



Pall Corporation

LP00971

Installation and Operating Instructions

SUPRApak™ L Series SA and WA Systems

service instructions



EN Installation and Operating Instructions  
SUPRApak™ L Series SA and WA Systems

ENGLISH

These instructions are valid for SUPRApak filter units with model numbers:

SPLWA100***	SPLWA200***	SPLWA210***	SPLWA300***
SPLWA311***	SPLWA320***	SPLWA400***	SPLWA421***
SPLWA430***	SPLWA520***	SPLWA531***	SPLWA630***
SPLWA632***			
SPLSA100***	SPLSA200***	SPLSA210***	SPLSA300***
SPLSA311***	SPLSA320***	SPLSA400***	SPLSA421***
SPLSA430***	SPLSA520***	SPLSA531***	SPLSA630***
SPLSA632***			

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### 1 Safety

#### 1.1 About this Chapter

This part of the operating instructions

- refers to the correct use of the filter unit
- explains the meaning and use of the warning signs listed on the following pages
- points out the hazards that might result from non-observance of these operating instructions
- informs the user how to avoid hazards.

In addition to these operating instructions, general requirements as well as all further regulations regarding health protection and accident prevention must be observed. Personnel must be trained on the proper use of the filter unit.

Safety and danger signs displayed on the filter unit must be observed.

The technical documentation must always be kept close to the filter unit.



#### Information

In case of any occurring problems that cannot be solved by means of the Pall documentation please do not hesitate to contact:

Pall Corporation

[www.pall.com](http://www.pall.com)

To contact a Pall Sales Office or Distributor, go to: <http://www.pall.com/contact> for specific local contact information.

For any inquiries, please make use of the "Product Observation" form, which is part of the Appendix (=> Chapter 7.3 Product Observation).

We will be glad to assist you.

#### 1.2 Safety Warnings

##### 1.2.1 Hazard Classification

The individual safety warnings are subdivided according to their meaning and significance. The following chart gives the user a view concerning the hazard symbols (pictograms) used, their meaning (signal words) and a description of the concrete hazards with their potential consequences.

Pictogram	Damage for	Signal word	Definition	Consequences
	Persons	Danger	Immediate danger	Death or serious injuries (causing disability)
		Warning	Possible dangerous situation	Possibility of death or serious injuries (causing disability)
		Caution	Less dangerous situation	Possibility of minor or slight injuries
	Objects	Attention	Possible damage	Possible damage to <ul style="list-style-type: none"> <li>• the product</li> <li>• its surroundings</li> </ul>
		Information	Application advice and further useful information	No dangerous or damaging consequences for persons or objects

#### 1.3 Potential Safety Hazards

The filter unit has undergone hazard analysis. Construction and design of the filter unit complies with the current applicable state of the art.



#### DANGER!

Prior to the first operation the operator must:

- install any necessary safety and protection devices in order to safeguard the operator or the filter unit from any sources of danger
- establish and supervise an effective job safety program for the filter unit
- introduce and supervise a necessary maintenance program for the filter unit.



#### DANGER!

**It is absolutely imperative to make sure that the filter housing is in a depressurized state before the clamping ring (V-band) is opened.**

**Prior to pressurization of the filter housing, it is absolutely imperative to make sure that the filter housing is closed (V-band) and all couplings are connected.**

In case of wrong operation or improper use there is danger to:

- personnel (including bodily injury or death) (i.e. due to poisoning, chemical burns, explosion, etc.)
- the unit and further material assets of the operating company
- the efficient work of the plant

Each person dealing with mounting, commissioning, operating and maintenance must:

- provide the necessary professional qualifications
- strictly observe these operating instructions

#### 1.4 Hazard Sources

The filter unit operates with

- filtration products
- chemical substances (for cleaning purposes)
- liquids and gases under pressure with higher temperatures



#### WARNING!

These sources of danger might

- endanger personnel with bodily injury or death
- endanger personnel health
- damage the filter unit and further material assets of the operating company
- reduce the efficiency of the plant

Ensure that the filter unit is always depressurized and that it cannot inadvertently become pressurized with liquids or gases via the equipment connections, prior to:

- maintenance work
- correction of defects in safety and protection devices

**The removal and shutdown of safety devices during operation of the unit is absolutely prohibited.**

### 1.5 Intended Use

The filter unit must be operated with properly functioning safety devices and properly installed protection devices! The filter unit must be shut down immediately in case of malfunctioning or ineffectiveness of a safety or protection device.

Operator and operating company are both responsible for correct use!

Should any hazards occur during the filtration process, especially when

- handling harmful substances and materials
- integrating the filter unit into an existing total unit the operating company must effectively safeguard personnel and equipment from the hazard sources in compliance with the locally applicable regulations, laws and allowed limits.

The filter unit must be used exclusively to filter liquid products (suspensions), in accordance with the design classification.



#### WARNING!

Design satisfies EC Pressure Equipment Directive (PED) 97/23/EC (Fluid Group 2, Category II, Module H). Pressure rating is suitable for non-hazardous liquids or gases. The PED category and fluid group classification indicates suitability of housing use on distilled spirits less than 70% by weight absolute alcohol. For such applications, the maximum allowable temperature must be below the flash point. For 70% by weight absolute alcohol the flashpoint is 21 °C (69.8 °F).

The operating personnel must be given adequate handling and operating instructions.

Any application which exceeds or is not in conformance with the order details will be regarded as an improper use and thus Pall Corporation will not be held responsible for any occurrences.

The materials of construction are resistant to many cleaning and disinfecting agents. However, the user is responsible for ensuring that the cleaning and sanitization regime they employ is fully compatible with the materials of construction of the unit and the SUPRApak filter module employed. See Chapter 7.4 (=> Materials of Construction).

The maximum operating temperature and maximum design pressure (=> Chapter 2.2 Operating Data, Connections, Measurements and Weights) must not be exceeded.

The strict observance of the operating instructions as well as the adherence to inspection and maintenance conditions are imperative conditions for a proper use of the filter unit.



#### CAUTION!

Should the filter unit be used for any other purpose than mentioned above, or should the intended capacity or process limits be exceeded, the filter unit is in danger of being damaged or even destroyed. Pall Corporation will not be held responsible or liable for damages that can be attributed to improper handling and operation; the user will be solely responsible. Under these circumstances, the warranty will no longer be valid.

- 1.5.1 By means of part number selection, the user may choose a filtration unit which is supplied with ATEX documentation, indicating suitability for ATEX 94/9/EC Classification, Group II, Category 2, Zones 1/21 and 2/22. For the use of this equipment in potentially explosive environments, please observe Chapter 8 (=> Explosion Protection ATEX).

### 1.6 Prohibition of Unauthorized Modifications

Any modification to the product not officially approved in writing by Pall Corporation shall be considered as not authorized, therefore not permitted.

Prior to any modification Pall must be contacted for approval, and failure to do so will invalidate the warranty.



#### WARNING!

Modifications of the filter unit or welding at load-bearing parts of the filter housing and surrounding components which are not previously agreed upon with Pall Corporation may

- harm personnel
- lead to damage or destruction of the filter unit.

### 1.7 Personnel Training

#### 1.7.1 Target Group

This manual is for

- the operating company
- operators and
- service and maintenance personnel.

Therefore, all safety warnings and signs refer to operation and application of the filter unit as well as to maintenance work.

In order to avoid unauthorized use of the filter unit when it is not in operation, all feed and discharge pipes must be safeguarded at all times.

The responsibilities for the individual fields of activity (operation, set up, maintenance and repair) must be clearly defined and observed.

In order to guarantee clarity of responsibilities and roles, we recommend that the responsible personnel be recorded in the operation log. (=> Chapter 1.8 Operating Log)

**Unclear designation of personnel responsibilities represents a security risk.**

#### 1.7.2 Authorized Personnel



#### Information

Knowledge of the information described herein is an indispensable condition for any handling of the filter unit.



#### WARNING!

There is a risk of danger for personnel, material assets and environment in case of improper operation and maintenance of the filter unit! Only authorized personnel are allowed to handle the filter unit.

Authorized personnel for operation and maintenance are the trained and skilled experts of the operating company and the manufacturer.

The operating company is responsible for

- personnel training
- personnel instruction regarding the potential hazards that may occur in the course of their activities as well as the measures to avoid such hazards; such training should be repeated at regular intervals
- documenting the trainings/instructions and confirming individual employee participation in writing
- monitoring whether personnel observe the safety procedures and the operating instructions and whether they are aware of the possible hazards.

Prior to commissioning the operator must:

- have read and understood the complete operating instructions
- be familiar with all safety and protection devices as well as the safety regulations.

For work involving the following parts of the filter unit additional requirements apply:

- Electrical installations and machinery:
  - Work must be carried out only by an electrician or under the direction and supervision of an electrician
- Pneumatics:
  - Work must be carried out only by skilled persons with specific knowledge and experience with pneumatics

### 1.8 Operating Log

The operating log contains details concerning authorized personnel and their training and education.

The operating company is obliged to keep an operating log.

In addition to dates and names the operating log must indicate the following details:

- Occurring troubles, problems, failures and the measures that have been taken for their elimination
- Operating company-designated security checks (check list)
- Inspection, maintenance and repair work
- Updates of these operating instructions, modifications of the unit
- The "Product Observation" form



#### Information

The operating log must be checked at regular intervals (e.g. monthly) by responsible management personnel.

### 1.9 Safety and Protection Devices

The following safety devices must be part of the filter unit:

- safety valve (Feed flr 'd inlet => Chapter 5, Fig. 5-1 P&ID SUPRApak)

#### Filter unit with clamp ring (V-band):

- slide bar lock at the arm of the clamp ring (=> Fig. 1-2, white arrow)



Fig 1-2: Slide bar lock



#### WARNING!

Equipment delivered without safety relief valve: It is the operating company's responsibility to ensure the equipment is protected with an adequately rated safety relief valve in line with the operating conditions, and according to the requirements of local pressure vessel directives.

The filter unit must only be operated with properly functioning safety devices and properly installed protection devices.

The filter unit must be shut down immediately in case of malfunctioning or ineffectiveness of a safety or protection device.

#### Both operator and operating company are responsible for the safe condition of the filter unit.

Should a safety device be activated the filter unit may not be restarted unless

- the cause of the fault has been eliminated
- the responsible person has convinced himself that there is no more danger of bodily harm or potential for damage of material assets.

Safety devices must not be

- removed
- blocked or
- deactivated in any other way.



#### WARNING!

You expose yourself and everybody else in the vicinity of the equipment to potential severe injuries if you bridge or remove safety and protection devices.

Should any hazardous areas which are not sufficiently secured result from:

- the local situation, e.g. in the course of maintenance work
- or the conditions at the place of installation these areas must be secured immediately through measures that are effective at any time.

Safety measures must always be adjusted to the local working conditions and the areas which are possibly affected by the filter unit. If a safety relief valve is part of the scope of supply, it has already been adjusted to the correct pressure by the supplier. Do not readjust the setting of this safety valve without contacting Pall Corporation.

#### 1.9.1 Safety Check

Please check the filter unit at least once per shift for externally discernible damage and defects. Any observed changes (including a change of the operating behavior) must be reported immediately to the responsible service technician.

Check all safety and protection devices (pressure test in an adequate manner)

- at the beginning of each shift (in case of interrupted operation)
- once a week (in case of continuous operation)
- after each service event (maintenance or repair work).

### 1.10 Protective Equipment



#### WARNING!

The operating company is responsible for identifying proper measures for handling the fluids and gases used in the filter unit.

Within this scope it must be determined:

- which protective equipment must be worn or be kept ready in case of need
- which measures must be taken to avoid dangers.



#### WARNING!

Prior to starting up the filter unit the operator must be sure that

- there is no danger for any personnel
- no material assets can be damaged



#### WARNING!

After completion of operation, do not open the filter unit before

- it is depressurized
- it is completely drained
- all feed and discharge pipes are closed.

### 1.11 Safety during Operation

Avoid any risks when working with the unit.  
These operating instructions do not replace a correct commissioning and introductory operator training.  
We recommend a training carried out by a qualified Pall employee.

### 1.12 Safety during Maintenance

#### 1.12.1 Maintenance Work

Prior to maintenance and repair work it might be necessary to remove the installed safety and protection devices. After having finished the work they must be reinstalled and reinspected.

Protective and safety devices are:

- Safety valve or rupture disc
- Parts of the assembly which are situated at high clearances off the ground must be accessed by secure steps, platforms, ladders and in some cases scaffolding.

Never use parts of the filter unit to climb on.

All maintenance work shall be in line with the operating company's current safe practices and applicable health and safety rules.



#### DANGER!

The use of damaged lifting equipment or load lifting devices or the use of equipment not providing a sufficient supporting or load capacity can cause severe, even deadly injuries.

Therefore check the lifting equipment and load lifting devices for their

- sufficient load capacity
- authorized use
- perfect condition.

Fix the loads carefully.

Never step under suspended loads.

#### 1.12.2 Accident Report

Accidents are to be reported as per the operating company's health and safety procedures and legislations, and Pall Corporation informed officially of such occurrences, sources of danger as well as "near accidents".

"Near accidents" can have many causes.

The sooner they are reported the sooner the faults can be rectified



#### Information

We draw the attention of the operating company to high risks of dangers when working with and around the filter unit.

### 1.13 Chemical Substances

When working with

- acids
- caustic solutions
- oils
- solvents and cleaning agents
- other chemical substances

observe the corresponding safety regulations on the packaging and in the material safety data sheets as well as in these operating instructions.

### 1.14 Fire

In case of fire, poisonous gas may be produced due to chemical reactions involving any synthetic materials or cleaning agents that may be contained in the filter unit.



#### DANGER!

The use of unsuitable fire-extinguishing media may cause further danger. Prior to commissioning the unit, adequate and suitable fire extinguishing media must be identified, depending on which types of flammable substances involved. If necessary, please contact your local firefighting authority for competent advice.

Should you try to extinguish a fire close to electrical installations or high-voltage lines, always keep a safe distance.

### 1.15 Remaining Hazards

There are still remaining hazards that cannot be secured through the applied safety and protection devices.

These might for example be:

- suspensions or cleaning liquids squirting out of pipes and their connecting pieces
- further sources of energy (i.e. electrostatic charges)
- hot equipment surfaces
- escaping steam, solvent vapor etc.

However, these hazards do not represent any defects in connection with the manufacture of the filter unit.

They rather represent sources of danger that might occur during operation by the user and when integrating the filter unit into an already existing installation.

The operating company must identify these dangers within a hazard analysis program and then take suitable measures to eliminate them.

### 2 General Information

#### 2.1 Identification

The following identification plate can be found on the housing cover.

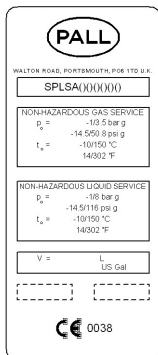


Fig 2-1: Nameplate on filter housing

#### 2.2 Operating Data, Connections, Measurements and Weights

Feed Fluid-Inlet	1 x DN 65 DIN 11851 bottom 1 x DN 65 DIN 11851 dome, riser pipe 2.5 inch clamp coupling (ISO 2852) adaptor available by specific order
Filtrate-Outlet	1 x DN 65 DIN 11851 2.5 inch clamp coupling (ISO 2852) adaptor available by specific order
Vent	Feed Fluid 1 x DN 6 (8 mm/ 0.31 inch OD hose tail)
	Filtrate 1 x DN 6 (8 mm/ 0.31 inch OD hose tail) (optional)
Drain	Feed Fluid 1 x DN 15 (18 mm/ 0.71 inch OD hose tail)
	Filtrate 1 x DN 15 (18 mm/ 0.71 inch OD hose tail)
Design Pressure	Liquids: max. 8 barg (116 psig) Gases: max. 3.5 barg (50.8 psig)
Design Temperature	max. 150 °C (302 °F) The maximum operating temperature is limited by the material of the standard seals (130 °C/266 °F) and the temperature limits of the filter modules. Please consult Pall.
Volume (empty)	53-267 l (14-70.5 US gal) (WA design - without accessories) 60-282 l (16-74.5 US gal) (SA design - with accessories)
Weight (empty)	50-110 kg (110-243 lbs) (WA design - without accessories) 86-160 kg (190-353 lbs) (SA design - with accessories)
Dimensions and Variants	Please request drawings: WA design (1 to 3-high): CC71316D00 WA design (4 to 6-high): CC71317D00 SA design (1 to 3-high): CC71318D00 SA design (4 to 6-high): CC71319D00

#### 2.3 Outline Drawings and Footprint

Footprint dimensions are given in mm.

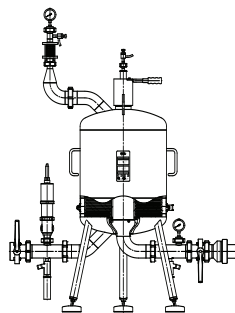


Fig 2-2: Outline drawing, 1 to 3-high SUPRApak L-SA housing

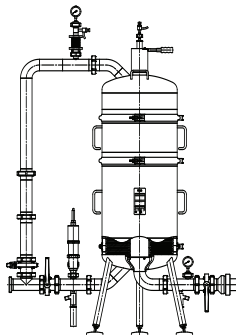


Fig 2-3: Outline drawing, 4 to 6-high SUPRApak L-SA housing

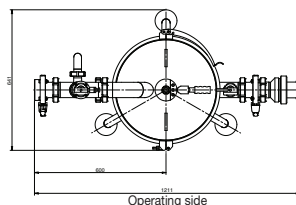
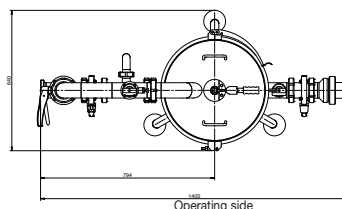


Fig 2-4: Footprint, 1 to 3-high SUPRApak L-SA housing



8 Fig 2-5: Footprint, 4 to 6-high SUPRApak L-SA housing



### 3 Assembly and Function

#### 3.1 About this Chapter

In this chapter you will find all functional units of the filter described:

- where they are
- how they are identified
- what their function is
- how they work together

#### 3.2 General View

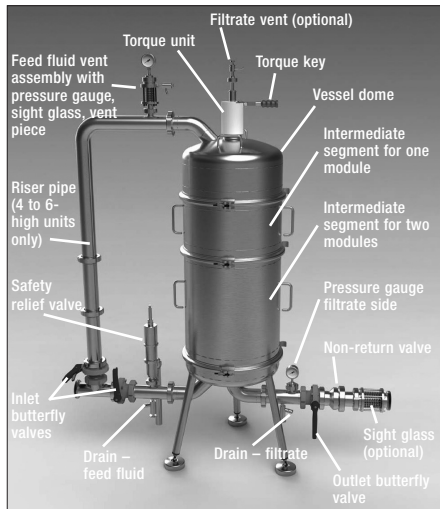


Fig. 3-1: Type SPLSA421TVNW65\*, showing Standard and Optional Accessories

#### 3.3 Operating Data – Housing

(⇒ Chapter 2.2 Operating Data, Connections, Measurements and Weights)

#### 3.4 Safety Warnings – Pressure Vessel

The pressure unit is designed and constructed according to the pressure equipment directive 97/23/EC.



#### WARNING!

The operating company must assure that the inlet (feed) pipe of the filter is outfitted with a suitable safety device, if it is not provided as an accessory. The safety device consists of a safety valve or rupture disc, to protect the system against exceeding the acceptable pressure limit. (⇒ Chapter 2.2 Operating Data, Connections, Measurements and Weights)



An authorized expert should do the legally required pressure vessel checks and inspections. Depending on the pressure vessel category of the filter unit, a pressure vessel check must always be done:

- prior to the first commissioning
- after any modification
- after repairs of the pressure vessel
- in restricted periods (according to local requirements)



#### WARNING!

Note the operating limits listed on the housing identification tag. The maximum values indicated must never be exceeded under any circumstances.

#### 3.5 Safety Valve



#### WARNING!

If the excess pressure protection device is activated due to an overpressure situation, steps must be taken to avoid uncontrolled leaking of the product (in case of corrosive or toxic fluid escape, refer to the user's safety handling procedures).



#### WARNING!

The safety valve (if included in the accessories) is adjusted to the maximum allowable liquid pressure and prevents excess pressure by draining off the liquid.



#### WARNING!

Should the safety valve be activated due to an overpressure situation, a spraying of fluid (i.e. CIP caustic solutions or acids; hot liquids) may occur. Position the safety valve in such a way that any escaping fluids do not cause a hazardous situation (i.e. directed to drain, or extending with a hose to drain).



#### WARNING!

Should gas pressure be used to pressurize the housing to empty it, a suitable gas pressure safety valve should be installed in the gas supply pipeline, to protect the assembly from excess gas pressure in case of an upset.

#### 3.6 Vent Units

Venting on the feed fluid side is done via valve HV03 (⇒ Fig. 5-1 Process and Instrumentation Diagram). The pressure gauge on this vent unit indicates upstream system pressure.

Venting on the filtrate side (HV04) is optional. This option allows venting of the SUPRApak filter unit on the filtrate side when filling the unit.

#### 3.7 Drain Valves

Drain feed fluid inlet HV05:

At the inlet side below safety valve.

Drain filtrate HV06:

At the filtrate outlet side below the filtrate pressure gauge.

#### 3.8 Isolation Valves

Butterfly valves (manually operated) HV01, HV02 with riser pipe additionally HV07.

#### 3.9 Non-return Valve

Located at filtrate outlet side after pressure gauge and drain valve, valve NRW01.

The non-return valve prevents a reverse flow of the filtrate into the vessel and, at the same time, prohibits backflushing or pressurizing from the outlet side.



#### ATTENTION!

The filter must neither be backflushed nor pressurized from the discharge side.

If this occurs: The SUPRApak modules would be destroyed!

Pressurization is only allowed in a forward flow (filtration) direction.

#### 3.10 Functional Description

The feed fluid enters the vessel via HV01. In housing types equipped with riser pipe (4 to 6 modules high): there is a second feed fluid inlet via riser pipe over the vessel dome, valve HV07. Due to the existing liquid supply pressure, the feed fluid flows through the SUPRApak filter modules into the central filtrate space and exits the vessel at HV02.

### 4 Installation

#### 4.1 About this Chapter

In this chapter you will be informed about:

- the transport
- the installation/ assembling
- the connecting of the filter unit, as well as
- the mounting and dismounting of the SUPRApak modules



#### WARNING!

Improper installation of the filter unit may

- endanger personnel
- result in material damage.

Only qualified and experienced assemblers should execute the activities described in this chapter.

#### 4.2 Delivery and Storage

When delivered, immediately check the filter unit for:

- completeness (according to the delivery documents)
- damage



#### Information

Immediately inform the forwarder in case of missing parts or transport damage.

Request the forwarder to confirm the damage in writing.

In case the filter unit is not installed immediately after delivery store it

- dry
- free from dirt and dust
- in a non-corrosive environment

In case of a longer storage period, use suitable long-term storage procedures.

Should you have any questions please use the "Product Observation" form. (⇒ Chapter 7.3 Product Observation).

#### 4.3 Transport



#### Information

The filter unit is delivered in a shipping crate. The weight of the filter unit is indicated in the delivery documents.



#### WARNING!

The use of damaged lifting equipment or load lifting devices resulting in the use of equipment not providing a sufficient supporting or load capacity can cause most severe, even deadly injuries.

Fix single parts and larger structural components carefully and safeguard them in a way that they cannot constitute a danger.

Check whether the lifting equipment and the load lifting device

- provide a sufficient load capacity and are not damaged.
- are provided with a test certificate (and a CE-label).



#### WARNING!

**Never step under suspended loads.**

Safeguard the piping in a way that it cannot be damaged during transport.

#### 4.3.1 Information about the transport of the SUPRApak Filter Unit

- The length of the rope used for slinging should be sufficient to allow a vertical hanging of the filter unit.
- Secure the ropes against slipping by means of safety devices.
- Only trained and qualified personnel should be employed for lifting, to avoid equipment and personal damage or injury.

#### 4.4 Unpacking, Cleaning and Installation

##### 4.4.1 Requirements for the Installation Location



#### CAUTION!

The filter unit's center of gravity is not located in the center. Care must be taken to avoid swinging during the handling of the equipment.

The SUPRApak Filter Unit must not be transported with installed SUPRApak modules.

Configure the working area around the filter unit according to the general applicable health and safety regulations.

The working area for operation, commissioning and maintenance must not be confined.

#### Surrounding conditions and environmental conditions

- Surrounding temperature: -10 °C to +80 °C (14 °F to 176 °F)

**Operation is only permissible in non-corrosive surroundings.**

##### 4.4.2 Unpacking

- Remove the shipping packaging and all transportation safety devices.
- Remove all packing materials and adhesive tape residuals from the filter unit.

##### 4.4.3 Installation

The filter unit will be delivered disassembled and must be installed.

The installation area must correspond to the applicable health and safety regulations.

The load-bearing capacity of the ground must be considered, taking into account the weight of the unit when filled.

The installation location should be flat and dry.

Put the filter unit on the plates of the cap-shaped feet.

Level the filter by means of the adjustable feet, then fix the feet in place with the counter nuts.



#### ATTENTION!

Exercise caution to ensure that the heavy accessory fittings are supported properly to avoid tipping of the filter housing.

##### 4.4.4 Cleaning of New Units

New filter units must be carefully cleaned before the first commissioning. If necessary disassemble the filter unit for cleaning. (⇒ Chapter 4.6 Assembly/Disassembly Instructions)

Clean individual parts with a soft brush or paint brush in a bowl with hot cleaning solution (cleaning solution: hot water with neutral detergent). The filter inlet and outlet pipes, fluid connecting passages as well as the sealing grooves must be cleaned with special care.

After cleaning, rinse with clear water, especially the product-wetted parts. In case of critical applications, i.e. in pharmaceutical applications, rinse with demineralized water.

- 4.5 Safety Warnings – Pressure Vessel  
 (=> Chapters 3.4 Safety Warnings, and 3.5 Safety Valve)



**ATTENTION!**  
 Should the filter unit be hard piped to surrounding pipework, axial and radial forces acting on the filter unit connections should be avoided.



**ATTENTION!**  
 If fluid is leaking from the filter housing or the fittings, this is an indication that the housing lid or the fittings are not correctly mounted or the seals are defective. Immediately stop filtration and look for the cause of the leakage.

A suitable hose or a pipe must be connected by the operating company at the vent and drain connections to direct fluid into a suitable vessel.

- 4.6 Assembly/ disassembly instructions filter unit and accessories

(=> Fig. 3-1, General View)

- 4.6.1 Opening the Housing and Lifting the Dome



**WARNING!**  
 Before opening the filter housing, ensure that the housing and/or the system is not under pressure. Disassemble venting accessories and, if existing, the riser pipe from vessel dome.

**Opening:** Turn torque key counterclockwise to open the filter housing. Open the clamp ring (V-band). Then lift the housing dome using the handles which are fitted for this purpose. In case of larger/ higher housings it is advisable to have 2 persons lift the dome. Single housing domes 4-modules high are fitted with lifting lugs, so the vessel dome can be lifted with a suitable lifting device or hoist.

If the filter is equipped with modules, it must be observed that the housing dome is carefully lifted over the SUPRApak modules, and placed so that the sealing surface will not be damaged.

Mounting and dismounting of the SUPRApak modules by means of the appropriate lifting device. (= > Chapter 4.8 Lifting Device)

- 4.6.2 Installing SUPRApak Modules

Place the O-ring in the housing O-ring groove. By slight pressing the O-ring will fit into the groove.



O-ring, housing sealing

Module Adaptor

Fig. 4-1

The installation of SUPRApak modules is done manually.

Place the first SUPRApak module directly on the module adaptor (Fig. 4-1). Note: there is no gasket needed at the module adaptor. When inserting, please observe that the plastic drainage core of the SUPRApak module catches centrally in the module adaptor.

SUPRApak module

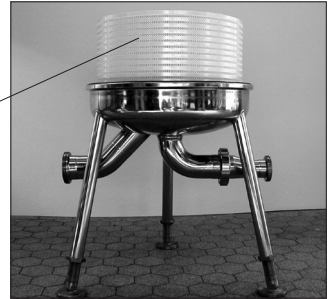


Fig. 4-2

Depending on the design type an intermediate piece or the housing dome will then be positioned. (= > Chapter 4.6.3 Positioning of the Dome)

Fit O-ring into groove by pressing slightly.

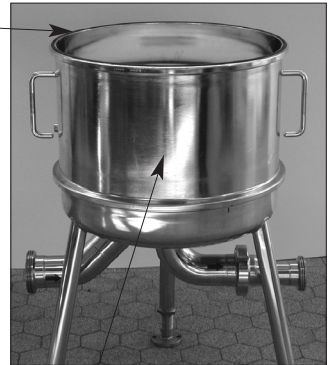


Fig. 4-3

**Intermediate piece:**

Depending upon the design type:

Z1: Single-height intermediate piece

Z2: Double-height intermediate piece

Z3: Triple-height intermediate piece

The intermediate pieces can be combined with each other thus offering the possibility of extension by one, two or three intermediate pieces. The maximum allowed housing height is 6-high. The addition of intermediate pieces may require the addition of a corresponding riser pipe assembly.

For sealing purposes, an intermediate plastic ring (supplied in each SUPRApak module box) is placed between each SUPRApak module. Please observe that the ring is exactly centered around the drainage core.

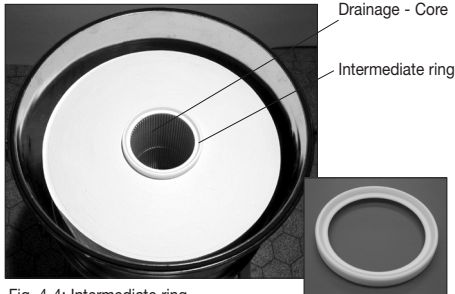


Fig. 4-4: Intermediate ring centered on the SUPRApak module

Fig. 4-5: Intermediate ring

**When inserting several modules:**

Insert all further SUPRApak modules as described.  
 Insert SUPRApak module and intermediate ring alternately (Fig. 4-4 and 4-5)  
 The intermediate ring serves as a centering aid for the next SUPRApak module.  
 When placing the subsequent SUPRApak modules please observe again that they are exactly centered and properly positioned.

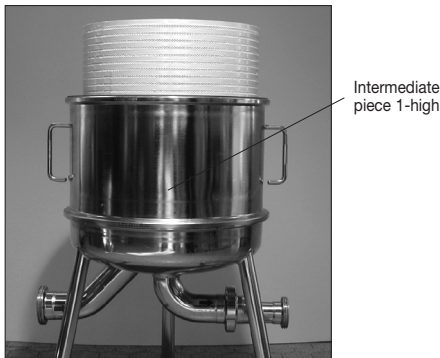


Fig. 4-6: SUPRApak housing with 2 SUPRApak Modules and intermediate piece 1-high

Do not place an intermediate ring onto the topmost SUPRApak module in the stack. The sealing function is ensured by the torque unit which is fitted at the top of the housing dome.

- 4.6.3 Positioning the Dome and Closing the Filter Housing
- Turn torque key counterclockwise until only one complete turn of the thread is left. Then slowly lift the housing dome over the SUPRApak modules onto the housing bottom or the intermediate piece. Pay attention to exact alignment.
- Close the clamp ring (V-band).
  - Tighten the SUPRApak modules.
- For this, turn the torque key clockwise until the clutch slips.



**WARNING!**  
 The torque unit was calibrated in dry condition and therefore the SUPRApak modules must be dry when the torque is applied.  
 Move the torque key smoothly; do not jerk it. Do not draw it obliquely downward or upward.



Fig. 4-7: Closing

Closing:  
 Turn torque key clockwise (in direction of the arrow) until the clutch slips.



**Information**  
 To ensure appropriate force is exerted by the torque unit, all parts should be clean and free from any contamination. Special attention should be paid to the sealing surfaces.



**CAUTION!**  
 The operating company must ensure that all gaskets are monitored at regular intervals. They must be checked for damage and leakage.

In case of defective gaskets the filter must not be put into operation, and the gaskets must be replaced immediately.



### ATTENTION!

All o-rings and other gaskets are made of EPDM material as a standard.

Other seal materials are possible. For further information please contact Pall.

#### 4.6.4 SUPRApak Filter Unit with Standard Accessories:

(=> Fig. 3.1 General View)

Filter inlet side: Connect the butterfly valve and safety valve. Connect riser pipe (if included in scope of supply) and second butterfly valve.

Filtrate Side: Connect the non-return valve and butterfly valve.

Ensure that there are sealing rings (gaskets) between all connection pieces.



### CAUTION!

If the filter unit is to be integrated into a pipeline, it must be ensured that no axial forces interfere with the connecting pieces.

#### 4.7 Connecting

The user must connect suitable hoses to all vent and drain valves. (For connection sizes => Chapter 2.2 Operating Data, Connections, Measurements and Weights)

##### 4.7.1 Compressed Air, Inert Gas (optional)

In many applications operators choose to displace the product from the inlet pipe, filter housing, and filter module by means of compressed air or inert gas.

Compressed gas can be introduced into the system either from a pressure vessel or via a pressure pipe or hose installed on the inlet side to the SUPRApak housing.

Pressure regulation is possible by means of a precision-regulating pressure gauge, selected according to the gas pressure specifications of the housing.

Additionally, a suitable gas pressure relief valve should be installed in the gas pipeline, to avoid exposing the SUPRApak installation to excessive gas pressure in the case of an upset. (=> Chapter 2.2 Operating Data, Connections, Measurements and Weights)

##### 4.7.2 Rinsing Liquid (optional)

In many cases the product displacement is carried out with the aid of liquids, e.g. with water, solvents or special rinsing solutions. Thus, solid matter can additionally be washed out. If required, the modules can also be pre-rinsed. The operating company should check whether the product feed pipe can also be used as the rinsing pipe, or whether an additional rinsing pipe must be installed.

##### 4.7.3 Hot Water Sanitization

Depending on the type of SUPRApak modules in use, sanitization with hot water in a forward flow direction of filtration with a maximum temperature of 85 °C (185 °F) is recommended for an individual period of 20 minutes. For maximum cumulative exposure, please refer to SUPRApak module operating instructions (FBSISPAK), or please consult Pall. No back pressure is allowed. Water quality: If possible, use demineralised water, free from contamination.

#### 4.8 Lifting Device for SUPRApak Modules (optional)

The lifting device only works in connection with a corresponding lifting tool (e.g. a chain hoist).

Removing the SUPRApak modules from the housing is only possible as a complete stack, i.e. the modules cannot be removed individually with this device.

Mounting of the complete stack outside the filter housing:



Fig. 4-8

Place the plastic ring supplied with the lifting device (as a spacer, with min. height of 100 mm) on a flat surface.

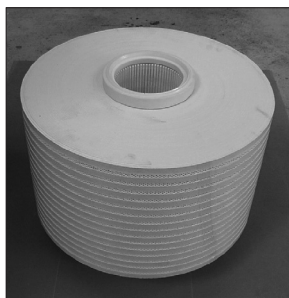


Fig. 4-9

Set the first SUPRApak module on the plastic spacer, then insert the intermediate ring. For further assembly, insert SUPRApak module and intermediate ring alternately as described above.

**Important:** Only use intermediate rings between the SUPRApak modules. No intermediate rings are needed at the upper and lower stack ends.

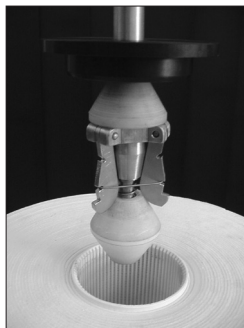


Fig. 4-10

Bring the lifting device in an exactly centered position above the SUPRApak module stack.



Center the plastic disc in the drainage core of the SUPRApak module.

Fig. 4-11



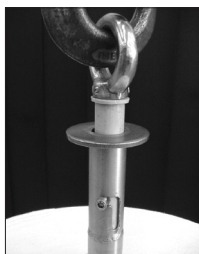
Move the lifting device downward until the plastic cone rests on the bottom



Keep the rod pressed down at the ring simultaneously moving the hoist slowly upward until the stack lifts off from the bottom



The screw head is now in the upper position



Turn the rod until the screw head fits at the left end of the slot. The lifting device is now locked

Fig. 4-12 to 4-15



Fig. 4-16 and 4-17: Put the spring connector into the hole at the disc. The locking mechanism of the lifting device is now secure.



Fig. 4-18 and Fig. 4-19: Continue to move the hoist slowly in an upward direction and check whether the hooks are completely latched and fit close at the core.

Installation of the complete stack into the filter housing

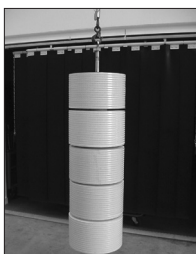


Fig. 4-20  
The complete stack is moved centrally above the housing bottom.



Fig. 4-21  
Introduce the plastic cone at the bottom part of the lifting device centrally into the module adaptor and move the hoist slowly downward until the lowest module is evenly centered onto the sealing grooves.

### Removal of lifting device from the module stack:

To unlock, pull the spring connector, then turn the rod until the screw head closely fits at the right side of the vertical slot.

Lower the hoist until the chain goes slack. Move the hoist slowly upward until the entire lifting device has come out of the stack.

### The next step is to close the housing.

(⇒ Chapter 4.6.3 Positioning of the dome and closing of the filter housing)



### 5. Operation and Process Description

#### 5.1 About this Chapter

In this chapter you will be informed about the safe operation of the filter unit.

#### 5.2 Prior to Commissioning

Start the filter unit only if all of the following conditions are fulfilled:

- technically perfect condition of the unit
- correct intended use
- related work activities heed safety warnings and exercise awareness of potential hazards
- operating instructions are followed
- all safety and protection devices are available and ready for use
- access by unauthorized persons is forbidden
- commissioning is done only by skilled personnel.



**WARNING!**  
Immediately eliminate failures that could compromise safety.

#### 5.3 During Operation

##### 5.3.1 Safety



**WARNING!**  
Avoid any work activities which could compromise safety.  
Immediately eliminate failures.  
Immediately inform the responsible personnel about occurring changes.  
Immediately stop the filter unit in case of any functional trouble, and protect it against unauthorized use.

#### 5.4 Initial Commissioning / Test Run

#### Designation of the operating elements:

Item/Name	Designation	Function
F01	SUPRApak filter unit	Filter vessel
HV01	Butterfly valve	Feed fluid inlet (bottom)
HV02	Butterfly valve	Filtrate outlet
HV03	Seat valve	Vent (feed fluid)
HV04	Seat valve	Vent (filtrate - optional)
HV05	Seat valve	Drain (feed fluid inlet)
HV06	Seat valve	Drain (filtrate outlet) HV07 – Butterfly valve – Feed fluid inlet (top)
SV01	Safety valve	Overpressure protection
PI01	Pressure gauge	Operating pressure, filter inlet
PI02	Pressure gauge	Operating pressure, filter outlet
NRV01	Non-return valve	Filtrate downstream
SG01	Sight glass	Feed fluid vent assembly
SG02	Sight glass	Filtrate outlet (optional)

##### 5.4.1 Test Run

During the test run observe the tightness and the pressure of the unit and surrounding installation.

##### 5.4.2 Checks prior to the Test Run

Check whether:

- all protection and safety devices are firmly fixed and functioning
- all potential hazard sources are secured
- all hoses and connections are firmly tightened
- all valves are closed
- the feed and discharge pipework for the feed fluid and the filtrate is connected correctly

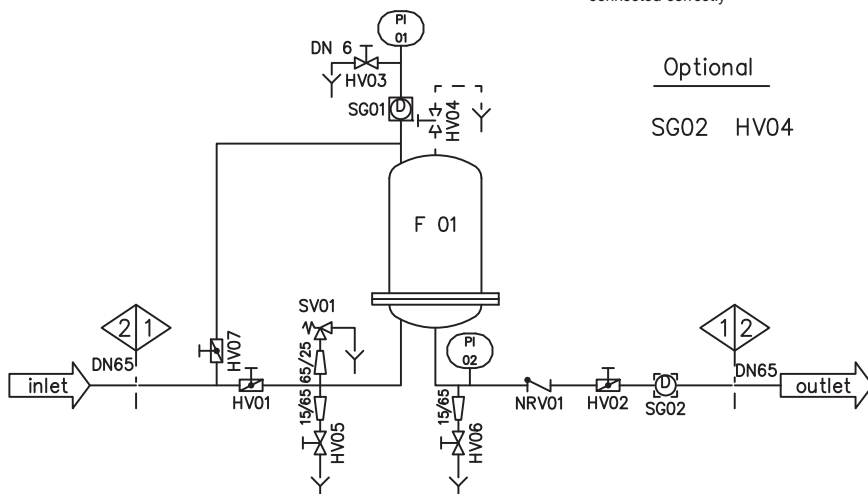


Fig. 5.1: Process and Instrumentation Diagram



### WARNING!

Several process steps can cause heating of equipment parts and surfaces. If touched, this can cause burns. Place warning signs at the filter unit and block off the area surrounding the filter unit as long as it is hot.

## 5.5 Filtration

In general, filtration with pre-rinsing is recommended. Such a procedure is described in Chapter 5.5.1. If it is intended to carry out filtration without pre-rinsing, please proceed directly as described in Chapter 5.5.2 or 5.5.3.

### 5.5.1 Pre-rinsing

#### 5.5.1.1 Purpose

Pre-rinsing of filters is carried out if specific filtrate requirements must be fulfilled.

Due to the fact that feed fluid might flow into the filtrate pipe when changing filters, this should also be a reason to pre-rinse the filter and the outlet pipe.

#### 5.5.1.2 Pre-rinsing Fluids

For details regarding suitable pre-rinsing fluids, please refer to SUPRApak Module Operating Instructions (FBSISPAK), or consult Pall.

The following choices for pre-rinsing fluids are possible:

- Water: We recommend to pre-rinse with 340 liters of water per SUPRApak SW/L module.
- Chemical Solutions (e.g. solvents, weak acids)
- Product to be filtered

Depending on the user's requirements, the rinsing solution may be discarded or further used.

The rinsing quantities must be determined according to the respective requirements of the product to be filtered.

#### 5.5.1.3 Pre-rinsing Procedures

During filling the filter unit needs to be vented.

- Venting valves HV03 and HV04 are opened
- Valves HV01 and HV02 at filter inlet and outlet side are opened; if filter is equipped with riser pipe also open valve HV07.

- Butterfly valve HV02 (outlet):  
Close valve HV02 until fluid comes out of the vent valves. Then throttle HV02 slightly until venting is effected, then open completely.

As soon as the filter is filled, the drain valves HV05 and HV06 must be opened momentarily in order to vent and rinse them as well.

A precondition is the corresponding installation of the required tanks (rinsing agent, pre-fill recipient, collection tank) and piping on site.

Drainage of the rising solution or the filtrate (→ Chapter 5.5.5 Emptying).

### 5.5.2 Hot Water Sanitization (if necessary)

#### 5.5.2.1 Purpose

Hot water sanitization of the filter unit and accessories must be done in case of specific requirements of the filtrate.

For details regarding hot water sanitization, please refer to SUPRApak Module Operating Instructions (FBSISPAK), or consult Pall.

#### 5.5.2.2 Sanitization Fluid

Hot water should be used for sanitization.

### 5.5.2.3 Sanitization Procedures

- Valves HV01 and HV02 at filter inlet and outlet side are opened; if filter unit is equipped with riser pipe, keep valve HV07 closed.

- Valves HV03 and HV04 must be opened momentarily for venting.

After having achieved the required hot water sanitization temperature (max. 85° C):

- Open venting valves HV03 and HV04 and discharge valves HV05 and HV06 for approx. 5 min. to sanitize these as well.

- With riser pipe: Open also HV07 for 5 min.

The duration of the hot water sanitization depends on the product; however, this should be between 20 and 25 min.

If the housing assembly is sanitized prior to installation, it is recommended that the connecting pipework must be sanitized prior to connection.

Alternatively the housing assembly can be installed within the system, then the whole system sanitized.

### 5.5.3 Filling with Product and Filtering

#### 5.5.3.1 Filling

Filling with product follows the same procedure as described in Section 5.5.1.3 – Pre-Rinsing.

#### 5.5.3.2 Pressurization

- Filter unit is completely filled, outlet valve HV02 throttled

- Ensure total venting indicated by absence of gas bubbles in feed fluid vent assembly sight glass (SG01). Close vents HV03 and HV04.

- Gradually increase the internal pressure to the system operating pressure, but NOT exceeding the maximum allowable pressure.
- Gradually open outlet valve HV02 until fully opened.

- With riser pipe: During filtration both inlet valves HV01 and HV07 are open.

Note: The module should be replaced when filtrate quality no longer satisfies requirements. (→ SUPRApak Module Operating Instructions: FBSISPAK).

### 5.5.4 Rinsing after Filtration (if necessary)

#### 5.5.4.1 Purpose

Depending on process and product a rinsing might be necessary to eliminate the product out of the filter, i.e. when

- Changing the product
- Rinsing the modules
- Preparing a filtration change
- Preparing for filter disposal

The rinsing can be done with hot or cold fluids and with different media.





### WARNING!

In case the rinsing is done with hot media, absolutely note:

- ⇒ Chapter 5.6 Use of SUPRApak modules at higher temperature or in applications with higher fluid viscosity
- ⇒ SUPRApak Module Operating Instructions (FBSISPAK)

### 5.5.4.2 Rinsing Procedures

Normally, the rinsing of SUPRApak modules is done immediately after filtration:

- Valves HV01 and HV02 at filter inlet and outlet side are opened
- Open valves HV03 and HV04 momentarily for venting

When rinsing with hot media the temperature is increased slowly from 20°C up to 60°C. Thereby filtration residuals dissolve little by little in the module and the pressure difference decreases. In this mode of operation, the use of a stainless steel core, as mentioned in Chapter 5.6, is not essential during rinsing. However, product-specific pilot tests should be done.

As soon as the rinsing temperature is achieved, the rinsing fluid can be recirculated for the required period of time.

Filter units equipped with riser pipe

Suggestion for rinsing:

- With cold media: HV02 closed, HV07 opened
- With hot media: HV02 opened, HV07 closed

### 5.5.5 Emptying

#### 5.5.5.1 Emptying without Pressure

- Close valve HV01, and if the filter unit is equipped with riser pipe, also close HV07
- Completely empty inlet side first by
  - opening valve HV03 and HV05
- Then open outlet side by
  - opening valve HV02 and HV04
- or
  - opening valves HV04 and HV06 (recirculation of the discharged volume towards the feed fluid side or drain)



### ATTENTION!

When proceeding in reverse order this might result in a vacuum at the outlet side.

### 5.5.5.2 Emptying after Pre-rinsing

In case of processes with pre-rinsing: after having drained the liquid carry out filtration according to 5.5.3. The residual rinsing solution is thereby displaced from the SUPRApak module. Should this blend be undesired in the filtrate, discard the initial filtrate volume.

### 5.5.5.3 Displacement with Pressurized Gas



### ATTENTION!

When using pressurized gas, the maximum allowable vessel pressure must be observed (see type plate).

Displace liquid in a forward flow direction. Use air, sterile air or inert gas as pressure gas. Feed via separate pressure pipe or via vent valve HV03.

Start with the lowest possible pressure, receive the displaced filtrate either at the drain valve HV06 or at the filtrate pipe HV02.

After having drained the filtrate side close valves HV02 and HV06. Carefully open drain valve HV05 and discharge feed fluid and / or rinsing solution.

After complete displacement of:

- Rinsing solution: Start with filtration (⇒ Chapter 5.5.3 Filling with Product and Filtering)
- Filtrate: Disassemble and remove the SUPRApak modules (⇒ Chapter 4.6 Assembly/Disassembly Instructions) (⇒ Chapter 4.8 Lifting Device) (⇒ Chapter 5.7 Cleaning)

Rinse the filtrate module adaptor area and the filtrate pipe.

### 5.6 Use at Higher Fluid Temperatures or Viscosities (e.g. sugar syrups, gelatin, etc.)

#### 5.6.1 Filtration Temperature $T > 40^\circ\text{C}$

When using the SUPRApak modules at operating temperatures above 40°C, a stainless steel core must be fitted into the center core of the module. (⇒ Fig. 5.2 and 5.3)



Fig. 5.2: Stainless steel core

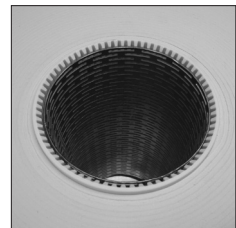


Fig. 5.3: Stainless steel core mounted inside a SUPRApak module

If a stack of several modules is used, stainless steel core sections must be fitted into the entire module stack.



### ATTENTION!

The stainless steel core is available in three different lengths.

- Short length: approximately 20 mm shorter than the SUPRApak module drainage core
- 1-high length: same length as the SUPRApak module drainage core
- 2-high length: same length as 2 SUPRApak module drainage cores

The short length stainless steel core piece should always be installed:

- in 1-high housings, or
- in multiple-high housings, only within the topmost SUPRApak module. The other modules in the housing must be fitted with the 1-high or 2-high length stainless steel core pieces.

### 5.6.2 Rinsing before Filtration at T > 40 °C (i.e. 70 °C for sugar syrup)

The SUPRAPak module should be rinsed directly before use with rinsing fluid of the same elevated temperature. Rinse and heat up the SUPRAPak module to filtration temperature. For example, when flowing hot sugar syrup through the cold SUPRAPak module, the syrup may get cold resulting in higher viscosity or even crystallisation within the module, and the unit may become blocked or even be damaged.

### 5.6.3 Interrupting Filtration at T > 40 °C

When interrupting (or stopping) a filtration that is run at elevated temperature with a feed fluid that increases its viscosity when cooling down, the SUPRAPak module should be rinsed out with hot water before stopping the process. Otherwise, the feed fluid may thicken or even crystallize within the cooled module, and the module may be irreversibly blocked or damaged and cannot be used any longer.

Alternatively, if only a short break is necessary, circulation of the hot medium in a closed loop for this short time may be possible.

## 5.7 Cleaning the Housing



### WARNING!

Before opening the filter housing confirm that it is absolutely depressurized.

Hot equipment surfaces can cause burns. Let the filter unit cool down.

Cleaning the filter housing must be done as necessary in the absence of product and filter modules, by means of detergents suitable for stainless steel. An additional cleaning with a soft brush is possible.

(⇒ Chapter 4.4 Unpacking, Cleaning, and Installation)

We recommend rinsing the filter housing with sufficient water after the cleaning to completely remove any remaining detergent residues.



### ATTENTION!

Exercise caution when cleaning or removing the diaphragm pressure gauges.

## 5.8 Disposal



### ATTENTION!

When disposing of used filter modules: Please follow locally applicable disposal directions.

## 6 Service

### 6.1 About this Chapter

This chapter deals with servicing the filter unit. Activities are organized according to:

- Inspection
- Maintenance
- Repair

The diagram below gives a suggested overview:

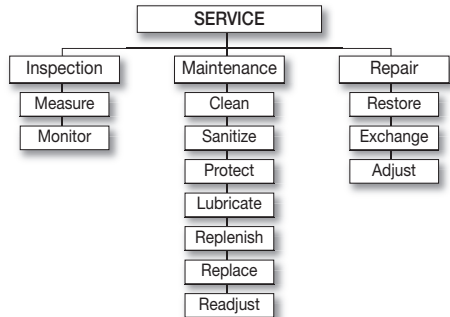


Fig. 6-1: Organization of Service Activities



### ATTENTION!

Regularly, properly executed service is an essential condition for:

- operational safety
- trouble-free operation
- long service life of the filter unit.



### ATTENTION!

Surrounding equipment supplied by other manufacturers must also be in perfect condition. Please note the instructions of the respective manufacturers.

## 6.2 Safety



### WARNING!

Improperly executed service and maintenance may lead to:

- serious personnel injuries
- equipment damage

Only qualified, skilled personnel are allowed to service the unit.



### WARNING!

All safety valves if provided by Pall Corporation are adjusted to the correct pressure and sealed.

Do not:

- take them out of operation.
- alter or adjust them unless Pall Corporation has been consulted.

### 6.2.1 Preparation



#### WARNING!

Do all maintenance and repair work only when the filter unit is:

- not in operation and
- depressurized.

Safeguard unauthorized product feed by separating the feed and discharge pipes from the filter unit.

### 6.2.2 Returning to Operation



#### WARNING!

Prior to starting the filter unit ensure there is

- no danger for personnel
- no danger for material assets.

### 6.3 Inspection and Maintenance



#### WARNING!

If a defect has been identified which could cause

- danger for personnel
  - damage to equipment,
- you must
- immediately stop the unit,
  - inform a maintenance technician.

If the process step can be continued despite the identified defect without endangering personnel or equipment:

- shut down the unit after process completion
- inform a maintenance technician.

Interval	Where	Looking for?	How
Daily	Complete filter unit	<ul style="list-style-type: none"> <li>• Externally visible damages and defects</li> <li>• Leak tightness</li> </ul>	Visual check for: <ul style="list-style-type: none"> <li>• Damage</li> <li>• Leakage (draining of liquids)</li> </ul>
		<ul style="list-style-type: none"> <li>• Connections</li> <li>• Tightness</li> </ul>	<ul style="list-style-type: none"> <li>• Check for tightness and re-tighten.</li> <li>• In case of leaky connections, dismount gaskets, check them and replace if necessary</li> </ul>
When changing filter modules	Gaskets	<ul style="list-style-type: none"> <li>• Externally visible damages, cracks or abrasion</li> </ul>	<ul style="list-style-type: none"> <li>• Visual check for damage ⇒ replace</li> </ul>
	Vessel gasket	<ul style="list-style-type: none"> <li>• Check for acceptable fit of gaskets in O-ring groove</li> </ul>	<ul style="list-style-type: none"> <li>• Visual check of the entire circumference</li> </ul>
Weekly	Complete filter unit	<ul style="list-style-type: none"> <li>• Hose lines</li> </ul>	Check for: <ul style="list-style-type: none"> <li>• Chafe marks</li> <li>• Tightness</li> </ul>
Monthly	Vessel gasket	<ul style="list-style-type: none"> <li>• Dirt, abrasion, damage</li> <li>• Check correct fit</li> </ul>	<ul style="list-style-type: none"> <li>• After opening the vessel, clean O-ring, check for cracks and abrasion and replace if necessary.</li> </ul>
Every 3 months	Clamp ring (V-band)	<ul style="list-style-type: none"> <li>• Fit of gripper clamp</li> </ul>	<ul style="list-style-type: none"> <li>• Adjust gripper clamp in unstressed condition</li> </ul>
Annually	Gaskets	<ul style="list-style-type: none"> <li>• Dirt</li> <li>• Abrasion</li> <li>• Damage</li> </ul>	<ul style="list-style-type: none"> <li>• Renew the gaskets of the entire filter unit</li> </ul>
	Torque unit rod seal	<ul style="list-style-type: none"> <li>• Replace the torque unit rod seal.</li> </ul>	See the following instructions ⇒ Chapter 6.3.1

### 6.3.1 Assembly/Disassembly of the Torque Unit and Replacement of the Torque Unit Rod Seal

Open the vessel. (⇒ Chapter 4.6.1 Opening the filter housing and lifting the dome)



#### WARNING!

The torque unit is under spring preload (approx. 600 N). In case of an improper disassembly, a sudden release of the spring might lead to injuries.

Two people are necessary for the disassembly/assembly of the white plastic cap. As an assembly tool, a used SUPRApak module can be of help. As seen in Fig. 6-2 it is put onto the bottom and the top of the vessel is set on top of it. While doing so please ensure that the plunger is centralized in the module.



Fig. 6-2



#### ATTENTION!

Adjust the plastic cap by at least one complete turn.

- One person must push the vessel top downwards until the safety ring lifts from the white plastic cap. See Fig. 6-2.
- Now the second person can remove the safety ring. (Use a special pincer for this.)

Carefully loosen the vessel top (the spring releases) and lift evenly (without tilting) until the shaft of the plunger is totally free. Then completely unscrew the white plastic cap.

#### Disassembly / Assembly of Torque Unit Rod Seal

The Torque Unit Rod Seal is situated in a groove underneath the flange and can be disassembled / assembled from the interior of the vessel.



#### ATTENTION!

When installing the Torque Unit Rod Seal please note that:

- the seal is not damaged
- the seal completely fits into the groove.

### Assembly of the Torque Unit

The assembly should be done according to Fig. 6.3 to 6.6.



Fig. 6-3:

- Centralize plunger onto the SUPRApak module
- Lubricate shaft and torque unit rod seal



Fig. 6-4:

- Lower the vessel top evenly, without tilting, even as the torque unit rod seal is pulled onto the shaft of the plunger.



Fig. 6-5:

- Attach spring



Fig. 6-6:

- Screw white plastic cap for at least 1 complete turn

- One person must push the vessel top downwards with about 60 kg of force, until the groove for the safety ring can be seen above the white plastic cap (=> Fig. 6-2).
- Using a special pincer, a second person can fit the safety ring onto the groove.
- Once the safety ring is engaged into the groove, carefully release the vessel top; now the spring is pre-stressed.
- Finally, attach the torque key (if it is not yet on the torque unit).

### 6.4 Repair

#### Recommendation:

For all repairs please request a service technician from Pall Corporation (=> Chapter 1.1 About this Chapter). Should the user's qualified personnel handle their own repairs, these operating instructions must be observed. Pall Corporation assumes no liability and does not warrant against any damages and operating troubles resulting from a non-observance of these operating instructions.



#### Danger!

There is risk of injury due to

- unexpected movement of parts *i.e.* butterfly valves
- hot surfaces
- unit parts and hose lines being under high pressure
- leakage or bursting of hoses

Prior to repair, separate the unit from all energy sources.

Ensure that all fittings are depressurized.



#### WARNING!

There is risk of injury or dangerous situations. Protection and safety devices removed prior to repair must be reinstalled before restarting the filter unit.

For repairs, please use:

- only functioning and suitable tools
- only original spare parts or serial parts explicitly released by Pall Corporation
- the points detailed in these operating instructions

**6.5 Failure**  
**6.5.1 Causes of Failure and their Elimination**

Failure	Cause	Actions
Pressure difference too high between feed fluid inlet and filtrate outlet	<ul style="list-style-type: none"> <li>• SUPRApak filter module is plugged</li> </ul>	<ul style="list-style-type: none"> <li>• Regenerate or rinse filter module or insert a new module</li> <li>• Check selection of the module type</li> </ul>
Filter module does not have the desired capacity	<ul style="list-style-type: none"> <li>• Filtration characteristics of the product have changed</li> <li>• Wrong SUPRApak module type was inserted</li> </ul>	<ul style="list-style-type: none"> <li>• Check the prefilter; readjust the filtration steps</li> <li>• Check selection of the module type</li> </ul>
Fibers in filtrate	<ul style="list-style-type: none"> <li>• Insufficient pre-rinsing</li> </ul>	<ul style="list-style-type: none"> <li>• Repeat pre-rinsing acc. Chapter 5.5.1</li> </ul>
DE (diatomaceous earth, Kieselguhr) particles or solids in the filtrate	<ul style="list-style-type: none"> <li>• Kieselguhr particles or solids have gotten into the module adaptor area during the module change</li> <li>• SUPRApak module is not correctly positioned at the module adaptor</li> <li>• Intermediate ring(s) is (are) not positioned centrally between the modules</li> </ul>	<ul style="list-style-type: none"> <li>• When changing the modules, secure the filtrate flange, perhaps carry out pre-rinsing according to 5.5.1 or start with circulation rinse</li> <li>• Open the housing and check the positions (seats)</li> <li>• Re-insert as described in ⇒ Chapter 4.6.2</li> </ul>
Leakage at the clamp ring (V-band)	<ul style="list-style-type: none"> <li>• Gasket damaged or broken</li> <li>• Clamp ring (V-band) not positioned correctly or pre-tensioning too low</li> </ul>	<ul style="list-style-type: none"> <li>• Exchange gasket</li> <li>• Mount clamp ring (V-band) according to separate assembly instructions. See separate technical documentation provided.</li> </ul>
Leakage at the torque unit	<ul style="list-style-type: none"> <li>• Torque unit rod seal damaged or broken</li> </ul>	<ul style="list-style-type: none"> <li>• Replace torque unit rod seal as described in ⇒ Chapter 6.3.1</li> </ul>

**6.6 Disposal**  
Discard filter units and any components thereof in accordance with local Health, Safety and Environmental requirements for the materials present.  
Due consideration must also be given to the nature of the contaminants on the filter units and components thereof before disposal.

**7. Appendix**

- 7.1 Warranty**  
Pall Corporation guarantees a warranty for the time period mentioned in the order confirmation of the filter unit.  
For the preservation of the warranty claim please note the following:
- the personnel responsible for operation, maintenance and repair of the filter unit must have the skilled qualification for these activities.
  - the units must be installed according to the installation plan on a suitable supporting surface.
- In case of replacing parts please use only spare parts released and delivered from Pall Corporation.
- 7.2 Product Observation**  
Pall endeavors to monitor our products in use. Therefore please inform us about everything which might be of consequence, especially:
- changed setting data
  - experience with the equipment which is important for other users
  - recurring troubles
  - difficulties with the Pall-provided documentation

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Pall Corporation  
www.pall.com  
To contact a Pall Sales Office or Distributor, go to:  
http://www.pall.com/contact  
for specific local contact information.

### 7.3 Spare Parts

For a comprehensive listing of recommended spare parts, please consult Pall, and refer to equipment drawings and data sheets.

The sealing materials most commonly needed are listed here.

Description	Material No.
O Ring, 456.06 mm x 5.33 mm, EPDM 70 Shore	ACS1039EM
Torque Unit Rod Seal 50 mm x 60 mm x 8.1 mm EPDM85	ACS1041AA

### 7.4 Materials of Construction

7.4.1 SUPRApak Filtration Equipment  
Wetted parts comprise the following materials, depending on the specific equipment type selected:

Stainless steel: 1.4404 (AISI 316L)

EPDM elastomers

Glass (if sight glass included in scope of supply)

For a specific listing of other non-wetted materials of construction, please refer to equipment drawings. See drawing reference numbers in Chapter 2.2 (=> Operating Data, Connections, Measurements and Weights)

#### 7.4.2 SUPRApak Modules

For information regarding materials of construction, please refer to the respective SUPRApak module data sheets, and SUPRApak Module Operating Instructions (FBSISPAK).

## 8. Explosion Protection (ATEX) (optional)

### 8.1 General

The filter assembly must be included in the manufacturer's explosion protection document.

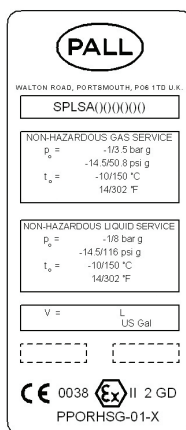
For the issuing of the Declaration of Conformity further effective directives in addition to the Directive 94/9/EC (ATEX95) must be taken into consideration if applicable.

By inclusion of the equipment into an installation, further operating instructions may be required.

The limit of the supply of the assessment can be seen in drawings CC71316D00 and CC71317D00 (WA design) and CC71318D00 and CC71319D00 (SA design).

Diagrams, descriptions, maintenance and operating instructions (amongst others, Accessories) will be supplied with (=> Technical Documentation)

### 8.2 Marking



### 8.3 Process Description / Requirements for Safe Operation

Filter housings are pressure vessels in which filter elements are arranged. They may include corresponding pipework and accessories for assembly within the installation.

Within the interior of the vessel, electrostatic or mechanical sparks are avoided, due either to the filter media which shields potential ignition sources, or due to the use of inert, non-ignitable gases.

The filter element material can become electrostatically charged.



#### WARNING!

Electrostatic discharges cannot be excluded, especially when opening the filter housing and removing the filter modules. Therefore specific measures are defined for the individual operating steps.

#### 8.3.1 Filling

Fluid friction with the filter element material can lead to electrostatic discharge.

Therefore, the filter assembly must be filled with a sufficient volume of inert gas before introducing the product to be filtered, so that no explosive atmosphere can form within the housing.

If required, the housing may be flushed repeatedly in order to remove any residual air.

### 8.3.2 Filtration

Filtration is carried out under positive pressure (e.g. 6 bar) and will only work if the filter elements are completely submerged in fluid.

During filtration under pressure, Directive 94/9/EC (ATEX) formally does not apply, as this directive only applies in the case of atmospheric conditions.

In this case an analysis according to ordinances or regulations regarding Hazardous Substances must be carried out.

During filtration, electrostatic charge differences may develop in the fluid.



#### WARNING!

The operator must ensure by suitable measures that no explosive mixtures can be formed in the interior.

### 8.3.3 Discharging Fluid from the Vessel by Gas Pressure

Emptying of the filter assembly must be carried out with inert gas. Depending on whether the explosive mixture is heavier or lighter than air, the inert gas must be introduced under pressure either at the top or bottom of the vessel. After emptying the assembly, inert gas with a slight overpressure should remain.

### 8.3.4 Cleaning

Depending whether the product cleaning is carried out by rinsing or by replacing the SUPRApak modules. Before opening the vessel the filter medium must be flushed sufficiently, so that after opening the formation of an explosive atmosphere is prevented. During cleaning the filter unit must be kept under slight inert gas overpressure, which also partially escapes via the cleaning media outlet. No explosive atmosphere will be formed in the vessel due to the lack of oxygen. In case inert gas escapes within the area of the cleaning media outlet, it must be ensured that dangerous conditions for the operators are avoided.

It is advisable to use electrostatically conductive cleaning media.

### 8.3.5 Assembly and Disassembly, or Replacement of the SUPRApak Modules

It is assumed that the filter unit is assembled and disassembled, and the modules replaced in a new or cleaned condition, so that no explosive atmosphere can be formed.

Otherwise the explosive atmosphere must be prevented by additional ventilation or suction.

#### Removal and Replacement of SUPRApak Modules with Lifting Device

If the intended SUPRApak lifting device is to be used for filter module removal, an electrically conductive connection (e.g. grounding cable with pincer) between the lifting device and the grounding point of the filter stack must be implemented before the lifting device touches the module(s).

It must be ensured, that the grounding cable be fixed **first** to the lifting device, and then to the intended grounding point of the filter module(s) outside the potentially occurring explosive atmosphere.

When removing the connection, these steps must be carried out in reverse order.

As the potential for electrostatic discharge cannot be excluded when removing the filter modules, it must be ensured that no explosive atmosphere exists.



#### WARNING!

If there is a risk that gas formation may occur from the spent modules, the above-mentioned measures should be undertaken to avoid the development of an explosive atmosphere.

### 8.3.6 Start Up after Non-Use

Before start up, it must be ensured that the contents of the filter assembly are inert, especially if cleaning was not carried out prior to shutdown. It is assumed that the filter unit is being assembled or disassembled in either new, or cleaned condition, to avoid the formation of an explosive atmosphere. Otherwise, additional ventilation or suction must be implemented, and the atmosphere monitored by portable gas detectors.

### 8.4 Information for Safe Intended Use

The SUPRApak Filter Unit consists of a pressure vessel and serves to remove solid matter and particles from fluids.

The maximum surface temperature (equal to the temperature of the filter media) is limited by the maximum temperature of the pressure vessel.

(=> Chapter 2.2, Operating Data, Connections, Measurements and Weights)

The design of this equipment satisfies EC Pressure Equipment Directive (PED) 97/23/EC (Fluid Group 2, Category II, Module H) for non-hazardous liquids and gases. (=> Chapter 1.5, Intended Use)

Letter "X":

The filter elements are electrostatically chargeable. Charge differences within the filter medium may result from filtration. Therefore electric discharges cannot be excluded and the requirements for safe operation (=> Chapter 8.3, Process Description/ Requirements for Safe Operation) or equivalent must be observed.

As the maximum surface temperature of the vessel is determined by the temperature of the fluid, the operator fixes the temperature classification. For determination of the temperature class or maximum surface temperature, the safety distances of EN 13463-1 and EN 1127-1 must be observed:

Maximum fluid temperature (°C)	Temperature class category 2G
440	T1
290	T2
195	T3
130	T4
95	T5
80	T6

Alternatively, the actual surface temperature may be indicated in Category 2G, and must be indicated in Category 2D.

- 8.5 Information for Safe Assembly/ Disassembly  
Before assembly, disassembly, and opening of the vessel, the system must be depressurized, empty, and the inlets and outlets must be shut off.  
It must be guaranteed by suitable measures that no explosive atmosphere can develop when opening the vessel.
- 8.6 Information for Safe Maintenance  
When opening the filter vessel, the operator must avoid, by suitable measures (e.g. ventilation or suction) simultaneously occurring external explosive atmospheres and release of vapors from the vessel interior.  
The inlets and outlets must be shut off safely so that no filter fluid flows in or out.  
To prevent release of unwanted liquids or vapors during operation, the tightness of the assembly must be monitored and maintained at all times.  
The filter element consists of electrostatically chargeable material. The potential of electrostatic discharge can therefore not be excluded, especially while the vessel is open and during handling of the filter modules.
- 8.7 Information for Safe Installation  
During installation and operation the operating instructions and design inspection certificates of the individual components must be considered.  
During installation of electric components EN 60079-14 must be observed.  
The filter housing and associated pipe work, valves, and supporting framework should be electrically cross-bonded and suitably connected to an earth point using the appropriate earth bosses or studs incorporated on the housing (where applicable) or by utilizing a suitable earth strap to link the filter housing to earth.  
Additional components must be listed in the required categories according to 94/9/EC.  
The vessel does not contain any energy sources.  
Filtration occurs under positive pressure (generally over 1 bar), so that no dust enters the vessel. The surface temperature is determined by the filter and must not exceed 2/3 of the ignition temperature of dust.  
Dust deposits must be removed regularly, dust coats may not exceed 5 mm.
- 8.8 Information for Dangerous Areas  
The surface of the filter can heat up. By suitable means it must be assured that operators will not inadvertently come into contact with hot filter unit surfaces.  
The operator must securely prevent any reactions between potential external explosive atmospheres and internal explosive mixtures.
- 8.9 Information for Safe Operative Range  
The filter may be used according to its device category only in gas explosion protection area 2 or in dust explosion protection area 21.  
These are areas where it can be expected that an explosive atmosphere of gases, steams, fogs or dusts may occasionally be formed.
- 8.10 Information about Safe Operating Data, Limiting Values, Surface Temperature  
The values for the allowed external temperature, the maximum media temperature and the allowed internal pressure are to be found in (=> Chapter 4.4.1 Requirements for the Installation Location and in => Chapter 2.2, Operating Data, Connections, Measurements and Weights).
- 8.11 Information about Special Conditions for Use  
According to the agreement with the manufacturer, sealing materials which are resistant to the filter fluids must be used.  
After closing the vessel and prior to filtration the closure and sealing tightness of the vessel must be secured.





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