



Filtec 3-G Service and Installation Guide

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Industrial Dynamics Company, Ltd.

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Contact Information

Corporate Headquarters	3100 Fujita Street, Torrance, California 90505-4007 U.S.A. Telephone: 310.325.5633 FAX: 310.530.1000 Internet: www.FILTEC.com
Mailing Address	P.O. Box 2945, Torrance, California 90509-2945 U.S.A.
Shipping Address	3100 Fujita Street, Torrance, California 90505-4007 U.S.A.
Customer Service	800.733.5173



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Preface

Introduction

The Filtec 3-G documentation provides operators, technicians, and service personnel with complete information about the Filtec 3-G. Other documents that describe the Filtec 3-G that you can consult include:

- Filtec 3-G and Filtec 3-XR Parts Catalog contains a pictorial parts catalog of spare and service parts that you might need to maintain and service your Filtec 3-G and Filtec 3-XR.
- Filtec 3-G and Filtec 3-XR Drawing Pack contains system drawings and schematics that you might need to install Filtec 3-G and Filtec 3-XR and complete procedures that are related to Filtec 3-G and Filtec 3-XR.
- Filtec 3-G Operation Guide describes how to use and maintain the Filtec 3-G.

Topics That This Guide Covers

Filtec 3-G Service and Installation Guide describes how to install Filtec 3-G and associated equipment and how to use the Filtec 3-G software.

Audience of This Guide

This guide is intended for use by FILTEC service personnel or customer personnel who have received training from FILTEC and who need to install and configure Filtec 3-G.

Conventions That Appear in This Guide

Use the following chart to learn about the typographic conventions that appear in this guide.

This typeface or symbol...	Indicates...	Example...
<u>abcd1234</u>	A link to another document or page in the current document, which, when you click on it, displays the other document or the other page.	<u>Filtec 3-G Service and Installation Guide</u>
 Important:	Important information that you might find helpful or useful and best practice suggestions.	 Important: Send oddly shaped (non-round) containers to FILTEC for testing and evaluation before you use them with Filtec 3-G.
 Caution:	That there is a potential for damage to the equipment. Depending on the particular damage that can result, harm to a person can also occur.	 Caution: To ensure your complete safety, run all power cables through liquid tight conduit.
 Warning:	That there is a potential for harm to an individual. As harm can be mild or severe, strictly observe the information that is provided.	 Warning: Before you attempt to install Filtec 3-G, turn off power and disconnect <i>all</i> electrical power cables from Filtec 3-G.
abcd1234	Emphasis, a definition of a new concept, or a variable for which you provide actual text.	Before you attempt to install Filtec 3-G, turn off power and disconnect <i>all</i> electrical power cables from Filtec 3-G. A <i>text field</i> is a set of alphanumeric characters in a product code that do not change. +X or -X
abcd1234	Text, including titles, menus, commands, and other information that you see or type on a screen.	Press key 4 until the Filtec 3-G product displays REJECTOR PULSE WIDTH on the screen.
abcd1234	A best practice to follow, a note, an example, a range of values that you can type in a field on a screen, and a document to which to refer.	Best Practice: Note: Example: Range: See Also:
abcd1234	A file name or directory path.	The system encrypts and internally stores the encrypted password that you provide in the configuration file <code>file.cfg</code> .



1. Safety Information

This chapter includes the safety mechanisms that are supplied with your equipment and the safe operating procedures when you use your FILTEC equipment.

This chapter also contains safety disclosure information and certifications that are required by the government, or other governing organizations, and voluntarily provided by FILTEC.

1.1 Safety Notices and Safety Labels

To ensure your safety, FILTEC has included many safety notices and labels within the product documentation and also within the equipment. Always observe these safety instructions.

1.1.1 Safety Notices

This documentation contains two types of safety notices: cautions and warnings. Always observe the safety notices. Cautions and warnings indicate safety issues as follows:



Warning: A warning indicates that there is a potential for harm to an individual. As harm can be mild or severe, strictly observe the information that is provided.



Caution: A caution indicates that there is a potential for damage to the equipment. Depending on the particular damage that can result, harm to a person can also occur.

1.1.2 Safety Labels

FILTEC equipment contains various safety labels. These labels are placed at strategic locations to help ensure your safety. Never remove safety labels from the equipment.

1.2 Radiological Safety

1.2.1 Introduction

This section provides information about radiation, radiation safety procedures, radiation certifications, and the radiation characteristics of your Filtec 3-G.

1.2.2 Understanding Radiological Safety

Your Filtec 3-G uses a small quantity of the radioisotope Americium-241 to produce low-level gamma radiation. The Americium-241 that your Filtec 3-G uses comes in the form of ceramic enamel. Its melting range is from about 1652 degrees Fahrenheit or 900 degrees Celsius to 1922 degrees Fahrenheit or 1050 degrees Celsius.

The Americium-241 is sealed inside a special type 304 stainless steel capsule that is double-fusion welded. This capsule is mounted in a stainless steel enclosure inside your Filtec 3-G inspection head.

A radiation safety shutter, when opened, permits a narrow beam of radiation to pass through the plastic radiation window in the enclosure. When the safety shutter is closed, all radiation is contained within the source enclosure.

There are two possible ways to be exposed to hazardous levels of radioactive material using this equipment: externally, through excessive exposure to a radiation source outside the body, and internally by ingesting radioactive material.

Your Filtec 3-G is unlikely to create hazardous radiation levels for the following reasons:

- The source of radiation in your Filtec 3-G produces a relatively weak source of low energy (low penetrating power) gamma radiation. To receive a hazardous dose of radiation from this low energy source would require extremely long exposure directly to the main radiation beam.
- While FILTEC warns against placing hands or other body parts in front of the gamma beam when it is turned on, it would require several hours of exposure for the hand to receive an excessive radiation dose.

- The gamma beam is tightly confined by shields and collimators and is completely contained within the inspection tunnel. Because the radiation beam does not spread outside the inspection tunnel, it is highly unlikely that under normal circumstances an appreciable radiation dose could be incurred at a location other than directly in front of the main gamma beam when the safety shutter is opened.
- The radioactive material is sealed by double fusion welds into a stainless steel capsule. At manufacture, and again at installation, this capsule is subjected to rigorous tests capable of detecting the leakage of five millionths of one percent of the contents. Therefore as long as the source capsule's integrity is not compromised, radioactive material cannot be released.
- As an additional precaution, the regulatory agencies require that a licensed individual inspect the radiation source and the shutter mechanism and conduct a leak test every 36 months.

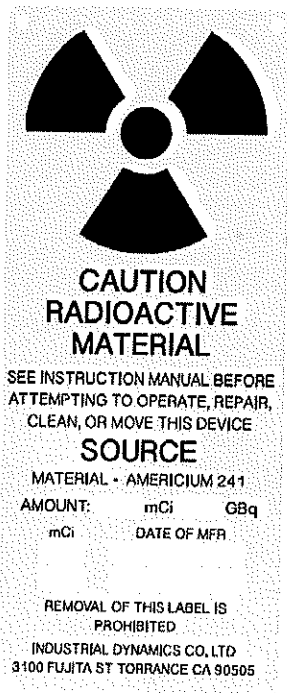
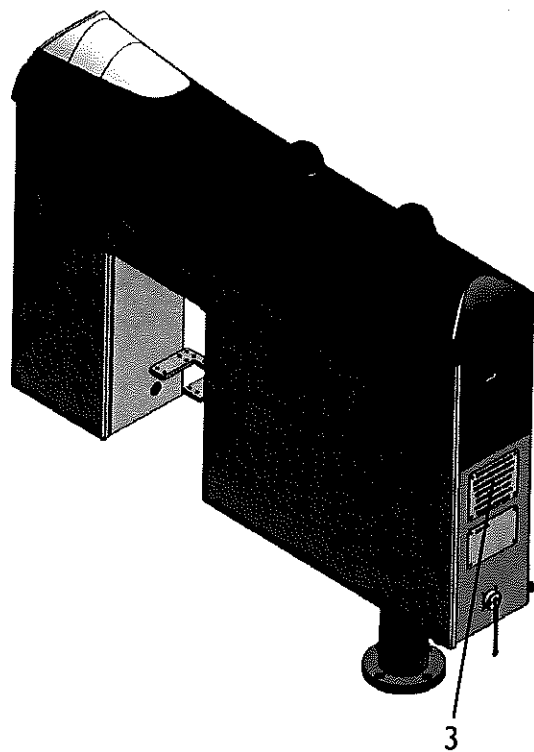
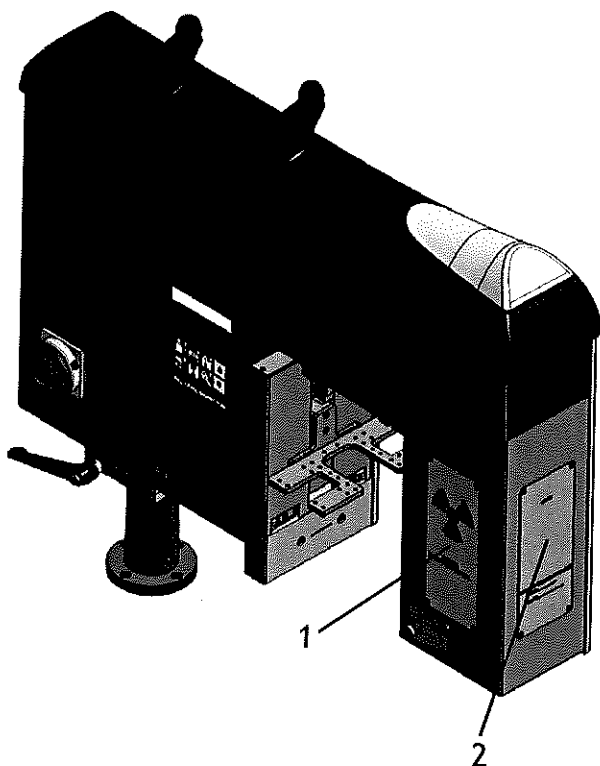
1.2.3 Radiological Safety Guidelines

You have been supplied with a copy of the rules, regulations and registration requirements for your location, however, the following is a brief synopsis of the general requirements.

1. Understand the rules, regulations, and registration requirements regarding the use of this equipment at your location. A copy of this is supplied with your Filtec 3-G.
2. Do not open or tamper with the enclosure containing the radio-isotope source.
3. Do not place your hands, or any other body part, between the source and detector when the safety shutter is open.
4. Have inspection and wipe tests performed by a licensed technician at the specified 36 month intervals (FILTEC service technicians can perform these inspection and wipe tests). Keep a record of each inspection and test.
5. In the case of an accident which crushes or punctures the source enclosure, seal off the area, cover your Filtec 3-G and surroundings with a plastic sheet or tarpaulin and contact FILTEC Customer Support immediately.
6. Do not relocate or dispose of the Filtec 3-G without proper approval. A licensed technician must perform this task.
7. If you have any questions, contact FILTEC Customer Support.

1.2.4 Radiation Measurement Testing Data

1. All measurements were taken with a Technical Associates Model Pug-1 survey meter. The meter was cross calibrated against an air ionization chamber survey meter whose response was corrected against an Americium-241 test source.
2. Source Shutter closed - The radiation levels are less than 0.05 mR per hour (mR/hr) at distances greater than 2 inches, or 5 centimeters, from any surface of the gauge (including inside the tunnel).
3. Source Shutter open - The extent of the main gamma beam is completely contained within the tunnel formed by the inspection head and shielding bar. All radiation levels outside the main beam are less than 0.05 mR/hr.
4. The exposure rate in the main beam is measured to be approximately 60 mR/hr at 2 inches, or 5 centimeters, from source enclosure containing 300 millicuries (mCi).



1

2

NOTICE

"The receipt, possession, use and transfer of the service are subject to a general license or equivalent and the regulations of the U.S. NRC or of a State with which the NRC has entered into an agreement for the exercise of regulatory authority."

"Operation of this device shall be immediately suspended until necessary repairs have been made if there is any indication of possible failure or damage to the shielding or containment of radioactive material, or the on-off mechanism and indicator."

"This device shall be tested for proper operation of the on-off mechanism or indicator at intervals not to exceed three years."

"The sealed radioactive source contained in this device shall be tested at installation and every three years thereafter, for leakage or radioactive material."

"Maintenance, tests or other service involving the radioactive material, its shielding and containment, shall be performed by persons holding a specific radioactive material license to provide these services."

"Installation, relocation, maintenance, repair, and initial radiation survey of this device, and leak testing, replacement, installation and disposal of sealed sources containing radioactive material used in this device, shall be performed only by persons holding a specific radioactive material license to provide these services."

REMOVAL OF THIS LABEL
IS PROHIBITED

SER NO:

MODEL NO:

INDUSTRIAL DYNAMICS CO. LTD
3100 FUJITA ST TORRANCE CA 90505
310-325-5633 / 888-4-FILTEC

DO NOT PLACE HANDS OR ANY
PORTION OF THE BODY BETWEEN
THE RADIOISOTOPE SOURCE AND
DETECTOR, WHEN THE GAMMA
BEAM IS ACTIVATED. CLOSE
SHUTTER WHEN REPAIRING OR
MAINTAINING THE MACHINE

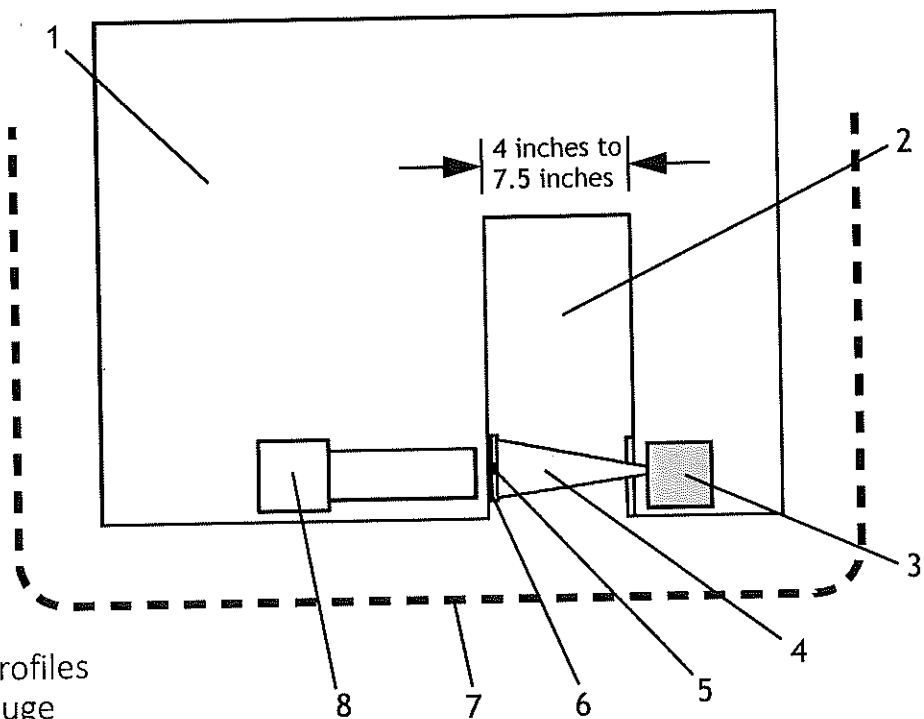
3

No. Description

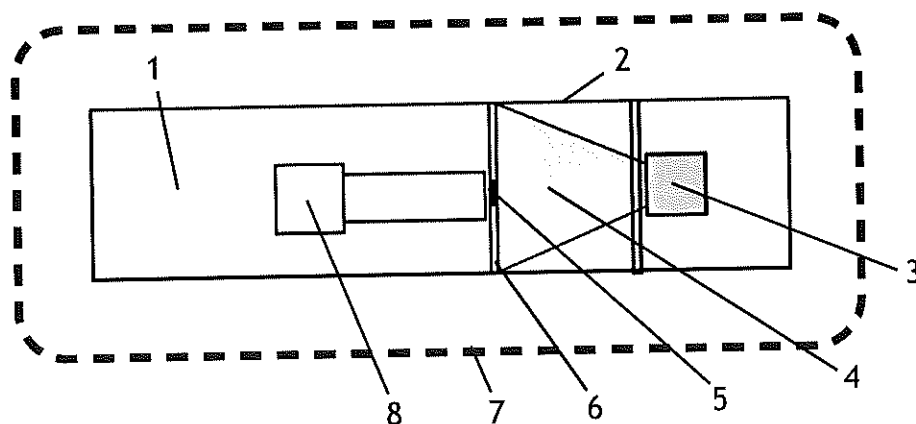
- 1 Radioactive material warning
- 2 Notice of United States Nuclear Regulatory Commission (U.S. NRC) regulation
- 3 Warning to keep hands and all body parts away from the radioisotope source in the Filtec 3-G

Figure 1-1. Safety Labels With Which You Must Comply

- | No. | Description |
|-----|--------------------------------------|
| 1 | Inspection head |
| 2 | Inspection tunnel |
| 3 | Sealed Americium-241 |
| 4 | Limits of the main beam |
| 5 | Detector window |
| 6 | Shielding bar (1/4 inch thick sheet) |
| 7 | Isodistance contour (5 centimeters) |
| 8 | Radiation detector |
- Note:** Gamma gauge equals 100 or 300 mCi source.



Radiation Exposure Profiles
Filtec 3-G Gamma Gauge



Radiation Data

- 1 All measurements were taken with a technical associates model PUG-1 survey meter that was cross calibrated against an air ionization chamber survey meter whose response was corrected against an Americium-241 test source
- 2 Source shutter closed - the radiation levels are less than 0.05 MR/HR at distances greater than 5 cm from any surface of the gauge (including inside the tunnel)
- 3 Source shutter open - the extent of the main gamma beam is completely contained within the tunnel formed by the inspection head and shielding bar. All radiation levels outside the main beam are less than 0.05 MR/HR.
- 4 Exposure rate in main beam is measured to be approximately 60 MR/HR at 5 cm from source enclosure containing 300 millicuries.

Figure 1-2. Filtec 3-G Radiation Profile Schematic



2. Overview of the Filtec 3-G Fill Level Inspector

This chapter provides a brief overview of the Filtec 3-G Fill Level Inspector.

2.1 How the Filtec 3-G Fill Level Inspector Works

2.1.1 Description

The Filtec 3-G inspects the liquid contents of a container and determines whether the container is either overfilled or underfilled. The Filtec 3-G cannot perform overfill and underfill inspections at the same time.

You can add inspection options such as bulged lid detection, down can detection, missing lid detection, and reject sorting (if you have a Servotec II rejector) to the Filtec 3-G to enhance its functionality.

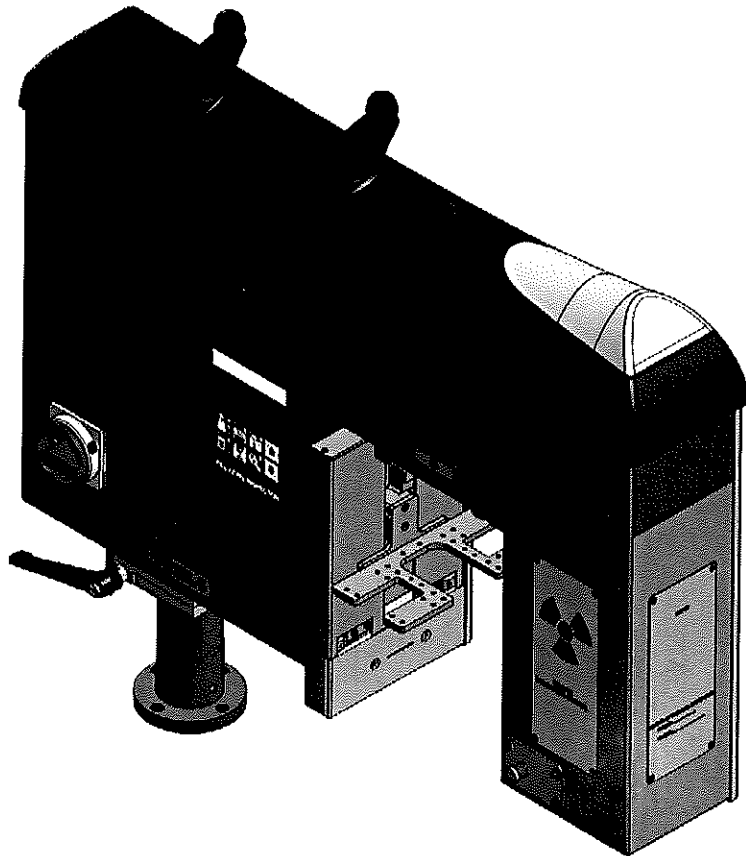


Figure 2-1. Filtec 3-G Fill Level Inspector

2.1.2 Fill Level Inspection Basics

The Filtec 3-G Fill Level Inspection systems uses a container radiation profile comparison principle to create a radiation fingerprint of the container.

To create a radiation profile a gamma beam is directed through the container. Some of the radiation is blocked by the container material and container's contents while the remaining gammas emerge from the opposite side of the container where they are measured by a gamma detector.

The amount of radiation measured is the container's radiation profile, or fingerprint, which is then compared against a master container profile.

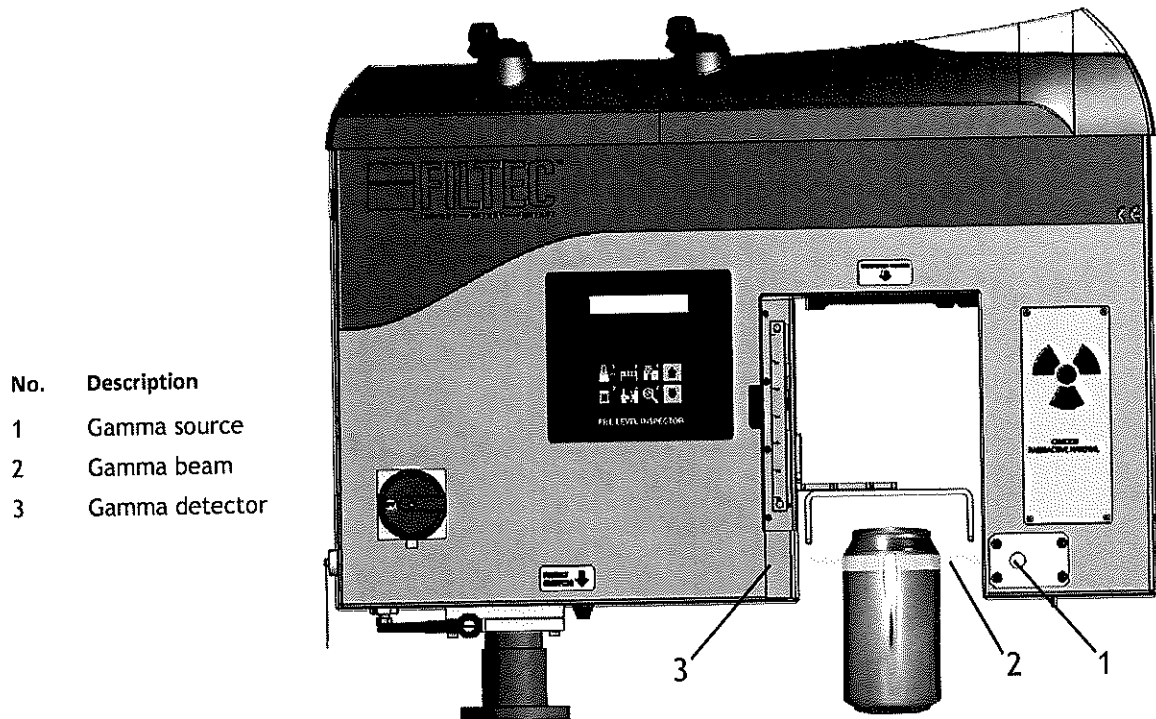


Figure 2-2. Scanning the Container

To allow for slight variances in the fill level an underfill threshold or overfill threshold is determined. These thresholds form the tolerance range for deviation from the master profile.

Any container with a gamma count above the underfill threshold (higher gamma counts indicate there is less product to absorb the gamma beam) is rejected as an underfill. Any container with a gamma count below the overfill threshold (lower gamma counts indicate there is more product to absorb the gamma beam) is rejected as an overfill.

2.1.3 Rejection Control Basics

The Filtec 3-G identifies and then tracks any container that fails inspection. Tracking begins the moment that the container crosses the inspection trigger beam in the Filtec 3-G and ends when the container reaches the rejector center line.

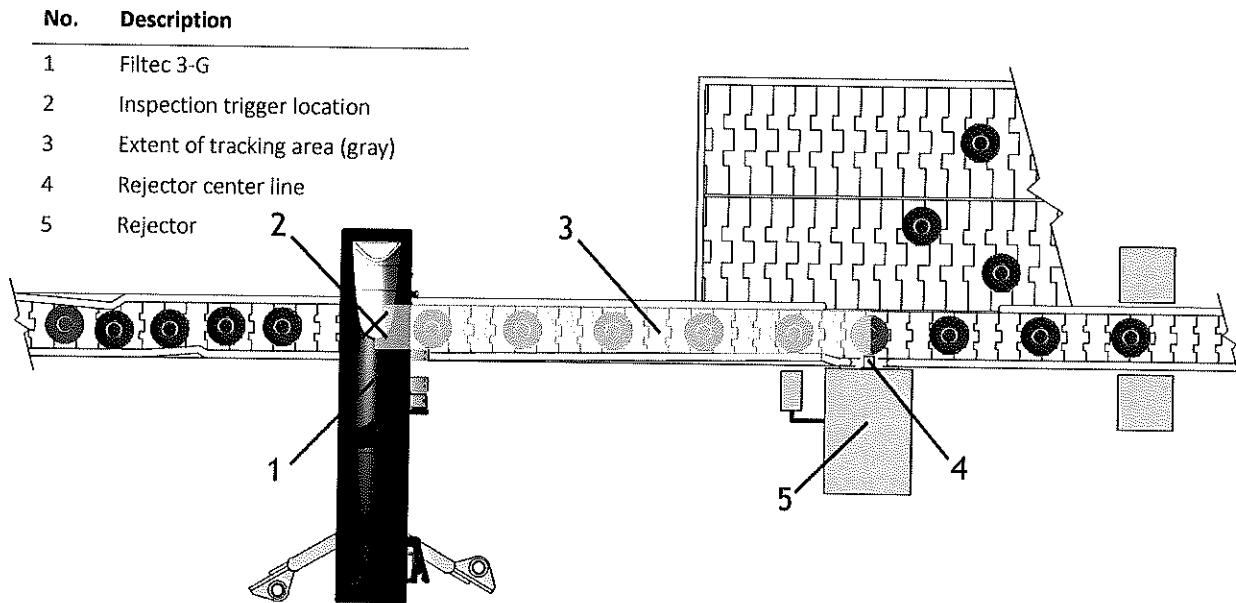


Figure 2-3. Tracking Containers That Fail Inspection

To maintain container tracking and to synchronize the rejector to the conveyor, the Filtec 3-G uses a high-resolution encoder coupled directly to the conveyor drive sprocket.

The encoder sends timing pulses to the Filtec 3-G, which uses the pulses to determine the container's position as it moves along the conveyor between the Filtec 3-G and the rejector. When the container reaches the rejector center line, the Filtec 3-G emits a reject signal, which activates the rejector and removes the container from the production line.

2.2 Optional System Features

The expandability of the Filtec 3-G enables you to add additional inspection capabilities to match your production requirements. Depending on the Filtec 3-G configuration that you order, your Filtec 3-G might contain some of the following features:

- Bulged can detection
- Missing lid detection
- Down can detection
- Reject sorting (if you use a Servotec II rejector or two Proline rejectors)
- External reject control
- Serial controller interface (Modbus or IDC protocols)
- Programmable logic controller (PLC) interface



Important: If you are unsure which options that your unit contains, contact your service department for information.

Bulged Can Detection

This feature utilizes an optical sensor to detect incorrectly bulged lids on cans.

Missing Lid Detection

This feature detects the presence or absence of the lid of a can. It is compatible with metal lids.

Dud Detection

This feature detects incorrect pressurization of vacuum sealed or pressure sealed containers.

Down Can Detection

This feature uses an optical sensor to detect a can that has been knocked over onto its side.

Reject Sorting

This option enables the Filtec 3-G to classify the various types of rejects and then reject them into different reject bins or reject conveyor lanes, based on the classifications. This option requires that you use a FILTEC Servotec II rejector or two Proline rejectors.

Serial Interface

Provides serial network communications over RS-232, RS-422, RS-423, and RS-485 networks. It enables you to directly control your Filtec 3-G system from a host computer or programmable logic controller (PLC) and collect counter data.

Programmable Logic Controller Interface (PLC)

Provides for data collection, so that you can receive signals from the Filtec 3-G. This option requires an I/O junction box.

2.3 Filtec 3-G Specifications

2.3.1 Table

Filtec 3-G specifications are shown in this table.



Caution: Use your Filtec 3-G as intended or you might void your warranty.

Specification	Description						
Material	Stainless steel construction						
Weight	The Filtec 3-G inspection head weighs 55 pounds or 24.95 kilograms.						
	 Warning: Two persons are required to lift the Filtec 3-G.						
Physical dimensions	<table><tr><td>Width</td><td>30.8 inches or 782.32 millimeters</td></tr><tr><td>Height</td><td>21.75 inches or 552.45 millimeters</td></tr><tr><td>Depth</td><td>7.75 inches or 196.85 millimeters</td></tr></table>	Width	30.8 inches or 782.32 millimeters	Height	21.75 inches or 552.45 millimeters	Depth	7.75 inches or 196.85 millimeters
Width	30.8 inches or 782.32 millimeters						
Height	21.75 inches or 552.45 millimeters						
Depth	7.75 inches or 196.85 millimeters						
Physical size of the inspection tunnel	The inspection tunnel of your Filtec 3-G comes in three sizes, which you specify when you order your inspection system: • Standard • Wide • Extra wide The dimensions of the containers that you intend to inspect define the size of the inspection tunnel that your particular Filtec 3-G includes. Use the following chart to determine the inspection tunnel that your Filtec 3-G includes.						

Specification	Description			
		Standard	Wide	Extra Wide
	Tunnel width	3.81 inches 96.77 millimeters	4.81 inches 122.17 millimeters	6.81 inches 172.97 millimeters
	Tunnel height	11 inches 279.4 millimeters	11 inches 279.4 millimeters	11 inches 279.4 millimeters
	Maximum container width at trigger	2 1/8 inches 54 millimeters	3 1/8 inches 80 millimeters	5 1/8 inches 130 millimeters
	Maximum container width at fill level	3 1/4 inches 83 millimeters	6 1/4 inches 159 millimeters	6 1/4 inches 159 millimeters
	Minimum fill level	1 1/4 inches 32 millimeters	1 1/4 inches 32 millimeters	1 1/4 inches 32 millimeters
	Note: You can also adjust the height of the inspection tunnel 6 1/2 inches or 165.1 millimeters to accommodate the height of your particular container by turning the crank over the inspection tunnel on the top of your Filtec 3-G.			
Operating temperature	The minimum operating temperature for your Filtec 3-G is 32 degrees Fahrenheit or 0 degrees Celsius. The maximum operating temperature for your Filtec 3-G is 113 degrees Fahrenheit or 45 degrees Celsius.			
Operating humidity	10 to 95 percent			
Power	Your Filtec 3-G requires computer grade 105 to 125 volts alternating current (VAC), 50 or 60 hertz (Hz), at 2.0 amperes, 1 phase or 220 to 250 VAC, 50 or 60 Hz, at 1.0 ampere, 1 phase that is derived from a separate branch circuit and isolated from equipment that can cause electrical transients. Note: You must correctly ground the neutral line. If you cannot maintain power regulation between 105 and 125, or 220 and 250, VAC, you must install a voltage regulator.			
Air	Your Filtec 3-G includes a separate air purge system that provides filtered, clean, dry, compressed air between 80 and 120 p.s.i. (input) with 0.5 standard cubic feet per minute (s.c.f.m.) nominal flow rate, or 138 to 827 kilopascals (kPa) at 14 liters per minute. The air purge system prevents outside elements from contaminating and corroding the electronic components inside your Filtec 3-G. The air purge system consists of an air filter and pressure regulator unit that you mount externally and an internal muffler and disperser. To satisfactorily purge air from the inspection head of your Filtec 3-G, the air purge system that you use with your Filtec 3-G must maintain a pressure of at least 7 pounds per square inch (p.s.i.).			
Environmental standards	The enclosure meets or exceeds National Electrical Manufacturers Association Type 4 (NEMA 4x) and Ingress or International Protection Rating IP65 standards			
	 Caution: The Filtec 3-G systems are intended for indoor use only.			
Pollution degree	Level 2			
Altitude requirements	None			

Specification	Description												
Location requirements	Ensure that you mount and position your Filtec 3-G to enable operators to turn off and disconnect your Filtec 3-G.												
Radiation source	The gamma radiation source that the Filtec 3-G contains is a low energy 60 kiloelectron volt (KeV) Americium-241 radioisotope with a half-life of 472 years. The Filtec 3-G uses a 100 millicuries (mCi) source for normal applications or a 300 mCi source for special applications.												
Conveyor line height requirements	Your Filtec 3-G mounts on a steel floor stand that you secure to the floor. You can use an Filtec 3-G with any conveyor that measures between 24 and 60 inches or 609.6 millimeters and 1524 millimeters from the floor. Note: You specify the height of the steel floor stand that you require when you place your order.												
Inspection accuracy	The basic fill level inspection accuracy is ± 0.0157 inches or ± 0.4 millimeters. The Filtec 3-G can examine from 0 containers per minute to 2200 containers per minute (CPM) without loss of reject index at a maximum of 500 feet per minute (FPM), or 152 meters per minute (MPM). The inspection accuracy that your Filtec 3-G achieves depends on conditions on the line and the type, contents, and diameter of containers that you inspect. Use the following chart to determine the inspection accuracy that your Filtec 3-G can achieve. <table><tr><th>Containers per minute (CPM)</th><th>Feet and meters per minute (FPM and MPM)</th><th>Accuracy</th></tr><tr><td>600</td><td>135 FPM or 41 MPM</td><td>± 0.06 inches or ± 1.6 millimeters</td></tr><tr><td>1200</td><td>270 FPM or 83 MPM</td><td>± 0.12 inches or $\pm 0.3.1$ millimeters</td></tr><tr><td>2200</td><td>500 FPM or 152 MPM</td><td>± 0.21 inches or ± 6.0 millimeters</td></tr></table>	Containers per minute (CPM)	Feet and meters per minute (FPM and MPM)	Accuracy	600	135 FPM or 41 MPM	± 0.06 inches or ± 1.6 millimeters	1200	270 FPM or 83 MPM	± 0.12 inches or $\pm 0.3.1$ millimeters	2200	500 FPM or 152 MPM	± 0.21 inches or ± 6.0 millimeters
Containers per minute (CPM)	Feet and meters per minute (FPM and MPM)	Accuracy											
600	135 FPM or 41 MPM	± 0.06 inches or ± 1.6 millimeters											
1200	270 FPM or 83 MPM	± 0.12 inches or $\pm 0.3.1$ millimeters											
2200	500 FPM or 152 MPM	± 0.21 inches or ± 6.0 millimeters											
Container handling capability	The Filtec 3-G handles most round glass containers, including contoured , steel, and cardboard containers, as shown in the diagram. Note: Send plastic, oddly shaped containers, or containers that are not round to Industrial Dynamics/filtec for testing and evaluation before inspecting them with the Filtec 3-G.												



Figure 2-4. Types of Containers That the Filtec 3-G Can Handle



Important: You must space containers at least 0.118 inches or 3 millimeters from each other on the conveyor. You cannot interleave, back up, stack, or stagger containers.

Display languages English, and others as needed

Table 2-1. Facts About Your Filtec 3-G



3. Installing Your Filtec 3-G

This chapter includes procedures that tell you how to install your Filtec 3-G.

3.1 Requirements That Your Conveyors Need to Meet

3.1.1 Requirements

To install the Filtec 3-G correctly, your production and reject conveyors need to meet particular requirements.



Note: The documentation for the rejector that you ordered for use with your Filtec 3-G contains additional requirements for the reject conveyor.

When installing and configuring your conveyors, ensure that:

- ☐ Your conveyor can gradually accelerate from a complete stop to production speed and prevent containers from sliding and falling over on the chain.
- ☐ You install the Filtec 3-G and rejector on the same segment of conveyor.
- ☐ You install a backup sensor that detects backed up containers downstream from the rejector to ensure that the production line shuts down before backed up containers accumulate in the reject area and damage equipment.
- ☐ All conveyor chains run smoothly as they pass through the inspection and reject areas.
- ☐ The production conveyor sidewall measures at least five inches or 127 millimeters tall.
- ☐ The production conveyor sidewall is stiff enough by flexing the sidewall with your hand.

If flexing the sidewall takes considerable effort, the sidewall is stiff enough. If flexing is too easy, create an adapter plate and mount it to the conveyor sidewall.
- ☐ All conveyor chains maintain a flatness tolerance of at least 0.004 inches, or 0.1 millimeters, and a surface roughness of at least 24 micro inches, or 0.6 micro meters.



Note: FILTEC can provide the names of chain suppliers whose products meet these specifications.

Best Practice: Push an empty container across the chain. Ensure that the container slides by itself without tipping for at least 2 feet, or 60 centimeters.

- ☐ If your conveyor contains raised separators between chains, position separators at least two-thirds the thickness of the chain below the chain surface.

Positioning separators in this way enables the wear strips to wear without the separator's interfering with the movement of containers across the conveyors.

- ☐ Wear strips that pass through the inspection and reject areas are pinned to the conveyor at the upstream end only.

Pinning wear strips in this way prevents the wear strips from buckling or warping due to expansion and contraction.

- ☐ You mount the rejector far enough downstream from the reject conveyor sprocket shaft to allow the conveyor chain to level out and settle completely onto the wear strips.

Best Practice: Mount the rejector at least 8 inches, or 203 millimeters, from the center line of the reject conveyor sprocket shaft.

- ☐ The guide rail on the rejector side is parallel to the chain motion (not angled).
- ☐ The guide rail that is opposite the rejector is configured so that the width of the lane that is created is no more than 0.2 inches, or 5 millimeters, wider than the diameter of the containers.
- ☐ You install a separator rail and nose piece between the production and reject lanes.

Installing a separator rail and nose piece prevents the jamming of downed containers.

- ☐ The conveyor chain in the inspection and reject areas is made of metal or plastic, and *not* flex chain.
- ☐ Chains are lubricated with a water and soap solution to provide additional slickness.

Using this solution is especially important when you operate the conveyor at slow speeds and when the containers are plastic.

- ☐ The reject conveyor moves five percent faster than the production conveyor.

Ensuring that the reject conveyor moves faster prevents containers that are consecutively rejected from colliding as they slide onto the reject conveyor.

- ☐ The reject conveyor is 7.5 inches wide or as wide or wider than the diameter of two containers.

- ☐ The reject conveyor chain is positioned lower than the production conveyor chain.

From the production conveyor chain, set each successive reject conveyor chain +0.000/-0.020 inches, or +0.0/-0.5 millimeters lower than the preceding chain.

You can position chains in this way by using different chain wear strip thicknesses.

3.2 Overview of Installing the Filtec 3-G

3.2.1 Decision Table

Use this table to determine the general procedures to follow to install the Filtec 3-G.

To...	Go to...
Unpack your Filtec 3-G	Unpacking the Filtec 3-G
Determine the ideal location at which to mount your Filtec 3-G and rejector	Determining the Ideal Location for Your Filtec 3-G
Prepare the conveyor to install your Filtec 3-G and rejector	Preparing the Conveyor
Assemble your Filtec 3-G floor stand	Assembling the Floor Stand
Mount the Filtec 3-G inspection head, floor stand, and, if necessary, support braces	Mounting and Positioning the Inspection Head Anchoring the Base Tripod to the Floor Installing the Slant Braces for Support
Install the air purge system	Installing the Air Purge System
Install the high-resolution encoder	Installing the High-Resolution Encoder
Prepare the conveyor to install the rejector	
Mount the rejector	
Wire the main power source to your Filtec 3-G	Wiring the Power Cable



Note: Refer to the following drawings as you install and wire your Filtec 3-G and high-resolution encoder.

As you...	Refer to drawing...
Install the inspection head and floor stand	I00803
Install the controller box, floor stand, and Filtec 3-G	I00804
Install the high-resolution encoder	I00484

3.3 Unpacking the Filtec 3-G

3.3.1 Introduction

FILTEC packs the Filtec 3-G and corresponding accessories such as mounting hardware, spare parts, special lubricants, and the encoder in individual boxes inside a big shipping box.

3.3.2 Diagram

Refer to this diagram as you complete the steps that follow.

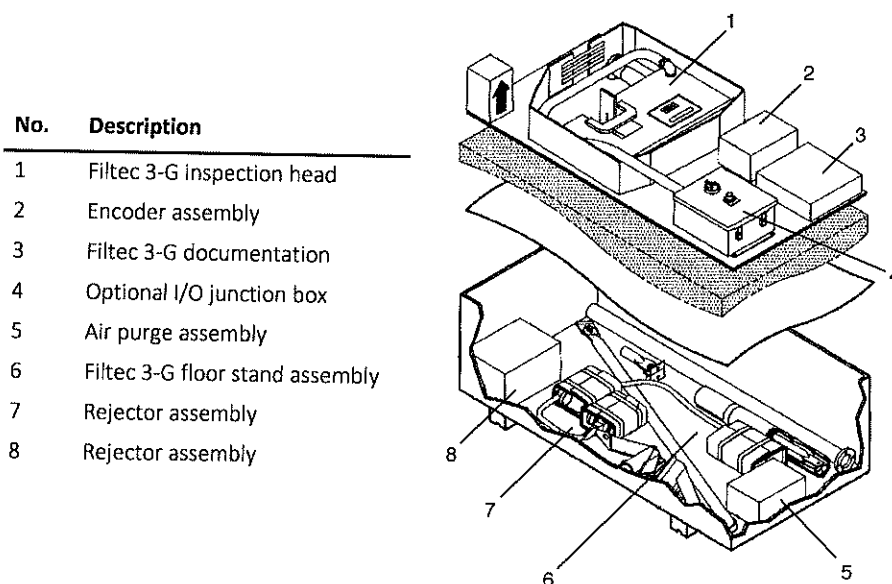


Figure 3-1. Unpacking the Filtec 3-G

3.3.3 Steps

Follow these steps to unpack your Filtec 3-G successfully.

1. Inspect the outside of the big shipping box for damage.
2. Did you find any damage?



Note: Damage to the outside of the shipping box does not necessarily indicate damage inside. However, damage does indicate that the company who shipped the box to you handled it poorly.

If *yes*, before you proceed, stop and immediately note and record the damage that you found.

If *no*, go to the next step.

3. Slowly and carefully unpack the big shipping box so that you do not damage the equipment inside.



Note: When removing the Filtec 3-G inspection head, ensure that two people grasp it by the sides, not by a bracket or handle.

4. Carefully inspect all packing materials before you discard them to ensure that you do not accidentally throw away a part.

5. Inspect all parts inside the individual shipping boxes for damage that might have occurred.

6. Did you find any parts that were damaged?

If *yes*, stop and contact FILTEC Customer Support as well as the company who shipped the Filtec 3-G to you and report the damage that you found.

If *no*, continue to the next section Determining the Ideal Location for Your Filtec 3-G.

3.4 Determining the Ideal Location for Your Filtec 3-G

3.4.1 Steps

Follow these steps to determine the ideal location at which to mount your Filtec 3-G.

1. Examine the length of your conveyor line.
2. Find a spot on the conveyor line:
 - That is far enough downstream to prevent from occurring all production events that might excessively agitate the contents of your containers, typically 3 to 5 seconds from a minor disturbance such as a brush off or curve, and 5 to 7 seconds from a major disturbance such as a seamer or sealer.
 - That is level and straight, that is, does not turn or curve.
 - Where the guide rail measures at least 19 inches, or 49 centimeters, long between brackets.



Note: You might need a longer distance for particular inspection options, ramp actions, if required, and reject conveyor requirements.

- Where the conveyor narrows enough so that containers are centered on the conveyor as they pass through the inspection point.



Note: You might need to perform ramp actions upstream to ensure that you center containers correctly.

- At which you can conveniently collect rejected containers, either in a bin that you can empty or on a reject table or conveyor.
3. Note and remember the spot that you find.
 4. Continue to the next section Preparing the Conveyor.

3.5 Preparing the Conveyor

3.5.1 Before You Begin

Before you begin, obtain the following tools:

- Tape measure that extends at least 10 feet or 3 meters
- Masking tape or permanent marker that marks stainless steel and masonry satisfactorily
- Level
- Power drill and a 3/8 inch, or 7 millimeter, drill bit that is capable of drilling masonry or a power driver
- Five 1/2 inch by 3 inch lag bolts and lead inserts or five similarly sized concrete studs
- 1/2 inch wrench
- 5/16 inch wrench
- Saw that is capable of cutting stainless steel

3.5.2 Steps

Follow these steps to prepare the guide rails for your Filtec 3-G.



Important: You can install your Filtec 3-G on either the right or left side of the conveyor. If, however, you orient it differently from the orientation that you specified when you placed your order, you might need to reconfigure sensors and triggers.

1. Mark the vertical center line of the Filtec 3-G by using a permanent marker or masking tape to draw a vertical line on the conveyor sidewall and guide rails.

No.	Description
1	Conveyor guide rails
2	Conveyor chain
3	Filtec 3-G center line marks
4	Conveyor sidewall

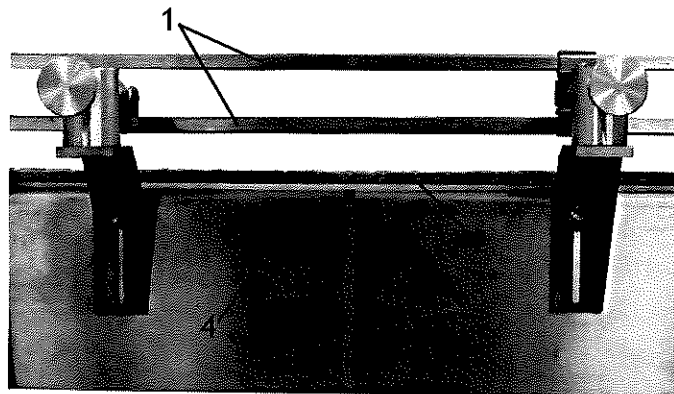


Figure 3-2. Drawing the Center Line for the Filtec 3-G

2. Create a 6.5 inch, or 165.1 millimeter, wide gap in the conveyor guide rails that is centered on the center line mark either by using a saw or by adjusting the rail horizontally.

Note: The Filtec 3-G passes through this gap.

No.	Description
1	6.5 inches, or 165.1 millimeters
2	3.25 inches, or 82.55 millimeters
3	Area to be removed (within dashed rectangle)
4	Conveyor chain
5	Center line marks
6	Conveyor sidewall
7	Conveyor guide rails

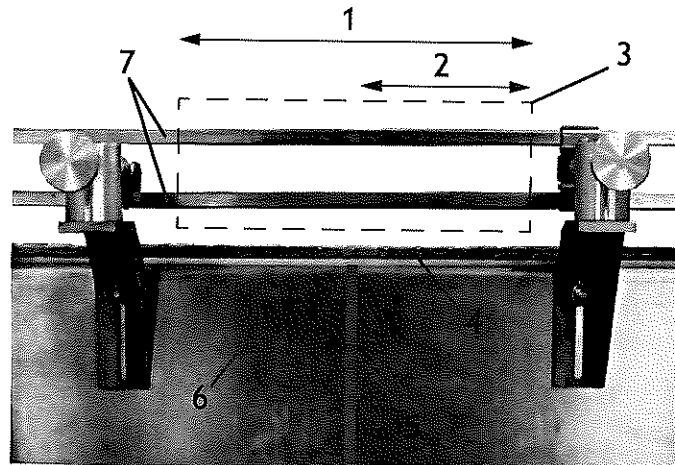


Figure 3-3. Creating an Opening in the Guide Rails

3. At a location that is upstream from the Filtec 3-G, modify the guide rails to form ramp actions that you need for your rejector, as described in your rejector's documentation.

Best Practice: Ensure that the last ramp action occurs at least 12 inches, or 31 centimeters, upstream from the center line of the Filtec 3-G to allow time for containers to stabilize after the movement.

4. Continue to the next section.

3.6 Assembling the Floor Stand

3.6.1 Types of Mounting Configurations

You can mount your Filtec 3-G in one of three configurations, depending on the height of your conveyor, as described in this chart.

If the distance from the floor to the top of your conveyor chain is...	Then use mounting configuration...
Less than 33 inches, or 838 millimeters	Low mount
Between 33 inches and 60 inches, or 838 millimeters and 1524 millimeters	Standard mount
More than 60 inches, or 1524 millimeters	High mount



Important: The particular parts that make up the mounting configuration that FILTEC ships to you depend on the mounting configuration that you specify when you place your order.

3.6.2 Steps

Follow these steps to prepare the floor stand for your Filtec 3-G.



Important: If you cannot mount the Filtec 3-G as originally planned, or discover that parts are missing from your shipment, contact FILTEC Customer Support.

1. Use this equation to calculate the correct length of the vertical support pipe that you need.

$$L_p = H_L + H_C - 11$$

L_p Is the length to which you cut the vertical support pipe, if necessary

H_L Is the fill level of the contents in the container. If you use this unit to inspect multiple containers with different fill levels, use the following equation to determine this value.

$$H_L = H_1 + \left(\frac{H_2 - H_1}{2} \right)$$

H_1 is the height of the lowest fill level
 H_2 is the height of the highest fill level

- H_c Is the distance from the floor to the top of your conveyor chain
- 11 11 inches, or 279 millimeters, which is the value that you subtract from the height



Caution: Double check your calculations before you cut the vertical support pipe. If you cut the vertical support pipe incorrectly, you cannot finish installing your Filtec 3-G until you receive a replacement pipe from FILTEC.

2. Cut the vertical support pipe to the length (L_p) that you calculated in step 1, removing the excess from the *unflanged* end.

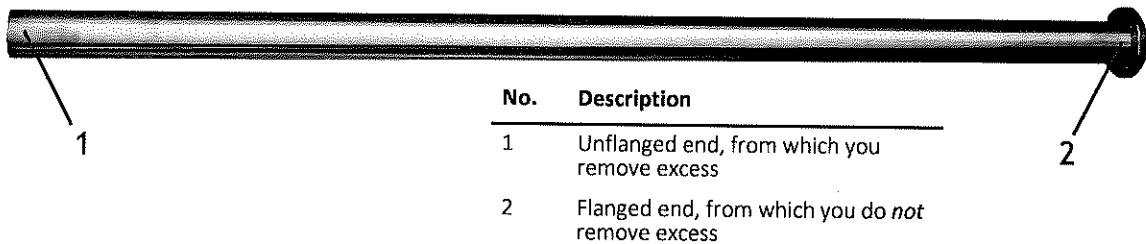


Figure 3-4. Removing the Excess From the Vertical Support Pipe

3. Assemble the mounting base tripod.

Leave the bolts loose enough to slide the vertical support pipe inside.

- | No. | Description |
|-----|-------------|
| 1 | Tripod leg |
| 2 | Stop plate |
| 3 | Bolt |

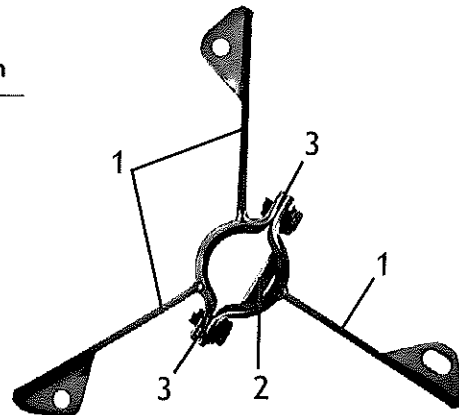


Figure 3-5. Assembling the Mounting Base Tripod

4. Insert the vertical support pipe into the tripod until it stops. Do not completely tighten the retaining bolts. Leave them loose enough so you can make alignment adjustments later.

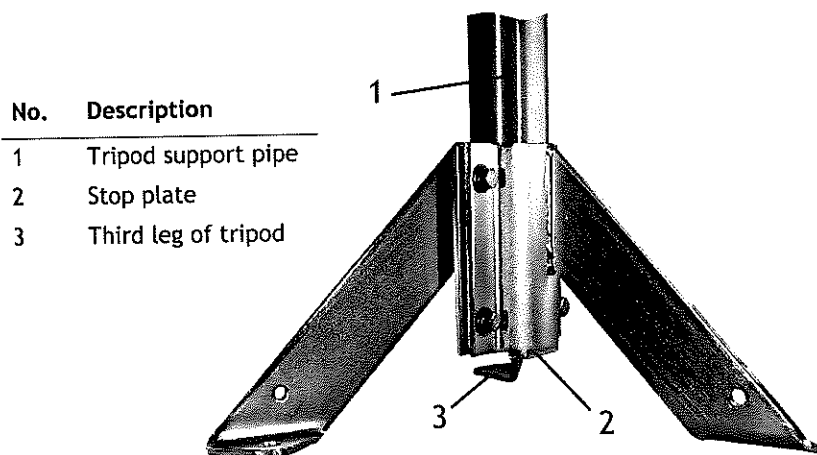


Figure 3-6. Inserting the Vertical Support Pipe Into the Mounting Base Tripod

5. If you are using a standard or high mount, attach the support braces to the tripod. Do not completely tighten the retaining bolts, leave them loose enough so you can make alignment adjustments later.

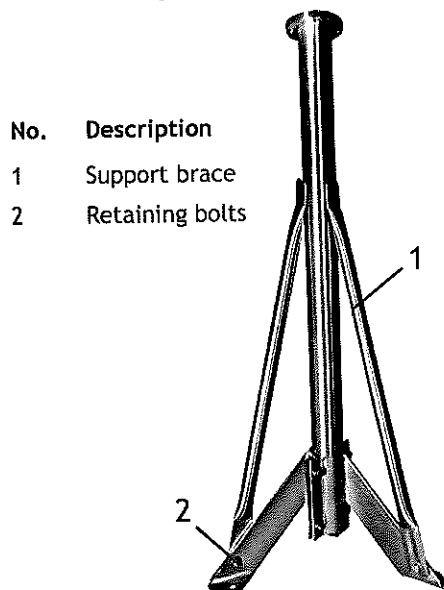


Figure 3-7. Attaching the Support Braces to the Mounting Base Tripod

6. Attach the upper ends of the support braces to the vertical pipe with the pipe clamp. The pipe clamp is only temporary. After final positioning adjustments are made, you will screw the supports into place and remove the clamp.

No.	Description
1	Pipe clamp

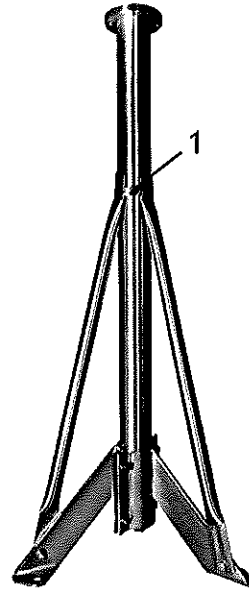


Figure 3-8. Attaching the Upper Ends of the Support Braces



Important: This pipe clamp is only temporary. After you make the final positioning adjustments, you screw the supports into place and remove the clamp.

3.7 Mounting and Positioning the Inspection Head

3.7.1 Steps

Follow these steps to mount and position the inspection head on the vertical support pipe on the floor stand that you assembled in the previous section.

1. Mount the inspection head to the top of the support pipe by connecting the flanges with the supplied hardware and tightening securely.

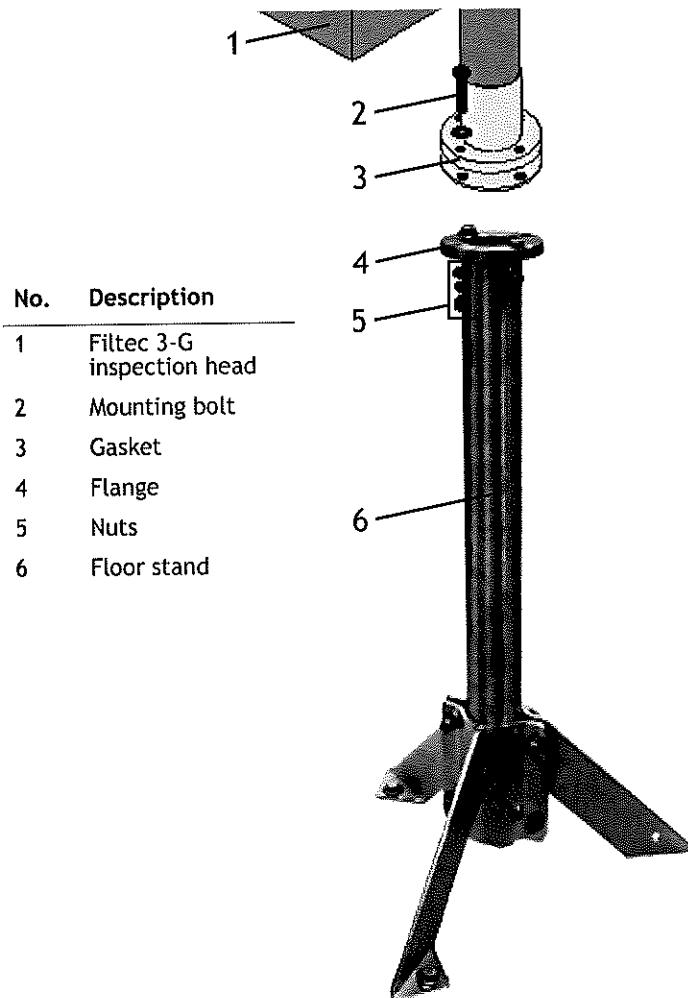


Figure 3-9. Mounting the Inspection Head on the Vertical Support Pipe

2. Move the assembled Filtec 3-G into position at the conveyor and align it as follows:

- Align the center line of the Filtec 3-G with the center line mark that you made on the conveyor sidewall.
- Align the inspection tunnel so that it is centered over the conveyor chain and the inspection head is perpendicular to the conveyor.
- Place a level along the bottom of the Filtec 3-G so that it spans the inspection tunnel.

You might need to raise the inspection head to fit the level between the conveyor and the Filtec 3-G.

- If necessary, shift the vertical support pipe in its mounting until the inspection head is level.

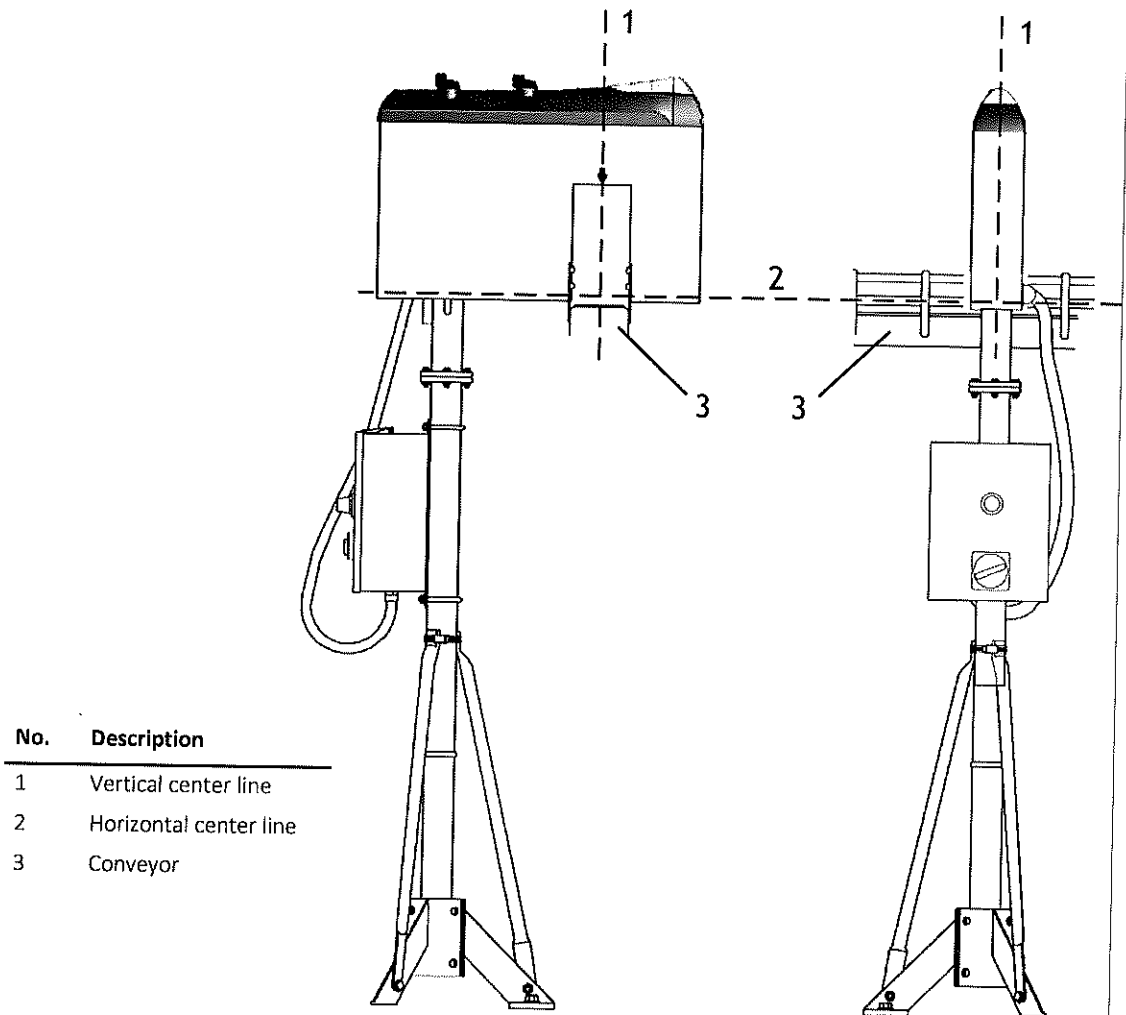


Figure 3-10. Aligning the Filtec 3-G With the Conveyor

3.8 Anchoring the Base Tripod to the Floor

3.8.1 Steps

Follow these steps to anchor the base tripod to the floor.

1. When you are sure that your Filtec 3-G is aligned correctly, use the permanent marker to mark the position of the three mounting holes in the base tripod on the floor.
2. At each of the three marks that you made on the floor, using the power drill and 3/8 drill bit, drill a mounting hole.



Note: Alternatively, you can anchor the base tripod to the floor by using a power driver and concrete studs instead of lag bolts and lead inserts.

3. Anchor the base tripod to the floor by inserting the three 1/2 inch by 3 inch lag bolts and lead inserts and tightening.

No.	Description
1	Lag bolt

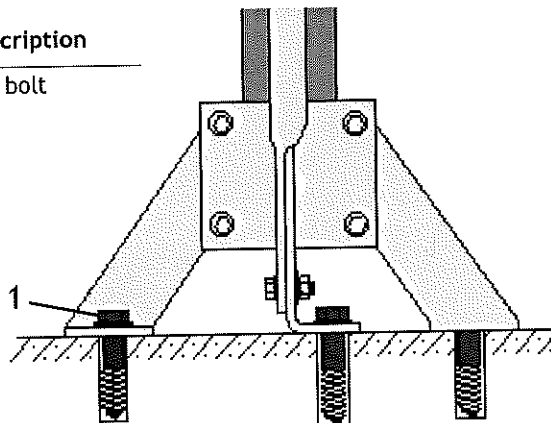


Figure 3-11. Anchoring the Mounting Base Tripod to the Floor



Best Practice: If necessary, insert shims that Filtec provides to ensure that the tripod is level on the floor.



3.9 Installing the Slant Braces for Support

3.9.1 Introduction

If you are installing your Filtec 3-G in a high or a low mounting configuration, you need to install slant braces for extra support. You can install the slant braces on either side of the vertical support pipe, depending on the available clearance from the conveyor and other objects.

3.9.2 Steps

Follow these steps to install the slant braces.

1. With the supplied pipe clamps, attach the slant brace vertical mounting brackets to the vertical support pipe.

Best Practice: Leave the clamps loose enough so that you can slide them up and down.

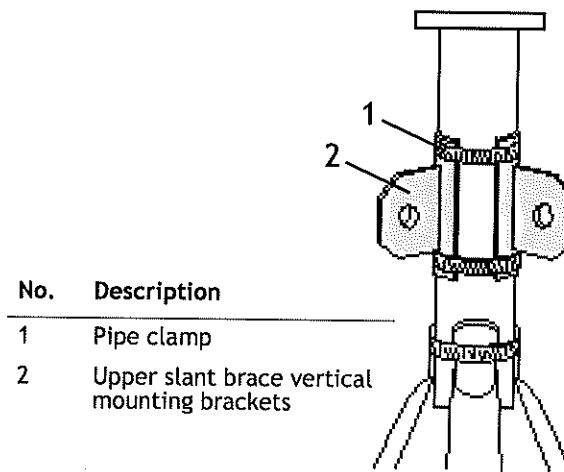


Figure 3-12. Attaching the Slant Brace Vertical Mounting Brackets



Important: The pipe clamps are temporary. After you position the slant brace vertical mounting brackets, you screw the support brackets into place and remove the clamp.

2. Determine the angle and length of the slant brace by stringing a measuring tape from the support bracket to the floor.

Best Practice: Move the slant brace vertical mounting brackets up or down to achieve the correct angle.

No.	Description
-----	-------------

- | | |
|---|---|
| 1 | Measure from the hole to the floor while maintaining an angle of approximately 35 degrees |
| 2 | The mount brackets should be angled from 60 degrees to 90 degrees to each other. |

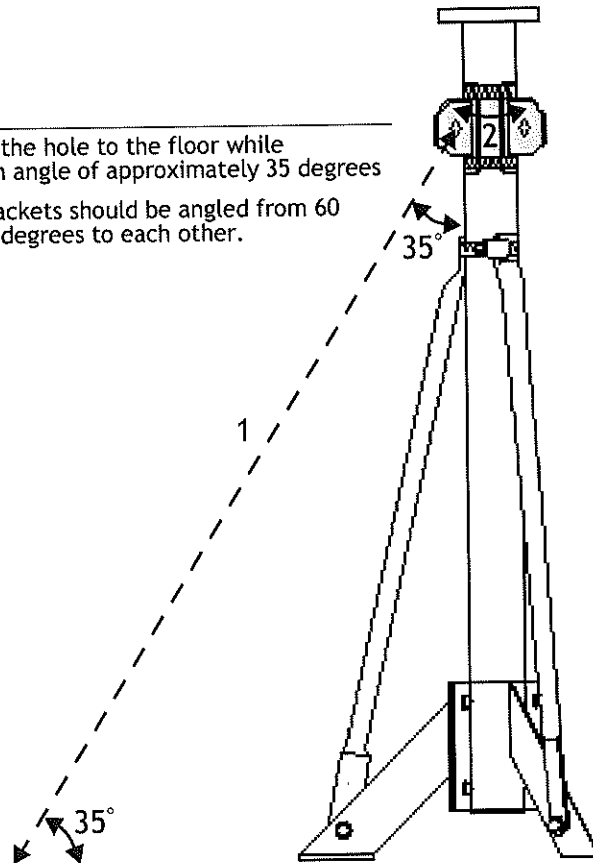


Figure 3-13. Determining the Length and Position of the Slant Braces

3. Calculate the length of the slant brace by subtracting 6 inches, or 152.4 millimeters, from the measurement that you made in [step 2](#).
4. Measure and cut the slant brace to the length that you calculated in the previous step by removing the excess from the open end.
5. Attach a slant brace to each vertical mounting bracket, ensuring that you maintain the angles of the slant braces that you determined in [step 2](#), and then tighten the pipe clamps securely.
6. Attach the slant brace floor mounting brackets to the slant brace stubs and then slide the stubs into the bottom ends of the slant braces, approximately 1 1/2 inches or 38 millimeters.

Note: Ensure that the floor brackets rest flatly on the floor.

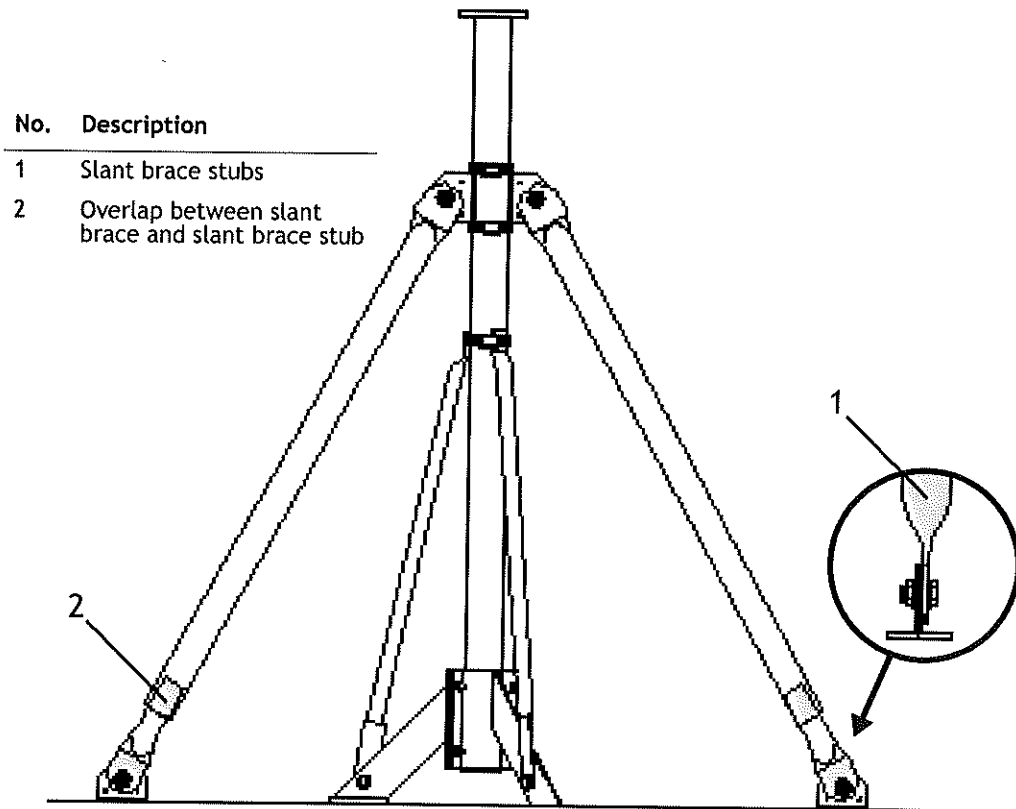


Figure 3-14. Attaching the Slant Braces and Slant Brace Stubs

7. Using the permanent marker, mark the positions of the mounting holes on the floor.
8. Anchor each bracket to the floor by inserting the two 1/2 inch by 3 inch lag bolts and lead inserts and tightening.

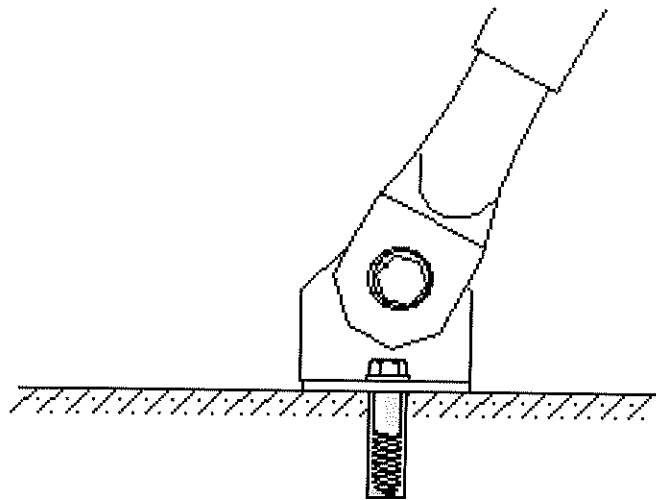


Figure 3-15. Anchoring a Slant Brace to the Floor

9. Re-verify the alignment of your Filtec 3-G.
10. Connect the points shown in the diagram.
11. Remove the pipe clamps.

No.	Description
1	Screw the brace mount brackets
2	Screw the support braces
3	Screw the slant brace feet

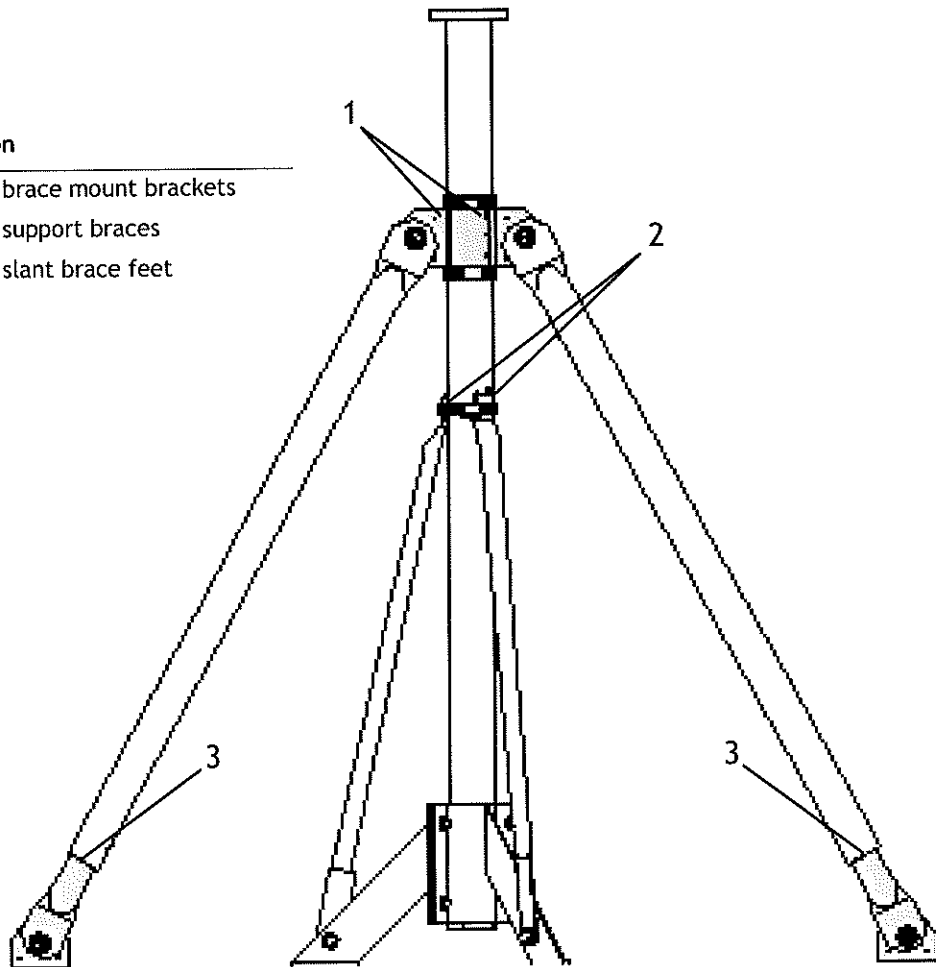


Figure 3-16. Connecting the Mounting Hardware

3.10 Installing the Air Purge System

3.10.1 Steps

Follow these steps to install the air purge system for use with your Filtec 3-G.

1. Using the supplied U bolt, attach the air filter regulator to the vertical support pipe.

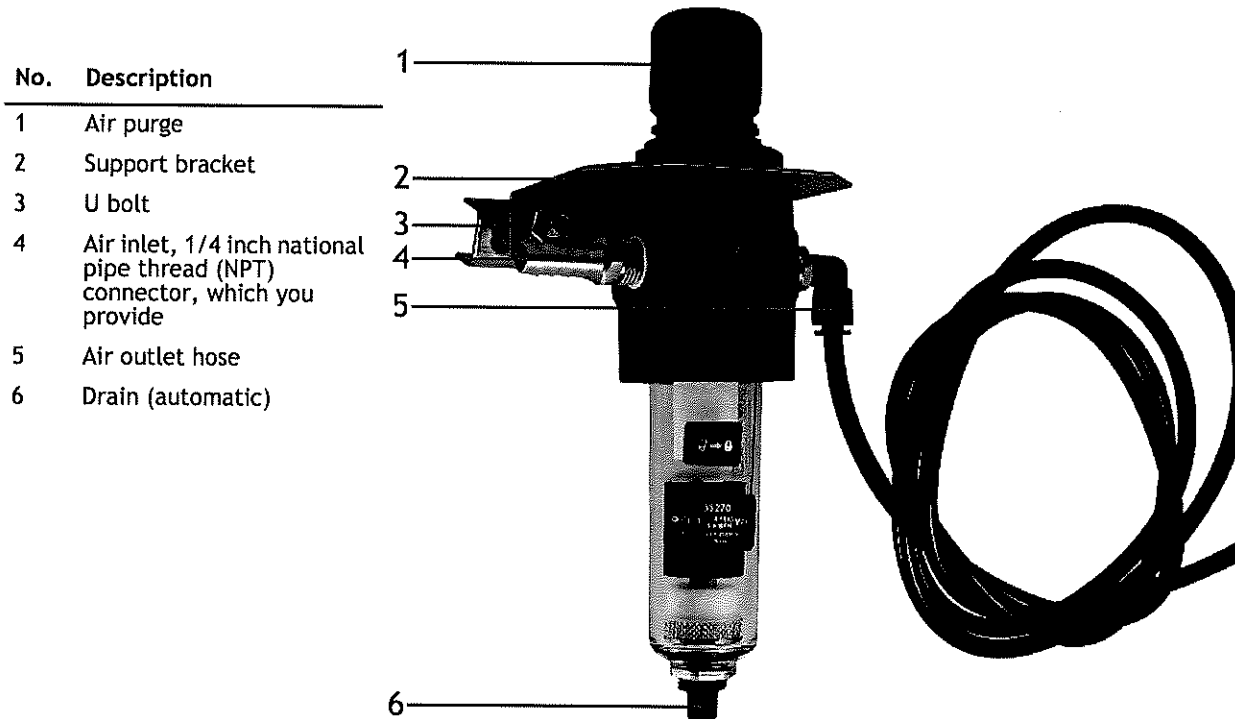


Figure 3-17. Installing the Air Purge System



Note: Alternately, you can mount the air filter regulator at another location, provided that the distance does not exceed the 40-inch, or 102 centimeter, long air hose.

2. Connect the air line from the filter or regulator to the air input of the Filtec 3-G.

No.	Description
1	Air regulator and disperser
2	Air input
3	Air hose (from the filter and regulator)

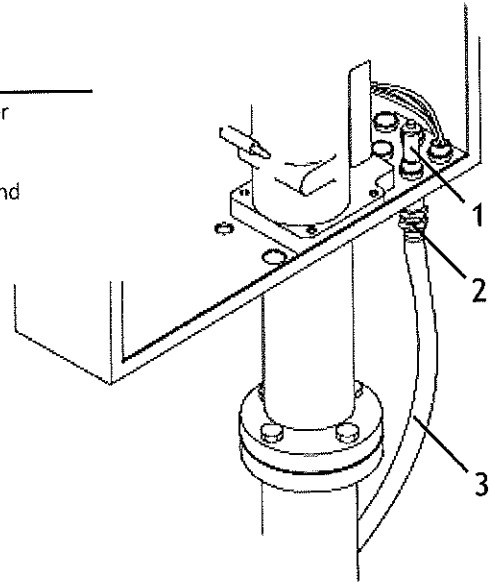


Figure 3-18. Connecting the Air Line to the Filtec 3-G

3. Connect the input air source line to the input of the air filter regulator.

3.11 Installing the High-Resolution Encoder

3.11.1 Introduction

You need to install the high-resolution encoder so that the sprocket shaft that drives the conveyor chain section that passes through the inspection area also drives the encoder.

Installing the encoder in this way ensures that it rotates at the same rate as the conveyor drive shaft.

Best Practice: Mount the high-resolution encoder inline, that is, directly attached to the shaft. If you are unable to mount the high-resolution encoder inline, offset mount it.

3.11.2 Steps: Mounting the High-Resolution Encoder Inline

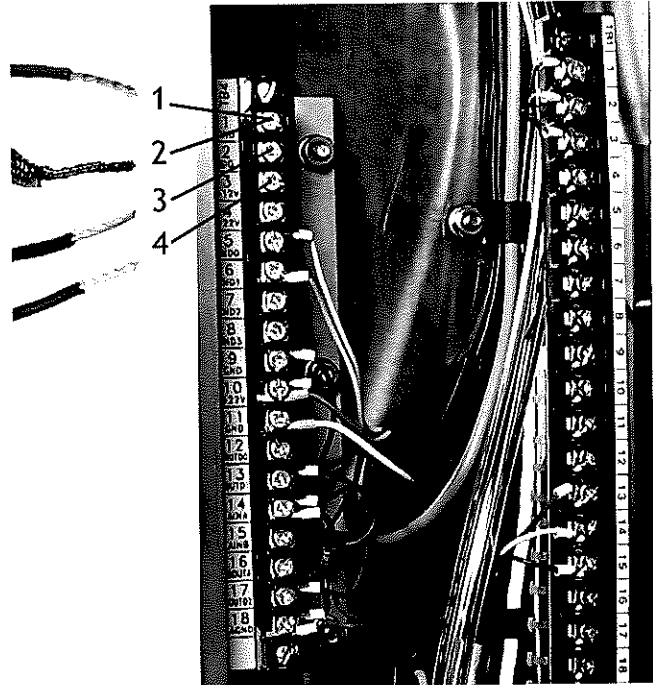
Follow these steps to mount the high-resolution encoder inline.

1. Drill and tap a 1.5-13 unified national coarse (UNC) x 0.65 inch (M12-6G x 1.65 centimeter) hole into the end of the sprocket shaft to mount the coupling stud.
2. Using Loctite 271 Red or equivalent adhesive, insert the coupling stud into the sprocket shaft.
3. Using installation drawing [I00484](#) as reference, select the drilling template in the drawing that suits your needs, and drill the encoder bracket mounting holes as directed.
4. Attach the encoder assembly by sliding the flexible shaft over the coupling stud and secure the encoder with the included screws and the shaft with the included hose clamp.

5. Route the high-resolution encoder cable through the watertight port in the bottom of the Filtec 3-G and attach the wires as described in the following chart.

If the power cable wire is... Then attach the wire to... As shown below...

Blue or ground	Terminal 1 on TB4
Shielded	Terminal 1 on TB4
Black or hot signal	Terminal 2 on TB4
Brown or voltage plus	Terminal 3 on TB4
White or spare	No terminal



No.	Description
1	Blue or ground wire, which you connect to terminal 1 on TB4
2	Shielded wire, which you connect to terminal 1 on TB4
3	Black or hot signal wire, which you connect to terminal 2 on TB4
4	Brown or voltage plus wire, which you connect to terminal 3 on TB4

Note: You do not connect the white, or spare, wire.

3.11.3 Steps: Offset Mounting the High-Resolution Encoder

Follow these steps to offset mount the high-resolution encoder.

1. Obtain the following equipment:
 - Two sprockets or flywheels that provide a 1:1 ratio
 - A timing chain or belt
 - An adapter bracket to mount the encoder over the sprocket or flywheel

2. Install your offset high-resolution encoder as shown in the following diagram.



Note: If you are unsure about how to install an offset high-resolution encoder on your conveyor, contact FILTEC Customer Support, which will assess your situation and help you devise a solution.

No.	Description
1	Conveyor drive sprocket
2	Encoder
3	Transfer pulley, shaft, and mount

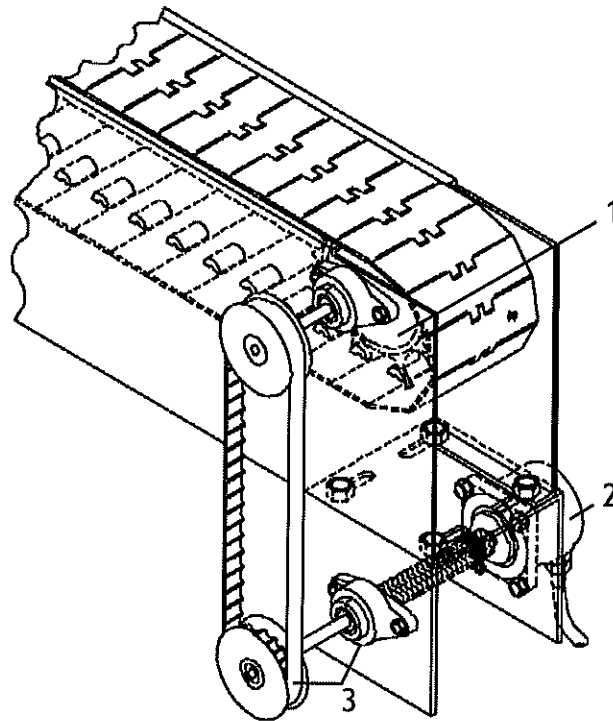
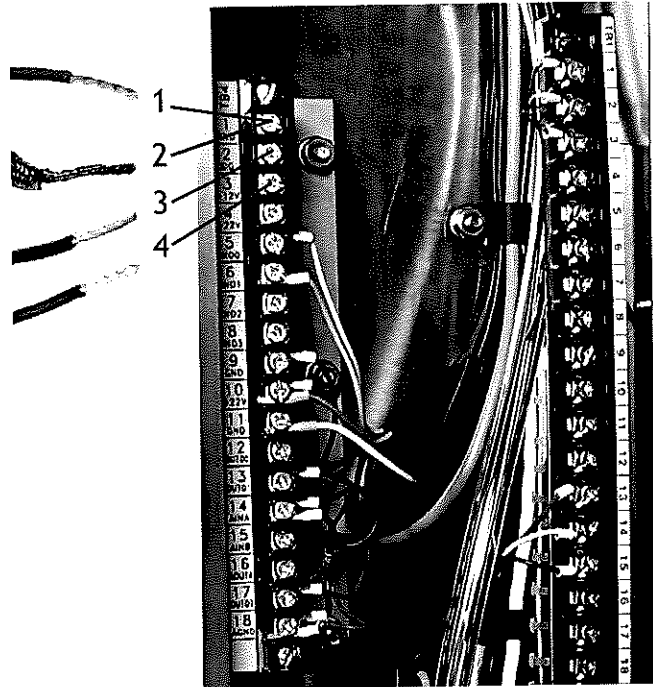


Figure 3-19. Offset Encoder Mount

3. Route the high-resolution encoder cable through one of the liquid tight fittings at the bottom of the Filtec 3-G and attach the wires as described in the following chart.

If the power cable wire is... Then attach the wire to... As shown below...

Blue or ground	Terminal 1 on TB4
Shielded	Terminal 1 on TB4
Black or hot signal	Terminal 2 on TB4
Brown or voltage plus	Terminal 3 on TB4
White or spare	No terminal



No.	Description
1	Blue or ground wire, which you connect to terminal 1 on TB4
2	Shielded wire, which you connect to terminal 1 on TB4
3	Black or hot signal wire, which you connect to terminal 2 on TB4
4	Brown or voltage plus wire, which you connect to terminal 3 on TB4

Note: You do not connect the white, or spare, wire.

3.12 Wiring the Power Cable

3.12.1 Introduction

You supply the power cable and wire it between the power source and your Filtec 3-G inspection system.



Warning: Before you attempt to wire cables to your Filtec 3-G, turn off power and disconnect *all* electrical power cables from your Filtec 3-G.

Failure to turn off power and disconnect all power cables can result in serious injury or death from electrocution.

3.12.2 Steps

Follow these steps to wire a power cable to your Filtec 3-G.

1. Obtain, cut to the length that you need, and have ready a 3-conductor power cable.



Caution: To ensure complete safety, run all power cables through liquid-tight conduit.

2. Use this table to determine what to do next.

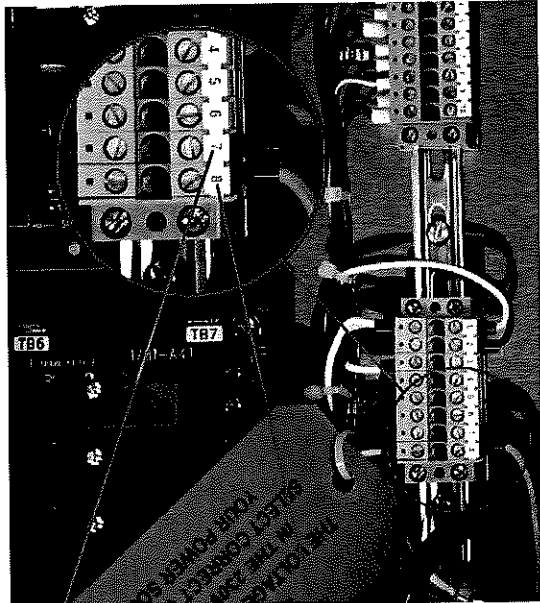
If you are wiring a power cable to a...	Then...
Filtec 3-G that <i>includes</i> an I/O junction box	<u>Wiring the Power Cable to the Filtec 3-G I/O Junction Box</u>
Filtec 3-G that <i>excludes</i> an I/O junction box	<u>Wiring the Power Cable to a Filtec 3-G Without an I/O Junction Box</u>

3.13 Wiring the Power Cable to the Filtec 3-G I/O Junction Box

3.13.1 Steps

Use this method to wire your power cable to an I/O junction box that interfaces with your Filtec 3-G.

1. Using a crimper, attach a ring terminal to the ground wire and attach ferrules to the hot and neutral wires in the power cable.
2. Remove the plug from one of the liquid tight fittings at the bottom of the I/O junction box.
3. Route the power cable through the liquid tight fitting and into the I/O junction box.
4. Use this table to determine how to connect the wires in the power cable to terminal block TB5 inside the I/O junction box.

If the power cable wire is...	Then attach the wire to...	As shown below...
Green or ground	Any available ground point in the I/O junction box	
Black or hot	Terminal 7 on TB5	
White or neutral	Terminal 8 on TB5	

No.	Description
1	Terminal 7
2	Terminal 8

5. Check the power cable to ensure that it fits snugly through the liquid tight fitting.

3.14 Wiring the Power Cable to a Filtec 3-G Without an I/O Junction Box

3.14.1 Steps

Use this method to wire the power cable to a Filtec 3-G that does *not* have the I/O junction box option.

1. Remove the cover from the inspection head of the Filtec 3-G.
2. Remove the plug from one of the liquid tight fittings at the bottom of the Filtec 3-G.
3. Route the power cable through the liquid tight fitting on the Filtec 3-G and into the inspection head.

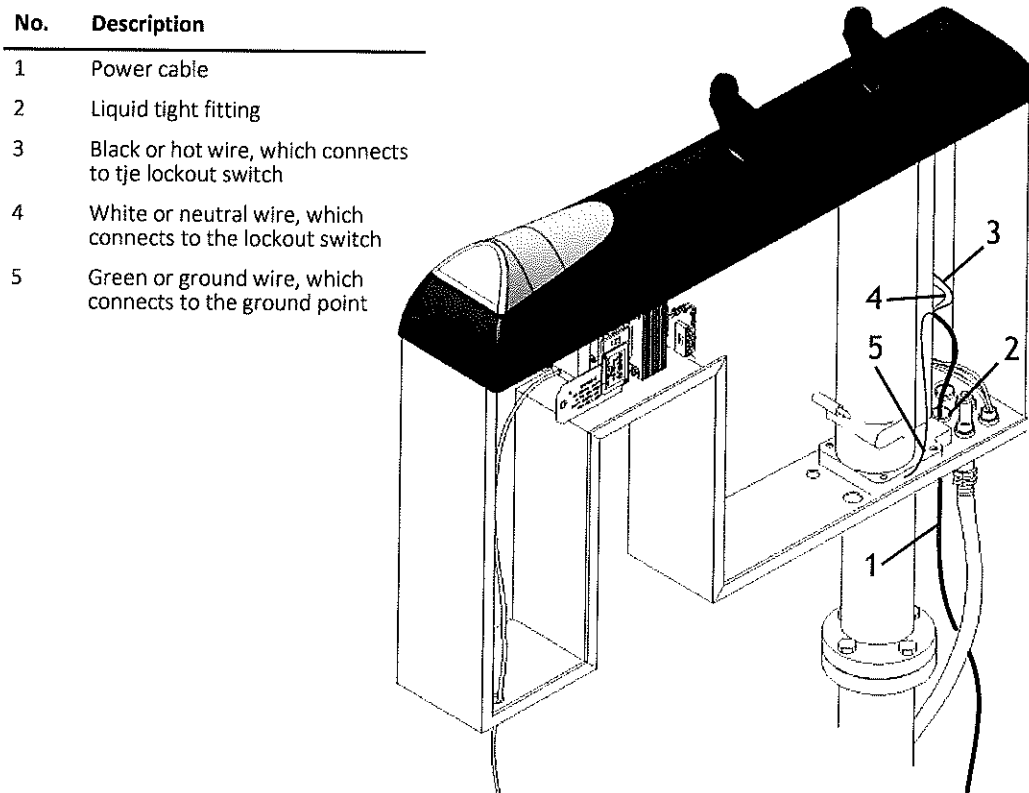
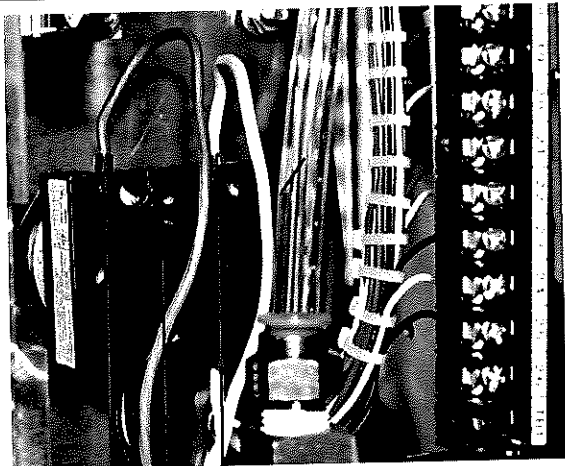


Figure 3-20. Routing the Power Cable Into the Filtec 3-G

4. Inside the inspection head, connect the wires from the power cable according to the following chart.

If the power cable wire is...	Then attach the wire to...	As shown below...								
Green or ground	Any available ground point in the Filtec 3-G									
Black or hot	The hot terminal on the lockout switch									
White or neutral	The neutral terminal on the lockout switch									
		<table><tr><th>No.</th><th>Description</th></tr><tr><td>1</td><td>Black or hot wire, which you attach to the black or hot terminal on the lockout switch</td></tr><tr><td>2</td><td>Lockout switch (from the back side)</td></tr><tr><td>3</td><td>White or neutral wire, which you attach to the white or neutral terminal on the lockout switch</td></tr></table>	No.	Description	1	Black or hot wire, which you attach to the black or hot terminal on the lockout switch	2	Lockout switch (from the back side)	3	White or neutral wire, which you attach to the white or neutral terminal on the lockout switch
No.	Description									
1	Black or hot wire, which you attach to the black or hot terminal on the lockout switch									
2	Lockout switch (from the back side)									
3	White or neutral wire, which you attach to the white or neutral terminal on the lockout switch									

5. Check to ensure that you routed the power cable correctly and safely.
6. Replace the cover of the inspection head.

3.15 Examples of Wiring the Power Cable to a Power Source

3.15.1 Introduction

This section includes examples that illustrate how to wire the power cable to a power source.

3.15.2 Example: Wiring to a Standard 115 VAC or 230 VAC Power Source With a Neutral Line

Follow these steps to wire the power cable to a standard 115 volts alternating current (VAC) or 230 VAC power source.



Caution: Ground neutral at the main power panel only. Do not ground neutral to any other point.

1. Use this chart to wire the power cable to a standard 115 VAC or 230 VAC power source.

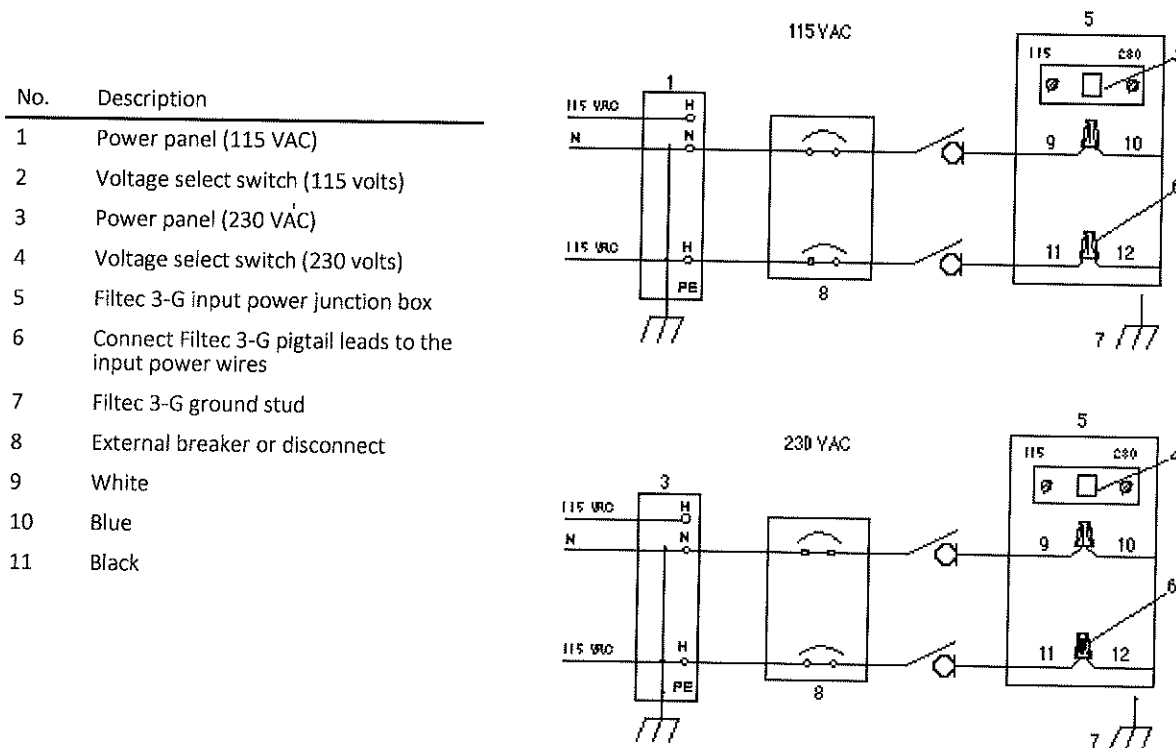


Figure 3-21. Wiring to a Standard 115 or 230 VAC Power Source With a Neutral Line

3.15.3 Example: Wiring to a Voltage Regulating Transformer

If voltage stability is a problem, wire the power cable to a voltage regulating transformer.

In this example, a transformer isolates the Filtec 3-G and converts the line voltage to the correct voltage for the Filtec 3-G.

1. Connect the secondary side of the transformer to the hot and neutral wires in the Filtec 3-G.



Note: It makes no difference which wires from the secondary side of the transformer you attach to input wires in the Filtec 3-G, but if you use color coded wires, connect white to neutral.



Important: Do *not* connect the transformer secondary terminals to neutral on the primary side because it negates the isolation properties.

2. Connect the ground stud in your Filtec 3-G to the ground system in your facility.
3. Connect the neutral wire to the ground stud in your Filtec 3-G.
4. Examine the transformer carefully to determine if it has an internal electrostatic shield.



Note: In some transformers, this shield might be attached to the transformer case or might have a separate wire lead.

5. Does the transformer have an internal electrostatic shield?

If *yes*, ground the shield to earth (either inside the Filtec 3-G or elsewhere).

If *no*, go to the next step.

6. Use this chart to wire the power cable to a voltage regulating transformer.

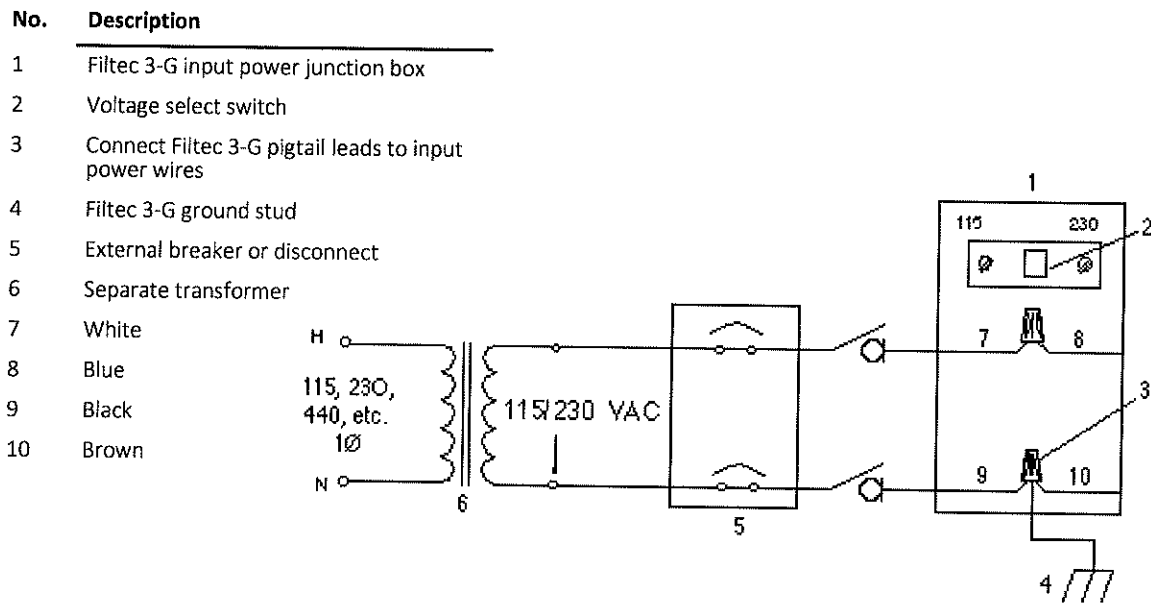


Figure 3-22. Wiring to a Voltage Regulating Transformer

3.15.4 Example: Wiring to a Polyphase or Single Phase Connection in the Same Distribution System

Follow these steps to wire the power cable to a polyphase or single phase connection in the same distribution system.

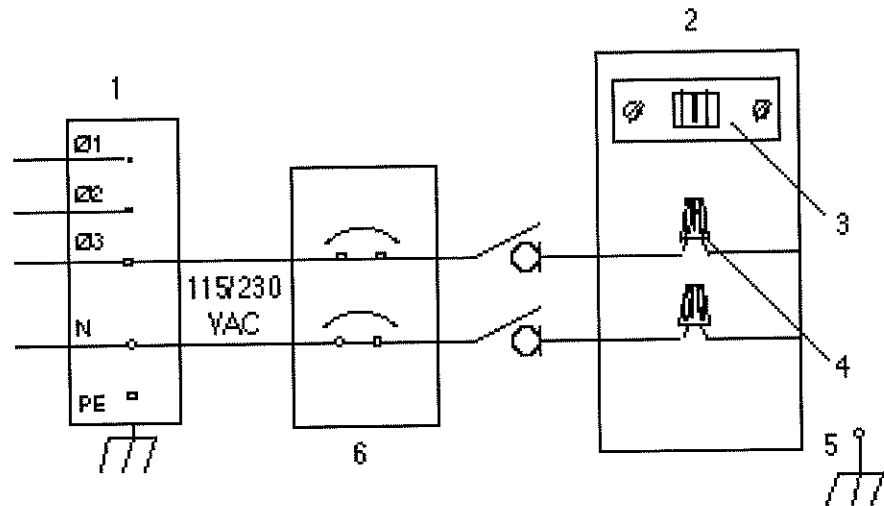
1. Connect neutral to the ground at the main power panel in your facility.
2. Connect the Filtec 3-G ground stud to the earth ground.



Important: Do *not* connect the Filtec 3-G neutral (white) wire to the ground stud.

3. Connect the Filtec 3-G hot (black) wire to any of the three legs (phases).
4. Use this chart to wire the power cable to a polyphase or single phase connection in the same distribution system.

Note: In this system, the leg to leg ($\phi 1$ to $\phi 2$, $\phi 2$ to $\phi 3$, and $\phi 1$ to $\phi 3$) voltage is 208 VAC or 380 VAC and any leg to neutral is 120 VAC or 220 VAC.



No.	Description
1	Power panel
2	Filtec 3-G power junction box
3	Voltage select switch
4	Connect Filtec 3-G pigtail leads to input power wires
5	Filtec 3-G ground stud
6	External breaker or disconnect

Figure 3-23. Wiring to a Polyphase or Single Phase Connection in a Distribution System

3.15.5 Example: Wiring to a High-Voltage Polyphase System (Delta or Wye) Through a Transformer

Follow these steps to wire the power cable to a high-voltage polyphase system through a transformer.

1. Connect the secondary side of the transformer to the hot and neutral wires in the Filtec 3-G.



Note: It makes no difference which wires from the secondary side of the transformer you attach to input wires in the Filtec 3-G, but if you use color coded wires, connect white to neutral.



Important: Do *not* connect the transformer secondary terminals to neutral on the primary side because it negates the isolation properties.

2. Connect the ground stud in your Filtec 3-G to the ground system in your facility.
3. Connect the neutral wire to the ground stud in your Filtec 3-G.
4. Examine the transformer carefully to determine if it has an internal electrostatic shield.

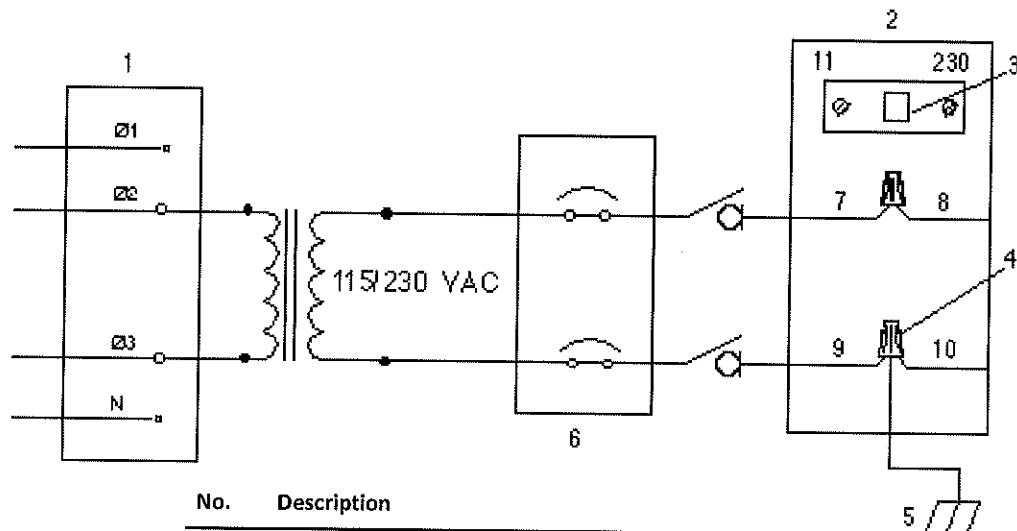
Note: In some transformers, this shield might be attached to the transformer case or might have a separate wire lead.

5. Does the transformer have an internal electrostatic shield?

If yes, ground the shield to earth (either inside the Filtec 3-G or elsewhere).

If *no*, stop, you have completed these steps.

Use this chart to wire the power cable to a voltage regulating transformer.



No.	Description
1	Power panel
2	Filtec 3-G power junction box
3	Voltage select switch
4	Connect Filtec 3-G pigtail leads to input power wires
5	Filtec 3-G ground stud
6	External breaker or disconnect
7	White
8	Blue
9	Black
10	Brown

Figure 3-24. Wiring to a High-Voltage Polyphase System Through a Transformer



4. Using the Filtec 3-G System Software

This chapter describes how to use the Filtec 3-G system software.

4.1 Operator Control Panel

4.1.1 Diagram

You interact with the Filtec 3-G through the operator control panel. The control panel contains eight keys and a two-line LCD (Liquid Crystal Display) capable of displaying 24 characters per line.

A remote, hand-held control is also available. The remote control panel detaches from the Filtec 3-G thereby allowing easier access.

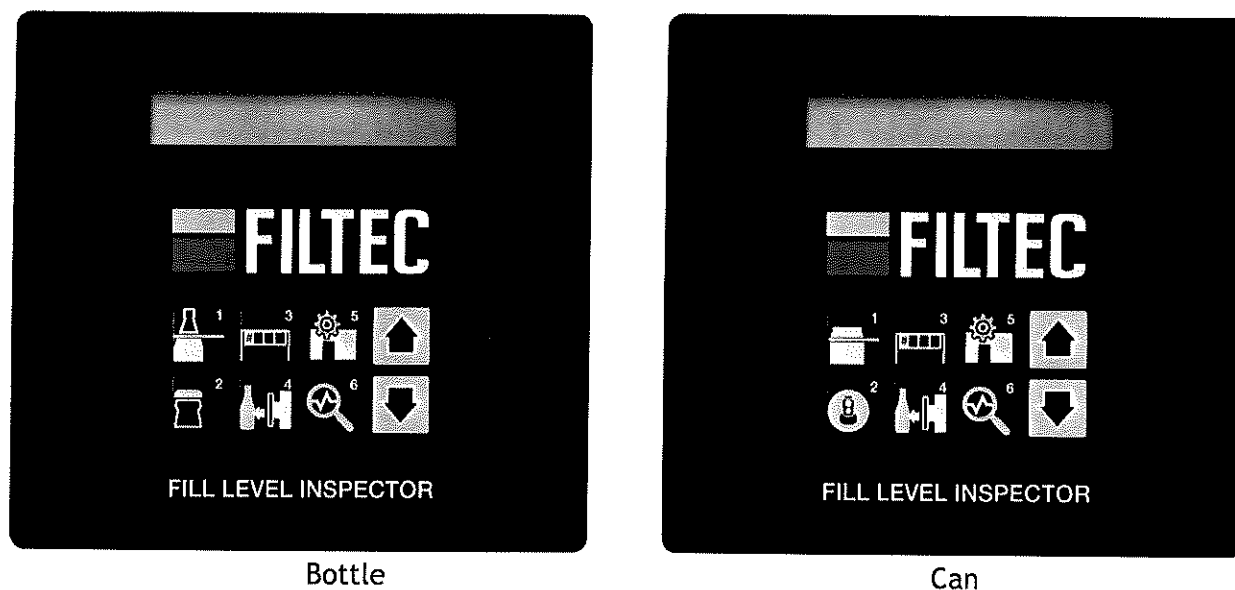


Figure 4-1. Operator Control Panel on the Filtec 3-G

4.2 Software Function Groups

4.2.1 List

The function group keys are numbered one through six, representing each of the following function groups:

- Fill Level Function Group (key 1)
- Finishing Function Group (key 2)
- Counters Function Group (key 3)
- Rejector Function Group (key 4)
- System Function Group (key 5)
- Diagnostic Function Group (key 6)

Operator's access to the Filtec 3-G's system software grants you rights to specific functions required to operate the unit, therefore you will have limited access to each function group.

Function Keys

Pressing a function key displays the first available function in that group. Repeatedly pressing the same function key scrolls through the list of available functions.

Arrow Keys

The arrow keys allow you to change a parameter value, enable/disable a function, reset shift counters, or clear an error.

After you select the correct function with a function key, press the up arrow to increase a value or press the down arrow to decrease a value. Holding the key down will rapidly increase the value. After you make a change, press another function key, or wait 5 seconds, and the value is automatically entered into memory.

4.3 Software Functions

4.3.1 Table

There are two types of software functions: status and operating. Status functions display information about the status of a software function or system component. Pressing the arrow keys has no effect on a status function because it is not a changeable parameter, it only provides current operating information for a particular software function.

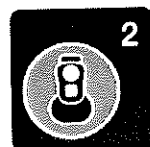
Operating functions allow you to change software function values (parameters). Using the arrow keys allows you to change a value, clear an error, or turn a function on or off.

The following list contains the software functions that are available to the Operator's access level. For more information see "Software Function Descriptions" on page 2-13.

Use this key...	To display the function...	Which you can set to...	Or use default value...
Fill Level Key 1			
	XRAY SOURCE 	ON or OFF	OFF
	UNDERFILL STATUS 	ON or OFF	OFF
	OVERFILL STATUS 	ON or OFF	OFF
	GAMMA COUNTS 	0 through 65535 Counts UPDATING CONSTANTLY UPDATING ON REJECT ONLY	UPDATING CONSTANTLY
	GAMMA THRESHOLD 	0 through 15000 counts	1900 Counts
	LOOKTIME GATE 	1 through 120 milliseconds	20 ms
	TARGET HEAD HEIGHT 	0 through 999 ticks	500 TICK(S)

Use this key...	To display the function...	Which you can set to...	Or use default value...
-----------------	----------------------------	-------------------------	-------------------------

Finishing Key 2



EXTERNAL REJECT STATUS

ON or OFF

OFF

EXTERNAL REJECT STATUS
ON

BULGED ENDS STATUS

ON or OFF

OFF

BULGED ENDS STATUS
ON

MISSING LID STATUS

ON or OFF

OFF

MISSING LID STATUS
ON

WIDTH AT DOWN CAN

1 through 250 millimeters

66 mm

WIDTH AT DOWN CAN
66 mm

DOWN CAN STATUS

ON or OFF

OFF

DOWN CAN STATUS
ON

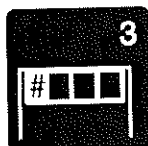
HEIGHT OF CAN

1 through 250 millimeters

125 millimeters

HEIGHT OF CAN
125 mm

Counters Key 3



TOTAL THROUGHPUT

0 through 65535 (0.00%)
containers

TOTAL THROUGHPUT
0 CAN(S)

TOTAL REJECTS

0 through 65535 (0.00%)
containers

TOTAL REJECTS
0 (0.00%) CAN(S)

TOTAL UNDERFILL

0 through 65535 (0.00%)
containers

TOTAL UNDERFILL
0 (0.00%) CAN(S)

TOTAL DOWN CAN

0 through 65535 (0.00%)
containers

TOTAL DOWN CAN
0 (0.00%) CAN(S)

TOTAL OVERFILL

0 through 65535 (0.00%)
containers

TOTAL OVERFILL
0 (0.00%) CAN(S)

TOTAL MISSING LID

0 through 65535 (0.00%)
containers

TOTAL MISSING LID
0 (0.00%) CAN(S)

Use this key...	To display the function...	Which you can set to...	Or use default value...
	TOTAL BULGED ENDS 	0 through 65535 (0.00%) containers	
	TOTAL EXTERNAL REJECT 	0 through 65535 (0.00%) containers	
	RESET ALL COUNTERS 	(EXECUTE)	
	RESET TOTAL THROUGHPUT 	(EXECUTE)	
	RESET TOTAL REJECTS 	(EXECUTE)	
	RESET UNDERFILL 	(EXECUTE)	
	RESET OVERFILL 	(EXECUTE)	
	RESET EXTERNAL REJECT 	(EXECUTE)	

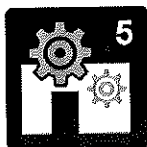
Rejector Key 4

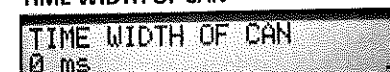


REJECTOR STATUS 	ON or OFF	OFF
FIRE REJECTOR ON DEMAND 	(EXECUTE)	OFF
REJECTOR PULSE WIDTH 	0 through 250 milliseconds	10 ms
REJECT NEXT CAN 	(EXECUTE)	
INSPECT TRIG TO C/L REJ 	67 through 4000 millimeters	500 mm

Use this key...	To display the function...	Which you can set to...	Or use default value...
	REJECTOR REACTION DELAY 	1 through 150 milliseconds	11 ms

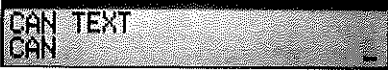
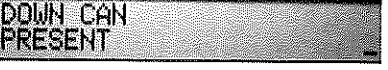
System Key 5



CLEAR SYSTEM 	(EXECUTE)	
LAST REJECT DETECTED 	NONE to the actual reject	
CURRENT LANGUAGE 	ENGLISH PORTUGUESE SPANISH GERMAN FRENCH	ENGLISH
	Note: Other languages are available on request.	
BEACON STATUS 	ON OFF HIGH PRIORITY ONLY	ON
SPT/MON P16 PORT STATUS 	LC= RX= TX=	LC=0 RX=0 TX=0
PLC OUTPUT PULSE WIDTH 	1 through 120 milliseconds	20 ms
CURRENT CAN TYPE 	1 through 32	1
LINE SPEED (CPM) 	0 through 2500 containers per minute	
LINE SPEED (CPH) 	0 through 150000 containers per hour	
SYSTEM DISPLAY 	OPERATE CALIBRATE	OPERATE
TIME WIDTH OF CAN 	0 through 65535 milliseconds	

Use this key...	To display the function...	Which you can set to...	Or use default value...
	CHAIN VELOCITY CHAIN VELOCITY 0 METERS/MIN	0 through 300 meters per minute	
	LOAD DEFAULT CONSTANTS LOAD DEFAULT CONSTANTS (EXECUTE)	(EXECUTE)	
	CAN WIDTH AT TRIG CAN WIDTH AT TRIG 55 mm	1 through 250 millimeters	55 mm
	MAXIMUM CAN DIAMETER MAXIMUM CAN DIAMETER 66 mm	1 through 400 millimeters	66 mm
	MAXIMUM LINE SPEED MAXIMUM LINE SPEED 1400 CPM	1500 containers per minute	1400 cpm
	CONVEYOR DRIVE SPROCKET CONVEYOR DRIVE SPROCKET 22 TEETH	18 through 29 teeth	22 TEETH
	CONVEYOR SEGMENT PITCH CONVEYOR SEGMENT PITCH 381 (1/10th) mm	50 through 700 (1/10th) millimeters	381 (1/10th) mm
	TEETH/CONVEYOR SEGMENT TEETH/CONVEYOR SEGMENT 2	1 through 3 teeth	2
	MAXIMUM CONVEYOR SPEED MAXIMUM CONVEYOR SPEED 120 METERS/MIN	21 through 120 meters per minute	120 METERS/MIN
	CALIBRATE ENCODER VALUE CALIBRATE ENCODER VALUE 2977 ENC PULSES/10 M	Encoder pulses per 10 meters	Encoder pulses per 10 meters
	ENCODER PRE-SCALER VALUE ENCODER PRE-SCALER VALUE 4 ENC PULSES	2 through 50 encoder pulses	4 ENC PULSES
	GAMM SAMPLE CUTOFF LIMIT GAMM SAMPLE CUTOFF LIMIT 4 SAMPLES	0 through 50 samples	4 SAMPLES
	GAMM SAMPLES PER ENCODER GAMM SAMPLES PER ENCODER 0 SAMPLES	0 through 50 samples	0 SAMPLES

Use this key...	To display the function...	Which you can set to...	Or use default value...
	CHANGE PASSWORD 	(EXECUTE) Note: You can specify up to three digits. Each digit can range from 1 through 6 only.	222
	VIEW PLC PIN ASSIGNMENTS 	(EXECUTE)	
	# OF CONTAINER TYPES 	1 through 32	5
	FILL LEVEL 	PRESENT or NOT PRESENT	PRESENT
	XRAY SOURCE 	PRESENT or NOT PRESENT	PRESENT
	REJECT VERIFICATION 	PRESENT or NOT PRESENT	NOT PRESENT
	REJECTOR TYPE 	H.S. LS-3 SLAT SERVOTEC SERVOTEC II Std. PROLINE H.S. PROLINE SLAT H.L. SLAT Std. LS-3 SLAT	STD. PROLINE
	ENCODER RESOLUTION 	500 ENC PULSES through 5000 ENC PULSES	500 ENC PULSES
	KNOWN CHAIN PITCH & TEETH 	PRESENT or NOT PRESENT	PRESENT
	REMOTE CLEAR INPUT 	NOT PRESENT TB1_2 bit 0 TB1_8 bit 1 TB1_5 bit 2 TB1_11 bit 3 TB1_23 bit 4 TB1_14 bit 5 TB1_17 bit 6 TB1_20 bit 7 TB4_5 bit 8 TB4_6 bit 9 TB1_7 bit 10 TB4_8 bit 11	TB4_8 bit 11

Use this key...	To display the function...	Which you can set to...	Or use default value...
	SAVE DEFAULT CONSTANTS 	(EXECUTE)	
	CAN TEXT 	Up to 10 alphanumeric characters maximum	CAN
	CONTAINER TYPE TEXT 	Up to 17 alphanumeric characters maximum	1
	UNDERFILL TEXT 	Up to 17 alphanumeric characters maximum	UNDERFILL
	OVERFILL TEXT 	Up to 17 alphanumeric characters maximum	OVERFILL
	BULGED ENDS 	PRESENT or NOT PRESENT	NOT PRESENT
	BULGED ENDS TEXT 	Up to 17 alphanumeric characters maximum	BULGED ENDS
	DOWN CAN 	PRESENT or NOT PRESENT	NOT PRESENT
	DOWN CAN TEXT 	Up to 17 alphanumeric characters maximum	BULGED ENDS
	SERIAL DATA ID NUMBER 	1 through 62	
	HOST MODBUS PORT STATUS 	LC= RX= TX=	LC=0 RX=0 TX=0
	MODBUS MESSAGE COUNTERS 	OK= BAD= OTHER=	OK=0 BAD=0 OTHER=0
	ALARM UNDERFILL 	ON or OFF	OFF

Use this key...	To display the function...	Which you can set to...	Or use default value...
	ALARM OVERFILL 	ON or OFF	OFF
	ALARM DOWN CAN 	ON or OFF	OFF
	ALARM EXTERNAL REJECT 	1 through 125 containers or OFF	OFF
	VIEW TB1&4 PIN ASSIGN. 	(EXECUTE) TRIGGER BEAM 3 MISSING CAP BACKUP SENSOR REJECT VERIFIER UPSTM EXT REJ LOW RES ENCODER REJECTOR POWER REJECTOR DRIVER HIGH RES ENCODER OILER DRIVER SLAT SENSOR XRAY ENABLED XRAY FAILED INPUT TB4- 6 EXTERNAL REJECT TB4- 7 REMOTE CLEAR **COMPLETED**	
	VIEW PLC PIN ASSIGNMENTS 	(EXECUTE)	
	EXTERNAL REJECT 	PRESENT or NOT PRESENT	NOT PRESENT
	EXTERNAL REJECT TEXT 	Up to 17 alphanumeric characters maximum	
	SERIAL INTERFACE 	NOT PRESENT IDC INTERFACE MODBUS INTERFACE	NOT PRESENT
	CALIBRATE ENCODER 	(EXECUTE)	

Use this key...

To display the function...

Which you can set to...

Or use default value...

Diagnostics Key 6



SYSTEM DIAGNOSTIC ERROR

SYSTEM DIAGNOSTIC ERROR
124 (ARROWS CLEAR ERROR)

0 through 179

(ARROWS CLEAR ERROR)

4.4 Software Function Descriptions

4.4.1 Introduction

This section contains function descriptions for each function group. Depending on the type of Filtec 3-G system that you have, machine configuration, and options package, some of these options might not apply to your Filtec 3-G.

4.4.2 Fill Level Functions Group



UNDERFILL STATUS

This function turns on and turns off the rejection of underfilled containers.

Deactivating this function inhibits the rejection of containers with fill levels below the underfill threshold. It does not turn off underfill inspection, it only stops the rejector from rejecting underfills.

Underfill and overfill cannot be active simultaneously on selected configurations of the Filtec 3-G.

OVERFILL STATUS

This function turns on and turns off the rejection of overfilled containers.

Deactivating this function inhibits the rejection of containers with fill levels above the overfill threshold. It does not turn off overfill inspection, it only stops the rejector from rejecting overfills.

Underfill and overfill cannot be active simultaneously on selected configurations of the Filtec 3-G.

GAMMA COUNTS

This function indicates the gamma ray count for the container that was most recently rejected or inspected.

You can specify that you want to update the count constantly by pressing an arrow key and selecting **UPDATING CONSTANTLY** or you can specify that you want to update the count only when the Filtec 3-G rejects a container by pressing an arrow key and selecting **UPDATING ON REJECT ONLY**.

The gamma count is the amount of radiation that passes through the container and is captured by the radiation sensor. Each container's gamma count is compared to the target fill level, underfill, and overfill thresholds for that container type. If the gamma count falls outside these threshold parameters, the Filtec 3-G rejects the container.

GAMMA THRESHOLD

Establishes the threshold value that the gamma counts must:

- Exceed for underfill rejection
- Not exceed for overfill rejection

Any gamma count value that falls outside of the **GAMMA THRESHOLD** value that you specify triggers a rejection.

LOOKTIME GATE

The time, in milliseconds, during which Filtec 3-G records gamma ray counts for each container.

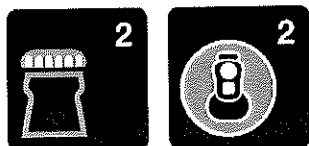
The looktime gate value is determined by the container's width at the inspection point and the conveyor speed. In simplified terms, it is the amount of time that the container requires to pass through the gamma ray inspection beam.

See also **TIME WIDTH OF CAN.**

TARGET HEAD HEIGHT

This function displays the head height setting for the current container type. When your Filtec 3G is working correctly, this setting and the height that is indicated in the head height counter (Figure 3-4-1 on page 3-2) match.

4.4.3 Container Finish Functions Group



BULGED ENDS STATUS

This function activates and deactivates bulged ends detection. Bulged ends detection is based on the difference between the height of the container with a correctly seated lid and height of the container with an incorrectly seated lid.

MISSING LID STATUS

This function activates and deactivates missing lid detection. Missing lid detection uses proximity and optical sensors to detect the presence or absence of a lid.

EXTERNAL REJECT STATUS

This function activates and deactivates the external reject function. When activated, the Filtec 3-G accepts the reject signal from an outside inspection source and activates the rejector.

DOWN CAN STATUS

This function activates and deactivates the down can detection function for cans.

WIDTH AT DOWN CAN

This function indicates the container diameter at the point where it intersects the down can sensor beam.

HEIGHT OF CAN

This function indicates the height of the can, in millimeters.

4.4.4 Counters Functions Group



The counters record operational and performance data about the Filtec 3-G and the production line on which it is operating. This data is useful for plant performance management and for machine maintenance. Here are some other issues of which you should be aware:

- The counters are active only for those functions that are active. If you disable a function, the associated counter (or counters) no longer include that function in the count.
- When you reset a counter, the current count is erased. If you need the current count, you should record it before you reset the counter.

TOTAL THROUGHPUT

This function displays the total number of containers that passed through the trigger beam. The counter automatically resets at 99999999.

TOTAL REJECTS

This function displays the total number of containers that the Filtec 3-G rejected. The counter automatically resets at 99999999.

This function indicates the sum of the rejections from all active inspection functions. If two functions reject the same container, only one total reject count is recorded.

The reject next can function is included in the value that the total rejects function displays.

TOTAL UNDERFILL

This function indicates the total number of underfilled containers that failed the fill level inspection. The counter automatically resets after 65535.

TOTAL OVERFILL

This function displays the total number of overfilled containers that failed the fill level inspection. The counter automatically resets after 65535.

TOTAL MISSING LID

This function displays the total number of cans that the Filtec 3-G detected that had missing lids. The counter automatically resets after 65535.

TOTAL BULGED ENDS

This function displays the total number of cans that the Filtec 3-G detected that had bulged lids. The counter automatically resets after 65535.

TOTAL DOWN CAN

This function displays the total number of down cans that the Filtec 3-G detected. The counter automatically resets after 65535.

TOTAL EXTERNAL REJECT

This function displays the total number of external reject signals that the Filtec 3-G received. The counter automatically resets after 65535.

RESET ALL COUNTERS

This function clears and resets all counters to zero.



Caution: Record all valuable data before executing this function.

To reset this counter:

1. On the operator control panel, press key 3 until your Filtec 3-G displays **RESET ALL COUNTERS** on the two-line display.
2. Press the arrow key to execute.

RESET TOTAL THROUGHPUT

This function clears and resets the total throughput counter to zero.



Caution: Record all valuable data before executing this function.

To reset this counter:

1. On the operator control panel, press key 3 until your Filtec 3-G displays **RESET TOTAL THROUGHPUT** on the two-line display.
2. Press the arrow key to execute.

RESET TOTAL REJECTS

This function clears and resets the total rejects counter to zero.



Caution: Record all valuable data before executing this function.

To reset this counter:

1. On the operator control panel, press key 3 until your Filtec 3-G displays **RESET TOTAL REJECTS** on the two-line display.
2. Press the arrow key to execute.

RESET UNDERFILL

This function clears and resets the total underfill counter to zero.



Caution: Record all valuable data before executing this function.

To reset this counter:

1. On the operator control panel, press key 3 until your Filtec 3-G displays **RESET TOTAL UNDERFILL** on the two-line display.

2. Press the arrow key to execute.

RESET OVERFILL

This function clears and resets the total overflow counter to zero. Record all valuable data before executing this function.

To reset this counter:

1. On the operator control panel, press key 3 until your Filtec 3-G displays **RESET OVERFILL** on the two-line display.
2. Press the arrow key to execute.

RESET EXTERNAL REJECT

This function clears and resets the total external rejects counter to zero.



Caution: Record all valuable data before executing this function.

To reset this counter:

1. On the operator control panel, press key 3 until your Filtec 3-G displays **RESET EXTERNAL REJECT** on the two-line display.
2. Press the arrow key to execute.

4.4.5 Rejector Functions Group



REJECTOR STATUS

This function disables or enables the reject signal transmitted by the Filtec 3-G to the rejector. This function also affects the external reject function in the same way. Although the actual rejection is disabled all counters and alarms continue to accumulate.

FIRE REJECTOR ON DEMAND

This function fires the rejector manually. This function is used to test the rejector mechanism or to manually activate it during start-up to provide initial lubrication under no load.

To execute this function:

1. On the operator control panel, press key 4 until your Filtec 3-G displays **FIRE REJECTOR ON DEMAND**.
2. Press the arrow key.

Result: Your Filtec 3-G fires the rejector.

REJECTOR PULSE WIDTH

This function specifies the amount of time, in milliseconds, that your Filtec 3-G applies voltage to the rejector solenoid. This translates into the speed with which the rejector ram extends and returns to the ready position.

REJECT NEXT CAN

This function defines the number of containers that you want to consecutively reject (also called batch reject).

You specify the number of containers to reject and the Filtec 3-G continues to reject containers until the counter reaches zero.

All containers that are rejected with this function are included in the total rejects counter.

This function is useful during testing and calibration procedures.

To activate this function:

1. On the operator control panel, press key 4 until your Filtec 3-G displays **REJECT NEXT CAN**.
2. Press the arrow key to enter the number of containers to reject.

INSPECT TRIG TO C/L REJ

This function specifies the distance, in millimeters, from the center line of the inspection trigger beam to the center line of the rejector pad.

This value is required to establish the correct time for the rejector to actuate so the center line of the rejector pad impacts the center line of the container.

REJECTOR REACTION DELAY

You use this function to specify the response time in milliseconds between when the container fails inspection and when the reject signal is sent to the rejector. The Filtec 3-G's processor uses this value to establish a lead time for the rejector pulse to compensate for the inertia of the rejector mechanism.

4.4.6 System Functions Group



CURRENT CAN TYPE

This function specifies the system parameters that describe a particular container type.

Your Filtec 3-G automatically uses the parameters that you specify when you later change over to and activate a container type.

You specify the number of container types that you intend to use by using the **# OF CONTAINER TYPES** function. You specify the name of each container type with the **CAN TEXT** function.

If your production line is set up for more than one container type, this function enables you to switch to different container production without having to reconfigure the software function parameters.

This function is only available if your Filtec 3-G is configured for multiple container types.

To select the **CURRENT CAN TYPE**:

1. On the operator control panel, press key 5 until your Filtec 3-G displays **CURRENT CAN TYPE**.
2. Press the arrow key until your Filtec 3-G displays the container type that you want.

LAST REJECT DETECTED

This function indicates the type of failure that caused the most recent reject container. The failure classification can be any of the inspection capabilities installed and active on your Filtec 3-G.

SPT/MON P16 PORT STATUS

This function displays the character information in a FILTEC Intellect product communication string. The FILTEC Intellect product is usually connected to the serial port located on connector P16 of the Filtec 3-G CPU card. The counters have a range from 0 to 255 inclusive and are then reset.

- LC is the last character that was received by the Filtec 3-G.
- RX is a count of the characters received by the Filtec 3-G.
- TX is a count of the characters transmitted by the Filtec 3-G.

BEACON STATUS

This function determines the operational status of the warning beacon. There are three status choices:

- **ON:** the beacon flashes once for each rejected container and continuously when a diagnostic error occurs. The beacon stops flashing when you clear the diagnostic error.
- **OFF:** The beacon will flash once for each rejected container.
- **HIGH PRIORITY ONLY:** The beacon flashes once for each rejected container and continuously when a high priority diagnostic error occurs. The beacon stops flashing when you clear the diagnostic error.

LINE SPEED (CPM)

This function indicates the speed of the production line measured by the number of containers per minute (cpm).

The measurement is the number containers that intercept the Filtec 3-G's trigger beam within 60 seconds inclusive. To calculate the number of containers per minute from the number of containers per hour, use the formula:

$$\frac{\text{cph}}{60} = \text{cpm}$$

LINE SPEED (CPH)

This function indicates the speed of the production line measured by the number of containers per hour.

The measurement is the number containers that intercept the Filtec 3-G's trigger beam within 60 minutes. To calculate the number of containers per hour from the number of containers per minute, use the formula:

$$\text{cpm} \times 60 = \text{cph}$$

SYSTEM DISPLAY

This function switches the system between operate mode and calibrate mode.

Operate mode is the normal operating mode for the Filtec 3-G and allows access only to those functions required for production operation.

Calibrate mode grants you complete access to all system functions, including configuration and container programming functions.

When you activate the password function, you must enter the password before you are granted access to calibrate mode.

When you place the Filtec 3-G in calibrate mode, if the Filtec 3-G is idle (that is, you do not press any keys) for 30 minutes, the system automatically returns to operate mode.

To switch operating modes:

1. On the operator control panel, press key 5 until your Filtec 3-G displays **SYSTEM DISPLAY**.
2. Press the arrow key to select either operate or calibrate mode. If the password protect function is enabled, you must enter the password before you can access calibrate mode.

CONVEYOR DRIVE SPROCKET

This function specifies the number of teeth on the sprocket that is physically contacting the conveyor chain. This is the primary value that your Filtec 3-G uses to calibrate the encoder.

SERIAL DATA ID NUMBER

This function specifies the Filtec 3-G's serial port identification number. This function applies only to units equipped with either the IDC or Modbus serial communications options.

HOST/MODBUS PORT STATUS

This function displays the character information in a Modbus serial communication string. The counters have a range from 0 to 255 inclusive and then reset.

- LC is the last character that was received by the Filtec 3-G.
- RX is a count of the characters received by the Filtec 3-G.
- TX is a count of the characters transmitted by the Filtec 3-G.

Pressing the arrow key sends the test message **IDC HOST/MODBUS TEST MESSAGE** and the Filtec 3-G increments the TX counter by 30.

MODBUS MESSAGE COUNTERS

This function displays the number of Modbus messages that the Filtec 3-G receives and defines as good, bad, or other.

- Good is the number of good messages that the Filtec 3-G receives.
- Bad is the number of bad messages that the Filtec 3-G receives.
- Other is the number of messages that Filtec 3-G receives that have an incorrect serial identification number.

PLC OUTPUT PULSE WIDTH

This function defines the output pulse width of all pulsed PLC outputs.

You can adjust the range from 1 to 120 milliseconds (ms). The output pulse from inspection functions is timed to pulse at the moment detection is made.

The total reject output pulse occurs when the Filtec 3-G fires the rejector. The total throughput pulse occurs when the container passes through the inspection trigger.

TIME WIDTH OF CAN

This function indicates the time, in milliseconds, that it takes a container to pass through the trigger beam. See also **LOOKTIME GATE**.

To change this value:

1. On the operator control panel, press key 5 until your Filtec 3-G displays **TIME WIDTH OF CAN**.
2. Ensure that the conveyor is running at maximum production speed.
3. Place a sample production container on the conveyor far enough upstream of the Filtec 3-G so that the container is positioned correctly and does not slip on the conveyor chain as it passes through the inspection area.

Result: Your Filtec 3-G displays a value after the **TIME WIDTH OF CAN** function on the two-line display.

4. Record the value that your Filtec 3-G displays.
5. Repeat step 3 and step 4 four more times and then calculate the looktime using the following equation.

$$\left(\frac{a + b + c + d + e}{5} \right) \times 0.6 = \text{Looktime}$$

6. On the operator control panel, press key 1 until your Filtec 3-G displays **LOOKTIME GATE**.
7. Use the arrow key to enter the value that you calculated for the looktime.

CHAIN VELOCITY

This function calculates the velocity of the conveyor chain in meters per minute (mpm).

Your Filtec 3-G automatically calculates this value.

ALARM UNDERFILL

This function specifies the minimum number of consecutive underfill rejects that trigger an alarm condition.

Your Filtec 3-G a resets the count to zero when it detects a good container.

This function can alert you to filler malfunctions.

ALARM OVERFILL

This function specifies the minimum number of consecutive overfill rejects that trigger an alarm condition.

Your Filtec 3-G a resets the count to zero when it detects a good container.

This function can alert you to filler malfunctions.

ALARM EXTERNAL REJECT

This function specifies the minimum number of consecutive external rejects that trigger an alarm condition.

Your Filtec 3-G resets the count to zero when chain of consecutive external reject signals is broken.

This function also can alert you when inspection problems occur at the external inspection unit.

LOAD DEFAULT CONSTANTS

This function retrieves the user defaults that your Filtec 3-G saved when an operator last ran the **SAVE USER DEFAULTS** function.

When you save the user defaults, they become the new active configuration for your Filtec 3-G.

To load the default constants:

1. On the operator control panel, press key 5 until your Filtec 3-G displays **LOAD DEFAULT CONSTANTS**.
2. Press the arrow key.

Result: Your Filtec 3-G loads the default constants.

CAN WIDTH AT TRIG

This function specifies the width, in millimeters, of the container at the point where it intercepts the trigger beam as it travels on the conveyor.

Your Filtec 3-G requires this value to establish the correct time for the rejector to actuate so that the center line of the rejector pad contacts the center line of the container.

MAXIMUM CAN DIAMETER

This function specifies the maximum diameter of the current container type that you are running. You need to set this value for all container types.

MAXIMUM LINE SPEED

This function specifies the maximum production speed of the conveyor, which is defined as containers per minute (CPM).

MAXIMUM CONVEYOR SPEED

This function specifies the maximum production speed of the conveyor, which is defined as meters per minute (MPM).

CHANGE PASSWORD

This function enables you to enter a three (3) digit password.

When the password option is active, you must enter the password to enter calibrate mode.

FILTEC sets the password to 222 at the factory. To change the password:

1. Remove the cover of your Filtec 3-G to gain access to dip switch S1-8.

2. Close dip switch S1-8.



Note: S1-8 is located on the processor card.

You must close dip switch S1-8 to display the **CHANGE PASSWORD** function. To disable the password protect function, close dip switch S1-8.

3. On the operator control panel, press key 5 until your Filtec 3-G displays **SYSTEM DISPLAY**.

4. Press the arrow key.

Result: Your Filtec 3-G enter calibrate mode.

5. Press key 5 until your Filtec 3-G displays **CHANGE PASSWORD**.

6. Press the arrow key.

Result: Filtec 3-G displays the Enter Password prompt.

7. Use the number keys (keys 1 through 6) to enter each of the three digits.

Best Practice: Write down and remember the password that you specify for future reference.

8. After a few seconds, your Filtec 3-G displays **COMPLETED**.

9. Inside your Filtec 3-G, open dip switch S1-8.

Result: You activate the password option. Whenever you or another operator attempts to enter calibrate mode, you or the operator must specify this password.

10. Press key 5 until Filtec 3-G displays **SYSTEM DISPLAY**.

11. Press the arrow key.

Result: Your Filtec 3-G returns to operate mode.

12. Replace the cover of your Filtec 3-G.

VIEW TB1&4 PIN ASSIGN.

This function displays the signal wiring assignments for pins in terminal blocks TB1 and TB4. It also lists the normal voltage levels that are associated with the signals.

To check which Filtec 3-G inputs have been assigned to pins on terminal block TB1 and TB4:

1. On the operator control panel, press key 5 until your Filtec 3-G displays **VIEW TB1&4 PIN ASSIGN.**
2. Continue to press the arrow key to scroll through the list.
 - The top line on the two-line display shows the sensor or function and its assigned terminal pin.
 - The bottom line on the two-line display lists the voltage level and triggered action.

For example, **BLKD <1V, UNBLOCKED >17V** indicates that if the signal voltage is less than 1 volt, the trigger is blocked, and if the signal is greater than 17 volts, the trigger is unblocked.

When you reach the end of the list, your Filtec 3-G displays **COMPLETED.**

VIEW PLC PIN ASSIGNMENTS

This function displays the programmable logic controller (PLC) signal wiring assignments. It also lists the normal voltage levels associate with the signals.

To check the PLC pin assignments:

1. On the operator control panel, press key 5 until your Filtec 3-G displays **VIEW PLC PIN ASSIGNMENTS.**
2. Press the arrow key to display the first pin assignment.
3. Continue pressing the arrow key to scroll through the list.

When you reach the end of the list, your Filtec 3-G displays **COMPLETED.**

CLEAR SYSTEM

This function clears the system by resetting all function parameters to factory defaults.

Best Practice: Because your Filtec 3-G erases all current settings, ensure that you use the **SAVE DEFAULTS** function before you execute this function, if you want to save them.

CURRENT LANGUAGE

This function selects the language that you want your Filtec 3-G to use.

Available languages that you can select include English, Portuguese, Spanish, German, French, and Italian. You can always select English.

CAN TEXT

This function enables you to create a custom name that replaces the word that represents a particular container.

Any instance in which the text string "Can" appears in the software is replaced by the text string that you specify.

To create a custom name:

1. On the operator control panel, press the arrow key until your Filtec 3-G displays the character that you want.
2. Press key 6 to advance to the next space.
3. Repeat the previous steps until you type the text string that you want.
4. Press key 5 once.

Result: Your Filtec 3-G uses the text string that you typed.

OF CONTAINER TYPES

This function specifies the maximum number of different container types that are inspected by this Filtec 3-G.

The value that you specify determines the number of current container types that you can create.

CONTAINER TYPE TEXT

This function enables you to create a name for each container type.

Your Filtec 3-G displays the name that you specify in the list of current container types.

To create container type text:

1. On the operator control panel, press the arrow key until your Filtec 3-G displays the character that you want.
2. Press key 6 to advance to the next space.
3. Repeat the previous steps until you type the container type text string that you want.
4. Press key 5 once.

Result: Your Filtec 3-G uses the text string that you typed.

REJECT VERIFICATION

This function detects whether a container is rejected by using a sensor downstream from the rejector. This sensor verifies that the container is missing from the conveyor.

FILL LEVEL

This function tells the Filtec 3-G that the fill level function is present and makes the fill level function available to users.

When you set **FILL LEVEL** to **NOT PRESENT**, it prevents users from accessing the fill level status function.

This function does not activate or deactivate fill level. This function only readies your Filtec 3-G.

This function does not activate or deactivate fill level inspection, it only readies the machine.

To turn fill level on or turn fill level off, you must use the **FILL LEVEL STATUS** function.

UNDERFILL TEXT

This function enables you to create a custom name that replaces the word that represents a particular container.

Any instance in which the text string "Underfill" appears in the software is replaced by the text string that you specify.

The following options are affected:

- **UNDERFILL STATUS**

- **TOTAL UNDERFILL**
- **RESET UNDERFILL**
- **ALARM UNDERFILL**
- **UNDERFILL TEXT**



Note: This document uses the text string “Underfill” throughout to represent the underfill text string. If you use this function to change the “Underfill” text string, remember that the new name that you specify represents “Underfill” used in this document.

To create a custom underfill text string:

1. On the operator control panel, press the arrow key until your Filtec 3-G displays the character that you want.
2. Press key 6 to advance to the next space.
3. Repeat the previous steps until you type the text string that you want.
4. Press key 5 once.

Result: Your Filtec 3-G uses the text string that you typed.

OVERFILL TEXT

This function enables you to create a custom name that replaces the word that represents a particular container.

Any instance in which the text string “Overfill” appears in the software is replaced by the text string that you specify.

The following options are affected:

- **OVERFILL STATUS**
- **TOTAL OVERFILL**
- **RESET OVERFILL**
- **ALARM OVERFILL**
- **OVERFILL TEXT**



Note: This document uses the text string “Overfill” throughout to represent the overfill text string. If you use this function to change the “Overfill” text string, remember that the new name that you specify represents “Overfill” used in this document.

To create a custom overfill text string:

1. On the operator control panel, press the arrow key until your Filtec 3-G displays the character that you want.
2. Press key 6 to advance to the next space.
3. Repeat the previous steps until you type the text string that you want.
4. Press key 5 once.

Result: Your Filtec 3-G uses the text string that you typed.

BULGED ENDS

This function specifies that your Filtec 3-G includes the feature that enables you to inspect cans for bulged ends. When you set this parameter to **NOT PRESENT**, this parameter indicates that the feature is not available in your Filtec 3-G.

This function does not activate or deactivate bulged end inspection. This function only readies your Filtec 3-G. To turn this feature on or off you use the **BULGED END STATUS** function.

BULGED ENDS TEXT

This function enables you to create a custom name that replaces the word that represents a particular container.

Any instance in which the text string "BULGED ENDS" appears in the software is replaced by the text string that you specify.

The following options are affected:

- **BULGED ENDS STATUS**
- **TOTAL BULGED ENDS**
- **RESET BULGED ENDS**
- **ALARM BULGED ENDS**
- **BULGED ENDS TEXT**



Note: This document uses the text string "Bulged Ends" throughout to represent the bulged ends text string. If you use this function to change the "Bulged Ends" text string, remember that the new name that you specify represents "Bulged Ends" used in this document.

To create a custom bulged ends text string:

1. On the operator control panel, press the arrow key until your Filtec 3-G displays the character that you want.
2. Press key 6 to advance to the next space.
3. Repeat the previous steps until you type the text string that you want.
4. Press key 5 once.

Result: Your Filtec 3-G uses the text string that you typed.

DOWN CAN

This function specifies that your Filtec 3-G includes the feature that enables you to inspect whether a can has fallen over on the conveyor. When you set this parameter to **NOT PRESENT**, this parameter indicates that the feature is not available in your Filtec 3-G.

This function does not activate or deactivate down can inspection. This function only readies your Filtec 3-G. To turn this feature on or off you use the **DOWN CAN STATUS** function.

DOWN CAN TEXT

This function enables you to create a custom name that replaces the word that represents a particular container.

Any instance in which the text string "DOWN CAN" appears in the software is replaced by the text string that you specify.

The following options are affected:

- **DOWN CAN STATUS**
- **TOTAL DOWN CAN**
- **RESET DOWN CAN**
- **ALARM DOWN CAN**
- **DOWN CAN TEXT**



Note: This document uses the text string "Down Can" throughout to represent the down can text string. If you use this function to change the "Down Can" text string, remember that the new name that you specify represents "Down Can" used in this document.

To create a custom down can text string:

1. On the operator control panel, press the arrow key until your Filtec 3-G displays the character that you want.
2. Press key 6 to advance to the next space.
3. Repeat the previous steps until you type the text string that you want.
4. Press key 5 once.

Result: Your Filtec 3-G uses the text string that you typed.

EXTERNAL REJECT

This function tells the Filtec 3-G that the external reject function is present and makes the external reject function available to users.

When you set **EXTERNAL REJECT** to **NOT PRESENT**, it prevents users from accessing the external reject status function.

This function does not activate or deactivate external reject. This function only readies your Filtec 3-G.

To turn external reject on or turn external reject off, you must use the **EXTERNAL REJECT STATUS** function.

EXTERNAL REJECT TEXT

This function enables you to create a custom name that replaces the word that represents a particular container.

Any instance in which the text string "External Reject" appears in the software is replaced by the text string that you specify.

The following options are affected:

- **EXTERNAL REJECT STATUS**
- **TOTAL EXTERNAL REJECT**
- **RESET EXTERNAL REJECT**
- **ALARM EXTERNAL REJECT**
- **EXTERNAL REJECT TEXT**



Note: This document uses the text string "External Reject" throughout to represent the underfill text string. If you use this function to change the "External Reject" text string, remember that the new name that you specify represents "External Reject" used in this document.

To create a custom external reject text string:

1. On the operator control panel, press the arrow key until your Filtec 3-G displays the character that you want.
2. Press key 6 to advance to the next space.
3. Repeat the previous steps until you type the text string that you want.
4. Press key 5 once.

Result: Your Filtec 3-G uses the text string that you typed.

REJECTOR TYPE

This function enables you to select the rejector model that you are using with, and is controlled by your Filtec 3-G.

At present, depending on your configuration, values to which you can set this parameter include:

- High speed LS-3 Slat
- Servotec
- Servotec II
- Standard Proline
- High speed Proline
- Slat
- Hazardous location Slat
- Standard LS-3 Slat

SERIAL INTERFACE

This function activates or deactivates the **SERIAL INTERFACE** function, which provides serial network communication over RS-232, RS-422, RS-423, and RS-485 networks. This function enables you to directly control your Filtec 3G from a host system or PLC.

KNOWN CHAIN PITCH & TEETH

This function enables you to configure your encoder.

If you know the conveyor chain pitch and the number of teeth per chain link, you set this function to **PRESENT**. If you do not know the conveyor chain pitch and the number of teeth per chain link, you set this function to **NOT PRESENT**.

If you set this function to **PRESENT**, you must also use the **CONVEYOR SEGMENT PITCH** and **TEETH/CONVEYOR SEGMENT** functions to adjust parameters for your encoder.

CALIBRATE ENCODER

This function initiates the routine that you use to calibrate the encoder.

ENCODER RESOLUTION

This function specifies the resolution of the encoder that you install with your Filtec 3-G. The standard encoder is 500 pulse. The high resolution encoder is 5000 pulse and is required when you use the **DIAMETER MISSING CAP** option.

SAVE DEFAULT CONSTANTS

This function permanently saves the current operating configuration.

When you use this function, your Filtec 3-G stores parameters until you save the default constants again.

To recall the settings, you use the **LOAD DEFAULT CONSTANTS** function.

To save the default constants:

1. On the operator control panel, press key 5 until your Filtec 3-G displays **SAVE DEFAULT CONSTANTS**.
2. Press the arrow key.

Result: Your Filtec 3-G saves the constants.

CONVEYOR SEGMENT PITCH

This function specifies the distance from one point on a conveyor chain segment to the same point on the next conveyor segment.

This function defines the conveyor segment pitch, which equals the length of 10 conveyor segments, or plates, measured in millimeters, divided by 10.

TEETH/CONVEYOR SEGMENT

This function defines the number of sprocket teeth on the drive sprocket that contacts the chain segment.

The typical value that you specify is 2, but for some conveyors you might specify a value of 1.

CALIBRATE ENCODER VALUE

This function specifies the number of encoder pulses emitted for every 10 meters of conveyor travel.

ENCODER PRE-SCALER VALUE

This function specifies the conversion factor that your Filtec 3-G uses to process the encoder prescaler value.

This value enables the Filtec 3-G to process data at a faster rate.

GAMMA SAMPLE CUTOFF LIMIT

This function displays the value that your Filtec 3-G calculates automatically when you calibrate the encoder.

The typical value range is 3 to 4 and should be equal to or 1 more than the number of gamma ray samples per encoder when using a high speed production line.

GAMMA SAMPLES PER ENCODER

This function displays the number of 500-microsecond gamma ray samples that occurred between the last two encoder interrupts. This value verifies the correct **GAMMA SAMPLE CUTOFF LIMIT**.

The encoder interrupt is determined by the line speed and prescaler value.

4.4.7 Diagnostics Function Group



This function displays the current diagnostic error.

Clearing the error stops both the signal beacon from flashing and the remote alarm PLC output signal from being generated.

How to Access Diagnostic Error Codes



Note: Do *not* use the reset switch to clear diagnostic errors.

To view the error:

1. On the operator control panel, press key 6 until your Filtec 3-G displays the current diagnostic error number.
2. Press the arrow key to scroll through the error definitions.
3. When you reach the end of the message, press the arrow key once again to clear the error.



5. Calibration Procedures

Perform the calibration procedures in this chapter only if your Filtec 3-G is completely installed and fully operational.

This section contains the following calibration procedures:

- Encoder calibration
- Sensor calibration
- Radiation detector calibration

5.1 Encoder Calibration Procedures

5.1.1 Description of an Encoder

The encoder attaches to the conveyor and sends timing pulses to the Filtec 3-G. The Filtec 3-G uses these timing pulses to synchronize all inspection and rejection activities with the production conveyor's speed.

You must calibrate the encoder for each different container type that is run on the production line.

The document Encoder Calibration Procedures, FILTEC part number 40258, contains procedures that describe how to calibrate your encoder.

5.2 Sensors Calibration Procedures

5.2.1 Types of Sensors

The Filtec 3-G contains two types of sensors:

- Proximity
- Fiber-optic

5.2.2 Fiber-Optic Sensors

Fiber-optic sensors project a highly focused light beam across a given space. When a container passes through the beam, the beam continuity is broken. This triggers the sensor signal indicating that an object is present in the beam.

The fiber-optic sensors used in the Filtec 3-G are:

- Center line inspection trigger
- Upstream inspection trigger

5.2.3 Before You Begin

1. Before attempting to calibrate any sensor, check the emitter and receiver to be sure the lenses are clean and unobstructed.
2. Before you begin any sensor calibration procedure, close the safety shutter by pushing the actuating rod completely in so that no red shows.
3. Remember to open the safety shutter when you have finished the calibration procedure by pulling the actuating rod out until it stops.

5.2.4 Calibrating the Center Line Inspection Trigger

1. Ensure that there is no object blocking the inspection trigger beam.

2. Turn the offset adjustment clockwise until the output contrast light emitting diode (LED) reaches 10 and then turn the adjustment counterclockwise until the LED drops to 5.

No.	Description
1	Output contrast LED
2	Output LED
3	Offset adjustment

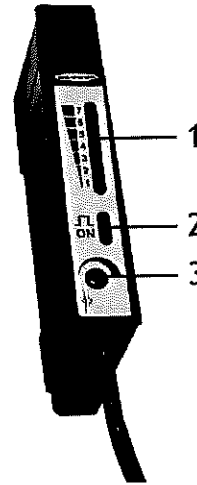


Figure 5-1. Calibrating the Inspection Trigger Amplifier

3. Place an uncapped production container in the inspection tunnel so the inspection trigger beam passes through the leading edge of the container.

This is the point where the container material is thickest.

4. Turn the offset adjustment clockwise until the output contrast LED returns to 5.
5. Note the number of turns required to return the level to 5.
6. Turn the offset adjustment counterclockwise half the number of turns required in the previous step.
7. Remove the container from the inspection trigger beam path.

Result: The output contrast LED should increase to 10 and the output LED should light.

5.2.5 Calibrating the Upstream Inspection Trigger

1. Clear the upstream inspection trigger beam of any containers so that it is not blocked.

2. Remove the amplifier cover and set the operation mode selector to dark (D).

No.	Description
1	Sensitivity dial and adjustment
2	Timer operation selector
3	Operation mode selector
4	Stable operation indicator LED (green) operation indicator (red)

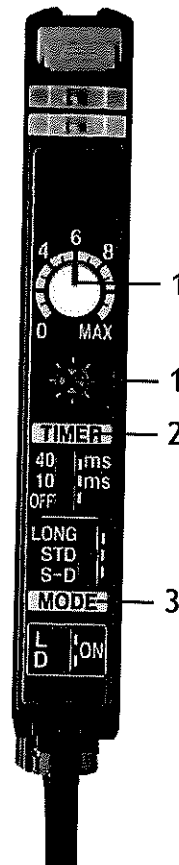


Figure 5-2. Calibrating the Upstream Inspection Trigger Amplifier

3. Set the sensitivity adjustment to minimum by turning it counter-clockwise until it stops.

Notice that the gauge needle moves to reflect the setting level and the red operation indicator LED lights.

4. Slowly turn the sensitivity adjustment clockwise until the red operation indicator LED is off.

You want the sensitivity adjustment to be on the edge of when the operation indicator LED turns off.

5. Note the gauge needle position.

This establishes the minimum sensitivity point.

6. Align an uncapped production container in the inspection trigger beam path so the trigger beam passes through the leading edge of the container.

This is the point where the container material is thickest.

7. Slowly turn the sensitivity adjustment clockwise until the red operation indicator LED is off.

Adjust the sensitivity to be on the edge of when the operation indicator LED turns off.

8. Note the gauge needle position.

This establishes the maximum sensitivity point.

9. Turn the sensitivity adjustment counterclockwise until the gauge needle is halfway between the minimum sensitivity point and the maximum sensitivity point.

This is the correct setting.

10. Verify the setting by using a production container to block the beam and then remove it.

Result: The operation indicator should be off when the container is blocking the beam and on when the beam is not blocked.

If the sensitivity adjustment is not functioning correctly, your adjustments might be slightly inaccurate.

Repeat the procedure again until the setting is correct.

11. Replace the amplifier cover.

5.3 Radiation Detector Calibration Procedure

5.3.1 Introduction

The radiation sensor contained in the Filtec 3-G is a scintillation tube detector (STD). A scintillation tube detector uses a scintillation tube to capture gamma rays and measure them.



Important: You must calibrate the scintillation tube approximately every three years.

5.3.2 Calibrating the Scintillation Tube Detector

There are two methods by which you can calibrate the STD:

- The standard scintillation detector calibration procedure is the simplest method. It uses the calibration LED on the calibration board as an adjustment reference.
- The alternate scintillation detector calibration procedure requires the use of an oscilloscope. This method is more complicated, however it will help you determine if the processor board is malfunctioning. Use this method only if there is concern as to the validity of the processor board.

Standard Scintillation Detector Calibration Procedure

1. Clear the inspection tunnel of all containers so that nothing is blocking the radiation inspection beam.
2. Open the radiation safety shutter completely.

3. Turn the high voltage output adjustment counterclockwise until it stops.

No.	Description
1	Scintillation tube detector (STD) calibration light emitting diode (LED)
2	High voltage output adjustment

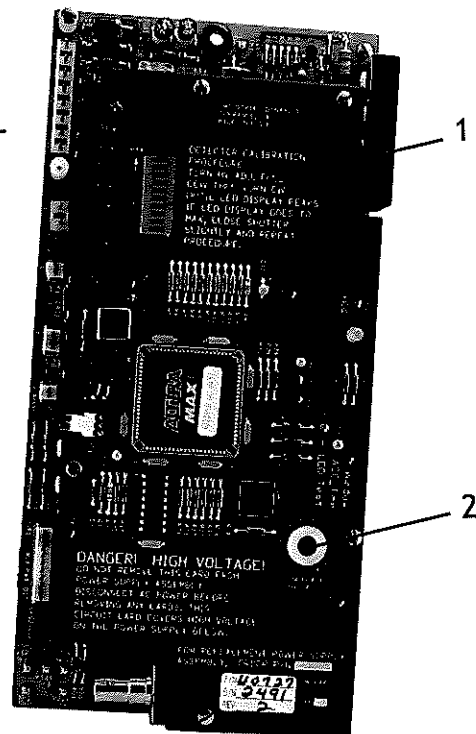


Figure 5-3. Calibrating the Scintillation Tube Detector (STD)

4. Attenuate the inspection beam by placing a good production container in the inspection tunnel so that it blocks the inspection beam.

If your Filtec 3-G is the extra wide inspection tunnel model, you do not need to attenuate the inspection beam unless the LEDs are constantly at maximum.

5. Slowly turn the high voltage output adjustment.

Result: The scintillation tube detector (STD) calibration light emitting diodes (LEDs) rise until they peak and then begin to fall.

6. Stop precisely when the LEDs begin to fall.

The peak, that is, the point immediately before the LEDs begin to fall, is the correct calibration point.

7. Turn the adjustor counterclockwise slowly until the LEDs return to the peak level again.

This is the correct setting.



Note: Continuing to turn the adjustor past the calibration point cause all LEDs to light. This is the high noise region of the scintillation tube detector (STD) sensitivity range. This is not the correct setting and causes your Filtec 3-G to malfunction during inspection.

Alternate Scintillation Detector Calibration Procedure

Use an oscilloscope with a frequency response of at least 25 MHz and set the scope as follows:

- One (1) microsecond per division horizontal
 - Two (2) volts per division vertical
 - The trigger source to internal
 - The trigger slope to positive
1. Connect the oscilloscope probe to lead 2 of connector P9 on the calibration card and the ground lead to TP5 GND on the processor card.
 2. Adjust the trigger level to synchronize on a single pulse and then rotate the adjustor:
 - Clockwise to increase the pulse width
 - Counterclockwise to decrease the pulse width

The amplitude of the pulses should be constant and do not change appreciably as the high voltage output is adjusted, however the pulse width varies. The pulse amplitude should measure approximately six (6) to eight (8) volts.

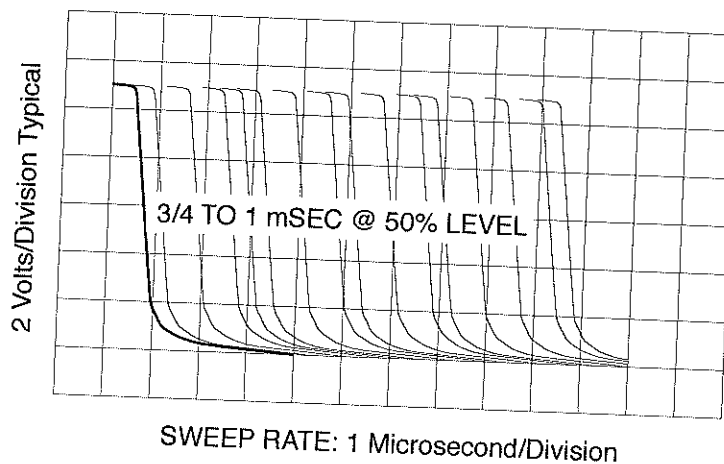


Figure 5-4. Scintillation Tube Detector (STD) High Voltage Output Wave Form

3. Adjust the high voltage output until the pulse width ranges between $3/4$ and 1 microsecond when measured at the 50 percent amplitude level.

If you cannot adjust the pulse width to at least $3/4$ microsecond, you must replace the scintillation tube detector (STD).

4. Verify that LED 11 on the processor card is lit.