



USER MANUAL
使用手册

1+1 PAH80



Water mist System
细水雾灭火装置

THE SEM-SAFE WATER MIST SYSTEM SEM-SAFE 细水雾灭火装置

The SEM-SAFE water mist system operates with totally new principles - the fire is suppressed incredibly quickly by water mist - at the same time the product processes a number of advantages compared with alternative fire-fighting systems/products. SEM-SAFE also reduces the well-known damages caused by extinguishing.

SEM-SAFE 细水雾灭火装置使用全新的灭火原理——细水雾能以难以置信的速度迅速将火灾扑灭——同时它还拥有与其它灭火系统/产品相比一系列的优势。SEM-SAFE 也能显著减少可能在灭火过程中会引发的众所周知的一些损失。

- * The SEM-SAFE water mist system totally eliminates health risks with chemical extinguishing agents as the water mist only contains atomized water.
由于细水雾中只含有雾化水，因此 SEM-SAFE 细水雾灭火装置能完全消除化学灭火剂所带来的健康隐患。
- * The SEM-SAFE water mist system totally eliminates damages to the environment, e.g. compared with halon or other gaseous extinguishing systems.
与哈龙或其它气体灭火系统相比，SEM-SAFE 细水雾灭火装置可完全消除对环境的破坏。
- * The SEM-SAFE water mist system optimizes safety for:
SEM-SAFE 细水雾灭火装置特别针对以下方面进行了优化：
 - Personnel
人员
 - Equipment
设备

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Part 1: Design data for SEM-SAFE Water mist pump unit 第一部分：SEM-SAFE 细水雾泵组的设计参数

Voltage / 电压: 3 x 380 V AC / 伏，交流
Frequency / 频率: 50 Hz / 赫兹
Total power consumption / 总功率: 30 kW / 千瓦
Stand-by HP pump power consumption / 备用高压泵功率: 30 kW / 千瓦

Working pressure / 工作压力: 120 bar / 公斤
Test pressure / 测试压力: 210 bar / 公斤
Operation pressure at nozzle head / 喷头处的工作压力: 100 bar / 公斤

Pump capacity / 泵流量:
Total pump capacity, High-pressure pumps / 高压泵总流量: 112 l/min / 升每分钟
High-pressure Pump no. 1 / 高压泵 1: 112 l/min / 升每分钟
High-pressure Pump no. 2, stand-by / 高压泵 2，备用: 112 l/min / 升每分钟
Pilot Pump no. 1 / 1 号稳压泵: 12 l/min at 12 bar
Pilot Pump no. 2, stand-by / 2 号稳压泵，备用: 12 l/min at 12 bar

Reservoir Tank capacity / 水箱容量: 820 l / 升

Water quality required / 水质要求: Potable water, which complies with the EU-order
80/778/EEC
可饮用水，符合欧盟指令 80/778/EEC

Part 2: Function description for SEM-SAFE Water mist pump unit 第二部分：SEM-SAFE 细水雾泵组的功能描述

The pump unit is made as a unit upon where 2 high-pressure pumps (**pos. no. 21, 22**) of Danfoss manufacture are mounted.

该泵组安装有丹佛斯公司生产的 2 台高压泵（位置编号 21、22）。

1 high-pressure pump with a total capacity for the dimensioned water volume at maximum release of the system (112 l/min), and 1 high pressure stand-by pump (**pos. no. 21, 22**) kept in stand-by mode at normal operation. The pump unit is also made with a pilot pump, and a stand-by pilot pump (**pos. no. 11, 12**) which is to maintain a pilot pressure in the system of approximately 12 bar. 1 台高压泵总流量为系统的最大流量（112 升/分钟），另有一台高压泵（位置编号 21、22）在通常工况下当做备用泵。该泵组还包括一台稳压泵以及一台备用稳压泵（位置编号 11、12），其目的是为了将系统的辅助压力维持在大约 12 公斤。

The pumps take suction from the reservoir tank.
泵从水箱中取水。

The water is pressed from the pump through a non-return valve (**pos. no. 23**) and into a common high-pressure manifold. A pressure relief valve (**pos. no. 25**) is mounted and manages to return the excess water to the reservoir tank.
泵将水经过一个止回阀（位置编号 23）打至公共的高压集流管中。系统中还装有一个泄压阀（位置编号 25），负责将多余的水返回水箱中。

The high-pressure manifold is also supplied with taps for necessary fittings as pressure transmitter (**pos. no. 15**), manometers (**pos. no. 28**) for control, regulation and supervision of the system, pilot pumps and a test valve (**pos. no. 19**).
高压集流管也提供了接头以安装必要的附件，例如用于控制、调节和监控系统压力的压力变送器（位置编号 15）和压力表（位置编号 28），以及稳压泵和测试阀（位置编号 19）。

IMPORTANT NOTICE!

重要提示！

Avoid dry running of the high-pressure pumps:

禁止高压泵干转：

After service of the pump system always make sure that the pump is properly filled with water before start.

在泵系统维护后一定要确保在泵启动前正确地往泵中注满水。

Before start-up, with the pump inlet line connected to the fresh water tank, loosen the upper bleeding plug, make sure that plenty of water is drained from the hole in the upper bleeding plug.

在启动前，确保泵的入口管路连接到水箱上，然后拧松泵体上的排空堵头，确保有足量的水从排空孔中排出。

Part 3: Function description Reservoir tank

第三部分：水箱功能描述

The reservoir tank is an open stainless steel tank (AISI 316) with a capacity of 820 l gross volume.
水箱是一个开式的不锈钢水箱（材质 AISI 316），其容量为 820 升。

The tank is equipped with a fresh water solenoid operated valve (pos.1), a level switch (pos.6), filters (pos.2), suction for high pressure pump, drain valve (pos.5) and by-pass from relief valve (pos.25).
水箱上安装有一个进水电磁阀（位置编号 1），一个液位开关（位置编号 6），过滤器（位置编号 2），高压泵吸水管，排水阀（位置编号 5），以及连接泄压阀（位置编号 25）的旁通管路。

Fresh water is supplied from the fresh water supply, through a filter (10μ) via a solenoid valve into the reservoir tank (pos.3), which operates as a buffer tank for the high pressure pumps (pos.21) and pilot pumps (pos.11).

外部水源通过过滤器（10μ）和电磁阀进入水箱。水箱给高压泵（位置编号 21）和稳压泵（位置编号 11）起一个缓冲的作用。

The water level in the tank is controlled by means of a level switch mounted in the tank. The fresh water solenoid valve opens at level L2 in the reservoir tank.

水箱水位由安装于其上的液位开关控制。当水箱水位到达 L2 位置时电磁阀开启进行注水。

If the fresh water supply to the reservoir tank fails during release of the system, and the water level in the reservoir tank subsequently drops below low - low level, the level switch will stop the high-pressure pump.

如果在系统启动后外部水源无法及时供水，相应地水箱中的水位降到超低位置，则液位开关将停止高压泵的工作。

When the reservoir tank is filled again, the solenoid valves will close again, and the high-pressure pump can manually be started again, when it has been reset in the control panel.

当水箱中再次充满水，电磁阀将再次关闭，如果高压泵已经在电控箱中被重置了，则可以通过手动方式重启。

The level switch has the following functions:

液位开关功能如下：

L1 Closes the fresh water solenoid valves.

L1 关闭进水电磁阀。

L2 Open the fresh water solenoid valve.

L2 打开进水电磁阀。

- L3 Alarm at low level.
- L3 低水位报警。

- L4 Shut down of high-pressure pump at low - low level.
- L4 在超低水位关闭高压泵。

Part 4: Function description for SEM-SAFE Control panel

第四部分：SEM-SAFE 控制面板的功能描述

The pump unit is operated from a control panel, which is powered from the main switchboard and the emergency switchboard.

泵组通过控制面板进行操作，控制面板配有主电源和应急电源。

The control panel consists of the following operating functions, indication functions and alarm functions for the system:

控制面板包括如下运行功能、指示功能和报警功能：

Operating functions

运行功能

- Emergency stop (S0)
急停（S0）
- Manual start of high-pressure pump sequence (S01)
高压泵手动启动（S01）
- Manual stop of high-pressure pump sequence (S02)
高压泵手动停止（S02）
- Lamp test (S03)
指示灯测试（S03）

Indication functions

指示功能

- Running lamps for pumps (H01-H07)
泵运行指示灯（H01-H07）
- Solenoid valve freshwater (H10)
电磁阀（H10）
- Running lamp Pilot pump (H11)
稳压泵运转指示灯（H11）
- Lamp for “system ready” (H12)
“系统就绪”指示灯（H12）
- Running hours pilot pump (P1)
稳压泵累计运行小时数（P1）
- Control supply (H15)
控制模块电源指示灯（H15）
- Alarm panel (U01)
报警面板（U01）

- System pressure (U04)
系统压力 (U04)
- Normal supply (H100)
主电源指示灯 (H100)
- Emergency supply (H200)
应急电源指示灯 (H200)

Alarm functions

报警功能

Alarm panel with following alarms:

报警面板具有如下报警功能：

- Motor failure tripped C.B.
电机故障
- Emergency stop activated.
急停
- Low level reservoir tank.
水箱低水位
- Leakage alarm, pilot pump has been running for more than 10 sec.
泄漏报警，稳压泵已运行超过 10 秒
- System Initiated
系统启动
- Main stop valve closed
主阀关闭

Normal operational state

正常工作状态

At normal operation state the following conditions to be fulfilled:
在正常工作状态下应满足以下条件：

- Voltage supply from normal supply available and emergency supply.
主电源和应急电源上电。
- No alarms are activated.
没有报警被触发。
- Lamp for “system ready” activated.
“系统就绪”指示灯亮。

Part 5: Periodic check program

第五部分：周期性检查程序

To ensure that the system always will function satisfactorily, a periodic check programme has to be carried out according to the mentioned procedure.

为确保系统正常工作，需要根据如下所述程序对系统进行周期性检查。

After having executed the programme the individual check programmes are dated and signed.
检查完成后，每一步均应记录日期并签名。

WEEKLY TEST 每周测试	Part A 第一部分	Control of the pilot pumps, and high pressure pumps 稳压泵和高压泵的控制
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EVERY SIX MOUNTH TEST 每半年测试	Part A 第一部分	Control of level switch in reservoir tank 水箱中液位开关的控制
	Part B 第二部分	Control for automatic change over from main supply to emergency supply 主电源向应急电源的自动切换控制
	Part C 第三部分	Control alarm system 控制报警系统
	Part D 第四部分	Control of filters 过滤器的控制

IMPORTANT NOTICE!

重要提示！

Avoid dry running of the high-pressure pumps:

禁止高压泵干转：

After service of the pump system always make sure that the pump is properly filled with water before start.

在泵系统维护后一定要确保在泵启动前正确地往泵中注满水。

Before start-up, with the pump inlet line connected to the fresh water tank, loosen the upper bleeding plug, make sure that plenty of water is drained from the hole in the upper bleeding plug.

在启动前，确保泵的入口管路连接到水箱上，然后拧松泵体上的排空堵头，确保有足量的水从排空孔中排出。

Weekly test **每周测试**

The alarm transmission to the fire brigade / alarm central must be disconnected during the test.
在测试过程中必须断开向消防队或报警中心发出的报警信号。

Part A: Control of the pilot pumps, and the high pressure pumps **第一部分：稳压泵和高压泵的控制**

Precondition:

前提条件:

Main valve pos. 29 to be closed.

主阀 29 关闭。

Test procedure:

测试过程:

1. Open test valve pos. 19 slowly (about 1/3).
缓慢打开测试阀 19（开度约 1/3）。
2. Control that pilot pump no.1 start.
启动 1 号稳压泵。
3. Switch off the circuit breaker Q11 (Pilot pump no. 1) after 5 sec.
5 秒钟后断开电路开关 Q11（1 号稳压泵）。
4. Observe that pilot pump no.1 stops, and pilot pump no.2 starts.
观察 1 号稳压泵停止，2 号稳压泵启动。
5. Observe that pilot pump no.2 stops after 10 sec.
观察 2 号稳压泵在 10 秒后停止。
6. Control that high pressure pump no. 1 starts.
控制 1 号高压泵启动。
7. Open test valve pos. 19 completely.
完全打开测试阀 19。
8. Observe that running lamps for the pumps are lighting.
观察主泵运行指示灯亮。
9. Let the high pressure pumps run for 2 minutes.
让高压泵运行 2 分钟。
10. Simulate thermal overload by pressing test push button on circuit breaker Q01.
按下电路开关 Q01 上的测试按钮以模拟热过载。
11. Control that high pressure pump no.1 stops, and high pressure pump no.2 (st.by.) starts.
控制 1 号高压泵停止，2 号高压泵（备用泵）启动。
12. Release the test push button on circuit breaker Q01, and reset Q01.
松开电路开关 Q01 上的测试按钮，并复位 Q01。

13. Control that high pressure pump no.2 (st.by.) stops, and high pressure pump no.1 starts.
控制 2 号高压泵（备用泵）停止，1 号高压泵启动。
14. Stop the pumps by press the “STOP” button “S2” on the control panel.
按下控制面板上的“停止”按钮“S2”，把泵停掉。
15. Close test valve pos 19.
关闭测试阀 19。

Re-establishing the pump unit.
重置泵组。

Open main valve pos. 29.
打开主阀 29。

Circuit breaker Q11 (Pilot pump no. 1) to be switch on.
连接电路开关 Q11（1 号稳压泵）。

Reset the alarm panel U1, and control that only lamp activated is H12 “SYSTEM READY”.
重置报警面板 U1，并使得只有“系统就绪”指示灯 H12 亮。

Enter the result in the journal.
记录测试结果。

Re-establishing the SEM-SAFE Water Mist system

重置 SEM-SAFE 细水雾灭火装置

Switch on the alarm transmission to the fire brigade / alarm central from the automatic control fire alarm system panel.
重新连接从自动控制火警系统面板上向消防队或报警中心发出的报警信号。

Every Six Monthly test **每半年测试**

This test is in continuation of the weekly test.
该测试是每周测试的延续。

Part A: Control of level switch in reservoir tank **第一部分：水箱中液位开关的控制**

Precondition:
前提条件：

Fresh water supply valve to be closed.
进水电磁阀关闭。
Main valve pos. 29 to be closed.
主阀 29 关闭。

Test procedure:
测试过程：

1. Open drain valve for tank pos. 5 and drain the reservoir tank to level 2.
打开水箱排水阀 5，使水箱水位降至 L2。
2. Observe that H8 “Solenoid valve Fresh water in service” in front of control panel is lighting.
观察控制面板上“进水电磁阀开”指示灯 H8 亮。
3. Drain the reservoir tank even further to level 3.
继续排水至水箱水位降至 L3。
4. Observe that H12 “System ready” is stop lighting, and alarm panel U1 “Low level reservoir tank” in front of control panel is activated.
观察“系统就绪”指示灯 H12 灭，报警面板 U1 上的“水箱低水位”开始报警。
5. Drain the reservoir tank even further to level 4.
继续排水至水箱水位降至 L4。
6. Observe that pumps not can be started.
观察泵无法被启动。
7. Close drain valve pos 5.
关闭排水阀 5。
8. Open to the fresh water supply and refilling the reservoir tank to level 2.
打开进水电磁阀并往水箱中注水至 L2。
9. Observe that that H8 “Solenoid valve Fresh water in service” in front of control panel is stop lighting, H12 “System ready” lighting, and solenoid valve pos. 1 is closed.
观察控制面板上的“进水电磁阀开”指示灯 H8 灭，“系统就绪”指示灯 H12 亮，电磁阀 1 关闭。

Re-establishing the pump unit.
重置泵组。

Open water supply valve.
打开进水电磁阀。

Open main valve pos. 29.
打开主阀 29。

Reset the alarm panel U1, and control that only lamp activated is H12 “SYSTEM READY”.
重置报警面板 U1，并使得只有“系统就绪”指示灯 H12 亮。

Enter the result in the journal.
记录测试结果。

Part B: Control for automatic change over from main supply to emergency supply **第二部分：主电源向应急电源的自动切换控制**

Precondition:
前提条件：

Circuit breaker Q01, Q02, Q11, Q12 to be switch off.
断开电路开关 Q01、Q02、Q11 和 Q12。

Test procedure:
测试过程：

1. Observe that “MAIN SUPPLY”, “EMERGENCY SUPPLY” and “CONTROL SUPPLY” are indicated on control panel.
观察控制面板上“主电源”、“应急电源”和“控制模块电源”指示灯亮。
2. Simulate Main supply off by pressing test push button on circuit breaker Q150.
按下电路开关 Q150 上的测试按钮以模拟主电源断开。
3. Observe that circuit breaker Q160 “EMERGENCY SUPPLY” is on.
观察电路开关 Q160 “应急电源”合上。
4. Observe that indication lamp on control panel “MAIN SUPPLY” is off.
观察控制面板上“主电源”指示灯灭。
5. Release the test push button on circuit breaker Q150.
松开电路开关 Q150 上的测试按钮。
6. Observe that indication lamp on control panel “MAIN SUPPLY” is on.
观察控制面板上“主电源”指示灯亮。

Re-establishing the pump unit.
重置泵组。

Circuit breaker Q01, Q02, Q11, Q12 to be switch on.
连接电路开关 Q01、Q02、Q11 和 Q12。

Enter the result in the journal.
记录测试结果。

Part C: Control Alarm system **第三部分：控制报警系统**

Precondition:
前提条件：

Main valve pos. 29 to be closed.
主阀 29 关闭。

The alarm panel to be reset after each test.
报警面板在每一步测试后都应重置。

Test procedure:
测试过程：

- “Main stop valve closed”
“主阀关闭”
Close main stop valve, and it is controlled that the alarm is activated.
关闭主阀，观察“主阀关闭”报警灯亮。
- “Motor failure tripped Circuit Breaker”
“电机故障触发电路开关”
Test push button on circuit breaker Q01 to be activated, and it is controlled that alarm is activated.
按下电路开关 Q01 上的测试按钮，观察“电机故障触发电路开关”报警灯亮。
- “Emergency stop activated”.
“紧急停止”
Emergency stop to be activated, and it is controlled that the alarm is activated.
系统紧急停止，观察“紧急停止”报警灯亮。
- “Low level reservoir tank”
“水箱低水位”
Close fresh water supply valve and drain the tank with drain valve pos 5.
关闭进水电磁阀并打开水箱排水阀 5 进行排水。

The reservoir tank to be drained to below low level, and it is controlled that the alarm is activated.

水箱水位降至低于低水位 L3，观察“水箱低水位”报警灯亮。

- “Leakage alarm, pilot pump”
“泄漏报警，稳压泵”

Test valve pos. 19 on pump unit to be opened. Pilot pump starts, and it is controlled that the alarm is activated after 10 sec.

泵组上的测试阀 19 打开。稳压泵启动，观察“泄漏报警，稳压泵”报警灯亮。

- “System initiated”
“系统启动”

Push the start button S1 or open test valve pos. 19. At the same time as master high-pressure pump starts the System initiated alarm is activated.

按下启动按钮 S1 或打开测试阀 19。观察在高压泵运转的同时“系统启动”报警灯亮。

Re-establishing the pump unit.

重置泵组。

Open water supply valve.

打开进水电磁阀。

Re-fill the reservoir tank.

往水箱中重新注满水。

Main valve pos. 29 to be open.

打开主阀 29。

Enter the result in the journal.

记录测试结果。

Part D: Control of filters

第四部分：过滤器的控制

Precondition:

前提条件：

Fresh water supply to be closed.

切断外部水源。

Test procedure:

测试过程：

1. Screw filters off, and take out the filter cartridges.
拧开过滤器，取出过滤器滤芯。
2. Clean the filter cartridge, and put it back into the filters.
清洗过滤器滤芯并将其放回过滤器中。
3. Screw filter on again.
重新装好过滤器。

Re-establishing the pump unit.
重置泵组。

Open water supply valve.
接通外部水源。

Enter the result in the journal.
记录测试结果。