECKING OPERATION OF THE SET

5.1 CHECKING OPERATION OF THE ELECTROPUMP

- Turn the main switch on the electropump panel to 1 (ON).
Check the direction of rotation of the electropump, starting it **for a few moments** with the START button and check that, when viewed from the fan side, the motor is turning in a clockwise direction. If not, exchange on the terminal board any two leads of the **electropump panel power supply.**
- Turn the selector on the electropump panel to AUT position.
- Open a valve in the system (or the pump manual start valve, located near the pressure switches)
- Check that the electropump starts.
- Close the valve in the system (or the pump manual start valve, located near the pressure switches)
- Put the system under pressure.
- Stop the electropump with the STOP button on the electric panel.

To check failed starting of the electric pump see the electropump instructions manual



ATTENTION: DURING OPERATION OF THE ELECTROPUMP:

- Check for any water leaks in the system and stop the electropump if necessary.
- The contact that indicates when the electropump is running closes and may activate any connected alarms..

5.2 CHECKING OPERATION OF THE COMPENSATING ELECTROPUMP (PILOT PUMP)

The compensating pump (or pilot pump) is an auxiliary pump which intervenes to draw small amounts of water.

It starts at a pressure higher than the starting pressure of the main pumps and stops when the pressure in the system is restored. It is not obligatory, but it is recommended in order to avoid needless starts of the main pumps in the case of leaks in the system.

- Turn the main switch on the electropump panel to 1 (ON).

To check the direction of rotation of the compensating electropump (or pilot pump), **turn its selector to MAN for a few moments** and check that, when viewed from the fan side, the motor is turning in a clockwise direction.

If not, exchange on the terminal board any two leads of the **power supply of the panel for the compensating electropump (or pilot pump)**.

- b) Turn the selector on the electropump panel to AUT position.
- c) Turn on a hydrant in the system.
- d) Check that the compensating electropump (or pilot pump) starts.
- e) Turn off the hydrant.
- f) Check that the electropump stops AUTOMATICALLY.

5.3 CHECKING OPERATION OF THE DIESEL MOTOR PUMP

- a) Turn the main switch on the Diesel motor pump panel to 1 (ON).

A 230V electric heater (located under the oil sump for air-cooled motors or in the head for water-cooled motors) will bring the oil (or water) to a minimum temperature, so as to facilitate starting of the motor pump.



When the Diesel motor pump is started up on the site for the first time, it is necessary to check the failed start alarm. (EN 12845 10.9.13.2 – UNI 10779) See the Electric Panel instructions booklet for further information.

- b) Turn the selector on the Diesel motor pump panel to AUT position.
- c) Open a valve in the system (or the pump manual start valve – ref. 5)
- d) Check that the motor pump starts.
- e) Close the valve in the system (or the pump manual start valve – ref. 5).
- f) Check that the number of rpm, shown on the display, corresponds to the value indicated on the data plate on the accelerator control, if necessary regulate the accelerator according to the indication on the plate.
- g) Put the system under pressure.
- h) Stop the motor pump with the STOP button on the electric panel.



ATTENTION: DURING OPERATION OF THE DIESEL MOTOR PUMP:

- Check for any water leaks in the system and stop the motor pump if necessary.
- The contact that indicates when the motor pump is running closes and may activate any connected alarms.

If it fails to start, the Diesel motor pump makes six attempts to start alternately on the two batteries (EN 12845 point 10.9.7.2 – UNI 10779).

The condition of Diesel motor pump running is detected by the speed sensor on the motor.

If the motor pump does not start after six attempts, the electric panel activates:

- a failed start warning light,
- a failed start alarm contact.

5.4 SETS WITH SEVERAL PUMPS

Standard EN 12845 – UNI 10779 contemplates various solutions with one or more pumps having similar characteristics:

- if TWO pumps are installed, each pump supplies the total flow rate of the system (100%),
- if THREE pumps are installed, each pump supplies 50% of the total flow rate.

Also, in sets where more than one pump is installed with superior or duplicate water supply, only one pump will be electric (10.2).

From this it may be deduced that, **in the case of a superior or duplicated supply**, the sets will be composed of:

- a) 1 electropump (100%),
- b) 1 Diesel motor pump (100%),
- c) 1 electropump + 1 Diesel motor pump (each supplies 100%),
- d) 1 electropump + 2 Diesel motor pumps (each supplies 50%),
- e) 3 Diesel motor pumps (each supplies 50%),

In the case of a single supply, there are no limits to the number of electropumps.

DAB supplies the sets in a “modular” version, in separate units, so as to be able to make up all the versions mentioned above. By means of the JOINING MANIFOLD (see drawing on page 32) it is possible to join the manifolds so as to obtain a single delivery manifold.

The intakes, the electric panels, etc. remain separate as contemplated by standard EN 12845 – UNI 10779.

6. PERIODIC MAINTENANCE

The whole fire-fighting system to standard EN 12845 – UNI 10779, including the set of fire-fighting pumps, **must always be kept in perfect working order**. For this reason, regular maintenance is of particular importance.

According to standard EN 12845 point 20.1.1 – UNI 10779, the user must:

- carry out a programme of inspections and checks;
- arrange a testing, assistance and maintenance programme,
- document and record the activities, filing the documents in a special register kept in the building.

The user must ensure that the testing, assistance and maintenance programme is carried out under contract by the installer of the system or by a company with the same qualifications.

6.1 WEEKLY CHECK (to be carried out at intervals of no more than 7 days)

The weekly check of the fire-fighting set to standard EN 12845 – UNI 10779 contemplates checking and noting down the following values:

- pressure of pressure gauges,
- water level in the tanks – water reserves,
- correct position of the interception valves.
- To test the automatic starting of the pumps, proceed as described below:
- Check the levels of the fuel and lubricating oil in the Diesel motors.
- Open the pump manual start valve (ref. 5).
- Check that the pump starts and make a note of the starting pressure.

To check the direction of rotation of the compensating electropump (or pilot pump), **turn its selector to MAN for a few moments** and check that, when viewed from the fan side, the motor is turning in a clockwise direction.

If not, exchange on the terminal board any two leads of the **power supply of the panel for the compensating electropump (or pilot pump)**.

- b) Turn the selector on the electropump panel to AUT position.
- c) Turn on a hydrant in the system.
- d) Check that the compensating electropump (or pilot pump) starts.
- e) Turn off the hydrant.
- f) Check that the electropump stops AUTOMATICALLY.

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- a) Turn the main switch on the Diesel motor pump panel to 1 (ON).

A 230V electric heater (located under the oil sump for air-cooled motors or in the head for water-cooled motors) will bring the oil (or water) to a minimum temperature, so as to facilitate starting of the motor pump.



When the Diesel motor pump is started up on the site for the first time, it is necessary to check the failed start alarm. (EN 12845 10.9.13.2 – UNI 10779) See the Electric Panel instructions booklet for further information.

- b) Turn the selector on the Diesel motor pump panel to AUT position.
- c) Open a valve in the system (or the pump manual start valve – ref. 5)
- d) Check that the motor pump starts.
- e) Close the valve in the system (or the pump manual start valve – ref. 5).
- f) Check that the number of rpm, shown on the display, corresponds to the value indicated on the data plate on the accelerator control, if necessary regulate the accelerator according to the indication on the plate.
- g) Put the system under pressure.
- h) Stop the motor pump with the STOP button on the electric panel.



ATTENTION: DURING OPERATION OF THE DIESEL MOTOR PUMP:

- Check for any water leaks in the system and stop the motor pump if necessary.
- The contact that indicates when the motor pump is running closes and may activate any connected alarms.

If it fails to start, the Diesel motor pump makes six attempts to start alternately on the two batteries (EN 12845 point 10.9.7.2 – UNI 10779).

The condition of Diesel motor pump running is detected by the speed sensor on the motor.

If the motor pump does not start after six attempts, the electric panel activates:

- a failed start warning light,
- a failed start alarm contact.

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Also, in sets where more than one pump is installed with superior or duplicate water supply, only one pump will be electric (10.2).

From this it may be deduced that, **in the case of a superior or duplicated supply**, the sets will be composed of:

- a) 1 electropump (100%),
- b) 1 Diesel motor pump (100%),
- c) 1 electropump + 1 Diesel motor pump (each supplies 100%),
- d) 1 electropump + 2 Diesel motor pumps (each supplies 50%),
- e) 3 Diesel motor pumps (each supplies 50%),

In the case of a single supply, there are no limits to the number of electropumps.

DAB supplies the sets in a “modular” version, in separate units, so as to be able to make up all the versions mentioned above. By means of the JOINING MANIFOLD (see drawing on page 32) it is possible to join the manifolds so as to obtain a single delivery manifold.

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- carry out a programme of inspections and checks;
- arrange a testing, assistance and maintenance programme,
- document and record the activities, filing the documents in a special register kept in the building.

The user must ensure that the testing, assistance and maintenance programme is carried out under contract by the installer of the system or by a company with the same qualifications.

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The weekly check of the fire-fighting set to standard EN 12845 – UNI 10779 contemplates checking and noting down the following values:

- pressure of pressure gauges,
- water level in the tanks – water reserves,
- correct position of the interception valves.
- To test the automatic starting of the pumps, proceed as described below:
- Check the levels of the fuel and lubricating oil in the Diesel motors.
- Open the pump manual start valve (ref. 5).
- Check that the pump starts and make a note of the starting pressure.

- Close the manual start valve.

In the case of a Diesel motor, the motor will be let run for at least 5 minutes.

- Stop the pump with the STOP button on the electric panel.

OPERATIONS ONLY FOR THE DIESEL MOTOR PUMP

- Straight after stopping, **the Diesel motor pump must be restarted immediately** with the manual start test button "OPERATE MANUAL START".
- Stop the pump with the STOP button on the electric panel.

6.2 MONTHLY CHECK

Check the level and density of the acid in all the cells or the starting batteries with a densimeter.

If the acid density is low, check the battery charger and, if necessary, change the batteries.

6.3 QUARTERLY CHECK (at intervals of no more than 13 weeks – see EN 12845 point 20.3.2 – UNI 10779)

- Check for any changes in the system, changed class of risk, etc.
- Check sprinklers, pipes, pipe supports (see EN 12845 point 20.3.3.2 – UNI 10779).
- Start the pumps and check the pressure and the flow rate.
- Check the operation of any generators – generating sets.
- Check the correct position of the interception valves.
- Check the correct operation of the secondary electric power supply coming from Diesel generators.

6.4 HALF-YEARLY CHECK (at intervals of no more than 6 months – see EN 12845 point 20.3.3 – UNI 10779)

- Check the dry alarm valves (in the system).
- Check the operation of the alarms in the control room and/or at the Fire Station.

6.5 YEARLY CHECK (at intervals of no more than 12 months – see EN 12845 point 20.3.4 – UNI 10779)

- Check the pressure and the flow rate of the pumps against the values given on the technical data plate.
- Check the alarm for failed starting of the Diesel motor pump according to EN 12845 point 10.9.7.2 – UNI 10779.
(make the six attempts to start alternately on the two batteries).

After the six attempts, check that the following are activated on the electric panel:

- the failed start warning light,
- the failed start alarm contact.

Straight after testing, restart the motor immediately with the manual test button "OPERATE MANUAL START".

- Check the operation of the float valves and the filters in the tanks.

6.6 THREE-YEARLY CHECK

- Check for corrosion outside and INSIDE the tanks, repairing the protection if necessary.
- Check the interception and check valves, replace them if necessary.

6.7 TEN-YEARLY CHECK

After no more than 10 years, clean all the tanks and check the internal structure.

7. REGULATING THE SET

7.1 CALIBRATION OF THE PRESSURE SWITCHES

Standard EN 12845 – UNI 10779 contemplates two pressure switches for each pump, each pressure switch with normally closed contacts connected in series.

Opening any one of the two pressure switches causes the pump to start.

For pressure switch settings different from those made in the factory, proceed in accordance with the following instructions during handover testing of the pumping set:

- the type of pressure switch installed in the pump set,
- the pressure limits indicated on the data plates of each pump,
- the limit indicated by standard EN 12845 – UNI 10779 according to which the two pressure switches must be calibrated in such a way as to start the pump at a value **pump pressure with delivery closed x 0.8**.
- In the case of sets with two pumps, the second pump will be started at a value **pump pressure with delivery closed x 0.6**

Danfoss pressure switch type KP

Slacken the 2 screws and remove the cover.

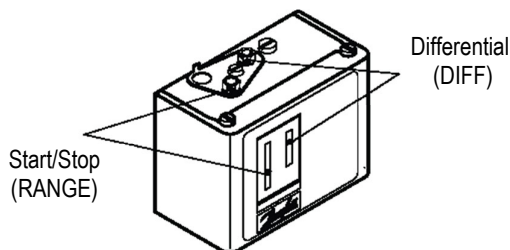
Unscrew the locking screw above the regulating screws.

Set the upper pressure limit on the START-STOP regulating scale (marked RANGE), turning the cross-headed screw.

Then set the lower pressure limit using the differential scale (marked DIFF), turning the hexagonal head screw.

Re-tighten the locking screw.

Replace the cover and tighten the 2 screws.



Klockner Moeller pressure switch type MCS

Undo the 4 screws and remove the cover.

Slacken and remove the locking screw "B" positioned in one of the 12 holes in the regulating knob "A". (figure 1)

When the regulating knob "A" is turned clockwise, the pump starting and stopping pressures are increased at the same time.

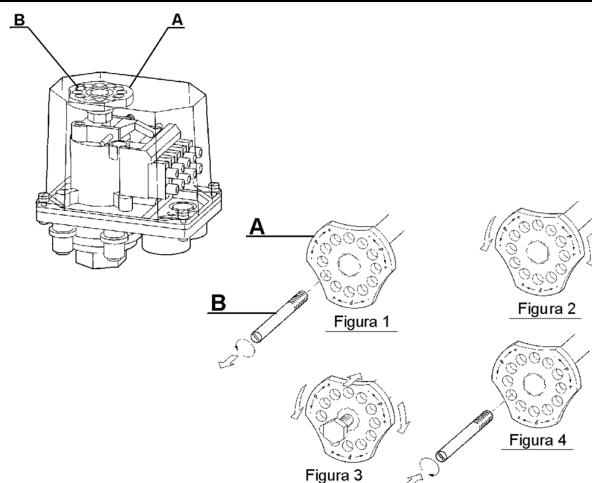
When it is turned counter-clockwise they are decreased. (figure 2)

When the regulating knob "A" is pressed and turned counter-clockwise, the differential between the starting and the stopping pressure of the pump is increased (the starting pressure decreases while the stopping pressure remains fixed).

When the regulating knob "A" is pressed and turned clockwise, the differential is decreased. (figure 3)

Replace and tighten the locking screw "B" in the hole in the regulating knob "A" that is most aligned with one of the two threads under the knob. (figure 4)

Replace the cover and tighten the 4 screws.



8. COMPENSATING ELECTROPUMP

8.1 The pump sets may be provided with a self-priming compensating pump, JET models, connected to the delivery manifold by means of a check valve and an interception ball valve.

Instead the suction, as in any pump of a set according to standards EN 12845 – UNI 10779, is kept independent.



Keep the pressure switch that controls the compensating pump always calibrated with starting and stopping pressures **higher** than the others. This is indispensable in order to allow this pump to perform its task of compensating small falls in pressure in the system before starting the main electropumps and motor pump.

9. MAINTENANCE

All our sets are subjected to strict testing of both the electrical and the hydraulic part.

It is unusual for malfunctions to occur, unless due to external or completely accidental causes.

Below is a table with some suggestions on regulating the set in the event of irregularities in operation.

FAULTS	POSSIBLE CAUSES	REMEDIES
A PUMP IN THE SET DOES NOT PRIME.	<ol style="list-style-type: none"> 1 Suction pipe with insufficient diameter; excessive use of couplings which cause sudden variations in direction of the suction pipe; siphon effect. 2 Suction pipe clogged. 3 Air infiltrations in the suction pipe of the pump. 4 Foot valve clogged or blocked. 5 Interception valve on suction partly closed. 	<ol style="list-style-type: none"> 1 Check that the suction pipe is correctly made, as indicated in the paragraph on "Installation". 2 Clean it or change it. 3 Testing under pressure, check the perfect seal in the couplings, the joins and the pipes. 4 Clean it or change it. 5 Open it completely.
A PUMP IN THE SET DOES NOT START.	<ol style="list-style-type: none"> 1 Main motive power switch and/or main auxiliary circuit switch off (in position "0"). 2 Protection overload switches of the transformer and/or of the auxiliary circuit faulty or tripped. 3 The Diesel motor pump starting batteries are not efficient. 4 Electric circuit interrupted. 	<ol style="list-style-type: none"> 1 Switch them on, turning them to position "1" and check that the two green lights come on indicating that the panel is live. If faulty, change them. 2 If tripped, reset them. 3 Check the efficiency of the battery chargers in the motor pump panel (check absorption of the motor pump panel with ammeters). If the batteries are inefficient, change them. 4 Use a tester to find the point of interruption and repair it.
THE STOP BUTTON DOES NOT STOP THE PUMP	<ol style="list-style-type: none"> 1 Important water leaks in the system, so the pressure is not re-established above the opening pressure of the pressure switch (about 1.5 bar above the closing pressure of the pressure switch, that is the starting pressure of the electropump and of the motor pump). 2 A jumper has been fitted on the terminals for connecting the float for the priming tank (to be installed in the event of suction above head) 	<ol style="list-style-type: none"> 1 Check the joins, couplings and pipes. 2 Remove the jumper in the event of suction below head. Insert the float for the priming tank in the event of suction above head.

ENGLISH

THE SET DOES NOT SUPPLY THE REQUIRED CHARACTERISTICS.	<ol style="list-style-type: none"> 1 The set chosen is undersized for the characteristics of the system. 2 Excessive water consumption for the flow rate that can be supplied by the water supply source (tank, well, mains, etc.) 3 Motors turning in inverse direction. 4 One or more pumps clogged. 5 Pipes clogged. 6 Foot valves clogged or blocked (set above head). 7 Interception valves at suction and delivery partly closed. 8 Air infiltrations in the suction pipes of the set pumps. 	<ol style="list-style-type: none"> 1 Replace it with one that suits the required characteristics. 2 Increase the flow rate that can be supplied by the water supply source. 3 Change it, performing the operation described in the paragraph on "Starting". 4 Dismantle them and clean the pump body and the impellers, ensuring that they are in good condition. 5 Clean them or change them. 6 Clean them or change them. 7 Open them completely. 8 Testing under pressure, check the perfect seal in the couplings, the joins and the pipes.
WHEN STOPPED, ONE OR MORE PUMPS IN THE SET TURN IN INVERSE DIRECTION.	<ol style="list-style-type: none"> 1 The respective not return or foot valves do not close well or are blocked. 2 The respective suction pipe is not airtight. 	<ol style="list-style-type: none"> 1 Check seal and correct operation. 2 Check the seal, testing under pressure.
AFTER BEING STOPPED, A PUMP IN THE SET DOES NOT START AGAIN.	<ol style="list-style-type: none"> 1 Motor protection fuses burnt out. 2 No current is reaching the coil of the respective remote control switch. 3 Remote control switch coil interrupted. 4 The system pressure is not reaching the respective control pressure switch. 5 Faulty control pressure switch. 	<ol style="list-style-type: none"> 1 Change them. 2 Use a tester to check the electric circuit as far as the coil itself and repair any interruption found. 3 Change it. 4 Remove it and clean the connecting sleeve. 5 Change it.