# Metal Detection Separator

**Machine Mounted Separator**

**Item# 161782 and 161783**

# Instruction Manual


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# Introduction

**Please read and understand this manual before proceeding with Testing, Installation, Operation or Service of this equipment. Pay particular attention to items relating to all phases of safe use.**

## Safety

**Safety during transportation:**

- Use approved lifting devices if the weight of equipment exceeds allowable weight limits for persons handling equipment.
- Trained and authorized personnel may only carry out assembling the hoisting device and the following transport!
- Observe safety regulations during equipment transportation!

**Safety during operation:**

- The protective covers of the unit must be securely fastened!
- The electronic control box has to be closed!
- Keep hands and fingers out of sensing tube! Danger of crushing injuries!
- People with implanted body aids may not stand in immediate proximity of the detector!
- Training of the personnel about audio-visual warning devices and rejection systems will be absolutely necessary!

**Before carrying out repair or maintenance work at the device, note the following!**

- Stop the flow of product!
- Disconnect from mains supply!
- Remove pressure supply!
- Be careful of external voltages at the switch exits!

**Use lockout/tag out procedures to protect from accidental connections to power source.**

**Repair or maintenance of the device, must be carried out by a trained, authorized personnel only**

## Operation guidelines

The MMS device is only to be used for the detection of metals in slow moving bulk material.

Do not use the unit for products:

- **That may be electrically conductive.**
- **That contains metallic mixture as part of the normal product.**
- **That are high in moisture or tend to bridge**
- **That have a particle size larger than 3/4“(20mm).**

Products which exhibit one or more of the above characteristics, should be examined only if OK’d by IMS Company since they might impair the sensitivity.

**Misuse**

This device is **not** intended for use in:

- **Areas with explosive hazards.**
- **Outside the stated protective system.**
- **Outside the permitted temperature range.**
- **Freefall application**

Operating the unit outside the given parameters may damage the unit and lead to injury or even death.

**Modifications**

Are only permitted if approved in writing by IMS Company. Any unauthorized modifications will transfer safety and warranty responsibilities to the party making the modification.

**Owners Responsibilities**

- **Ensure that equipment is used for the intended purpose only.**
- **Inspect unit regularly for proper function and equipment condition.**
- **Maintain manuals and safety labels in legible and complete condition.**

Maintenance and repair as stipulated in the owners manual and may only be performed by trained, authorized personnel only.

# Construction

This is the construction of MMS-2 and MMS-3 Metal separators.

## Housing closed (see figure 1)

1. Material in feed port
2. Power light
3. Metal light
4. Fault light
5. Test/Reset button
6. Electronic Control Box
7. Reject Port
8. Air inlet and Filter (optional)

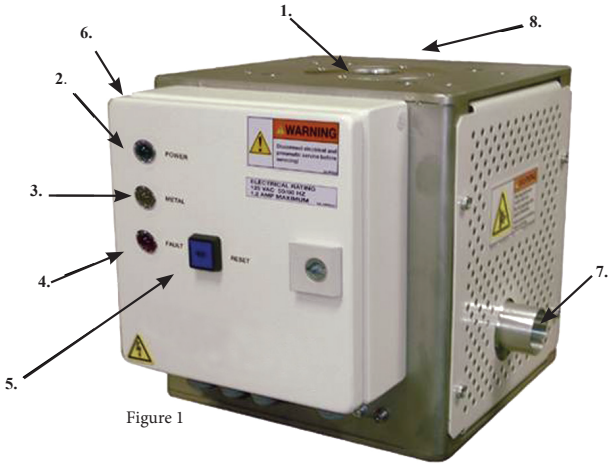



Figure 1

## Housing with side guard removed (see figure 2)

9. Search head
10. Air pressure switch (with self-mointioring)
11. Reject Mechanism
12. Sensing tube

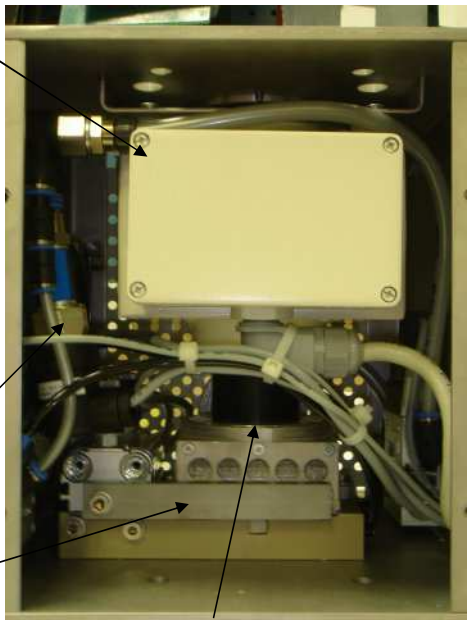



**Figure 2**

**Note**: Do not operate unit with out the side guards. Fingers or other objects may be crushed.

## Principle of Operation

In figure 3 and 4, the MMS unit is cutaway to show functionality.

a). Plastic material in slow moving column
b). Metallic particle
c). Top adapter plate
d). Detector coil
e). Slide gate shut off
f). Pneumatic venturi vacuum device
g). Reject tube
h). Bottom Adapter plate
i). Vacuum air inlet
j). Sensing Tube

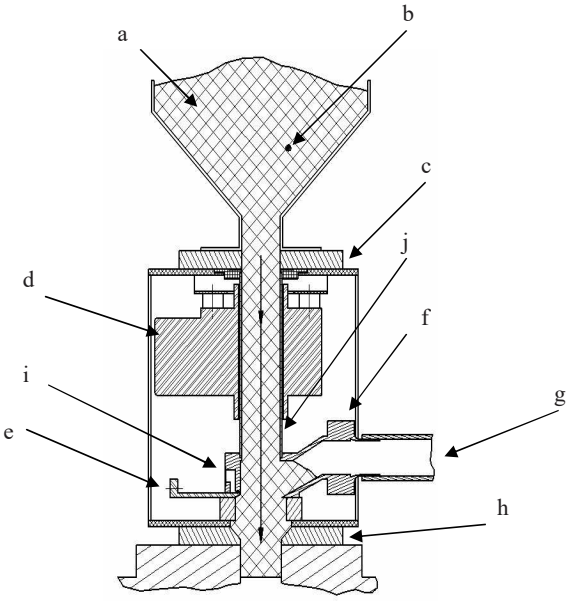



**Figure 3**

Normal operation:

In normal operation the plastic material flows slowly through the sensing tube (j) and the reject column into the plactic machinery below.

What happens when a reject event occurs: (see figure 4)

**1.** A metal particle disturbs this electromagnetic field.
A reject signal is generated by the electronics system.

**2.** The slide gate closes by an air cylinder/solenoid stopping material flow.

**3.** At the same time a solenoid valve opens air passage to the venturi device (f), which creates a vacuum and causes the suspect plastic material to be rejected out of the system through the reject tube (g). See figure 4

**4.** After a set time, the vacuum is released and the slide gate is opened allowing material flow to resume.

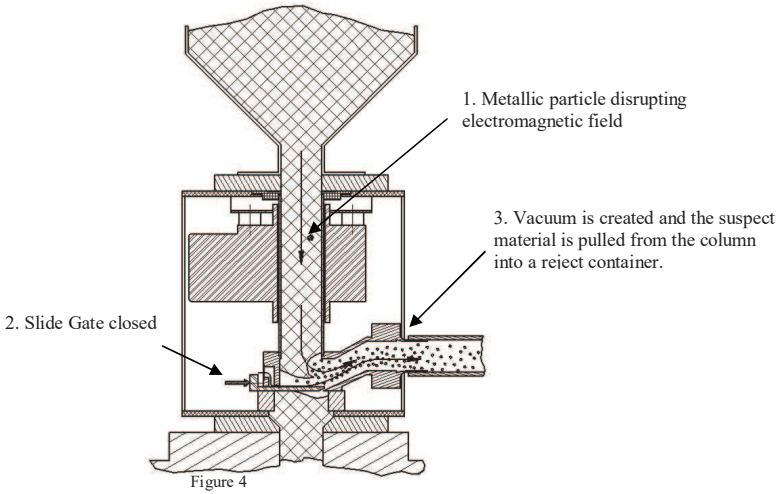


Figure 4

# General notes on metal detection

## Electro-magnetic short circuits

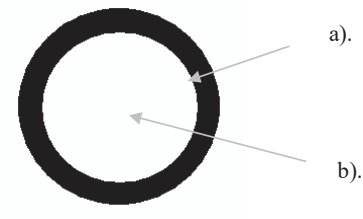
Certain metal frame constructions can act as an electro-magnetic loop in the vicinity of the metal detector, affecting the magnetic field of the metal detector. Metallic connections must either be welded tight, or interrupted, e.g. with unilateral isolation.

## Electrostatic discharges

Prevent at all cost electrostatic discharges to the metal detector and surrounding construction components using the appropriate grounding. Electrostatic discharges can cause false signals and at worst, destroy the analysis electronics.

## Differences in sensitivity within the sensing tube

Please note, that the detector coil does not create a uniform electromagnetic field. As a consequence, differences in sensitivity occur in the outlet opening. The least sensitive part of the detector is in the middle of the outlet opening.




**a)** Area of highest sensitivity

**b)** Area of lowest sensitivity

MMS sensing tube view from the top

## Sensitivity differences of different metal types

Please note, that different metal types influence the electromagnetic field to a different degree. Please see the sensitivity response to various metals in the specifications

## Position-dependency of the metal parts

Metal detection can be dependent on the position and orientation of the metal part, depending on the shape of the metal part. The maximum sensitivity values of the data sheet are tested with ball-shaped test parts. Generally speaking, all metal parts that have at least the same diameter as the balls used for the data-sheet values can be detected with certainty, irrespective of position and orientation.

## Testing in regular intervals

Changes in the environment of the detector (e.g. new machines) can influence detection precision. Check the settings and functions of the metal detector in regular intervals, by carrying out manual tests with appropriate test parts.

## Environmental influences

The metal detector has to be protected against environmental and weather influences (direct sun, wind, frost). The detector has to be especially protected from direct or indirect insulation when temperatures are above the allowed temperature. High surface temperatures can lead to false detections and destruction of the metal detector in the worst case. An internal fan is provided to cool the coil and other temperature sensitive components. **Do not disconnect fan or block air movement in or out of fan.**

# Getting Starting

## General

It is our company's goal to ship the metal detector to the customer with as many pre-configured settings as possible. If the machine is shipped with factory default settings, it should be noted, that the factory defaults are the best possible compromise between maximally attainable detection precision and lowest possible sensitivity to interference.

In order to adjust the settings according to one's own requirements, the following plan will outline how to go about setting up the machine. Only the steps are explained, for a thorough explanation of the menu items, you should consult the operating manual.

## Safety procedures before taking the device into operation

**Before operating the metal detector at least the following parts of the device must be checked:**

- Is the device damaged anywhere?
- Are all electronic components connected securely and undamaged?
- Are all pneumatic supplies and mains undamaged (if installed)?

The device can start if **everything checks out ok.**

## Safety area

Before operating the device, make sure that all possible openings of the MMS unit are secured.

Safety area:

**Note:**

You **have to** protect the areas marked in red by suitable safety measures before activating or testing the device.

Operating the device without protective measure is **not permitted.**

Please use lock out/ tag out procedures when servicing machine.


Bottom View

# Start Up

## Sensitivity setup

In most situations it is difficult to perform a sensitivity test with the MMS unit installed on a machine. Adjust sensitivity prior to installation in the chapter „Adjustments“. If an ongoing sensitivty tests must be performed for maintaining quality systems. Please inquire about reject confirmation retrofit equipment.

See chapter **Adjustments → Sensitivity**

## Assemble metal detector

Assemble the metal detector according to the information provided in the chapter „Installation“.

See chapter **Installation**

## Connecting the 24V switching exits and relays

Connect the 24V switching exits and relays as needed. Please follow the indications in the chapter

See chapter **Installation → Connection**

## Connect pressurized air supply

See chapter **Installation→ Connection → Pressurized air supply**

## Connect power supply

See chapter **Installation → Connection → Supply voltage**

- The electronics perform an auto test and adjust to the supplied voltage
- The reject is activated once during this phase to assure proper operation.

Now your metal detector is fully assembled and connected.

All further instructions refer to the most important, settings that should be adjusted at your detector in order to ensure perfect operation of your device while maintaining the highest possible sensitivity.

## Switch metal detector on

Having assembled the detector mechanically, as a first step it is taken into operation. Under this condition the detector is only subject to external influences (peripheral disturbances). If at this point faulty responses are triggered, you have to try and find the source of the disturbance and to correct the error. For this switch off all machines (motors, actuation, etc.) in the direct surroundings of the metal detector so that the metal signal of the metal detecting device stays within the triggering range. As a next step the device is taken again into operation step by step.

After each step control the measure signal in order to locate the disturbance that causes an increased noise level. If noise suppression is not possible, then you can only reduce the sensitivity until there is no more incorrect triggering.

See chapter **Adjustment → Sensitivity**

## Start complete production line

Now start the complete production line. For the set-up-step you should, if possible, use only metal-free products.

## Optimize sensitivity settings

**Note:**
The higher the sensitivity is set, the higher the susceptibility for incorrect triggering.

See chapter **Adjustment → Sensitivity**

## Set the rejection time

See chapter **Adjustment → reject duration time**

## You now have set your metal detection device at optimum level.

All further setting possibilities serve for adjusting the metal detection device to the production process and for implementing functions and evaluations adapted to applications.

An overview of all of your metal detection device's functions is provided in chapter „Adjustment".

See chapter **Adjustment**

# Installation

*Please note when assembling your detector the following assembly instructions in order to ensure perfect operation.*

## Installation guidelines

### Electronics

**Connect the metal detector to a clean, constant voltage power supply.**

Voltage fluctuations can cause false tripping. Therefore, a constant voltage transformer (AC line conditioner) is recommended. In order to check if false tripping is caused by voltage fluctuations you can temporarily supply the metal detector with a UPS (Uninterruptible Power Supply, direct, independent power supply as used for Computers). Please, do not forget to plug off the input cable of the UPS to separate it from the AC line

**Do not disconnect the metal detector from the power if possible.**

A constant, uninterrupted power supply enables more sensitive adjustments and prolongs lifetime of electronic components. Powering the unit on and off causes it to recalibrate (**approx**. **40 seconds**) during which time metal will not be detected.

**When welding at the construction where the metal detector is mounted, disconnect the metal detector from the power supply and do not use the control panel, mounting surface as a ground.**

Welding near the metal detector will lead to false tripping.

**All wiring must be shielded.**

Shielding must be placed vertically in the electronic control box, preferably using the EMV screw connection.

## Detector

**Do not install the detection coil inside a strong electromagnetic field. (Especially if the direct surroundings of the coil there are strong a load variations at other electronic devices)**

Interferences can trigger faults.

**Make use of the metal separator in a low vibration environment.**

When set up for low vibrations, higher sensitivity settings can be achieved. If possible, reduce impact from molds closing

**When welding in the area where the metal detector is mounted, disconnect the metal detector from the power supply and do not use the control panel-mounting surface as a ground.**

Welding in the surroundings of the detector will trigger faults.

## Adapter Plates

Adapter plates simplify mounting. If you can mount the unit directly to a housing (Please see mounting hole dimensions in figure 6), Adapter plates can be omitted. Regardless of how the unit is mounted, a pin must be provided to activate the safety switch through the bottom housing plate (see figure 7). **Do not drill into the top and bottom plates of the welded housing!**

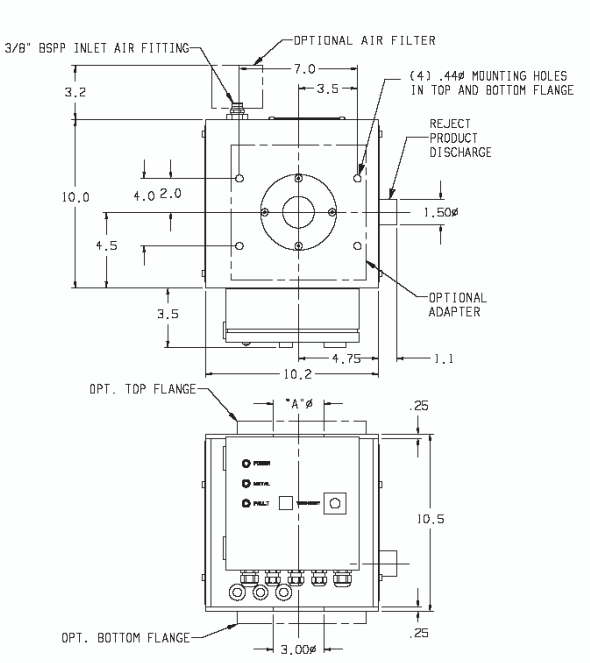
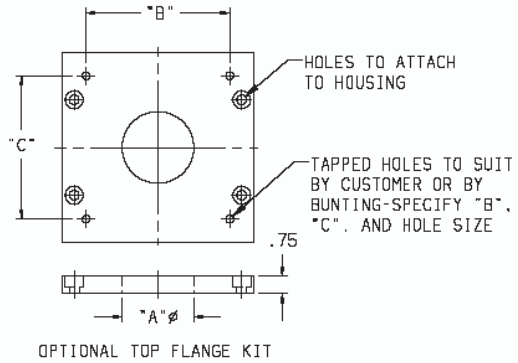



**Figure 6**

**Note: Top and bottom mounting holes have the same dimension**



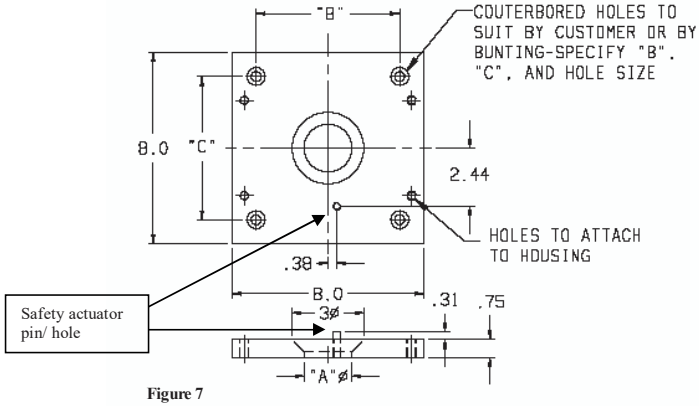




**Figure 7**
OPTIONAL BOTTOM FLANGE KIT

## Mounting Instructions

**Note: Please read safety instructions before installing.**

## Flange kit mounting

1. Drill and counter bore bottom flange to match bolt pattern or plastic machinery. Counter bore must be deep enough so that the screw is below flange surface. (See figure 8)
2. Drill and tap Top flange to match bolt pattern of equipment above mms unit.
3. Bolt bottom flange kit to machinery (Fasteners not provided). Note: Flange must be oriented with Decal Arrow Pointing to control box side.
4. Remove side covers on MMS unit and mount to bottom flange with screws provided. **Note: Bottom flange must be secured properly in the right the direction in order for the slide gate to function properly.**

5. Bolt top flange kit to mms unit with screws provided.

6. Mount upstream equipment to top flange (fasteners not provided).

7. Replace side covers and attach the reject hose securely to the mms. **Note: Reject hose should not run more than 3 ft horizontal before going vertically downward.**

8. Provide Receptacle for rejected material that includes a ventilated cover to prevent material spillage but allow pressurized air to escape. Attach the reject tube to receptacle.

9. Attach high volume Air filter to MMS with 3/8“ BSPP fitting. **Note: ¼“ Quick disconnect fittings are not acceptable (Use ½“ diameter ball valve for less restrictions).**

10. Plug in power cord to 115 Vac, 1 phase, 50/60 Hz receptacle.

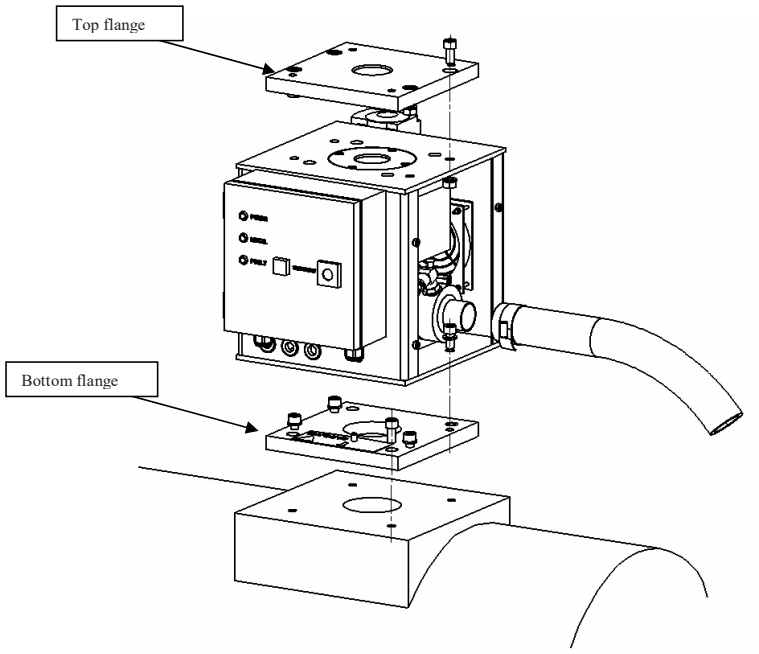



**Figure 8**

## Mounting without flange kit

When mounting the MMS with the optional flange kit refer to figure 6 to get hole spacing for the unit. Then follow flange kit mounting instructions above. **Note: Be sure to supply a safety pin in your supplied bottom flange. If no pin is supplied will cause the slide gate not to function. Refer to Figure 7 for safety pin dimensions.**

Having mounted your metal detector according to the directions provided on the above pages. You now can connect it.

## Supply voltage

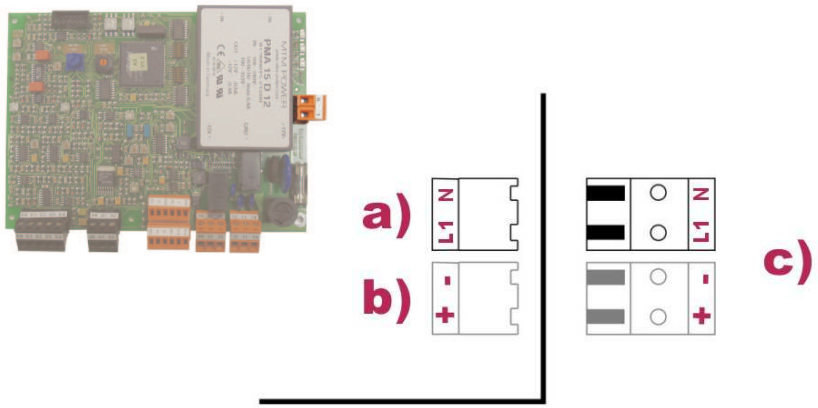
Connect the supply voltage only after you have integrated all connections. Otherwise there will be error messages.

The supply voltage has to lie within the following bounds:

Continuously: 120V AC (240V AC versions are available upon request)
50 / 60 Hz

Power protection: Max. 10 A

If you do not use the mains plug of the shipped package, you have to configure the mains connector as follows:

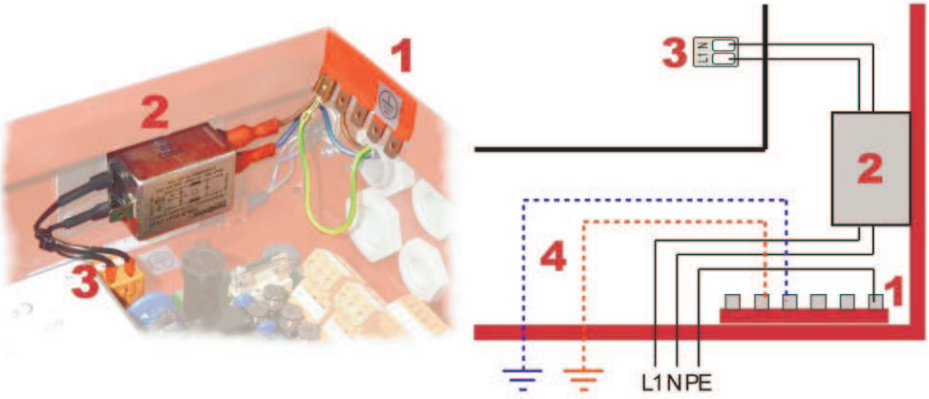



**a)** Alternate voltage **b)** Direct voltage **c)** after line filter

**Please note:**

**The electronics cannot be damaged by malfunctions of the power supply. The malfunctions can lead to reduced detection precision or even false detection impulses if no demodulator is used**.

To avoid premature failure from the power supply, the MMS is equipped with a line filter (2).




**1.** Central ground point (connection via spade connector 6.3 mm)
**2.** Mains filter
**3.** Mains socket

**5.** External earth wires should be connected to the central ground point (1).

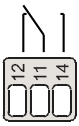
**Repair and maintenance work on the board. May only be carried out by trained and authorized personnel only! Improper adjustments can impair or even prevent your metal detector from operating!**

## Metal relay

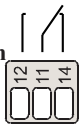
**Relay 1** is reserved to control the venturi reject device/ solenoid

Contact load:
U~ 250 V
$I_{max}$ 3 A

Normal operation, without power: **(Vacuum reject Not Active)**




When metal is detected: **(Vacuum reject active)**



## Failure relay (recommended)

**Relay 2** is set by the factory to be used as the „failure“ relay.

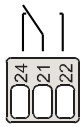
Neutral relay – switch contact, switches when system monitoring is actuated

You can determine the functional state of the appliance with the help of a neutral contact.

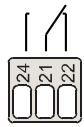
If the control system detects an **„internal error“**(fault of electronics) or an **„external error“**(defect in reject mechanism), it immediately activates the **„Failure relay“**. You can use the change over process of the differential relay to connect an alarm or to disconnect the materials supply by the metal detector.

Contact load:
U~ 250 V
$I_{max}$ 3 A

Normal operation: **(manufacturer setting)**




„Fault“ condition, without power: **(manufacturer setting)**




Resetting failure info on the failure relay can only be effected by manual reset.

Connecting the differential relay is not necessary to operate the metal detecting unit. However, it increases the safety of your production process.

In order for the metal detector to continue operation after eliminating the source of errors, a manual reset has to be effected.

See chapter **Errors and problems**

If the fault condition is unknown, please consult the chapter **„Errors and problems“** to diagnose the problem.

## Pressurized air supply

| | |
|---|---|
| Air pressure requirements: | filtered 80 to 100 psi, 50 cfm minimum |
| Fitting size: | 1/2” barbed fitting |
| Air supply size requirements: | Minimum ½” I.D. hose with no line restriction like quick disconnect fittings. |

As the first step, connect the air pressure supply before you connect the metal separator to the power supply. Otherwise the system monitoring will indicate a fault (if equipped with the optional self-monitoring feature). **Note: Filter/ water separator is highly recommended (otherwise solenoid valves and air cylinder are subject to damage)**

**Please note:**

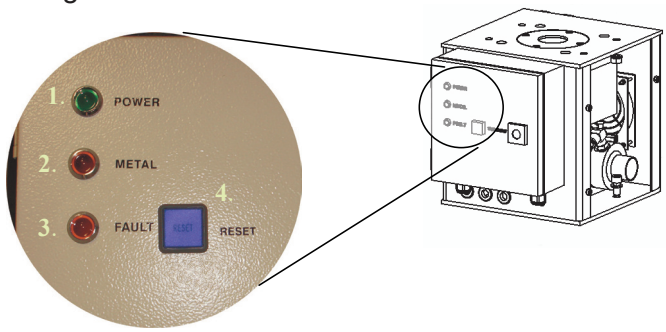
Insufficient air supply will require longer reject duration to purge contaminated material and will cause the MMS unit to go into fault (only with self-monitoring option) if the pressure drops below 60 psi. To prevent a pressure drop during a reject event, provide a air storage tank to absorb the sudden air demand.

## Reject Tube

Reject hose should be 11/2 inch I.D. static conductive with ground wire.  Also should have a receptacle for reject material that includes a ventilated cover to prevent material spillage, but allows air to escape.

# Operation

## Test-Button/ Indicator lights




As standard scope of delivery the detector is delivered with three **indicator lamps (1,2,3)** and a **test button (4).**

1. The **Power lamp (1.)** indicates that there is voltage to the unit. If the lamp does not light up, please consult the chapter "**Errors and problems"**

| | | | |
|---|---|---|---|
| **Power lamp** | **:** | dark | → no/wrong voltage |
| | | light on | → distribution voltage o.k. |

See chapter **Errors and problems → Mains supply**

2. The **Metal lamp (2.)** indicates when there is a metal reject event.

| | | |
|---|---|---|
| **Metal lamp:** | dark | → normal operation |
| | light on | → metal reject event |

3. The **Fault lamp (3.)** indicates when there is a malfunction with the unit. Metal is indicated, when the fault lamp lights up once during reject event. If light is on all the time or blinking then please consult the chapter "**Errors and problems**"

| | | |
|---|---|---|
| **Fault lamp:** | dark | → Normal state |
| | 1x lights up | → Metal |
| | Light on | → external error |
| | blinks | → internal error |

See chapter **Errors and problems**

**4.** Pushing the **reset/test button (4.)** performs two functions: 1. Test and 2. Reset.

**Test-Button:** Push once to test function of the MMS reject mechanics.

**1.** The "Test" function causes a "test reject" event, which simulates a detection of metal in the sensing coil. It causes a reject event that activates the slide gate and vacuum reject. If the MMS is provided with the self-monitoring option, a sensor will ensure that the slide gate leaves the home position within .1 second of receiving the metal signal.

With self-monitoring a pressure monitor sensor, continuously checks for minimal 60 psi air pressure.

If either of these conditions is not met, an external fault signal is indicated by "Fault" light

The "Test" function can also be used to purge material in the system during changeovers. The "Test" button may need to be pushed repeatedly to discharge the desired amount of material

**2.** The "Reset" function resets the electronics after a "Fault" has been indicated by the self-monitoring option. Pushing the "Reset" will also trigger a "Test" event.

# Adjustment

## General

The metal detector comes with default values ex factory. Usually changing factory default should not be necessary. If you should nevertheless require changes you should record the factory default settings in the intended textboxes for your safety, so that you can restore them if required.

| *Factory* |
| --- |
| ↘ |

In order to be able to change settings the control box of the analyzing electronics has to be opened. Use the supplied key to open the control box

See chapter **Operation → Opening the electronics case**

The exact location of the switches that have to be changed is depicted in the „Key plan“.

See chapter **Technology → Key plan**

You can change the switch settings with the help of a small screwdriver.

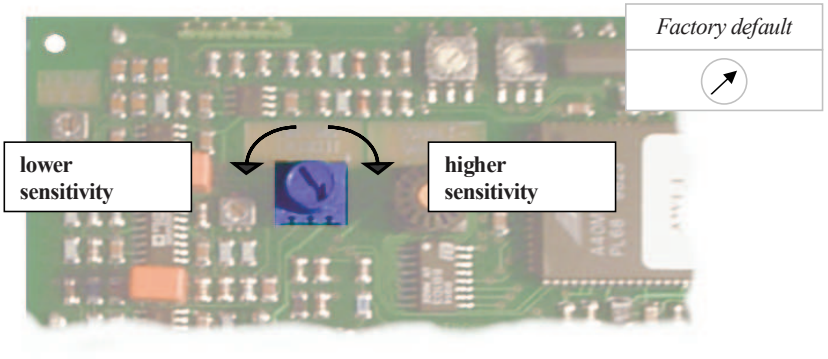
**Note that changing the settings can impair correct operation of your metal detector. Trained and authorized personnel may only change settings.**

## Sensitivity

The sensitivity settings can be altered using the below depicted rotary potentiometer.

**If sensitivity is set to a high level, smaller metal pieces can be detected.**

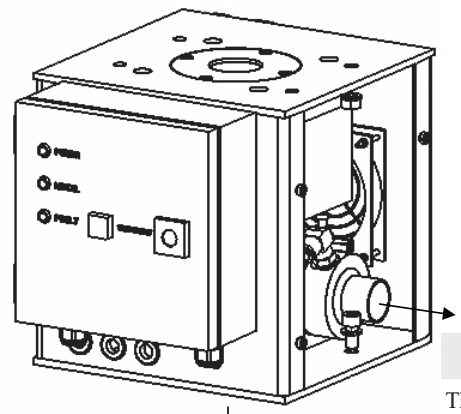
A higher sensitivity, however, also increases a higher susceptibility to outside influences like vibration.



In order to guarantee optimized settings for sensitivity the following approach is recommended.

**Turn the blue potentiometer left (counter clockwise), with a small slotted screwdriver, up to limit stop.**

**Metal / test piece:**
(test piece obtainable on request).



**Metal is rejected**

The desired sensitivity has been achieved

**Metal is not rejected**

The sensitivity of the coil is set too low.
Turn the potentiometer a fraction to the right and repeat the process.

**Please note that due to physical reasons it is not possible to reach a higher sensitivity than stated on the data sheet.**

## Reject duration

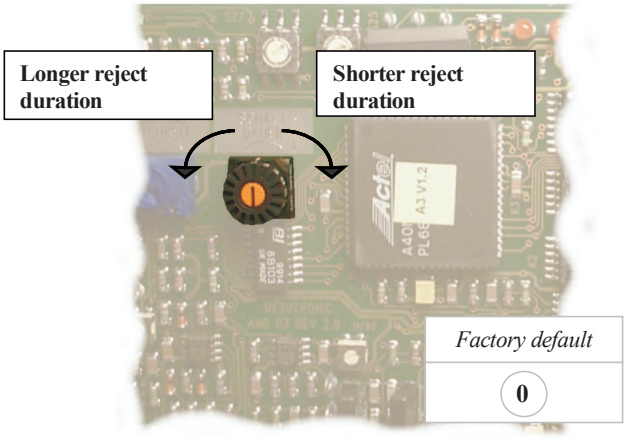
Reject duration is the time within which the rejection mechanism remains in the reject position once metal has been detected. The time range of the reject duration can be adjusted by means of switch **K 3.2.**

Due to the varying air pressure supplies and material characteristics at different locations. The duration time may need to be adjusted to your application.

See chapter **Technology → Switches**

For optimum reject duration, please observe the following:

1. Fill the sensing tube with material and add at least, 3"(75mm) of material above the tube.
2. Place a small container (about .5 cu. Ft. or 14 liter) in the reject receptacle to receive rejected material.
3. Push the "Test/Rest" button.
4. Measure the amount of rejected material (e.g. 8"x 8"x 2"of material in a box = 128 cu. In).
5. If the amount of rejected material is in the range shown in the chart below the reject duration time is correct. If the amount of material is less than the range shown, increase duration time. If the amount of material is greater than the range shown, decrease the duration setting.




| MMS inlet size | The amount of material in reject bin, if the reject time is set properly. |
|---|---|
| **2"** | ~33 Cu in of material (~.54 liters) |
| **3"** | ~70 Cu in of material (~1.15 liters) |

**Caution: Reducing the reject duration to minimize rejected material. May result in contaminated product or machine damage from metal contaminant.**

# Maintenance and Cleaning

*Trained and authorized personnel may only carry out work on the device.*

## Maintenance Electronics

- All electronic components are maintenance-free.

## Maintenance mechanics

### General

- Check regularly that the unit is securely fastened and all guards are in place.
- Check regularly whether all interconnecting cables and screw (transmitter / receiver control box cover...) are firmly attached.

### Ejection mechanics

**When maintaining mechanical elements of the device, the pressurized –air and power supply must be disconnected, and the risk of reconnection must be avoided properly with lock-out/ tag-out procedures.**

- Check mechanical parts for excessive wear and tear.
- Check the sensing tube for wear!
- Check the air solenoid for (dirt) contamination!
- Check the slide gate function for smooth operation by moving it manually!

**Please note:**
**The air cylinder does not require lubrication.**

**We recommend testing the reject mechanism if the cylinder has not been operating for a long time:**
Push the **test button**

See chapter **Operation**

# Cleaning

## General

**Please note:**

- Electronic box must be closed.
- All covers must be fitted.
- The sensor surface must be kept free of impurities, especially metallic or conductive particles, at all times.
- None of the electronic casings and lids may be cleaned using high-pressure cleaning devices.
- Trained and authorized personnel may only carry out repair work.

The outside of the MMS unit should be cleaned and checked periodically for loose material inside and around the unit. Use a damp rag to clean the exterior. To remove any foreign material from the inside of the MMS, first power off the unit and then remove the side plates from the machine. Use a shop vacuum or low-pressure air hose to remove any loose particles from inside of the unit.

# Maintenance and Cleaning

## General

The analyzing electronics permanently monitor the functional status of the metal detector.

If a failure is indicated, either by control panel or by Failure-LED, this means, that there is problem with your metal detector.


| | | | |
|---|---|---|---|
| 1 | **Mains-LED** (green) | Dark<br>On solid | → No/wrong voltage<br>→ distribution voltage o.k. |
| 2 | **Metal-LED** (red) | Dark<br>On solid | → Normal state<br>→ metal |
| 3 | **Error-LED** (red) | Dark<br>On solid<br>Blinks | → Normal state<br>→ system fault<br>→ Internal fault |

**Additionally to the LED you can determine the operational status with the help of a neutral contact.**

Also see chapter: **Assembly → Connection → Failure relay**

If the controlling system recognizes a failure status, the connection „Failure relay“ is switched on.

The connection „Failure relay“ remains in failure status even after repairing the failure.

Manual reset occurs after when the test button for a test reject is activated.

**Next is failure finding. The following pages list and explain different causes of errors.**

# Fault

## Fault Light Diagnosis

| Fault light activity | Possible Causes | Solutions |
|---|---|---|
| Blinking | Slide gate did not actuate | Check air pressure. Make sure there is nothing blocking slide gate or reed switch may be faulty. |
| | Faulty coil or electronics | See troubleshooting guide below |
| Solid | No air pressure | Make sure the air supply is between 80-100 psi |
| | Slide gate did not return to open position | Make sure there is nothing jamming the slide gate or it may be a faulty reed switch. |
| | Faulty electronics | See troubleshooting guide below |

**Authorized and trained persons should only perform troubleshooting.**

The following troubleshooting hints should help you to find the problem. Please follow the recommended sequence.

**Possible causes for a „fault“ indication:**

### 1. Insufficient air pressure:

The air pressure monitor assures that there is sufficient air pressure to actuate the reject device.
**Please assure that the operating pressure is set to 80-100 psi.**

### 2. Mechanical defect:

A position sensor monitors the position of the slide gate. If the flap does not leave its rest position or does not return to it‘s rest position in the allowed time span, a fault will be indicated.
**Check the slide-gate for ease of movement. Please also check that there is no material residual remaining that prevents free movement of the flap.**

### 3. Position sensor fault:

**Check for function.**
The position sensor is factory pre-set. The LED may or may not be lit in the rest position.

**Example:** *If the LED is lit in the normal position then the sensor is functioning properly. If the LED is not lit after the slide-gate leaves its rest position and lights up again after it returns to the rest position.*

**If the position sensor has been misaligned or when exchanging a defective initiator, please proceed as follows:**

1. The initiator has to be even with the edge of the pressure cylinder, as shown on the opposite picture. When the initiator is in the right position, you can fix it by means of a hexagon socket screw 1.3 mm.
2. Disconnect the metal detector from the power supply.

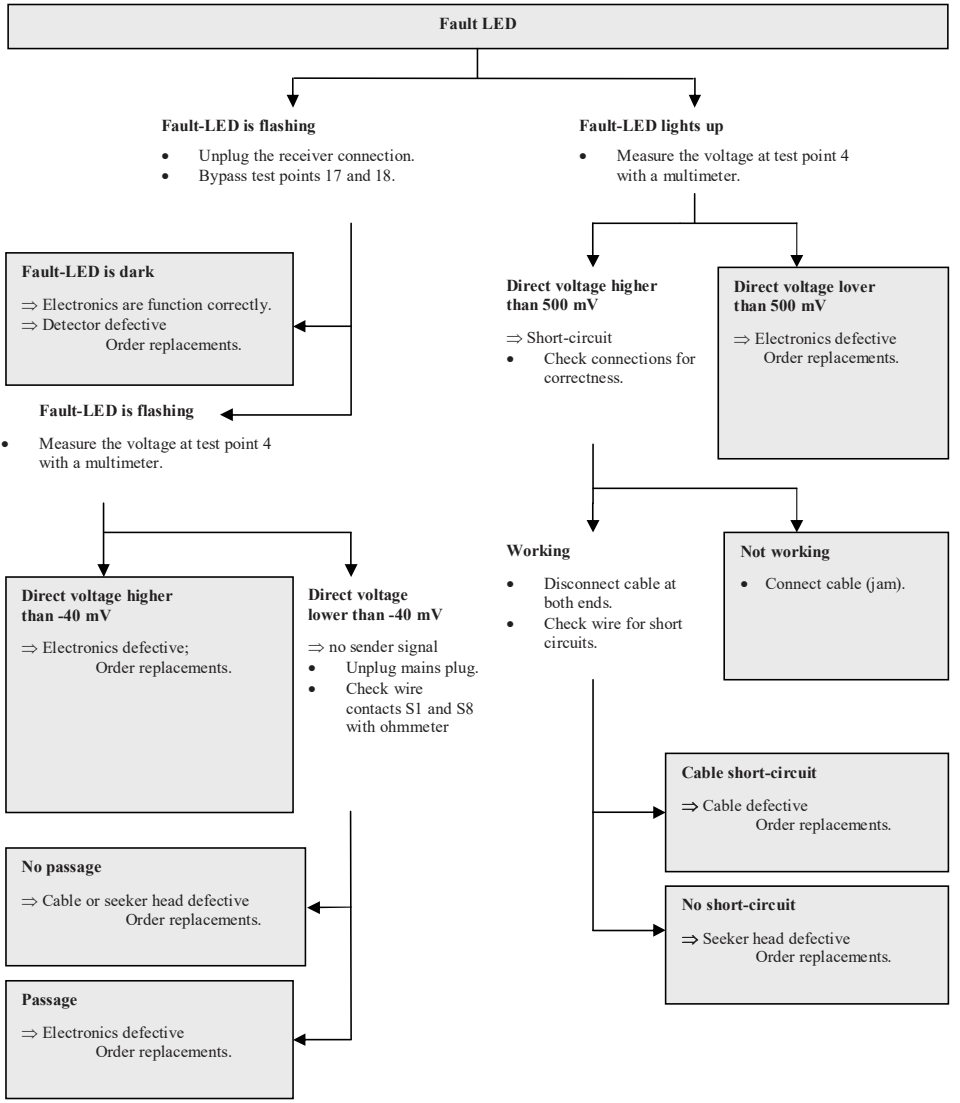
Please assure that items 1, 2, and 3 have been tested before proceeding with the troubleshooting.

# Troubleshooting

Trained and authorized personnel may only carry out troubleshooting. Using the troubleshooting you will be able to locate the error or fault Please proceed as follows. The Test points (TP) found under **Layout.**

See chapter **Technology – Layout**

**The service diagnosis, that includes attaching and detaching the jumper cables, is carried out with the power on. Please be careful when testing the test points.**



# Mains supply

## Net-LED / Main supply-LED dark

**1. Step: Check the mains supply!**

Range of the mains supply: *Customized version:*

Continuously: 120 V AC 240V AC versi*on available upon request*
50 / 60 Hz

System protraction: max.10 A

**2. Step: Check the device fuse!**

In order to protect the evaluation electronics a time lag 315 mA fuse has to be used.

- Fuse o.k.

  Mains supply not o.k.
  *Measures:*
  - Check the voltage actually connected to the **mains supply**. Does the voltage meet the requirements?
  - Contact our service department

See chapter **Errors and problems→ Service**

- Fuse defective

  Replace the device fuse with a spare fuse located on the electronics board. (315 mA, 5x20 mm according to DIN)


1. Main supply LED
2. Time-lag spare fuse. 315 mA, 5x20 mm according to DIN
3. Device fuse, 315 mA, 5x20 mm according to DIN

## Service

Our trained personnel will be glad to help you troubleshoot the problem with your metal detector.

Please find the model and serial number for the metal detector, which is located on the backside of the electronic control box cover and or on the outside of the metal detector.

Before contacting our service department, please fill-in the following form thoroughly. This will help our service technicians to find the problem.

**Sales Order #**

**Serial number device**

The device's serial number you can find on the type plate. It is a 6-digit number and a 2-digit character combination. (For instance. 010512-MN)

**Serial number electronics**

The electronics serial number you can find on the electronics-casing box or on the power supply transformer or on the board. It is a 6-digit number and a 2-digit number (for instance 010512-50)

**Product description**

(Type, temperature, impurities...)

**Detailed error description**

**Measures taken so far**

**Have there been prior service calls?** **Yes** **no**

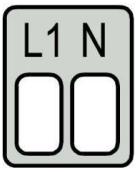
If yes, which order number and/or error description?

# Technology

## Technical data

| | |
|---|---|
| **Operating voltage:** | 120 V AC<br>50 / 60 Hz |
| *Customized 240 V AC version:* | *on request* |
| **Current load:** | max. 1.2 A |
| **Device fuse:** | 315 mA time lag, 5x20 mm according to DIN |
| **Fan fuse:** | 1 amp |
| **Mains protection:** | max. 10 A |
| **Protective system:** | IP 54 |
| **Temperature range:** | |
| Operating: | -10° to +50° C/ 14° to +122° F |
| Storage/Transportation: | -10° to +60° C/ 14° to +122° F |
| **Humidity:** | up to 100 % without condensation water |
| **Conveying speed:** | Slow flowing material |
| **Reject duration:** | adjustable from 0.1 – 16 Sec. |
| **Mains connection:** | ca. 1.8 m cable with safety plug<br>(US-version with US-standard plug) |
| **Air supply:** | 50 CFM minimum |
| **Operating pressure:** | 80 psi- 100psi |
| **Weight:** | MMS unit 50 lbs/ 22 kg<br>Flange Kit 8 lbs/ 2.5 kg |

## Electric mains




Contact L1, N

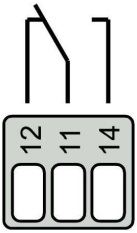
**Electric mains voltage range:**

Continuously: 120 V AC
50 / 60 Hz

***Customized versions:***

240 V AC version: available *on request*

## Relay 1 (switches when metal is detected)



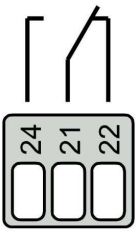

Contacts 12, 11, 14

Dead state: Contacts 11 and 12 closed

Contact load: U~ 250V Imax 3A

**Note: Relay 1 is reserved for the reject mechanism.**

## Relay 2 (switches when an error is detected)

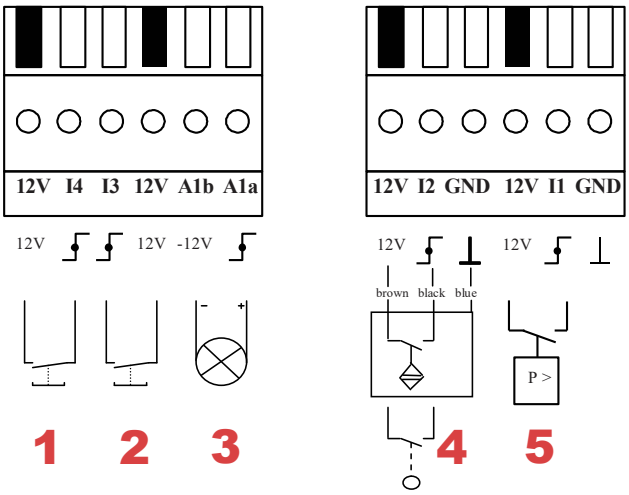



Contacts 24, 21, 22

Dead state: Contacts 21 and 22 closed

Contact load: U~ 250V Imax 3A

## Terminal block




**$I_{max}$ total** (all connections): 100 mA
U= -12V / +12V = 24V

1. Contacts **12V, I4** connection possibilities of test switch. Using the test switch you can initiate a test in order to test the operation of the slide gate and vacuum system. (Max. cable length 5 m/8 ft)

2. Contacts **I3, 12V** (additional reset connection, max. cable length 5m/8ft)

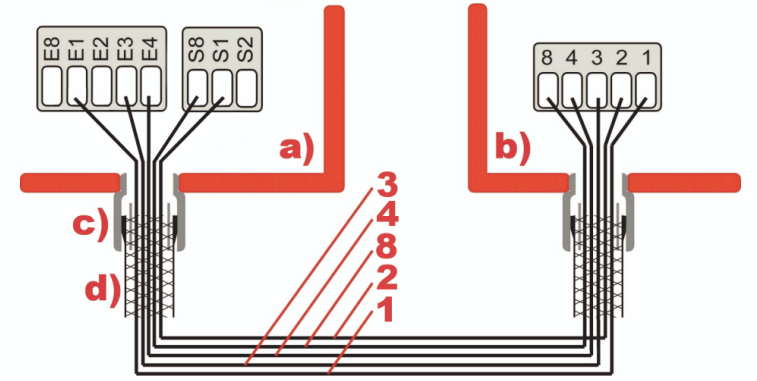
3. Contacts **A1b, A1a** active output used for the control of the slide gate and vacuum reject mechanism.

4. Contacts **12V, I2, (GND)** optional connection used for the slide gate proximity switch. (Optional feature)

5. Contacts **12V, I1, (GND)** Input for the pressure switch to monitor pressure of the system. (Optional feature)

## Transmitter- / Receiver connection

Contacts E1, E3, E4, S8, S1

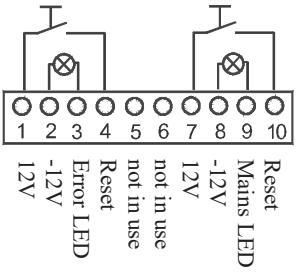


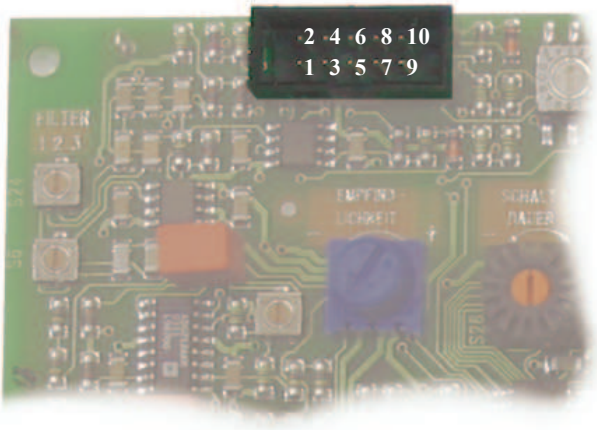

a) Electronics
b) Detector / Transmitter- / Receiver connection housing
c) EMV-screws
d) Shielding

| Electronic | Conductor Nr | Color | Detector |
|---|---|---|---|
| E1 | 1 | White | 1 |
| S1 | 2 | Brown | 2 |
| E3 | 3 | Green | 3 |
| E4 | 4 | Yellow | 4 |
| S8 | 8 | Black | 8 |

## Test / Reset – connection

Function depends on field of application.




**Reset-Button**

- **dark** ⇉ **Normal state**
- **lighted** ⇉ **Metal**
- **blinks** ⇉ **Error**

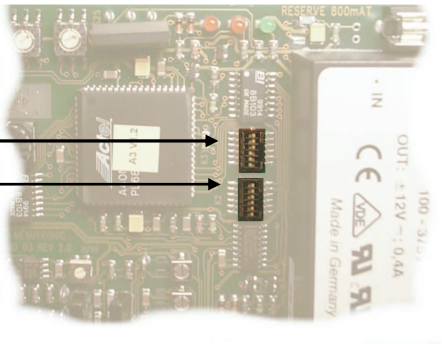
# Switches

Switch to the right (Toward power supply.)
Switch to the left (Away from power supply.)
Factory setting underlined

K 3.1
**K 3.2**
K 3.3
K 3.4
K 3.5
**K 3.6**

Range of segregation duration **short** : 120 ms – 2,4 s
Range of segregation duration **long** : 1 s – 16,5 s

Self-monitoring on (Option)
Self-monitoring off




**K 2.1**
**K 2.2**
**K 2.3**
**K 2.4**
**K 2.5**
**K 2.6**

Operating mode active output: switches when detecting metal
Operating mode active output: switches when detecting metal and when a failures occurs

Operating mode failure relay: switches when failures occur
Operating mode failure relay: switches when failures occur and when metal is detected

Operating mode metal relay: switches when metal is detected
Operating mode metal relay: switches when metal is detected and when failures occur

## Metering points

If malfunctions should occur, you can check the most important signals with a Multimeter.

**Only authorized and trained personnel may carry out repairs or other kinds of works on the board!**
**Improper changes can impair or prevent the function of the metal detector.**

**Metering with applied voltage is**
**!! Hazardous !!**

Ground points

**TP M**
Test points for ground connection
**TP 14**

Measurable by Multi-meter:

**TP 4** **Test point current, output transformer:**
Direct voltage: -40mV to 500mV

**TP 23** **Receiver voltage:**
Direct voltage: -150mV to 250mV

Measurable by oscilloscope:

**TP 3** **Test point current, output transformer:**
Direct voltage: 250mVss to 1,5Vss

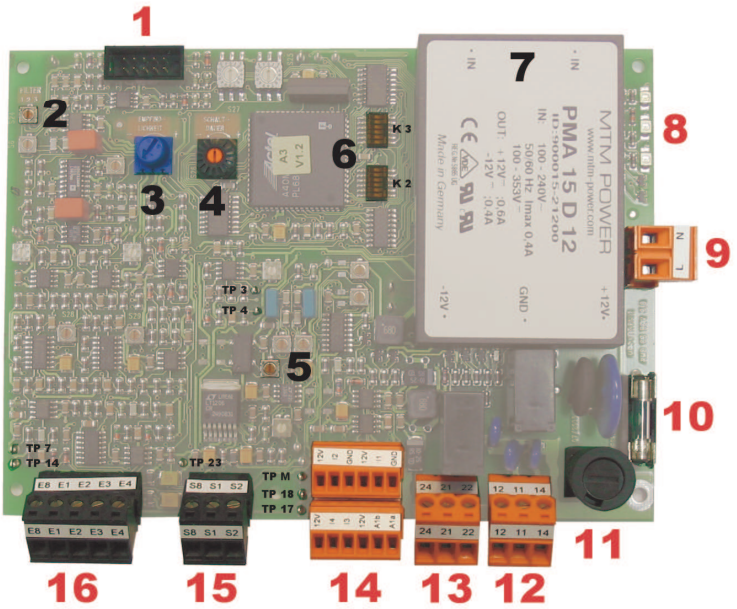
**TP 7** **Receiver voltage:**
Alternative current: max. 950mVss

Test points for failure routine:

**TP 17**

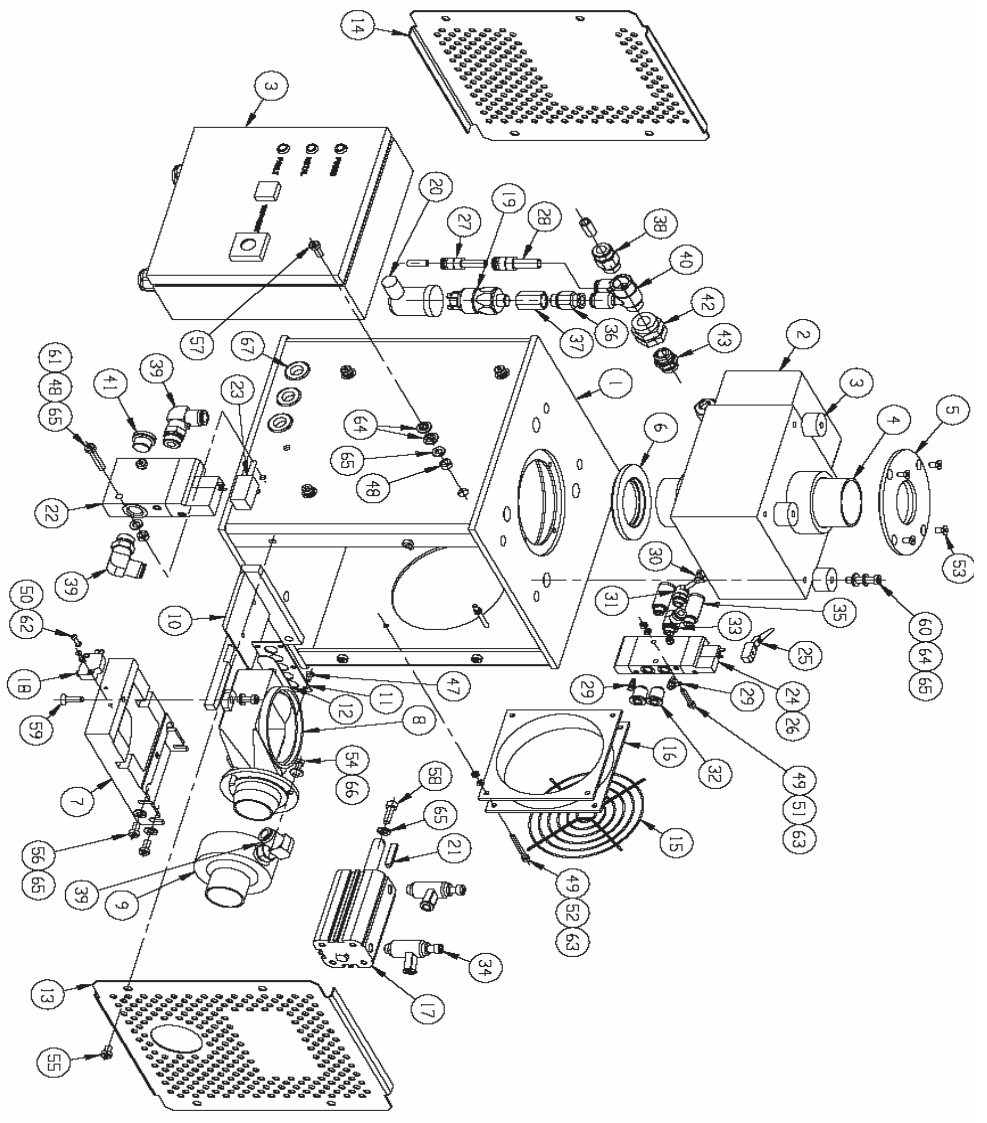
**TP 18**

## Electronics




1. Test / reset connection
2. Noise Filter
3. Sensitivity
4. Ejection time
5. Secondary frequency
6. Switches
7. Power supply
8. LEDs
9. Mains supply
10. Time-lag spare fuse 315 mA, 5x20 mm according to DIN
11. Time-lag device fuse 315 mA, 5x20 mm according to DIN
12. Relay 1 (Metal relay)
13. Relay 2 (Failure relay)
14. Terminal block
15. Transmitter connection
16. Receiver connection

## Spare Parts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| Item | Part Number | Description | Item | Part Number | Description |
|---|---|---|---|---|---|
| 1 | MDMM-HS10 | housing | 33 | FI414 | 6mm tube to G1/8 branch "T" |
| 2 | MDCL30055001 | detector coil-MMS-2 | 34 | FI416 | 6mm tube to G1/8 flow control |
| | MDCL30085001 | detector coil-MMS-3 | 35 | FI418 | G1/8 muffler |
| 3 | | detector electronics | 36 | FI420 | 10mm tube to G1/4 male |
| 4 | MDMM-ST50 | sensing tube-MMS-2 | 37 | FI428 | G1/4 hex coupler |
| | MDMM-ST75 | sensing tube-MMS-3 | 38 | FI430 | 10mm tube to G3/8 male |
| 5 | MDMM-TC50 | top clamp-MMS-2 | 39 | FI432 | 10mm tube to G3/8 male elbow |
| | MDMM-TC75 | top clamp-MMS-3 | 40 | FI435 | 10mm tube to dual G3/8 male |
| 6 | MDMM-RA50 | reject adapter-MMS-2 only | 41 | FI436 | G3/8 plug male |
| 7 | MDMM-RB10 | reject base plate | 42 | FI438 | G3/8 female bulkhead |
| 8 | MDMM-RC10 | reject casting | 43 | FI439 | G3/8 hex nipple |
| 9 | MDMM-RV10 | vacuum adapter | 44 | TU34 | air tube-3/16"OD |
| 10 | MDMM-SG10 | slide gate | 45 | TU6MM | air tube -6mm OD |
| 11 | MDMM-IC10 | inlet cover | 46 | TU10MM | air tube -10mm OD |
| 12 | MDMM-RS10 | inlet screen | 47 | FA1293 | M4-.7x 8mm LHSOCHCS |
| 13 | MDMM-SC10 | side cover-lh | 48 | FA1297 | M6-1.0 HN |
| 14 | MDMM-SC20 | side cover-rh | 49 | FA1301 | M4-.7 HN |
| 15 | MDMM-FA10 | fan guard | 50 | FA1585 | M3-.5x 16mm SOCHCS |
| 16 | MDMM-FA11 | fan-115VAC | 51 | FA1770 | M4-.7x 25mm SOCHCS |
| 17 | MD.PN.AC10 | air cylinder | 52 | FA1780 | M4-.7x 40mm SOCHCS |
| 18 | MD.PN.PS15 | switch-pneumatic | 53 | FA1975 | M5-.8x 10mm SOCFCHCS |
| 19 | MD.PN.PS10 | pressure switch | 54 | FA1984 | M5-.8x 16mm HHCS |
| 20 | MD.PN.PS11 | pressure switch connector | 55 | FA2628 | M6-1.0x 8mm LHSOCHCS |
| 21 | MD.PN.PX10 | cylinder sensor | 56 | FA2630 | M6-1.0x 12mm LHSOCHCS |
| 22 | MD.PN.VL10 | vacuum valve | 57 | FA2642 | M6-1.0x 16mm LHSOCHCS |
| 23 | MD.PN.VC10 | vacuum valve connector | 58 | FA2650 | M6-1.0x 16mm SOCHCS |
| 24 | MD.PN.VL22 | gate valve | 59 | FA2651 | M6-1.0x 16mm SOCFCHCS |
| 25 | MD.PN.VC20 | gate valve connector | 60 | FA2665 | M6-1.0x 30mm LHSOCHCS |
| 26 | MDMM-VS10 | valve spacer | 61 | FA2666 | M6-1.0x 35mm LHSOCHCS |
| 27 | FI402 | reducer-8mm to 6mm | 62 | FA5809 | M3 ITLW |
| 28 | FI404 | reducer-10mm to 8mm | 63 | FA5810 | M4 HSLW |
| 29 | FI406 | 3mm tube to M3 elbow | 64 | FA5818 | NYLON ISOLATER WASHER |
| 30 | FI407 | 3mm tube "Y" connector | 65 | FA5980 | M6 HSLW |
| 31 | FI409 | 3mm tube to G1/8 elbow | 66 | FA6304 | M5 PLW |
| 32 | FI410 | 6mm tube to G1/8 male | 67 | GRM653 | rubber grommet |

## Notes

# Returned Merchandise

**Full Customer Service:** If you are not fully satisfied with our product, we will work with you to achieve your complete satisfaction, and to build a long-term relationship between our companies. This procedure applies to all requests for returned merchandise.

**Damaged Freight:** IMS Company is not responsible for damages to our products during the course of transit. If you have a damaged freight claim, please file that claim with your carrier.

**RGA Required:** Whenever you wish to ship to IMS Company any of our products (or any item for evaluation or potential future business), you must call or write to obtain a Return Goods Authorization number. RGA numbers enable IMS Company employees to track the product through our system and improve our customer service. However, an RGA number does not guarantee that your credit request will be approved. We will evaluate your credit request on a timely basis, and we will do our best to satisfy your request.

**RGA Procedure**

1. Contact an IMS Company representative with your RGA request; he or she will gather the necessary information and will fax a written decision concerning your request within two working days. Call 800-537-5375 (or fax 888-288-6900) and ask for an Inside Sales Associate.

2. All RGA items must be shipped to IMS Company with freight prepaid by the customer. IMS Company will not accept freight collect shipments on any RGA or warranty work, unless there is prior written approval by the Technical Service Manager.

3. After an RGA has been issued, it is valid for customer shipment to IMS Company for 50 calendar days. Ship returned merchandise to our Chagrin Falls location. Returned merchandise must be returned in “like new” condition in order for credit requests to be considered. The RGA # should be prominently marked on the returned package.

4. Upon receipt of the returned merchandise, IMS Company employees will inspect the merchandise and review the situation surrounding the return. Disposition of the credit request will be decided by IMS Company management and communicated to the customer within 10 working days.

Restocking Charges: The following restocking charges will be applied to returned items.

| | |
|---|---|
| 1.Stock Catalog Items (off-the-shelf stock) | 30% minimum charge |
| 2.Non-Stock Catalog Items (not normally carried in stock) | 50% minimum charge |
| 3.Custom Items (custom fabrication, “built-to-order”, Customer applications-including catalog stock with modifications | non-returnable items |

## Product Warranty

IMS Company warrants its equipment to be free of defects in material and workmanship for a period of one year from date of shipment and to conform to specifications and quality as quoted. IMS Company shall remedy any such failure in compliance with this warranty by making replacement of said defective parts or, at the seller's option, making repairs or adjustments to any defective parts providing:

1. The purchaser give IMS Company prompt written notice of defect, including unit serial number and date of purchase;

2. The purchaser, at his expense, returns the defective part to IMS Company 10373 Stafford Rd. Chagrin Falls, OH 44023 for inspection and verification of defect; and

3. The purchaser accepts shipment of replacement parts F.O.B. Chagrin Falls, OH 44023.

The extent of this warranty shall be limited to the replacement of defective parts. The purchaser shall bear the expense of installation and adjustment of replacement parts unless otherwise agreed to in writing by IMS Company. Replacement of a part under warranty does not extend the warranty term.

This warranty shall not apply if failure of equipment or parts is caused by abuse, improper maintenance or repairs, misapplication, incorrect adjustments, exposure to corrosive or abrasive material, or any modification or alteration affecting the operation of the unit which is not authorized by IMS Company.

Equipment parts or accessories not manufactured by IMS Company are subject strictly to the warranties, if any, of those respective manufacturers. Such items as motors, reducers, bearings, and belting are covered under this statement.

The foregoing is in lieu of all other warranties, expressed or implied, including any warranty of merchantability or fitness for a particular purpose.

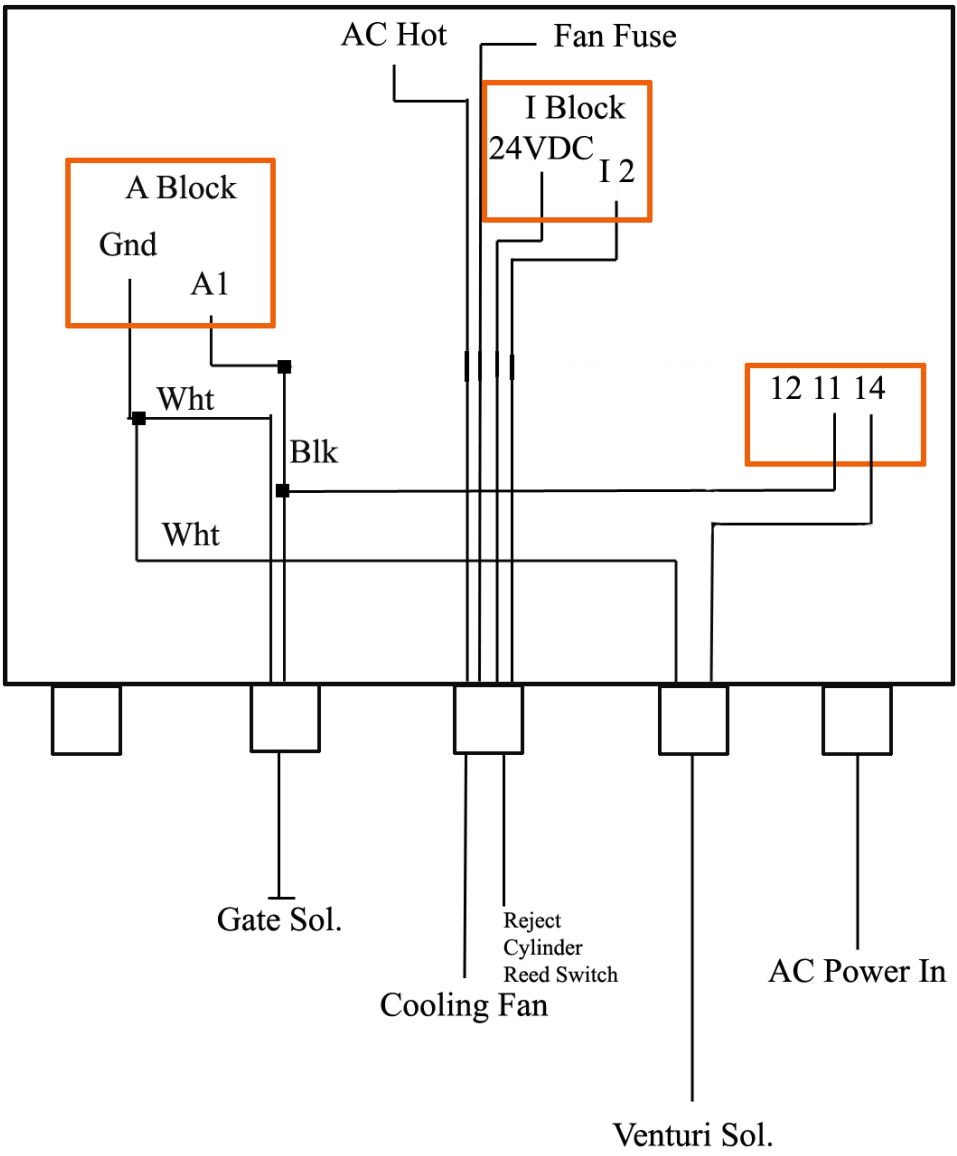
For technical assistance call Tech Support Hotline: 1-866-467-9001
or visit our website www.imscompany.com

IMS Company

10373 Stafford Rd.
Chagrin Falls, OH 44023
U.S. and Canada: Phone 1-800-537-5375
Mexico: 001-888-304-1307
Fax: 888-288-6900
Email: sales@imscompany.com

# MMS Appendix

# MMS Wiring Guide



# The MMS Reed Switch for The reject gate.


The Reed Switch has an LED mounted on the outside. This LED illuminates when the gate is in the fully open position.

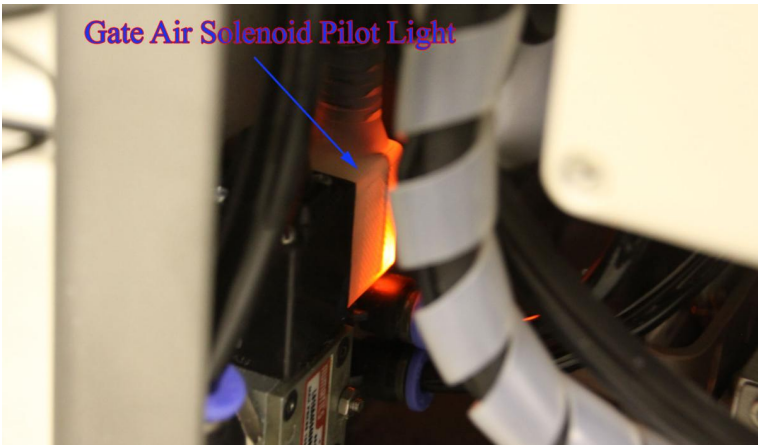
If something stops the gate from leaving the open position, the ERROR Light on the front panel will flash.

If the gate does not return to the open position after rejection, the ERROR Light will flash.

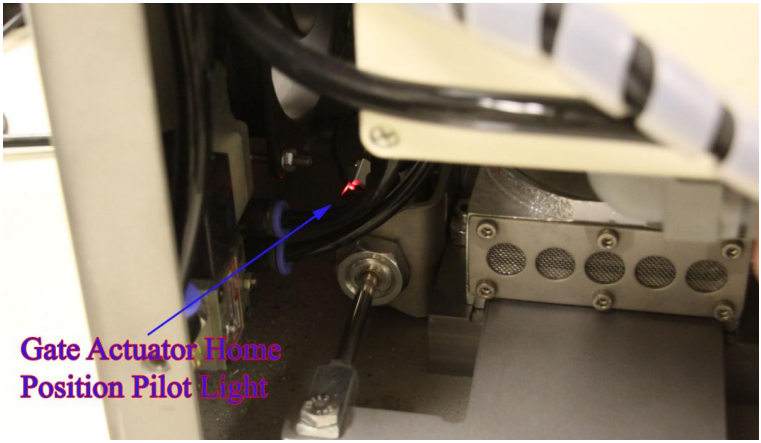
# MMS Reject System Indication Lights

Three things happen together when the MMS unit senses metal and rejects that metal. The gate Air Solenoid changes ports to draw the Gate Actuators in, closing the flow gate. The Reed Switch on one of the Gate Actuators opens indicating the Gate is closing. The Vacuum Solenoid fires and ports air into the reject tube, vacuuming the rejected material out of the sensing tube area. The deration of this Reject cycle is determined by the rotary switch to the right of the sensitivity potentiometer.

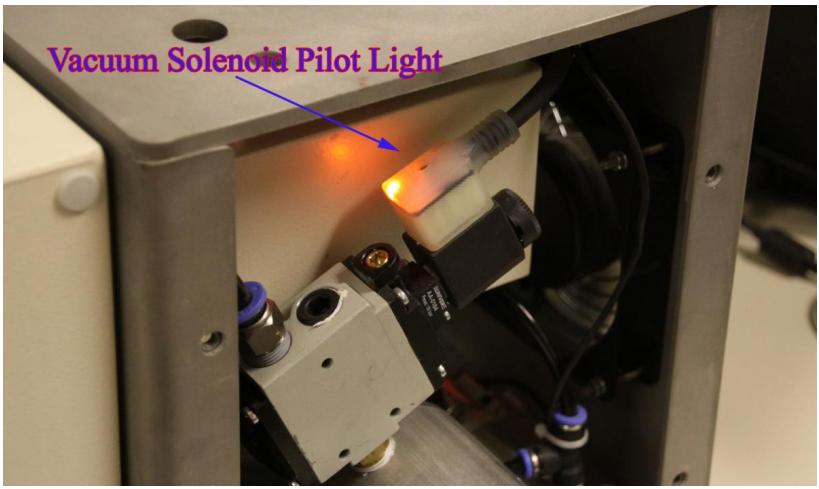
When the reject cycle is finished, the Gate Air Solenoid changes ports again forcing the Gate Actuators back open. The Reed Switch pilot light once again illuminates when the Gate arrives at the open position. Lastly, the Vacuum Solenoid close air flow to the reject port.




When the signal is sent to close the Reject Gate, the pilot light on the Gate Air Valve Solenoid will light. The light will stay illuminated as long as current flows to the solenoid.




When the Reject Gate is in Home or Open position, the pilot light on the Reed switch will be illuminated. When the Gate Actuators are supplied with air from the Gate Solenoid Valve, the actuators draw in, closing the gate. At this time the Reed Switch pilot light will extinguish. When the Gate Solenoid changes ports and forces the Gate Actuators back to the Open position, the Reed Switch pilot light will once again illuminate. If the gate does not return to home position in the allotted time, an error will result. The error light on the front panel will flash. If the gate does not leave home position during the reject cycle, and error will result. The Error Light will flash on the front panel.



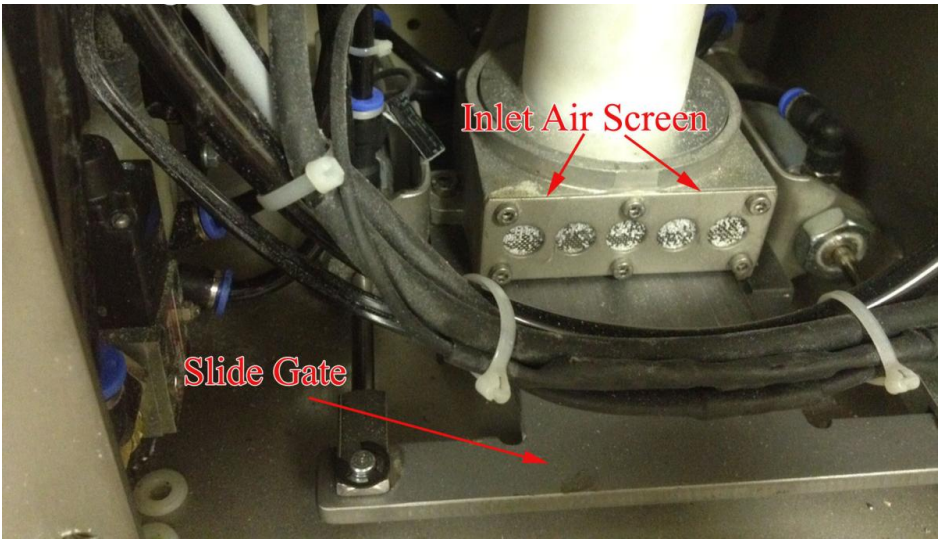

During the Reject Cycle, the Vacuum Solenoid ports air through the Reject port. When the Vacuum Solenoid receives current, the pilot light illuminates.

# MMS Reject System

## REMOVE AIR AND POWER BEFORE SERVICING THE MMS UNIT!!!

Problems with the reject system can cause the ERROR light on the front panel to illuminate. Check the Inlet screen and insure it is clean. The Slide gate groves May be checked at the sametime. The slide gate may be removed by first Removing the retaining clips (2) and the Attachment Pins (2). Then pull the gate toward you to remove it. The Inlet Screen can be removed by removing the hex head screews (6).

(Note: In this image, the coil has been removed for clarity.)




No lubrication is required for the slide gate. The Gate track must be kept clean and free of material. If the slide gate does not leave its open position or does not return to its open position after rejection, an Error will occur.

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