camfil
AIR POLLUTION CONTROL

Instruction Manual

Farr Gold Series® Dust Collector - GSP 4
ATEX-classified



FARR GOLD SERIES®

Customer:

Location:

Purchase Order:

Local rep:

Rep. phone:

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SECTION 100 - DEFINITIONS

m^3/h
Actual m^3 of gas per hour. The volume of gas flowing per hour at the operating temperature, pressure, elevation and composition.

Air-to-Cloth Ratio
The ratio between air flowing through a dust collector and the m^2 of filter area available (m^3/m^2 h). Sometimes referred to as the velocity (m/h) of air through the cloth.

Blinding
Blockage in a fabric or media by dust that cannot be discharged by the cleaning mechanism, resulting in a reduced gas flow and an increased pressure drop across the media. Once enough material has built up, airflow is severely restricted and the bags have to be cleaned or replaced.

Bridging
Material handling problem characterized by the particulate forming a cavity over the discharge or opening of a hopper or storage vessel. Also, the accumulation of collected dust between two or more filter elements.

Clean Air Plenum
The dust collector area, through which gases are directed, located on the clean side of the filter media.

Collection Efficiency
The measure of a dust collector's ability to remove particulate from the inlet gas, typically expressed in percent or emission rate (mg per cubic meter).

Dew Point
The temperature at which condensation begins to form as the gas is cooled.

Differential Pressure
The change in pressure or the pressure drop across a device. The difference between static pressures measured at the inlet and outlet of a device, Ref. Pressure Drop.

Dust Cake
A dust build-up on the filter elements that increases the efficiency of the filter media.

Diaphragm Valve
A compressed air valve operated by a solenoid valve that opens to allow a pulse to a row of filters.

Dust Loading
The weight of solid particulate suspended in an air stream, usually expressed in mg per cubic meter.

Emissions
Particulate that escapes through or around a dust collector into the atmosphere.

Negative Pressure System
A system where the fan is located after the dust collector on the clean air side, pulling air through the system.

Positive Pressure System
A system with a fan located prior to a dust collector on the dirty side, pushing air through the system.

Precoat
Material added to the air stream at start-up to aid in establishing the initial dust cake on the filter media.

Pulse Duration (On-Time)
The length of time a pulse lasts, generally described as the length of time the electric signal holds the solenoid pilot valve open (fixed at 150 ms).

Pause Time (Off-Time)
Elapsed time between pulses in a dust collector cleaning system.

Solenoid Valve
An electromechanical plunger device that is either "normally open" or "normally closed". In use with a dust collector, it is for the relief of air pressure to activate a compressed air device such as a diaphragm valve.

Tube Sheet
A steel plate on which the open end of the filter elements are connected. This wall separates the clean air and dirty air plenums of the dust collector.

SECTION 110 - INTRODUCTION

Congratulations on your selection of Camfil Air Pollution Control equipment! As the owner / operator of this equipment you have an important responsibility to see that it is operated and maintained in a safe manner. The unit will require moderate attention to keep it in good operating condition. This manual has been prepared to aid you in that effort. Throughout this manual, reference may be made to various components, which may or may not be part of your particular system. They are included in the interest of fully describing typical systems with all available options.

This manual covers the installation, operation and maintenance of the Farr Gold Series GSP4 dust collector. This air cleaning equipment is used to eliminate dust contaminants from the environment making the facility or plant a healthier and safer work place. This unit has been assembled using only quality materials and labor. This machine has been checked to make sure that it is operational for you at the time of installation.

Prior to installing your equipment, thoroughly read and understand this manual. Locate all parts and ensure that nothing is missing, suffered shipping damage, or has been damaged during unloading. Familiarize yourself with each component of your system and its function using the contents of this manual as a guide. Refer to any local codes or ordinances relating to equipment of this type. They may affect the method or procedure used to install your system.

Important! For safe and reliable results, assembling work, electrical installation, use, service and trouble-shooting should be performed by qualified personnel. Special training may also be necessary.

Standards relating to the connection and use of dust collectors in hazardous areas must be taken into consideration, especially national standards for installation. Only trained personnel familiar with these standards should handle this type of dust collector.

The ATEX-classified Camfil APC GSP4 Dust Collector is specially designed to comply with official regulations concerning the risk of explosion. If improperly used, badly connected, or altered, no matter how minor, the reliability could be in doubt.

110.1 Intended Use

The ATEX classified Camfil APC GSP4 is designed for collecting and filtering non explosive as well as explosive organic and metal dust. The dust collector must not be used without its integrated spark filter. When switching dust it's vital for the safety that the cartridges are pulsed clean and the dust container emptied before operation with a new dust is started.

The unit is only safe to use for the application and dust given in the EX CALC Safety Document. If the usage shall be changed contact Camfil APC for a renewed assesement. If this is not done the CE-marking of the unit is invalidated.

N.B. To guarantee the correct function the dust collector must only be used according to its intended use and according to the instructions in this manual.

Do not discard this manual! It contains information, which when properly used, will insure proper operation, continued high performance and a long work life to your unit.

IMPORTANT! This unit is designed to handle only dust classified as ST1 having a MIE > 10 mJ can be filtered.

IMPORTANT!



110.2 Conditions for Safe Use and Start

Unless the conditions listed below are fulfilled it is not allowed to start the dust collector.

• The unit is only approved for it's intended use and can only be used safely for this. The intended use includes dust generating process and materials used. Any change with this needs to be approved by Camfil APC. The user is responsible for supplying Camfil APC with relevant information.

• Before the unit is started, after any major changes and at least yearly a safety inspection must be done to verify that the system is safe to operate (see procedure 400.9).

• The dust collector is intended to be used as a part of a system. This system may not be started until it has been declared in conformity with relevant safety requirements. This includes risk assessment and an explosion protection plan if the system will handle explosive dust.

NB! This is a minimum requirement each case must be treated individually, this is the responsibility of the plant owner/operator.

110.3 Technical Data

Filtration..... 99,94% at 0,5 um (after some time in use)
Operating airflow..... Max. 3500 m^3/h
Filter area / filter cartridge..... 120 m^2 (4 x 30 m^2)
Filter material..... Cellulose / Polyester HemiPleat Extreme Fire Retardant*
Operating temperature..... - 20 ºC to + 40 ºC
Process air (dry) temperature.... 0 ºC to +70 ºC
Environment classes..... C3 according to EN ISO 12944
Compressed air requirements.... See page 15, figure 220.2.2
Compressed air connection.....Minimum ½" (R15)
Voltage supply..... 400 V, 3 P, 50 Hz
Protection class..... IP 55
Power..... 5.5 KW/DOL, Fuse 25A Slow (Cat C)
Working pressure..... 0 kPa to - 2,5 kPa depending on airflow
PMax red..... 0,45 Bar
Equipment category..... 3 D: Applicable to the interior of the product
Marking..... EX II 3 D 90 ºC
Sound Power at 1m..... $LpAeq_{120s}$ = 84.5dB (Pulsing on 15sec intervals)
Weight..... 1050 kg
Dimensions..... 1420 x 1950 x 3180 mm (W x L x H)

* Other cartridges might be used depending on application and suitability.

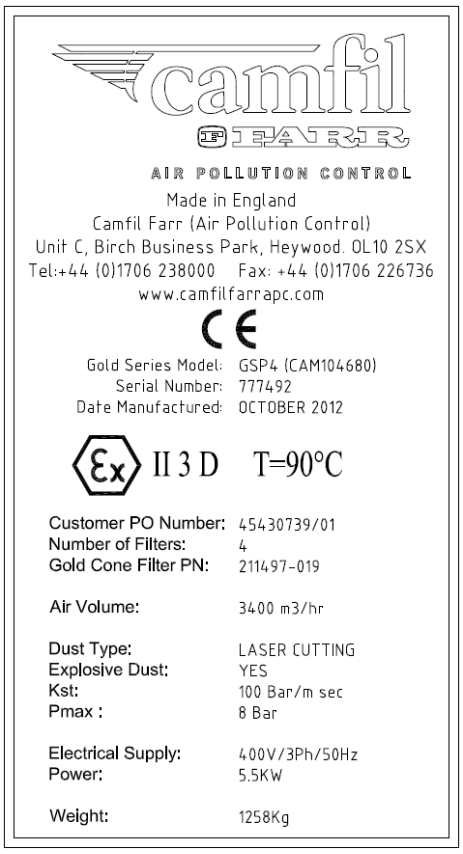


Figure 110.4.1 Serial Plate

110.4 Understand Your Serial Plate

Once you receive your equipment, it will be important to have the collector's serial, model, and part numbers. This information will be helpful when calling customer service or finding original equipment supplied with the collector. This information should be found on a white plate on the door of your collector, see figure 110.4.1. You should write this information in this book for easy access. Here is what your serial plate will show.

Serial # – This represents the sales order number and will link the unit to the prints and engineering documents associated with your unit.

Model # – This will represent what size unit you have received. (Example: GSP4).

Gold Cone Filter P/N # – This field represents the part number of the filters provided with the order.

Dust type # – The dust described on the serial plate is the only dust that can be safely handled by the system. If you want to change the use of the system Camfil APC must be consulted or the CE mark of the unit is invalid and the system can no longer be considered safe.

SECTION 120 - SAFETY PRECAUTIONS

120.1 Safety Precautions

Camfil APC relies on the skills and expertise of its customer and any consulting engineers and/or installing contractors hired by that customer to properly install the dust collection system of which Camfil APC equipment is a part. Read this manual thoroughly and comply with the precautionary statements relative to worker safety. Precautions must be taken to ensure that all electrical/air connections and regulation devices are installed and operating properly.

WARNING!

Explosion risk! Risk of grave personal injury and/or product damages!

A risk area around the ATEX-classified Camfil APC Dust Collector must be marked in an obvious way, for example with a fence and warning lines and signs. Within the risk area no inflammable material must be found. When the dust collector is in operation the risk area must only be entered by service tech-nicians.

DANGER!

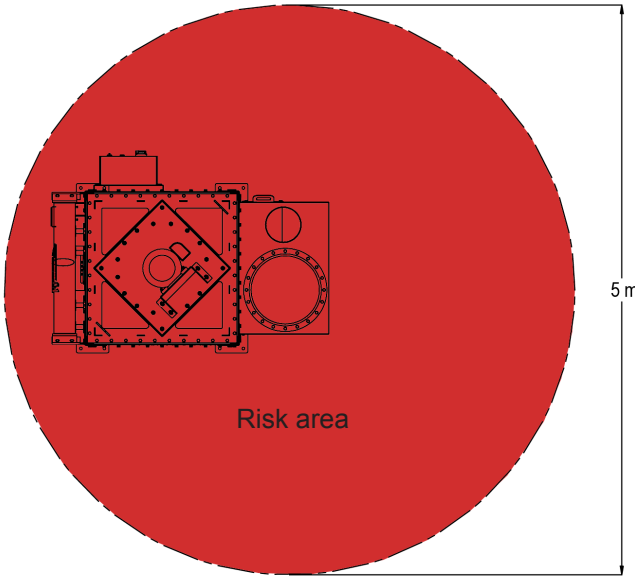
Explosion risk! Risk of grave personal injury!

During the operation the roped-off area must only be entered, if absolutely necessary, by service technicians to the dust collector.

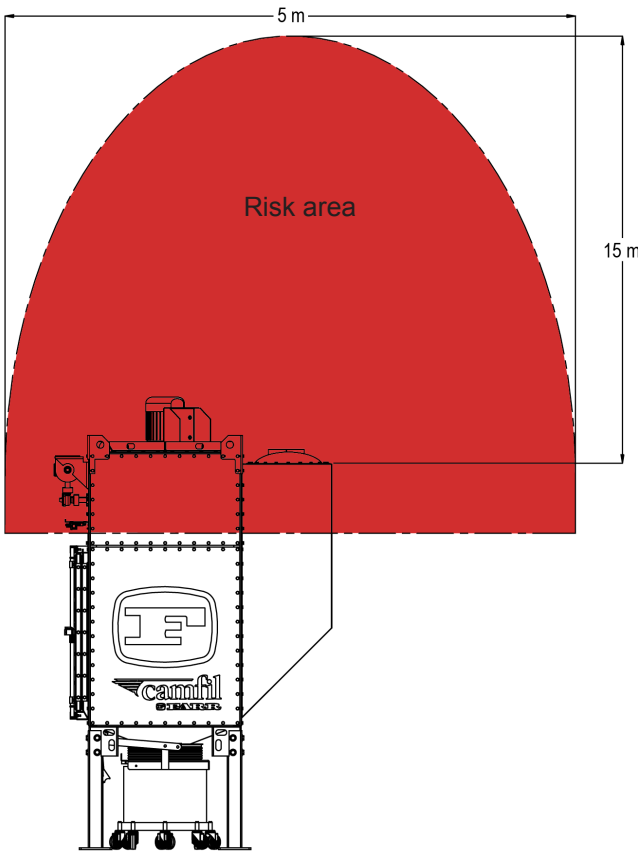
Figure 120.1.1 Warning sign example which can be used to mark the risk area.

120.2 Flame and Pressure Risk Area

This only applies to units working with explosive dust.



Top view



Side view

120.3 Understand Signal Words and Symbols

The symbols shown below appear on the equipment to alert you of potential hazards. When you see these symbols you must read, understand, and heed the information that accompanies them.

WARNING!
Do not attempt to operate or maintain this piece of equipment until you have read and thoroughly understood all of the safety information contained in this manual. All such information must be taken seriously. This piece of equipment contains moving parts and potential pinch points, which can cause serious injury or death. If you do not understand any subjects in this manual, seek assistance from your supervisor before operating this equipment. DO NOT attempt to operate this equipment without factory-installed guards. Replace damaged guards.

DANGER!

Indicates an imminently hazardous situation, which, if not avoided, may result in death or serious injury.

WARNING!

Indicates a potential hazardous situation, which, if not avoided, may result in death or serious injury.

Indicates a potential hazardous situation, which, if not avoided, may result in minor or moderate injury and or property damage.

Indicates the presence of an electrical power source, which could result in death, personal and/or property damage.

120.4 Warning Decals and Guards

This piece of equipment contains several warning decals located in many different locations. It is the owner/operator's responsibility to maintain the integrity of these decals and to ensure that all operators of the equipment are aware of them and understand their meaning. Replacement decals are available free of charge from your Camfil Service Representative, or by contacting Camfil APC. Part numbers for these decals are listed in the spare parts list in section 600.

This piece of equipment may contain one or more safety guards to protect the operator(s) from injury. It is the owner/operator's responsibility to maintain the integrity of these guards and ensure that they are in place when the equipment is in operation.



Indicates hazards associated with compressed air sources.

120.5 Lock-out/Tag-out Requirements

Employers shall establish a program and utilize procedures for affixing appropriate lock-out/tag-out devices to energy isolating devices and to otherwise disable machines or equipment to prevent unexpected energizing, start-up, or release of stored energy in order to prevent injury to employees.

Before inspecting or servicing this equipment perform an approved Lock-out/Tag-out procedure on the electrical service, the compressed air (or other gas) supply, or any other energy source.

SECTION 130 - RECEIVING YOUR EQUIPMENT

130.1 The Purchaser's Responsibility

A visual inspection of your equipment should be performed before it is removed from the truck. Dents, scratches and other damage should be noted and photographed. The structural integrity of the housing will be adversely affected by dents. Camfil APC should immediately be notified of any structural damage to your equipment. It is the purchaser's responsibility to file shortage reports and damage claims with the carrier. The carrier is responsible for any damage to the equipment while it is in transit unless specific arrangements are made otherwise.

Besides a common set of hand tools, a crane, fork-lift and/or chain-fall will be required to position the dust collector.

Camfil APC must rely on the skill and expertise of its customers and the customer's installation contractor to ensure that all electrical connections are made correctly and air connections and regulation devices are installed and operating properly.

130.2 Uncrating and Inspection

Each Farr Gold Series dust collector is normally shipped on two skids.

Use extreme care when handling the unit and components. Careless handling can damage delicate parts or affect assembly alignments. Compare the number of items received against the carrier's Bill of Lading. Inspect all items for apparent damage. Immediately report any shortages or obvious damage to the carrier and to your local Camfil APC representative.

When all skids are completely unpacked, check all items received against the material list or the packing list (if any) sent with the shipment. Further inspect the unit and components for hidden damage. Again, report any shortages or damage to the carrier and to your local Camfil APC Representative.

Do not return any damaged components without first contacting your Camfil APC Representative to obtain Returned Goods Authorization (RGA). Carefully inspect all packing material so that small parts are not inadvertently discarded.

SECTION 200 - INSTALLATION OF YOUR EQUIPMENT

200.1: Table, Farr Gold Series Assembly Tools

The following items may be required to install your equipment depending on configuration and installation requirements:

Only trained, authorized personnel should be permitted to service or maintain electrical or safety components. It is the buyers/installers responsibility to ensure that all applicable electrical and safety codes are met.

ITEM	DESCRIPTION	INTENDED USE
1	Socket Set	General tightening of fasteners
2	Common Screwdriver	Electrical connections
3	Phillips Screwdriver	Electrical connections
4	Electric Drill or Impact Wrench	Installation of self-tapping screws and fasteners
5	Hammer Drill	Anchoring to floor
6	Masonry Bit	Anchoring to floor
7	Hammer	Installing anchors
8	Pliers	General use
9	Wire Cutters	Electrical connections
10	Wire Nuts	Electrical connections
11	Electrical Tape	Electrical connections
12	Extension Cord	General use
13	Conduit	Electrical connections
14	¾" or larger black iron pipe or equivalent	Compressed air connections
15	Fittings for items 13 & 14	Compressed air and electrical connections
16	Thread Sealant	Compressed air connections
17	Alignment Punch	Aligning holes
18	Forklift or Overhead Hoist	Moving and positioning components
19	Electrical Cable (4 wire of appropriate cross section area)	Fan electrical connections
20	Safety approved expansion bolts M12 or equivalent suitable for the application	Anchoring to floor
21	Transit or Carpenters Level	Leveling Unit

WARNING!

Risk of personal injury and/or product damages!



Use approved lifting equipment for unloading, assembly, and installation of the units.

200.2 Foundation

The unit must be placed on a suitable foundation. The foundation must be level and of sufficient strength to hold the weight of the unit (see technical data for weight data).

WARNING!

Risk of personal injury and/or product damages!



The unit is stabile but if it is hit by a heavy object it can fall over unless it is placed on a solid foundation and anchored.

Attach the unit to the foundation using M 12 Anchor bolts or similar.

200.3 Earthing Test Procedure

IMPORTANT! Earthing of all metal parts is a necessary requirement for ATEX-classified dust collectors. This procedure should be performed before the dust collector is put to use, regularly (at least once a year) and after any major service or modification of the unit.

Use a calibrated ohm meter. A good connection between metal parts shall not have more then 10 ohm resistance.

1. Check that the incoming earth from the building is connected to the control system.

2. Check that the earth point in the control system is connected to the dust collector.

3. Verify that there is connection between the hopper and the following parts
a. Legs
b. Frame/-s
c. Door/doors
d. Inlet
e. Side panels. Measure on at least one bolt / panel

4. Note the date and result of the test in the service scheme of the user manual.

NOTE! It's good practice to also perform a test on the dirty side pipe system. Instructions for this is outside the scope of this instruction.

SECTION 210
- ATTACHING DUCT WORK

This section covers and design guidelines for ducting to your dust collector.

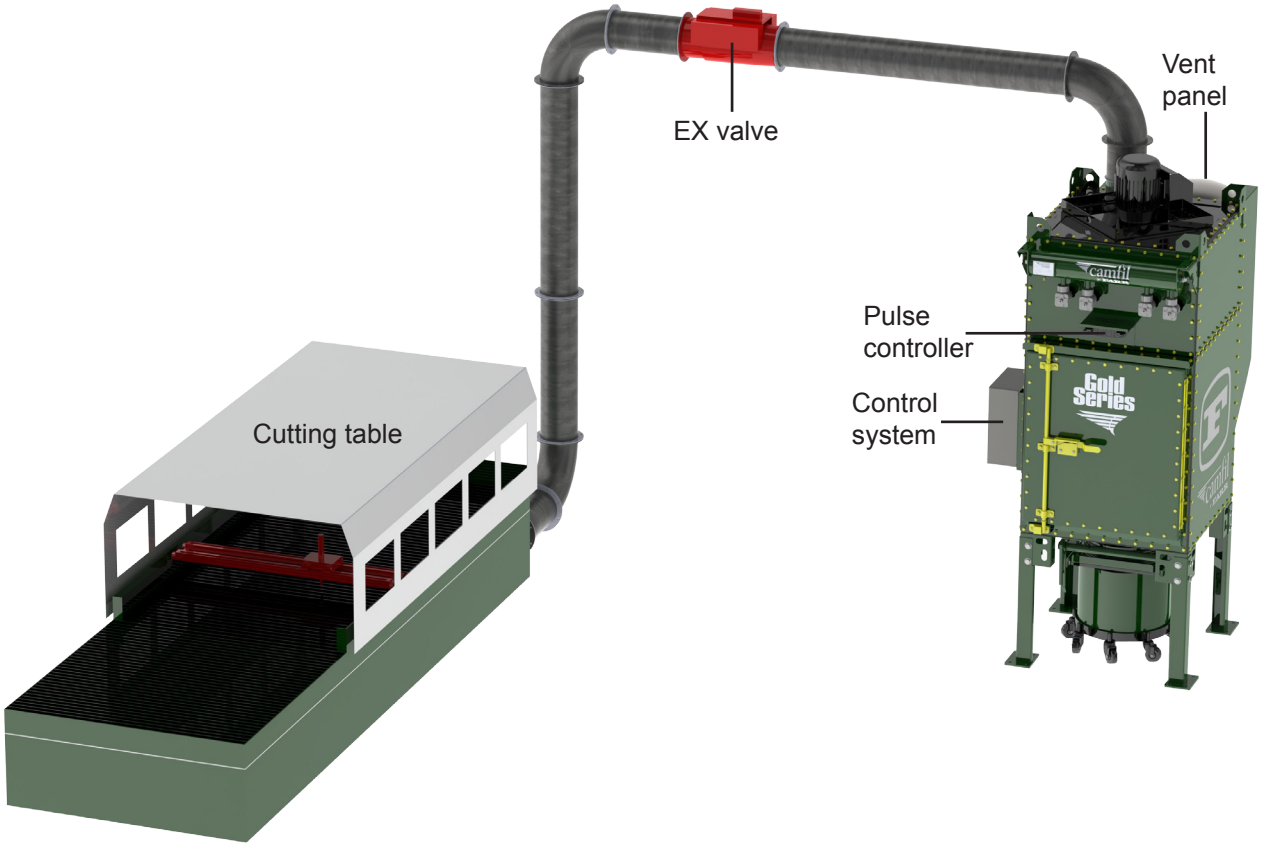


Figure 210.1 A typical installation

SECTION 220 - FIELD UTILITY CONNECTIONS

220.1 Electric connections

WARNING!

Failure to perform an approved Lock-out/Tag-out procedure may result in a sudden release of energy resulting in property damage, personal injury or death! Ensure that the circuit you are working with is off before you make these or any other electrical connections. Serious injury may result if you do not take proper safety precautions!

The unit is equipped with an integrated motor starter (A) and a pulse controller (B) to run the fan and the cleaning. To run the unit requires an electrical connection 3 phase 400 V and protective earth. The pulse controller is pre-installed and supplied from the motor starter. The electrical connection must be done by a licensed electrician according to national and local regulations. Its recommendable to use a slow fused 25 A power supply with a well dimensioned cable cross section to minimize losses (less than 1%) and enable easy start. More than 6 starts per hour will result in excess heat build up. This may cause failure in the starter or the motor.

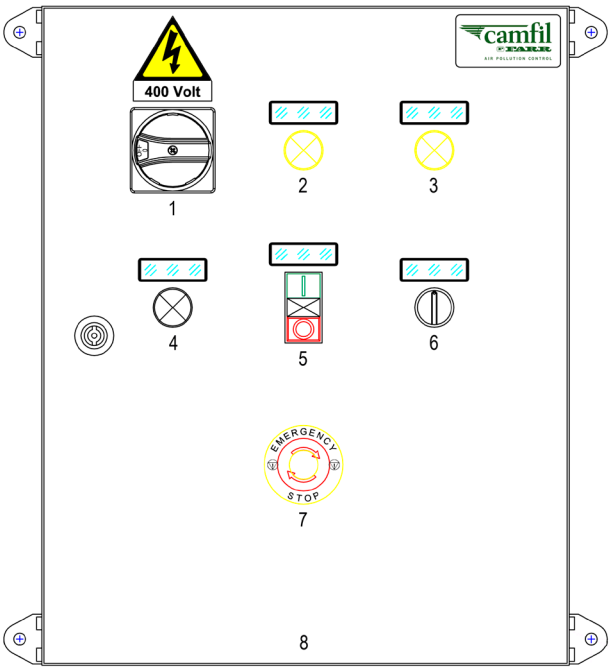


Figure 220.1.1

The unit can be started locally using the start/stop button (selector 6 in local mode). Or through a remote contact. In remote mode there is a adjustable stop delay (0-5 min.) to eliminate post cutting smoke from the table and prevent frequent starts that may overheat the fan motor.

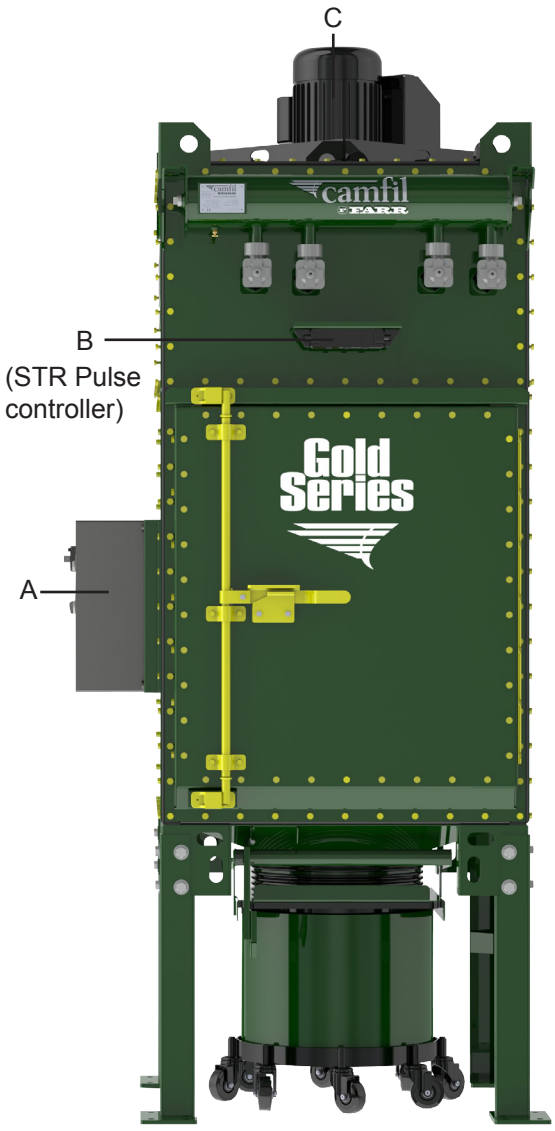


Figure 220.1.2

Legend:

1. Main isolator (lockable)
2. Overload lamp
3. Fault lamp
4. Power lamp
5. Start/stop local and running light
6. Selector remote/locale
7. Emergency push button
8. Metallic box 500 x 400 x 200 mm

Electrical connection of incoming power shall be done to the input terminals on the main switch and the PE connection terminal next to the main switch.

220.1 Electric connections (continued)

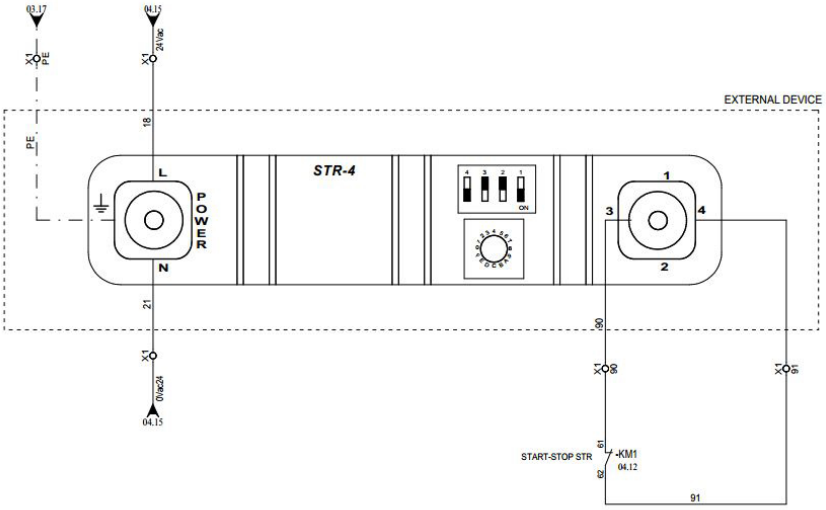


Figure 220.1.3 - STR Connections

220.2 Compressed Air Connection

Supply the header (compressed air reservoir) with clean, dry compressed air regulated to 6-7 Bar. Oil or water in the compressed air lines will cause the filter media to fail. The airline should be equipped with a manual shut-off valve, a filter/ separator, an air regulator and a pressure gauge, all located close to the unit. Camfil APC recommends that the compressed air supply be kept at a dew point of + 2 ºC or less. Make provisions for draining any condensate from the air reservoir with an automatic tank drain or by other means.

Total air consumption is variable and is dependent on the type and concentration levels of airborne dust and the set points used for determining the cleaning cycle.

Connect an air hose or hard plumbing from the compressed air source to the 1” NPT coupling on either side of the header (1/2” minimum air supply line). A shut-off valve is recommended between the compressed air source and the header.

Slowly open the shut-off valve, allowing pressure to build in the tank.

When the header has reached full line pressure, close the shut-off valve.

Inspect the header, valves, fittings and solenoid valves for air leaks.

Tighten all fittings and clamps as required. Re-open the air shut-off valve.

IMPORTANT!

- The compressed air supply pressure has to be 6-7 Bar.
- The compressed air shall have a dew point (+2°C is recommended) below the minimum temperature at which the system is ment to be used.
- The compressed air supply must be both oil and water free.
- Improper air pressure or contamination in the compressed air can result in cleaning valve failure, poor cleaning, and poor filter performance.
- Purge compressed air lines to remove debris before connecting to the compressed air manifold.
- Quick couplings restrict the air too much and are not recommended.
- Turn off and bleed off compressed air supply before doing any service work.
- Do not pressurise the system if the air temperature is below the minimum operating temperature.

220.3 Main connection terminal

The unit is pre-wired and ready to run. But there are some additional functions that can be utilized.

External start/stop: Used as remote start from a machine connect a potential free contact that close when you wish to start. Connect to X1: 20 and 70.

Alarm: If the unit stops due to emergency stop or motor overload there will be a signal on the main panel but it's also possible to connect a external alarm. The unit will supply a potential free contact that Close in case of alarm. Connect to: X1: 80 and 81.

External E-Stop: If you have a external e-stop contact, like a signal switch on a explosion protection damper this can be connected here to stop the system in case of explosion. **NB! This is a strict safety requirement when working with explosive dust.**

Connect by removing the bridge and connecting you cable to X1: 23 and 24.

X1

DESTINATION DESCRIPTION	DESTIN.		WIRE	TERMINAL		SECTION	ORIGIN	ORIGIN DESCRIPTION
FAN MOTOR	M1-PE	⊘	⏚	⏚	⊘	4mm²		
FAN MOTOR	SEZ.1-1	⊘	U1	U1	⊘	4mm²	RT1-2	
FAN MOTOR	SEZ.1-3	⊘	V1	V1	⊘	4mm²	RT1-4	
FAN MOTOR	SEZ.1-5	⊘	W1	W1	⊘	4mm²	RT1-6	
EARTH STR	G1-PE	⊘	⏚	⏚	⊘	4mm²		
EARTH AUXILIARY		⊘	⏚	⏚	⊘	4mm²		
24Vac		⊘	18	18	⊘	2,5mm²		
SRT4 POWER SUPPLY - 24Vac 50Hz	G1-L	⊘	18	18	⊘	2,5mm²		
24VacSEZ		⊘	20	20	⊘	2,5mm²		
REMOTE START	CS1	⊘	20	20	⊘	2,5mm²		
SRT4 POWER SUPPLY - 24Vac 50Hz	G1-N	⊘	21	21	⊘	2,5mm²		
0Vac24		⊘	21	21	⊘	2,5mm²		
EXTERNAL EMERGENCY STOP	SBE1-11	⊘	23	23	⊘	2,5mm²	SBE0-12	EMERGENCY PUSHBUTTON
EXTERNAL EMERGENCY STOP	SBE1-12	⊘	24	24	⊘	2,5mm²	KA1-A1	
REMOTE START	CS1	⊘	70	70	⊘	2,5mm²	KA3-A1	
PRESENCE OF ALARMS		⊘	80	80	⊘	2,5mm²		
PRESENCE OF ALARMS		⊘	81	81	⊘	2,5mm²		
START-STOP STR	G1-3	⊘	90	90	⊘	2,5mm²	KM1-61	
START-STOP STR	G1-4	⊘	91	91	⊘	2,5mm²	KM1-62	
		⊘	BLOCK		⊘			

Figure 220.3.1 - GSP X1

Dust Collector Air Consumption for GSP4 based on diaphragm size												
1” Diaphragm Valve (150 msec on time)												
Pause Time	5	10	15	20	25	30	35	40	45	50	55	60
Compressed Air Consumption (m^3/h)	54.0	27.0	18.0	13.5	10.8	9.0	7.7	6.8	6.0	5.4	4.9	4.5

Figure 220.3.2

SECTION 230 - FILTER INSTALLATION/REPLACEMENT

New units ship with filter cartridges installed. We have many types of replacement filters available for a wide range of applications. Refer to section 420 - GSP4 Spare Parts for replacement filter and various parts identification. Care should be taken to make sure the correct Camfil APC original equipment replacement filters are used to insure continued satisfactory performance of the unit.

Please contact Camfil APC for genuine replacement parts.

230.1 Step by Step Instructions

1. 1. Shut down the process or dust generating operation to which the dust collector is installed. Continue the operation of the unit for 20 minutes to assure good removal of the collected dust. Break the electric power and shut off and bleed the compressed air from the tank. If required, perform an approved lock/tag out procedure. Empty the dust container.

2. Open the access door at the front of the unit, swinging it out of the way.

3. Unlatch the clamp bars as shown in Figures 230.1.1-230.1.4.

• With your left hand, rotate the right-hand clamp bar clockwise or up and pull it toward you, until its locking tab clears the rectangular cut-out on the left-hand clamp bar.

• With your right hand, rotate the left-hand clamp bar counter-clock-wise or up and push it away from you until its locking tab clears the rectangular cut-out on the right-hand clamp bar.

• Rotate the right-hand clamp bar counterclock-wise or down, until it is clear of the cartridge removal path – Figure 230.1.2.

• Rotate the left-hand clamp bar clockwise or down, until it is clear of the cartridge removal path also – Figure 230.1.3.

• Figure 230.1.4 shows the cartridges ready to be removed.

4. Remove the dirty filter cartridges by sliding them off the clamp bar channels. Clean the surface of the tube sheet in the areas where the filter gasket forms a seal.

5. Remove a new cartridge from the shipping carton, taking care not to cut or otherwise damage the filter media.

• Make sure the clamp bar handles are fully opened and will not interfere with the cartridge during installation - Figure 230.1.5.

• Grasp the new cartridge by the top metal pan and set it onto the clamp bar channels.

• Holding the cartridge level, slide it forward, pushing on the cartridge pan, do not push the media, taking care not to drag the gasket along the tube sheet.

• Push the cartridge in just far enough to leave room for the next cartridge to rest on the clamp bar channels.

• Repeat steps 4 and 5 until the row is full.

6. To seal the new cartridges, repeat the instructions in step 3 in reverse order. With your left hand, rotate the left-hand clamp bar counter-clock-wise or up to between 80° and 90°. While pushing the left- hand clamp bar away from you, rotate the right-hand clamp bar clockwise or up, with your right hand. Insert the locking tab on the left-hand clamp bar when it lines up with the rectangular cut-out on the right-hand clamp bar. Release the left-hand clamp bar. With both hands rotate the right-hand clamp bar clockwise or up and pull it toward you, until the locking tab inserts into the rectangular cut-out on the left-hand clamp bar – Figure 330.1.2. The clamp bars must be bent slightly if the locking tabs do not stay inserted in the rectangular cutouts.

7. Repeat the above procedure until all the rows of cartridges are full.



Figure 230.1.1 - Clamp bars closed



Figure 230.1.4 - Clamp bars open



Figure 230.1.2

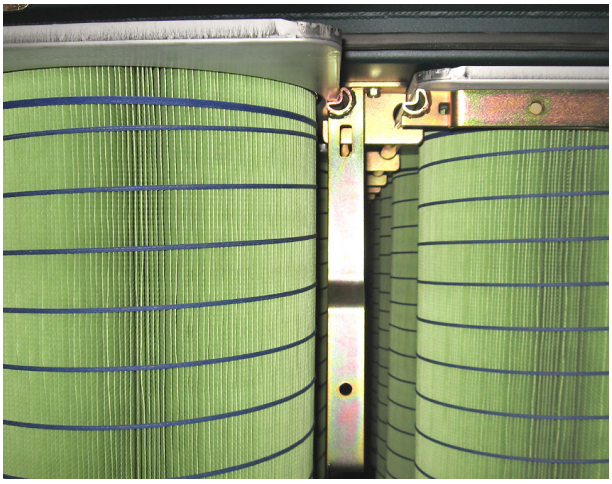


Figure 230.1.5



Figure 230.1.3

230.2 Filter Replacement
Minimizing Dust Contamination

If you wish to reduce dust contamination around the unit it is possible to use the following procedure. Wear suitable personal protection and acquire a plastic bag to fit the cartridges (610 x 1020 mm).



Figure 230.2.1 - Open door



Figure 230.2.3 - Pull the bag up over the cartridge



Figure 230.2.2 - Put the plastic bag under the used cartridge



Figure 230.2.4 - Open the clamps



Figure 230.2.5 - Pull out the cartridge



Figure 230.2.7 - Close the box



Figure 230.2.6 - Place the used cartridge in the box that came with the replacement cartridge

SECTION 240 - PRECOATING OF FILTERS

In applications where the dust concentration is high and/or the dust particles are large (more than 0.5 microns), pre-coating of the filters is not required. In applications where the dust concentration is low and/or the dust particles are small (less than 0.5 microns), pre-coating will result in a higher initial efficiency and extended filter life. Maximum efficiency of the filter is not achieved until a dust cake is formed on the media, which may take weeks without pre-coating. By applying a suitable pre-coat dust, maximum efficiency can be attained in a few hours. This is desirable if the air is to be re-circulated through Safety Monitoring Filters (SMF), or if the dust is toxic. Also, if the collected dust contains a considerable content of hydrocarbons or similar substances, the life of the filters can be greatly increased by pre-coating.

Table 240.1 - Cartridge Pre-coat Data

Model Desig-nation	Pre-coat Amount Expanded Perlite (kg)	Pre-coat Amount Limestone (kg)
GSP-4	3.63	16.33

Note: Expanded perlite is only product Camfil APC provides.

Pre-coating Procedure

1. Ensure the filter cartridges are correctly installed.

2. Install a clean, empty discharge container under the unit.

3. If a Safety Monitoring Filter (SMF) is installed, it must first be removed from the system.

4. Disable the dust collector so that it does not pulse while the pre-coat is being applied. This can be done by shutting off the compressed air and bleeding the compressed air reservoir or turning off the power to the timer control.

5. Weigh out the appropriate amount of pre-coat dust according to Table 340.1.1.

6. Start the collector and feed the pre-coat dust into the collector. The dust can be fed into any suction hood in the duct system or through the hopper discharge.

7. Dust will be observed from the fan outlet. This is normal and should stop when all the pre-coat dust is applied.

8. When all the dust has been applied, collect the dust from the discharge container and repeat the above procedure.

9. Record the Magnehelic gauge reading and set the fan damper to correspond to the system design airflow. Airflow can be measured by means of a Pitot tube, anemometer, or similar device.

10. Remove any remaining pre-coat dust from the outlet ducting, SMF housing, and discharge container. Discard according to local codes and procedures.

11. Re-enable the collector by either opening the compressed air line or turning on the power to the timer control (see step 4).

15. The system is now ready for operation.

SECTION 300 - OPERATION OF YOUR EQUIPMENT

Camfil APC has prepared this proprietary user's manual for the exclusive use of its customers. The recommendations contained herein are based on proven techniques and on test data believed to be reliable. It is intended that personnel having specialized training in accordance with currently accepted practice and normal operating conditions use this manual. Variations in environment, changes in operating procedures or extrapolation of data, may cause unsatisfactory results. Since Camfil APC has no control over the conditions of service, it expressly disclaims responsibility for the results obtained or for any consequential or incidental damages of any kind incurred.

The Farr Gold Series dust collector described in this manual is designed for the capture of airborne particles generated from mixing, sanding, grinding and cutting operations involving wood, metal, fiberglass, plastics, advanced composites or similar materials.

300.1 System Operation

Incoming dust-laden air enters the inlet plenum where a baffle forces large or heavy particles to drop out of the air stream and fall into the hopper. The clean air passes through the filter media from the outside to the inside of the filter cartridge and exits through the open top of each filter cartridge. The air then flows from the filters into the clean-air plenum, where it enters the fan inlet and is exhausted. The dust is captured on the outside surface of the filter media.

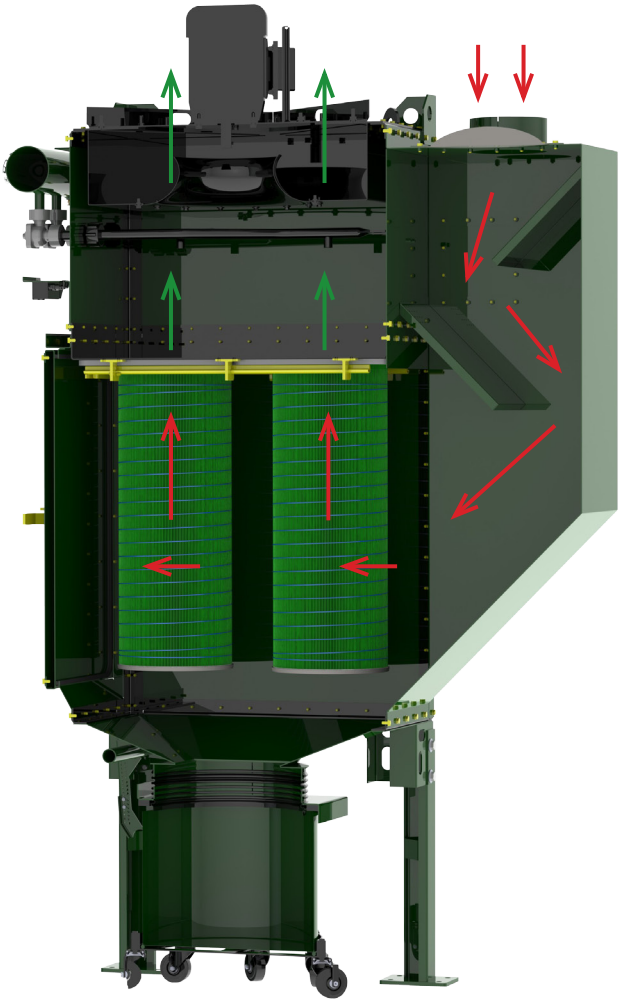


Figure 300.1.1 - GSP4 Operation

1. Dust laden air enters the inlet of the collector. The baffle forces large or heavy particles to drop into the hopper.
2. Dust collected on the cartridges drops into the hopper and is collected in a discharge device.
3. Clean, filtered air rises from the center of the Gold Cone cartridge, through the clean air plenum and into the fan.

The filter media can be made of several different fabrics and materials depending on the application. However, the high efficiency of these cartridges is due to the dust layer or “cake” formed on the surfaces of the media. The media primarily provides a surface on which dust particles collect through the following four mechanisms:

• Inertial Collection – Dust particles strike the fibers placed perpendicular to the airflow direction instead of changing direction with the air stream.

• Interception – Particles that do not cross the fluid streamlines come in contact with fibers because of the fiber size.

• Brownian Movement – Sub-micron particles are diffused, increasing the probability of contact between the particles and collecting surfaces.

• Electrostatic Forces – The presence of an electrostatic charge on the particles and the filter can increase dust capture.

A combination of these mechanisms results in formation of the dust cake on the filter, which eventually increases the resistance to air flow. The filter must be cleaned periodically. A balance must be maintained between having some dust cake formation to improve efficiency and an acceptable increase in pressure drop. A timer controller monitoring the differential pressure (DP) and pulsing accordingly, can maintain the dust cake with minimal increase in pressure. By pre-coating your filter with a special dust at start-up, you can increase initial efficiency of your collector (see Section 240 – Precoating of filters).

300.2 Filter Cleaning

The Gold Cone cartridge elements are sequentially cleaned by back flushing with air. This momentary airflow reversal is induced by a short burst of compressed air. The air is released from the compressed air reservoir by a fast-acting, high-flow diaphragm valve. This “pulse” of air dislodges the accumulated dust from the filter element. The dislodged dust then drops into the hopper or collection drawers. Each pulse cleans one row of filter cartridges leaving the remaining cartridges available to continue filtering the ventilation air. This allows the cleaning to take place without the need to stop the ventilation system. Figure 400.2 shows a Gold Cone cartridge in normal operation. Figure 400.3 demonstrates the pulse of compressed air cleaning a cartridge.

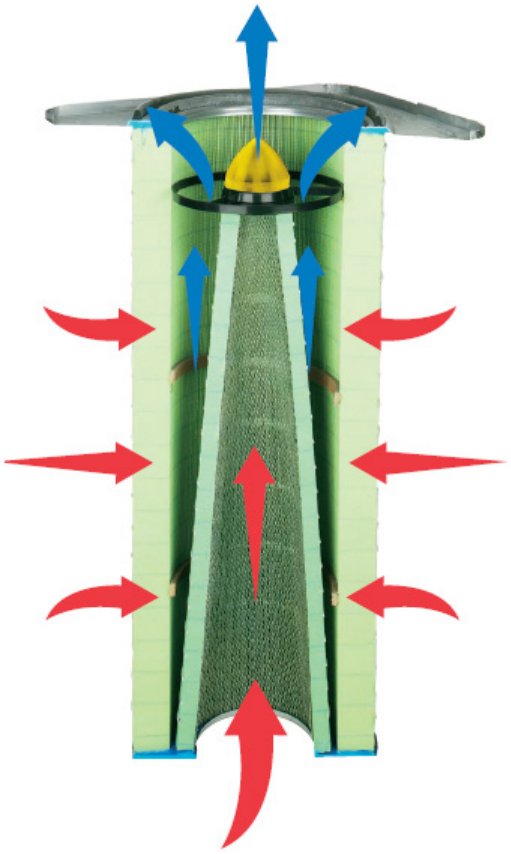


Figure 300.2.1 - Normal Gold Cone Operation

300.3 Cleaning System Components

HEADER (COMPRESSED AIR PRESSURE RESERVOIR)

A header is provided with a 1 in. NPT coupling at each end. Supply the header with clean, dry compressed air between 0,62 and 0,72 MPa (6 and 7 Bar). The air supply line should be equipped with a manual shut-off valve, a filter/ separator, an air regulator and a pressure gauge, all located near the unit.

SOLENOID/DIAPHRAGM VALVES

Solenoid-operated valves on the collector operate one (1) diaphragm valve each. Diaphragm valves on the collector operate one (1) pulsejet blowpipe each. The automatic timer control energizes the solenoid, which causes the plunger in the solenoid to move. When the plunger moves, air in the upper chamber of the solenoid is released to the atmosphere. The resulting difference in air pressure between the upper chamber and the compressed air reservoir allows the diaphragm valve to open. This allows the air in the header to be released into the pulsejet blowpipes. The size of the diaphragm valves is 1”. See Section 420 - GSP4 Spare Parts for the size of diaphragm valves on your collector.

PULSEJET BLOW PIPE

Each pulsejet blowpipe contains one (1) nozzle for each cartridge. These nozzles are positioned above, and directed into, the opening of the filter cartridge. As the pulse of air reaches the nozzle, it is accelerated through the smaller diameter. The resulting shock wave travels down the length of the inside of the filter cartridge, dislodging the dust from the filter cartridge.

WARNING!

Risk of personal injury!

Use caution when working near an operating collector. Wear appropriate ear and eye protection! Hearing damage can result from high noise levels generated during filter cleaning or “pulsing” and collected debris, near the diaphragm valve discharge, may become a projectile, creating the potential for eye injury. Do not operate with access doors open!

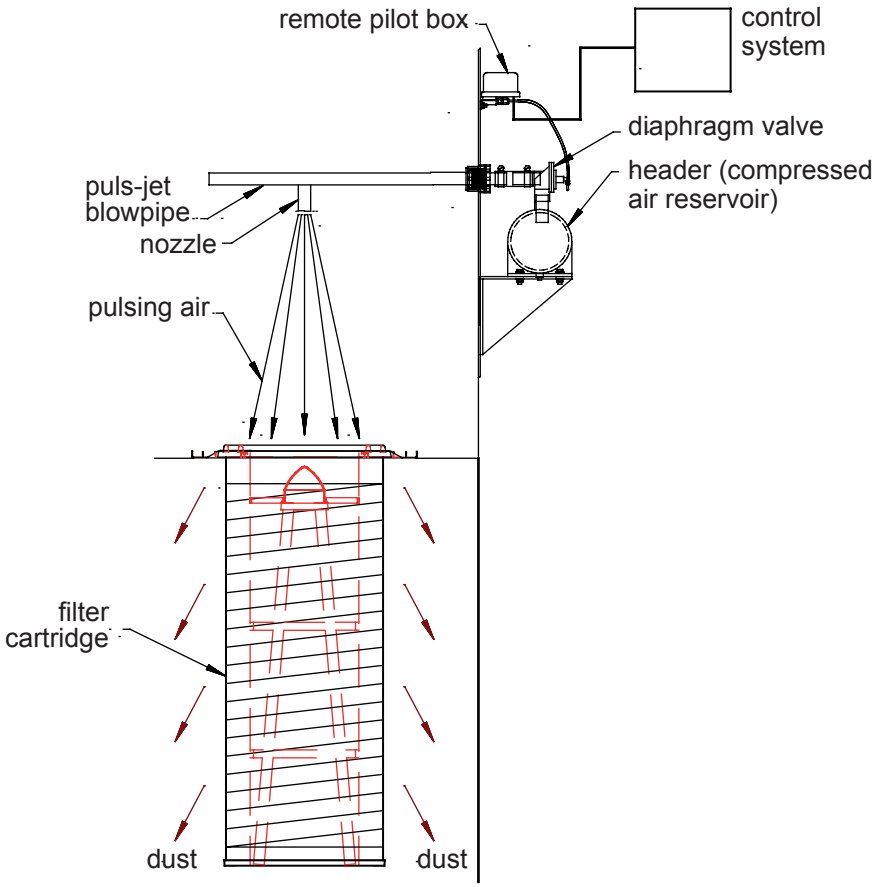


Figure 300.3.1 - Pulse jet cleaning components

300.4 Recommended Controller Settings

The following settings apply to the STR timer that is shipped with a GSP4 dust collector. These settings represent a recommended starting point and the optimum operation settings may vary for your application.

Pulse Frequency (off time)	15 seconds	Increasing this value will decrease compressed air consumption. Decreasing this value will increase compressed air consumption. You would decrease this value if your application involves high dust loads and dust that does not easily release from the cartridge. On applications with light dust loads this value can be increased to conserve compressed air.

To optimize the cleaning system operation for continuous cycle cleaning, perform the following procedure:

1. Make sure the timer is set at the recommended settings above at start up.

2. Monitor the pressure on the collector for 4 weeks. If the pressure is less than 0.5 kPa after this period, the cleaning system can be adjusted to reduce air consumption.

3. Increase the pulse frequency by 2 seconds or 1 step.

4. Repeat steps 2 and 3 until the dust collector stabilizes at 0.5 to 0.75 kPa.

Note, these adjustments may have to be reversed as the filters age.

CAUTION: Over cleaning the cartridges will result in higher emissions, shorter cartridge life, and higher energy costs.

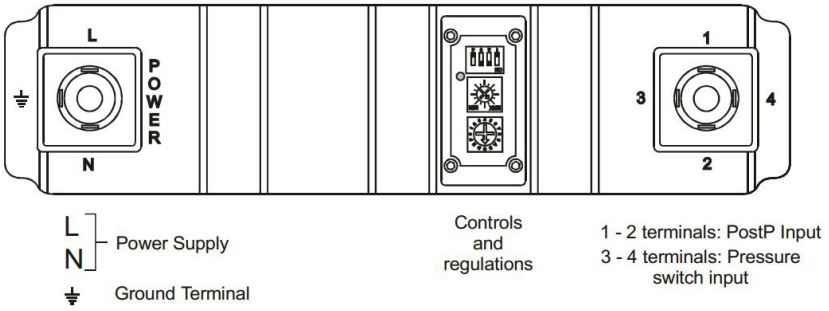
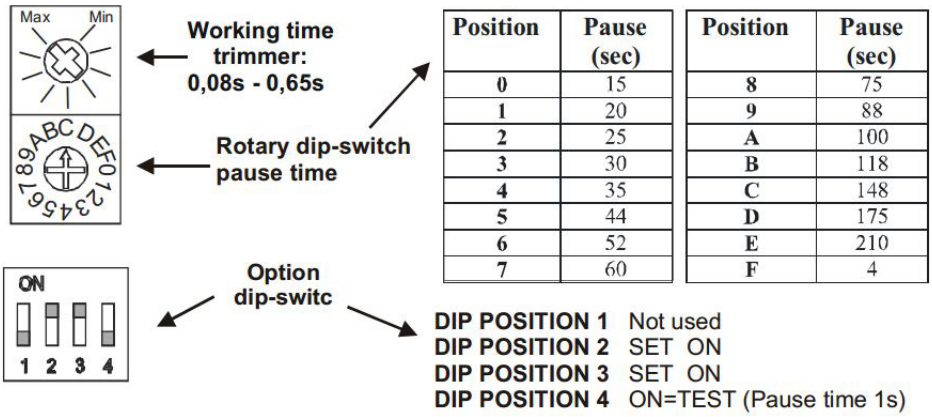


Figure 220.1.3 - STR



Position	Pause (sec)	Position	Pause (sec)
0	15	8	75
1	20	9	88
2	25	A	100
3	30	B	118
4	35	C	148
5	44	D	175
6	52	E	210
7	60	F	4

Figure 300.4.1 - STR settings

To adjust the time between the cleaning pulses se the instruction above. We do not recommend that you change any other settings.

SECTION 400 - PREVENTIVE MAINTENANCE

WARNING! Risk of personal injury!



- Use protective goggles, breathing mask and gloves when doing servicing and repairing work inside the system, especially when replacing the filter cartidges and emptying the dust container.
- Before doing any service work, clean the working place and all surrounding areas.
- Avoid contact or exposure to dust as much as possible during servicing or maintenance.
- Shut-off and bleed compressed air supply before servicing any compressed air components.
- Disconnect electrical power before servicing.
- The Control Box must not be opened or be disconnected from cables if there is explosive dust in the atmosphere or dust cover on the boxes. In that case the boxes must be cleaned.
- If the Minimum Ignition Energy, MIE, of the dust is less than 10 mJ, the service personnel must use shoes and other clothes specially designed to be used in explosion hazardous areas. Tools used for service works on the dust collector then also must be approved for explosion hazardous areas.

Your Farr Gold Series Dust Collection system requires very little maintenance to achieve maximum life and efficiency. The following items should be periodically serviced:

400.1 Filter Elements

Pressure drop across Gold Cone filter elements normally increases rather rapidly when the filter elements are new and clean, but then climbs much more slowly throughout the rest of their service life. Typically, when the Gold Cone elements cannot be cleaned below a differential of 1,5 kPa or greater, they have reached the end of their service life and require replacement. Other indications for replacement are cart-ridges that have been in service over 2 years or cartridges that have been damaged by moisture, high heat, or other perilous conditions.

400.2 Hopper

At the start/end of each shift, check the discharge container at the bottom of the unit. Dispose of any waste accumulation according to federal, state and local environmental regulations. Under no circumstances should the hopper be used to store collected material. Empty and replace full collection containers frequently. Do not over fill containers, as this will inhibit performance of the collector.

400.3 Solenoid and Diaphragm Valves

The solenoid and diaphragm valves may require periodic maintenance depending on the quality of the compressed air supplied to the unit. Check each valve periodically to see that it is operating properly and if required.

400.4 Control System

The automatic timer control does not require any routine maintenance. Check periodically to verify that the board is operating properly and the user-defined settings have not been tampered with. Dirt and moisture can damage the timer board. Check the enclosure periodically to ensure that no condensation is forming on the inside and that dust has not collected on the circuit board or inside the enclosure. Refer to separate instruction manual regarding the Control System.

400.5 Cleaning and Repair

The external and internal surfaces of the unit should be treated as any other painted metal surface subject to corrosion. Examine the unit for any damage to the surface coating and repair as necessary. Keep the external surfaces clean to prevent the possibility of hidden damage occurring. Periodic application of a quality automotive wax will prolong the life of painted surfaces and make them easier to clean.

400.6 Pressure vessels

Drain condensate periodically, as moisture will damage the filter media. Verify periodically that the operating pressure is between 0,62 and 0,72 MPa (6 and 7 Bar). Inspect the reservoir for damage or corrosion. If you find significant damages or corrosion replace the tank.

SAFETY AND WARNING!

(Compressed air tank(s))
Risk of personal injury!



- Never attempt to disconnect or remove any connecting component of the pressurized system before bleeding off pressure and performing lock-out / tag-out procedures on the pressure source.
- Do not alter, add to, or weld on to the reservoir. **This is strictly forbidden!** Doing so may cause irreparable damage and weaken the integrity of the vessel, thus causing an explosion hazard.
- Do not exceed 0,82 MPa (8,2 bar) in pressure.
- In case of fire, immediately depressurize reservoir.
- Replace reservoir if it has been exposed to temperatures above 93,3 ºC (200 ºF).
- Use the reservoir for its intended purpose only, in Camfil APC Dust Collection Systems. **Misuse of the reservoir may cause injury or death.**
- A damaged reservoir must not be pressurized until it has been appraised by a qualified pressure vessel inspector. **Never attempt to repair a damaged reservoir.**

400.7 Inspection Log

Copy and use this inspection log. It should be maintained to assure that a proper maintenance routine is followed.

Date _____
Time _____
Inspector _____

Daily

Are Diaphragm valves firing?	Y / N	Y / N	Y / N	Y / N	Y / N
Any visible stack emissions?	Y / N	Y / N	Y / N	Y / N	Y / N
Check and emptydust cart.					

Weekly

Check compressed air pressure.	KPa	KPa	KPa	KPa	KPa
Clean compressed air filter tap.	( )	( )	( )	( )	( )
Check tube sheet for filter leaks.	( )	( )	( )	( )	( )

Monthly

Record Differential Pressure (dP).	KPa	KPa	KPa	KPa	KPa
Check door seals for deterioration.	( )	( )	( )	( )	( )
Check air lines & fittings for leaks.	( )	( )	( )	( )	( )

Semi-Annually

Record pulse duration.	( )	( )	( )	( )	( )
Record pulse delay.	( )	( )	( )	( )	( )
Check pulse pipe alignment.	( )	( )	( )	( )	( )
*Check fan, etc.	( )	( )	( )	( )	( )

Annually

Check case/support for corrosion.	( )	( )	( )	( )	( )
Check all bolts and welds.	( )	( )	( )	( )	( )
Check ductwork for build up of dust.	( )	( )	( )	( )	( )
Bag dye penetrate test.	( )	( )	( )	( )	( )
Safety inspection (See section 400.9).	( )	( )	( )	( )	( )

Notes/Comments

400.8 Suggested Preventative Maintenance Schedule

Frequency	Procedure
Daily	Check controller and pressure drop Observe stack (visual or with opacity meter) Walk through system, listening for proper operation Check for unusual occurrences in process Observe control panel indicators Assure that dust is being removed from system
Weekly	Inspect and if required clean spark trap Operate damper valves Check compressed air lines, including line filters and dryers Check that valves are opening/closing properly in sequence Check pressure drop indicating equipment for plugged lines
Monthly	Inspect fans for corrosion and material buildup Spot check for filter cartridge leaks Check hoses and clamps
Quarterly	Inspect filter cartridges thoroughly Check duct for dust buildup Observe damper valves for proper seating Check gaskets on doors Inspect paint, insulation, etc.
Annually	Inspect housing for corrosion Inspect hopper for wear Check explosion vent Safety inspection, see Section 400.9

400.9 Safety inspection of Farr Gold Series dust collector

NOTE: This inspection must be performed by a competent person familiar with explosion safety and dust collection systems.

- Check that all metal parts in the collector are electrically bonded (See procedure 200.4).
- Check that the electrical system is correctly installed according to the system manual. Pay special attention to cable glands that should be adapted to the cable diameter and tightened.
- Check that the unit's door seals (See procedure 400.10).
- If the unit is protected by venting, verify that the risk area is clearly marked and if required in the risk assessment fenced off. There shall be no significant obstructions in the vent area and no combustible or loose material shall be stored in the area.
- Emergency stop in case of explosion. Verify by testing that the system stops in case of an explosion. The stop signal can come from several sources such as a suppression system, a mechanical isolation valve or a burst detector on an explosion vent panel. Test each installed detector individually and ensure that the pulse controller, fan and any other accessories stop directly.
- If the system is protected by venting check that the vent panel is undamaged. If the panel is in any way damaged it must be replaced.

Additional checks for yearly inspection

- Verify that the units use (Dust/-s and application) is the same as the originally stated intended use. If this has changed the unit should not be used until Camfil APC technical support has verified that the new use is safe.
- If the system is equipped with an explosion isolation valve. Verify that this has been inspected by a competent person.
- If the system is protected by an explosion suppression system, verify that this has been inspected and tested by a approved service engineer from the supplier.
- If the filter unit is equipped with a ATEX approved fan, check that this has been inspected and approved by a competent person according to the instructions from the fan manufacturer, if this is required to maintain the approval.

400.10 Checking the Door Seal

Door Adjustment Instructions

Check door gasket compression by consecutively closing and clamping door gasket onto a 100 x 200 mm strip of standard copy paper, first at the top, then middle, and then lower section of the handle side. Make sure paper is inserted so that gasket compresses against paper. A properly compressed gasket should not allow paper to be removed, when pulling paper laterally with moderate force. Do not use excessive force, as this will cause the paper to tear and/or the gasket to roll. Increase door gasket compression only when test fails.



Figure 400.10.1



Figure 400.10.2



Figure 400.10.3

Instructions for Increasing Door Gasket Compression



Figure 400.10.4 - Use either 1.5 mm. Or 3 mm shim (the unit comes with 2 of each)



Figure 400.10.5 - Loosen bolts and insert one shim



Figure 400.10.6 - Verify shim is in place and retighten bolts



Figure 400.10.7 - Add additional shims for any other areas that require gasket compression. Re-test all areas after adding shims.

SECTION 410 - TROUBLESHOOTING

High pressure drop / Low air flow

A. Listen for the cleaning pulses from the system

Are all valves pulsing normally?
- **No** --------> Go to cleaning system section of this guide.
- **Yes**

B. Check how long the cartridges have been used.

• When the system is stopped the control system will show number of hours in operation.
• All cartridge changes should be noted in the user manual. Check when the last one was made.
• If the cartridges have been running for more then 6000 h replace them.
• Please note that in heavy use it might be nessesary to replace cartridges earlier then 6000 h.

C. Check the designed air flow against the actual airflow

Measure the air flow. Is the actual flow higher then the design air flow?
- **Yes** --------> If it's not possible to adjust the flow back to the intended value, please contact Camfil APC for advice.
- **No**

D. Check if the process the filtered air is comming from has been changed.

• If the dust/fume generating process is changed significantly the performance of the dust collector can be affected.
• Significant changes can for example be, working with another material, new additives, increasing the power of a machine or working more intensly.
• If you suspect that there has been a significant change contact Camfil APC for advice.

E. Inspect the inlet.

• If it's blocked clean it.
• If inlet blockages from the product beeing filtered re-occurs, contact Camfil APC for advice. You may need another type of inlet and overbags.

F. Inspect the cartridges

• Check if the surface of the cartridges is blocked by firbrous dust. We recommend that overbags are installed.

G. If the dust collector is sited outside or in a unheated space.

• Check if the dust inside the collector is agglonomerating.
• It is recommendable to install a off line damper, in the duct leading to the collector. This will close when the collector is out of operation and prevent natural draft that can cause condensation.
• We recommend that the collector is pre-heated with clean air for a short while at the start up before dust load is applied.
• We also recomend that the collector is flushed with clean air a while before shut down.
• If the problems continue we recommend that the unit is moved to a heated space or insulated.

Cleaning system problems

WARNING!

Risk of personal injury! Close supply valves and bleed the pressure from the compressed air tanks before any components of the cleaning system are removed or opened.



A. Check that the compressed air supply is connected and supplying 0,62 - 0,72 MPa (6 - 7 Bar).

B. Check that the compressed air drier is working and that the dew point is 2 C or less.

C. Verify that the supply pipe is at least ½" (R15) and that no restrictions for example quick couplings are used.

D. Verify that the supply has sufficent capacity.

Air consumption depends on valve size and pulsing frequency.

E. If one or more valves are closing slowly or making abnormal noice.

• This problem is typically caused by contaminated compressed air. Make sure that the air supply is filtered.
• Bleed of the pressure. Remove the cover from the pulse-jet valve. Examine the membrane for damage and if nessesary remove any contaminants, especially from the bleed hole in the membrane.
• Carefully reassemble the cover, making sure that the closing spring is in place.
• Remove the pilot valve body from the STR and disassemble the valve.
• Clean the inside in the same way as the pulse-jet valve.
• If the problem re-occurs it may be nessesary to clean tanks and pipes by blowing them with compressed air.
• If one ore more valves dosen't clean at all. Go to the controll system problems section.

SECTION 420 - GSP4 SPARE PARTS

This list is meant to be a general listing of common replacement parts and equipment that you will need to keep your dust collector operational long into the distant future. To know what specific filters and components match your specific collector and application, always refer to your bill of lading or original packing slip.

* Recommended spare parts

Item No.	Camfil Part No.	Part Description
1	212659001	Diaphragm Valve- 1” Pipe
2	222953004	Timer/Valve, 24 VAC, STR, 4 Valve
3	204574001	Door Gasket (Sold in Feet, 14 feet required for one door)
4	205229001	Gold Threadcutting Bolt (3/4” Length) Minimum of 100 per order
5	205229002	Gold Threadcutting Bolt (1-1/4” Length) Minimum of 100 per order
6	069441021	Flexible Hose- 20” Diameter
7	207551009	Hose Clamp- 20” Diameter (Bridge Clamp)
8	222358001	Drum Lid Gasket (Neoprene)
9	222954500	X-vent, Antidet Relief, DN500
10	215384001	98 Liter Collection Drum
11	217780001	Collection Drum Dolly
12	211497-019	GS Hemi Pleat Cartridge HMPTXF-325
(1)	K2501	1” DD Diaphragm Valve Repair Kit
(1)	0165102010149	Pilot Valve Repair Kit
(2)	MA150618	Taper Swivel Elbow to suit 1” DD Valve (G1/8 to 6mm)
	074492000	Rope Caulk sealant (12mtrs per roll)

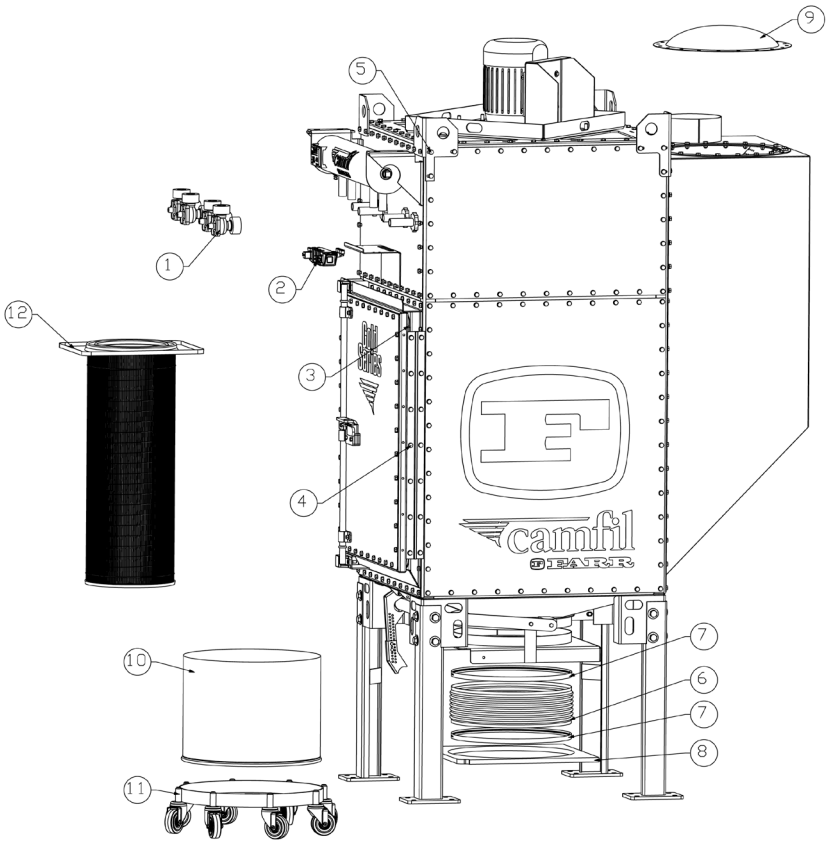


Figure 420.1

camfil
AIR POLLUTION CONTROL