

Operating Instructions and Spare Parts List

OptiFlex™ Automatic Line Gap Triggering



IMPORTANT

Before using this equipment, carefully read all instructions in this manual. Keep this manual for future reference!

TW Gema

Superior By All Measures

Manual #137767

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Safety Regulations For Stationary Electrostatic Powder Spraying Equipment

1 Safety Symbols (pictograms)

This chapter sets out the fundamental safety regulations that must be followed by the user and third parties using the powder spraying equipment. These safety regulations must be read and understood before the powder spraying equipment is used.

The following symbols can be found throughout these operating instructions. Their meanings are defined as follows:

These general safety precautions must be followed, along with all other regulations found in the operating instructions.



DANGER!

Danger due to live electricity or moving parts. Possible consequences are death or serious injury.



WARNING!

Improper use of the equipment could damage the machine or cause it to malfunction. Possible consequences are minor injuries or damage to the equipment.



IMPORTANT!

Useful tips and other information

2 Conformity of Use

1. The stationary powder spraying equipment is built to the latest specifications and conforms to recognized technical safety regulations. It is designed for the normal application of powder coating.
2. Any other use is considered as non-conformity. The manufacturer is not responsible for damage resulting from improper use of this equipment; the end-user alone is responsible. If the powder spraying equipment is to be used for other purposes or other substances outside of our guidelines, then ITW Gema should be consulted.
3. Observance of the operating, service and maintenance instructions specified by the manufacturer is also part of conformity of use. The stationary powder spraying equipment should only be used, maintained and started up by trained personnel, who are informed about and are familiar with the possible hazards involved.
4. Start-up (i.e. the execution of a particular operation) is forbidden until it has been established that the powder spraying equipment has been set up and wired according to NFPA33 and NFPA70 guidelines. Machine safety must also be observed.
5. Unauthorized modifications to the powder spraying equipment exempts the manufacturer from any liability from resulting damage.
6. The relevant accident prevention regulations, as well as other generally recognized safety regulations, occupation health and structural regulations are to be observed.
7. Furthermore, the country-specific safety regulations must be observed.

3 Technical Safety Regulations

3.1 General Information

The powder spraying equipment from ITW Gema is designed with safety in mind and is built according to the latest technological specifications. This equipment can be dangerous if it is not used for its specified purpose. It should also be noted that because of this there exists:

A danger to life and limb of the user or third party.
A danger of damage to the equipment and other machinery belonging to the user.
A hazard to the efficient operation of the equipment.

1. The powder spraying equipment should only be started up and used once the operating instructions have been carefully studied. Improper use of the controlling device can lead to accidents, malfunction or damage to the control itself.
2. Before every start-up, check the equipment for operational safety. Regular servicing is essential!
3. Safety regulations must be observed for safe operation.
4. Safety precautions specified by local legislation must be observed.
5. The power plug must be disconnected before the machine is opened for repair.
6. The power plug and socket connection between the powder spraying equipment and the mains network should only be taken out when the power is switched off.
7. The connecting cable between the controlling device and the spray gun must be set up so that it cannot be damaged during operation. Safety precautions specified by local legislation must be observed!
8. Only original ITW Gema replacement parts should be used in order to preserve the explosion protection. Damage caused by non-ITW Gema parts will not be covered under warranty.
9. If ITW Gema powder spraying equipment is used in conjunction with machinery from other manufacturers, then their safety regulations must also be taken into account.
10. Before starting work, familiarize yourself with all installations and operating elements, as well as with their functions. Familiarization during operation is too late!
11. Caution must be exercised when working with a powder/air mixture. A powder/air mixture is flammable! No smoking during powder coating!
12. As a general rule for all powder spraying installations, persons with pacemakers should never enter high voltage areas or areas with electromagnetic fields. Persons with pacemakers should not enter areas with powder spraying installations!



WARNING!

We emphasize that the customer is responsible for safe operation of the powder spraying equipment. ITW Gema is in no way responsible for any resulting damages.

3.2 Safety Conscious Working

Each person responsible for the assembly, start-up, operation, service and repair of powder spraying equipment must have read and understood the operating instructions. The customer must ensure that the operator has had the appropriate training for powder spraying equipment and is aware of the possible sources of danger.

The powder spraying equipment should only be used by trained and authorized personnel. This also applies to modifications to the electrical equipment, which should only be carried out by a specialist.

The operating instructions and the necessary closing-down procedures must be followed before any work is carried out concerning the set-up, start-up, operation, modification, operating conditions, mode of operation, servicing, inspection or repairs.

The powder spray equipment can be turned off by using the main switch or failing that, the emergency shut-down. Individual components can be turned off during operation by using the appropriate switches.

3.3 Individual Safety Regulations for Operating Company and/or Operating Personnel

1. Any operating method which will negatively influence the technical safety of the powder spraying equipment is to be avoided.
2. The operator should see to it that no non-authorized personnel work on the powder spraying equipment (e.g. this also includes using the equipment for non-conformity work).
3. The operator is under obligation to check the powder spraying equipment at least once every shift for signs of external damage, defects or changes (including the operating characteristics), which could influence safety and to report them immediately.
4. The operator is required to ensure that the powder spraying equipment is only operated when in satisfactory condition.
5. As far as is necessary, the operating company must ensure that the operating personnel wear protective clothing (e.g. face masks).
6. The operating company must guarantee cleanliness and an overview of the workplace with suitable instructions and checks in and around the powder spraying equipment.
7. No safety devices should be dismantled or put out of operation. If the dismantling of a safety device for set-up, repair or servicing is necessary, reassembly of the safety devices must take place immediately after maintenance or repair work is finished. The powder spraying device must be turned off while servicing is carried out. The operator must train and commit the responsible personnel to do this.
8. Activities such as checking powder fluidization or checking the high-voltage spray gun, etc. must be carried out with the powder spraying equipment switched off.

3.4 Notes on Special Types of Hazards

3.4.1 Power

There is danger to life from high-voltage current if the shut-down procedures are not observed. High-voltage equipment must not be opened – the plug must first be taken out – otherwise there is the danger of electrical shock.

3.4.2 Powder

Powder/air mixtures can be ignited by sparks. There must be sufficient ventilation in the powder coating booth. Powder lying on the floor around the powder spraying device is a potentially dangerous source of slipping.

3.4.3 Static Charges

Static charges can have the following consequences: charges from people, electric shocks, and/or sparking. Charges from objects must be avoided (see “Earthing”).

3.4.4 Earthing

All electrically-conducting parts and machinery found in the workplace must be earthed $\leq 1 \text{ M}\Omega$. The earthing resistance must amount to $\leq 1 \text{ M}\Omega$. The resistance must be tested on a regular basis. The condition of the machinery surroundings, as well as the suspension gear, must ensure that the machinery remains earthed. If the earthing of the machinery includes the suspension arrangements, then these must constantly be kept clean in order to guarantee the necessary conductivity. The appropriate measuring devices must be kept ready in the workplace in order to check the earthing.

3.4.5 Compressed Air

When there are to be longer pauses or standstill times between working, then the powder spraying equipment should be drained of compressed air. There is a danger of injury when pneumatic hoses are damaged and from the uncontrolled release and improper use of compressed air.

3.4.6 Crushing and Cutting

While in operation, moving parts may automatically start to move in the operating area. It must be ensured that only instructed and trained personnel go near these parts. The operator should ensure that barriers comply with the local security regulations.

3.4.7 Access Under Exceptional Circumstances

The operating company must ensure that local conditions are met when repairs are made to the electronic parts or when the equipment is restarted so that there are additional measures such as barriers to prevent unauthorized access.

3.5 Prohibition of Unauthorized Conversions and Modifications to Machines

All unauthorized conversions and modifications to electrostatic spraying equipment are forbidden for safety reasons.

The powder spraying equipment should not be used if damaged. The faulty part must be immediately replaced or repaired. Only original ITW Gema replacement parts should be used. Damage caused by other parts is not covered by guarantee.

Repairs must only be carried out by specialists or in ITW Gema workshops. Unauthorized conversions and modifications may lead to injury or damage to machinery. The ITW Gema guarantee would no longer be valid.

4 Safety Requirements for Electrostatic Powder Coating

1. This equipment is dangerous if the instructions in this operating manual are not followed.
2. All electrostatically conductive parts and, in particular, the machinery within 5 m of the coating equipment, must be earthed.
3. The floor of the coating area must conduct electricity. Normal concrete is generally conductive.
4. The operating personnel must wear electricity conducting footwear (e.g. leather soles).
5. The operating personnel should hold the gun with bare hands. If gloves are worn, these must also conduct electricity.
6. The supplied earthing cable (green/yellow) must be connected to the earthing screw of the electrostatic powder spraying hand appliance. The earthing cable must have a good metallic

5 About Operating Instructions

These operating instructions contain all important information which is required to operate your OptiFlex™ Automatic Line Gap Triggering equipment. It will guide you safely through the installation phase; give you notes and tips for the optimum use of your new Automatic Triggering equipment. Information about the functioning of individual system components will be found in respective documentation.

6 Definitions and Acronyms

OptiFlex Automatic – A packaging concept of utilizing OptiStar™ control units. The OptiStar units are mounted in a vertical arrangement, two units side by side, and utilize an enclosure to secure the control units. The assembly provides electrical and pneumatic distribution for all OptiStar units and any optional equipment. The structure creates a concept for ease of assembly, installation and service. Reference photo on cover page and spare parts section for more detail.

OptiStar CG06 - Control Gun #6 – Control units used within OptiFlex Automatic Line Gap Triggering system that contain an internal 24VDC power supply for stand-alone and simplified installations. Digital bus, CANbus or Flow Control **CANNOT** be used with the OptiFlex Automatic Line Gap Triggering system.

OptiGun™ GA02 – Gun Automatic #2 – Automatic gun supplied with OptiFlex packages.

OptiFlex Automatic Line Gap Triggering - Line Gap Trigger Control for one OptiFlex Automatic Cabinet (14 guns maximum).

This manual contains more detailed information on each one of the above mentioned items. Please reference the Table of Contents for page locations.

7 Field of Application

The OptiFlex Automatic Line Gap Triggering system with ITW Gema OptiStar control units and OptiGun automatic powder guns is especially designed to meet the demands of production line applications in both manufacturing, and custom electrostatic coating installations, where reliability in automated working, comfortable operation, and safety are the advantages to the end user.

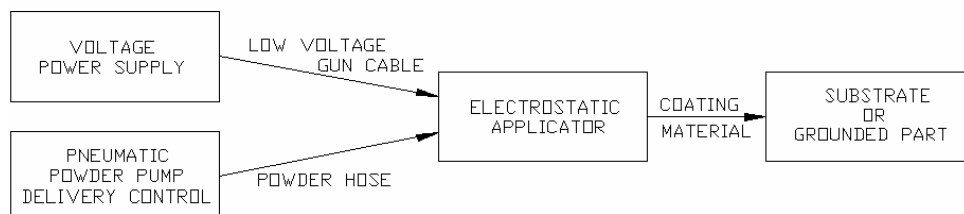
The scope of the delivery depends on the number and composition of the modules.

It is extremely important to follow the “assembly instructions” in this manual, and the operating instructions supplied with the OptiFlex Automatic unit and OptiStar control unit, when setting up and operating the OptiFlex Automatic Line Gap Triggering system.

8 The ITW Gema Powder Coating Process

One method available today, is to use process control methods that allow a very reliable, accurate and repeatable control of the powder delivery and electrostatic voltage. The powder process control equipment available is the OptiFlex and OptiStar control units. These two control modules take advantage of technology to improve powder coating application by consistent and repeatable film build.

The electrostatic powder coating process contains four main components.



The objective of applying powder electrostatically is to provide the attraction of the powder to the substrate. Without electrostatics, the powder will not adhere to the substrate. A remote power supply (OptiStar) produces a low voltage, high frequency AC signal through the gun cable to a cascade in the gun. The cascade, located in the gun barrel, then steps up the power signal through a transformer to approximately 4.5kV. The AC signal is then fed through a bank of capacitors and diodes to produce the necessary high voltage pulsating DC signal. The capacitors and diodes in the ladder create the required DC voltage by filtering AC ripple and creating reversing current blocks, which are necessary for producing a 98kV signal. This high voltage is transmitted to the electrode in the tip of the gun creating an electrostatic field between the applicator and the target object. The target is electrically grounded through its support, which may be either stationary or moving. The voltage level is also set at the control module, and can be adjusted to an output that will provide maximum transfer efficiency for any given application.

As the powder coating exits the powder gun, it passes through a suspended electrode where the powder enters an area called the corona field where ions are formed. This corona field is created from the potential at the electrode tip that discharges negative ions into the atmosphere. These ions collide with the powder particles and then, by following the electrical lines of force and the airflow from the gun, the powder particles are transferred to the grounded target object

The powder is transferred from the feed hopper by air moving through the venturi pump. This air passage through the pump creates a negative air pressure causing the powder to be pulled up the lift tube and transported through the powder hose to the gun. By using a flow meter to determine the proper volume of air is supplied to the pump, the powder flow rate and pattern can be regulated to insure a smooth delivery. The powder delivery rate can be set quickly and accurately, and can be duplicated as production requirements demand.

9 General Information

This is general information, for more detailed information see corresponding Operating Instructions or Section for any given piece of equipment.

9.1 Mains Supply

- The mains supply is the local voltage which needs to be in the range of 85-264VAC single phase. See also wiring diagram.
- The mains frequency can be 50 or 60 Hz.
- Adding the connected load of the individual OptiStar's (0.5Amp/OptiStar) plus OptiFlex Automatic Line Gap Triggering System (0.5Amp) together gives the total connected load for the complete system.

9.2 Compressed Air

- The equipment only requires a compressed air supply on the main air distribution network (Main air input and compressed air distribution)
- The following values for compressed air must be maintained:

Input Pressure:	85-150PSIG
Compressed Air Consumption:	6.5-90SCFM (based on # of OptiStars)
Max. Water Vapor Content:	1.3g/m ³
Max. Oil Vapor Content:	0.1mg/kg

9.3 Mounting Frame Dimensions

Width: 23.6"
Height: 75.6"
Depth: 27.6"



10 Setting up the OptiFlex Automatic Powder System








10.1 Possibilities

- OptiFlex Automatic Line Gap Triggering System mounts in the lower electrical section of the OptiFlex Automatic Cabinet. No separate enclosure is required.
- OptiFlex should not be located within 3 ft. of any powder booth opening to be compliant with NFPA 33.
- Maximum of 14 OptiStar (CG06) units can be mounted in one OptiFlex Automatic Assembly (does not apply to OptiStar units with Digital bus, CANBus and/or FlowControl).

10.2 Assembly Instructions

- After unpacking and assembling the OptiFlex Automatic unit ensure the unit is in a secure location and not in the way of any moving object, forklift, etc. that could cause physical damage.
- Internal connections have already been made at the factory; connections to control units will be done in the field and prior to starting the equipment. The connection possibilities for individual control units are found in the accompanying operating instructions.
- When connecting the pneumatic hoses in the OptiFlex Automatic assembly, their lengths and radii should be taken into account

KEY

	DENOTES CIRCUIT BOARD TRACE CONDUCTOR
	DENOTES INTERNAL INSULATED WIRES FOR POWER FEED/SWITCHES/LIGHTS OR EXTERNAL INSULATED WIRES FOR INTERLOCKING/PLC CONTROL
<u>BLK (##AWG)</u>	DENOTES INSULATED WIRE COLOR AND/OR AWG
•	DENOTES CIRCUIT BOARD TRACE CONNECTION
	DENOTES SCREW TERMINALS ON CIRCUIT BOARD, UNLESS NOTED
	FIRE DETECTION INTERLOCK – MUST BE ISOLATED DRY CONTACT (CLOSED DURING NORMAL OPERATION)
	EXHAUSTER MOTOR STARTER INTERLOCK – MUST BE ISOLATED DRY CONTACT (CLOSED DURING NORMAL OPERATION)
	CONVEYOR MOTOR STARTER INTERLOCK – MUST BE ISOLATED DRY CONTACT (CLOSED DURING NORMAL OPERATION)
	OPTITRONIC(CG03) UNITS CAN BE FROM ONE TO EIGHT UNITS
	ALL POWER & INTERLOCKS, AS WELL AS ELECTRICAL FITTINGS, PROVIDED BY END USER
	USE #16AWG GREEN FOR GROUND UNLESS NOTED
	USE #16AWG YELLOW FOR EXTERNAL INTERLOCKS UNLESS NOTED
	DENOTES INSERTED METAL COMB JUMPER ON TERMINAL FOR MANUAL SYSTEM CONTROL WHEN REMOVED, REMOTE PLC CONTROLS INDIVIDUAL SYSTEM INPUT FOR EACH OPTITRONIC
	DENOTES REMOTE LOCATED DEVICE EXTERNAL TO OPTIMANAGER1 CONTROL UNIT
	DENOTES REMOTE LOCATED DEVICE INTERNAL TO OPTIMANAGER1 CONTROL UNIT
	DENOTES CONNECTOR NUMBER FOR SCREW TERMINAL, UNLESS NOTED

- 11 Fire Detection System Interlock** - User supplied, normally open dry contact from the fire detection system. Contact is provided under normal operating conditions with Fire Detection energized and no faults or fire alarms. Wire terminations are located on the “A0” mounting plate, terminals “75(X0)” and “76(X0)”.

Off – The dry contact interlock from the fire detection system is open and the guns can’t turn on. This could be caused by no power to the fire detection system, a problem with the fire detection system, or a fire fault has occurred.

On – The dry contact interlock from the fire detection system is closed and the guns can turn on. This means the fire detection system is OK.

- 11.1 Exhauster Motor Starter Interlock** - User supplied, normally open dry contact from the booth exhauster motor starter. Contact is provided under normal operating conditions with booth exhauster running and no external faults. Wire terminations are located on the “A0” mounting plate, terminals “75(X0)” and “76(X0)”.

Off – The dry contact interlock from the booth exhauster motor starter is open and the guns can’t turn on. This means the booth is not running.

On – The dry contact interlock from the booth exhauster motor starter is closed and the guns can turn on. This means the booth is running OK.

11.2 Conveyor Motor Starter Interlock - User supplied, normally open dry contact from the conveyor motor starter. Contact is provided under normal operating conditions with conveyor running. Wire terminations are located on the "A0" mounting plate, terminals "75(X0)" and "76(X0)".

Off – The dry contact interlock from the conveyor motor starter is open and the guns can't turn on. This means the conveyor is not running. If used, the hopper fluidization remains on to keep the powder fluidized when the conveyor is off.

On – The dry contact interlock from the conveyor motor starter is closed and the guns can turn on. This means the conveyor is running OK.

11.3 Conveyor Bypass Switch (Optional) - User supplied switch that is wired in parallel with the conveyor motor starter dry contact.

Off – The switch is open and the guns turn on and off based on the conveyor motor starter interlock.

On – The switch is closed and the guns turn on regardless if the conveyor motor starter interlock is on or off.



Note: Interlock Terminals "75(X0)" and "76(X0)" are the only terminals provided for wiring terminations. If additional terminals are required for interlocking, spare terminals within OptiFlex Automatic cabinet can be utilized or terminate in remote location prior to interface with OptiFlex Automatic cabinet. See photo above as reference.

12 OptiFlex Automatic Line Gap Triggering Unit

- Automatic system to monitor line gaps on the conveyor line.
- Utilizes a single photo eye to recognize parts as they enter the booth.
- Contains a "System" On Timer to trigger the guns on.
- Contains a "System" Off Timer to trigger the guns off.
- All timers, wiring, etc. located inside bottom of OptiFlex Automatic cabinet
- Used with OpStar(CG06) Units Only. Not designed to be used with Digital bus,CANbus and Flow Control.



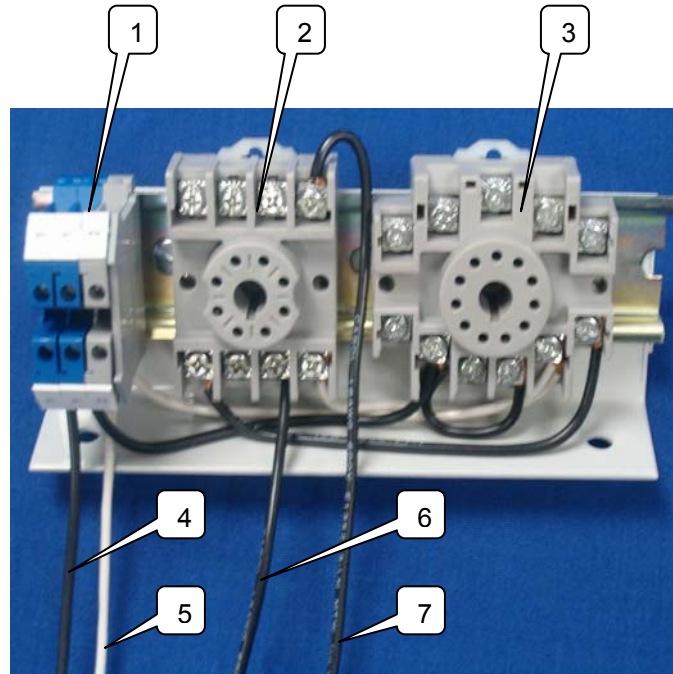
12.1 OptiFlex Automatic Line Gap Trigger Electrical Specifications:

Mains Supply Voltage:	110-120VAC Single Phase
Mains Supply Current:	1Amp Maximum
Input Frequency:	50/60 Hertz
On/Off Timers:	120VAC, 10VA each
Temperature Range:	32 F. to 104 F.
Interlocking:	Reference NFPA 33

The OptiFlex Automatic Line Gap Trigger option automatically turns the guns on or off depending on whether there is product on the conveyor line. If there is no product on the conveyor between the photo eye that determines if there are parts present and the last guns in the booth, then the guns automatically shut off based on the Spray Off Timer setting. Once the next part breaks the photo eye beam, the guns will turn on based on the Spray On Timer setting.

The photo eye that determines if a part is present should be located outside the booth near the part entrance to the booth. The photo eye beam should be located in such a way that it sees the part and not the hanger. This way the photo eye beam will not sense empty hangers and spray the guns without parts present.

12.2 OptiFlex Automatic Line Gap Wiring



OptiFlex Automatic Line Gap Wiring Diagram
Located inside OptiFlex Automatic Cabinet

ITEM 1 – Wiring Terminals used for AC power distribution for both timers and photo eye.

ITEM 2 – “Spray ON” timer base used for wiring termination and mounting timer.

ITEM 3 – “Spray OFF” timer base used for wiring termination and mounting timer.

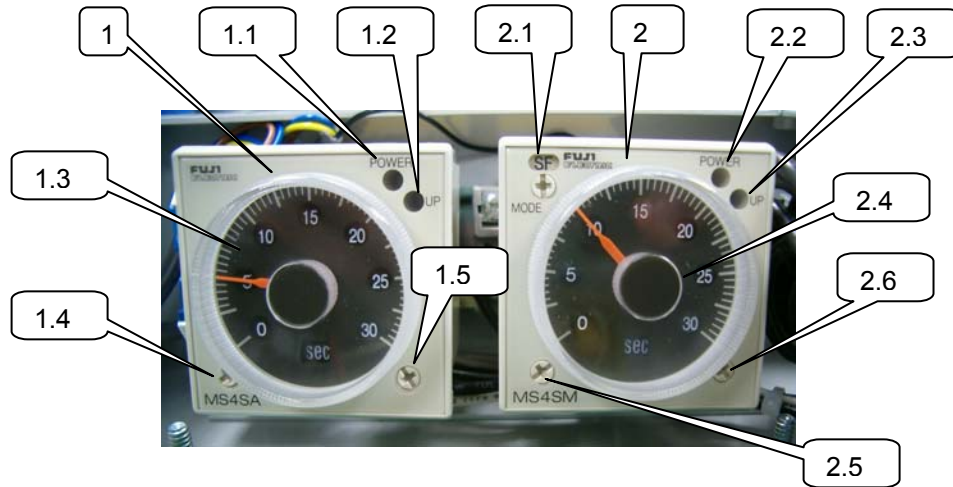
ITEM 4 – AC supply voltage wire coming from fuse breaker(F4) located on “A0” mounting plate. Other required power feed connections are terminated from this point to both timer bases.

ITEM 5 – AC neutral wire coming from terminal “N(X0)” located on “A0” mounting plate. Other required neutral wiring connections are terminated from this point to both timer bases.

ITEM 6 – AC supply voltage wire from terminal “75(X0)” located on “A0” mounting plate. This wire provides the supply voltage for the “System” (trigger) and to the “Spray ON” timer base.

ITEM 7 – AC wire from terminal “75(X0)” located on “A0” mounting plate. Used for contact closure of “System” (trigger) signal from timer base.

12.3 OptiFlex Automatic Line Gap Trigger Timer Settings



“Spray ON” and “Spray OFF” timers
Located inside OptiFlex Automatic Cabinet

ITEM 1 - Spray “ON” Timer – Set this timer based on the time it takes the front edge of the part to break the photo eye beam to when the guns turn on before the gun’s location.

Item 1.1 - Power “ON” LED Indicator (Green)

Item 1.2 - LED Output Indicator (Red)

Item 1.3 - Time Unit Indicator Window (Adjust by manually rotating plastic housing)

Item 1.4 - Timing Range Selector (Factory preset to 0-30)

Item 1.5 - Time Unit Selector (Factory preset to seconds)

ITEM 2 - Spray “OFF” Timer – Set this timer based on the time it takes the back edge of the part to break the photo eye beam to when the guns turn off after the gun’s location.

Item 2.1 - Operation mode selector and indicator window (Factory preset to SF mode)

Item 2.2 - Power “ON” LED Indicator (Green)

Item 2.3 - LED Output Indicator (Red)

Item 2.4 - Time Unit Indicator Window (Adjust by manually rotating plastic housing)

Item 2.5 - Timing Range Selector (Factory preset to 0-30)

Item 2.6 - Time Unit Selector (Factory preset to seconds)

Use the following conversion tables as a starting point for the proper timer settings. The actual timer settings should be adjusted based on watching the guns turn on and off then increasing or decreasing the timer settings more specific to the application once it is running.

If the guns turn on too soon, increase the Spray On Timer setting.

If the guns turn on too late, decrease the Spray On Timer setting.

If the guns turn off too soon, increase the Spray Off Timer setting.

If the guns turn off too late, decrease the Spray Off Timer setting.

IMPORTANT: If the conveyor stops while guns are spraying in the booth, the timers will continue to run.

If a part is breaking the photo eye beam when the conveyor stops, the timers will run as if parts are present and the timers will operate as normal when the conveyor starts. If the conveyor motor starter interlock is working, the guns will turn off when the conveyor stops and turn back on when the conveyor starts. In this situation, the parts will be coated as normal.

If a part is not breaking the photo eye beam when the conveyor stops, the timers will continue to run. If the conveyor is off for a short amount of time and the timers have not completed the set time, the guns will turn on when the conveyor starts and the timers will operate as normal. If the conveyor is off for a long amount of time and the timers have completed the set time, the guns will not turn on when the conveyor starts. The automatic timing will run correctly when the next part breaks the photo eye beam. This will cause the parts between the guns and the photo eye to pass through the booth without being sprayed.

12.4 Timer Setting Conversion Tables – OptiFlex Automatic Line Gap Trigger Controls Package

SPRAY ON TIMER SETTING INSTRUCTIONS:

- The table determines the SPRAY ON TIMER setting based on the distance from the photo eye to the first gun relative to the conveyor speed.
- The distance from the photo eye to the first gun is measured in feet and should be rounded to the nearest foot when measuring.
- If the conveyor speed changes for different applications, use the fastest conveyor speed for the SPRAY ON TIMER setting.
- The timer setting calculation assumes the gun will turn on 12" ahead of the part.
- Formula: Timer Setting (seconds) = [Distance (feet) - 12" Gun On Lead] / Conveyor Speed (feet/minute)
- Use these timer settings as a starting point. The actual timer settings may be changed based on the application.

SPRAY ON TIMER SETTING (seconds)

DISTANCE FROM PHOTOEYE TO FIRST GUN (ft)

Conveyor Speed (ft/min)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
3	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380
4	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285
5	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228
6	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190
7	17	26	34	43	51	60	69	77	86	94	103	111	120	129	137	146	154	163
8	15	23	30	38	45	53	60	68	75	83	90	98	105	113	120	128	135	143
9	13	20	27	33	40	47	53	60	67	73	80	87	93	100	107	113	120	127
10	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114
11	11	16	22	27	33	38	44	49	55	60	65	71	76	82	87	93	98	104
12	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95
13	9	14	18	23	28	32	37	42	46	51	55	60	65	69	74	78	83	88
14	9	13	17	21	26	30	34	39	43	47	51	56	60	64	69	73	77	81
15	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76
16	8	11	15	19	23	26	30	34	38	41	45	49	53	56	60	64	68	71
17	7	11	14	18	21	25	28	32	35	39	42	46	49	53	56	60	64	67
18	7	10	13	17	20	23	27	30	33	37	40	43	47	50	53	57	60	63
19	6	9	13	16	19	22	25	28	32	35	38	41	44	47	51	54	57	60
20	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57
21	6	9	11	14	17	20	23	26	29	31	34	37	40	43	46	49	51	54
22	5	8	11	14	16	19	22	25	27	30	33	35	38	41	44	46	49	52
23	5	8	10	13	16	18	21	23	26	29	31	34	37	39	42	44	47	50
24	5	8	10	13	15	18	20	23	25	28	30	33	35	38	40	43	45	48
25	5	7	10	12	14	17	19	22	24	26	29	31	34	36	38	41	43	46
26	5	7	9	12	14	16	18	21	23	25	28	30	32	35	37	39	42	44
27	4	7	9	11	13	16	18	20	22	24	27	29	31	33	36	38	40	42
28	4	6	9	11	13	15	17	19	21	24	26	28	30	32	34	36	39	41
29	4	6	8	10	12	14	17	19	21	23	25	27	29	31	33	35	37	39
30	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38

SPRAY OFF TIMER SETTING INSTRUCTIONS

- The table determines the SPRAY OFF TIMER setting based on the distance from the photo eye to the last gun relative to the conveyor speed.
- The distance from the photo eye to the last gun is measured in feet and should be rounded to the nearest foot when measuring.
- If the conveyor speed changes for different applications, use the slowest conveyor speed for the SPRAY OFF TIMER setting.
- The timer setting calculation assumes the gun will turn off 12" after the part.
- Formula: Timer Setting (seconds) = [Distance (feet) + 12" Gun Off Lag] / Conveyor Speed (feet/minute)
- Use these timer settings as a starting point. The actual timer settings may be changed based on the application.

OFF TIMER SETTING (seconds)

Conveyor Speed (ft/min)	DISTANCE FROM PHOTOEYE TO LAST GUN (ft)																			
	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
3	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400	420		
4	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285	300	315		
5	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228	240	252		
6	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210		
7	34	43	51	60	69	77	86	94	103	111	120	129	137	146	154	163	171	180		
8	30	38	45	53	60	68	75	83	90	98	105	113	120	128	135	143	150	158		
9	27	33	40	47	53	60	67	73	80	87	93	100	107	113	120	127	133	140		
10	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126		
11	22	27	33	38	44	49	55	60	65	71	76	82	87	93	98	104	109	115		
12	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105		
13	18	23	28	32	37	42	46	51	55	60	65	69	74	78	83	88	92	97		
14	17	21	26	30	34	39	43	47	51	56	60	64	69	73	77	81	86	90		
15	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84		
16	15	19	23	26	30	34	38	41	45	49	53	56	60	64	68	71	75	79		
17	14	18	21	25	28	32	35	39	42	46	49	53	56	60	64	67	71	74		
18	13	17	20	23	27	30	33	37	40	43	47	50	53	57	60	63	67	70		
19	13	16	19	22	25	28	32	35	38	41	44	47	51	54	57	60	63	66		
20	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63		
21	11	14	17	20	23	26	29	31	34	37	40	43	46	49	51	54	57	60		
22	11	14	16	19	22	25	27	30	33	35	38	41	44	46	49	52	55	57		
23	10	13	16	18	21	23	26	29	31	34	37	39	42	44	47	50	52	55		
24	10	13	15	18	20	23	25	28	30	33	35	38	40	43	45	48	50	53		
25	10	12	14	17	19	22	24	26	29	31	34	36	38	41	43	46	48	50		
26	9	12	14	16	18	21	23	25	28	30	32	35	37	39	42	44	46	48		
27	9	11	13	16	18	20	22	24	27	29	31	33	36	38	40	42	44	47		
28	9	11	13	15	17	19	21	24	26	28	30	32	34	36	39	41	43	45		
29	8	10	12	14	17	19	21	23	25	27	29	31	33	35	37	39	41	43		
30	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42		

13 OptiFlex Automatic Line Gap Trigger – Photo Eye

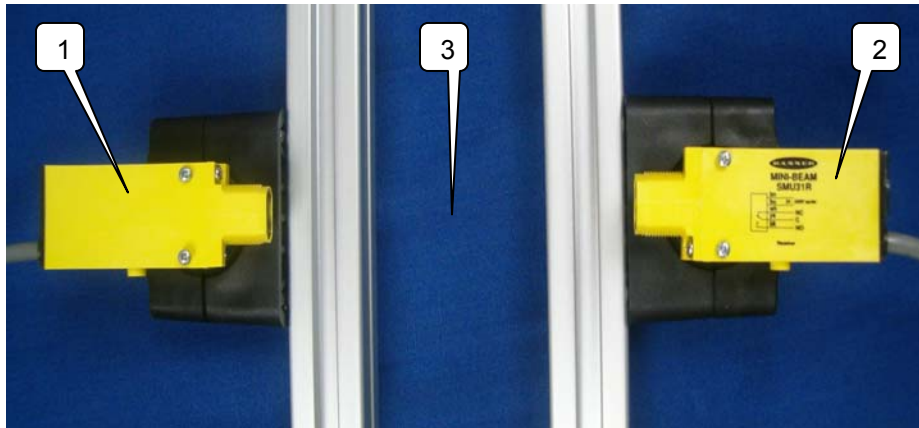


Photo Eye Emitter and Receiver
Complete Assembly

The OptiFlex Automatic Line Gap Trigger incorporates a single photo eye pair to be used for part identification. A photo eye sensor is an optical control that detects an invisible beam of light, and responds to a change in the received light intensity. The photo eye pair consists of both an emitter (Item1) and receiver (Item2). This is typically called an Opposed-Mode alignment configuration.

- The emitter (Item1) is typically mounted on the left side of the booth vestibule entrance end of the booth, if viewing the booth from the entrance end.
- The receiver (Item2) is typically mounted on the right side of the booth vestibule entrance end of the booth, if viewing the booth from the entrance end.
- The picture shown above indicates the complete photo eye assembly mounted to photo eye brackets and vertical aluminum extrusions. The area shown at Item3 is typically where the booth vestibule entrance would be located for part recognition.

13.1 Photo Eye Electrical Specifications

Supply Voltage:	24-240VAC
Supply Current:	2.5VA
Supply Protection Circuitry:	Protected against transient voltages
Output Configuration:	SPDT Relay
Output Response Time:	20 mS Maximum
Maximum Switching Speed:	25/second
Construction:	Reinforced polyester housing, totally encapsulated, o-ring seal Acrylic lenses and SS screws
Environmental Rating:	NEMA 1,2,3,4,12 and IEC IP67
Connections:	PVC-jacketed 5-conductor 9M (2 conductor for emitter)
Operating Temperature:	-4 to +131 F.
Relative Humidity:	90% at 50 Celsius

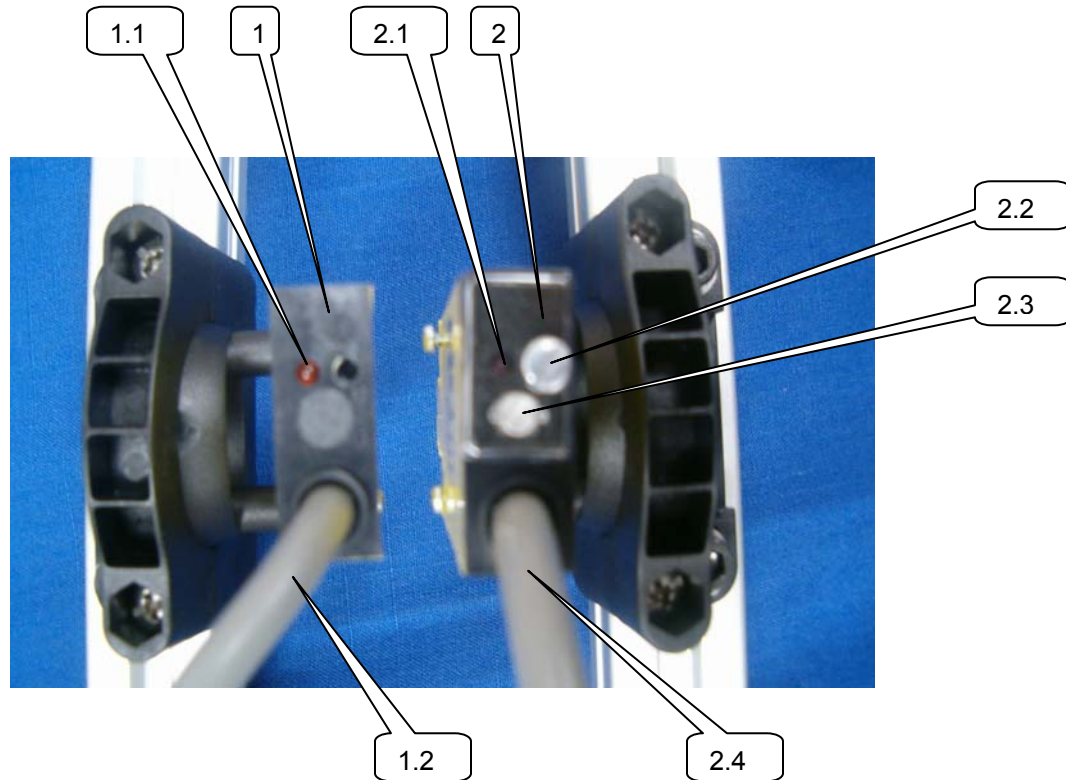


Photo Eye Emitter and Receiver
Rear View

ITEM 1 - Photo eye emitter. Used to provide a sensing beam to the receiver.

ITEM 1.1 – Supply voltage LED indicator (Red)

ITEM 1.2 – Power supply cable. Cable hardwired at the sensor end and routed back to the Genesis2.0, Level One Cordgrip fitting on the back right hand side of the unit labeled “Remote PLC Input”. Supplied cable is 9 meters long. Cable has two individual conductors, brown is for 120VAC phase and blue is for 120VAC neutral. Reference schematic for more wiring details.

ITEM 2 – Photo eye receiver. Used to receive the sensing beam from the emitter and provide an SPDT relay contact output to a remote control device.

ITEM 2.1 – Alignment Indicator Device (AID). Used to determine correct alignment between emitter and receiver. LED flashes at a rate proportional to signal strength or alignment.

ITEM 2.2 – Round head screw used to secure clear acrylic cover over adjustment controls.

IMPORTANT NOTE: ITEM 2.3 – Light/Dark Operate Selection Switch. Factory default setting is in the Dark Operate Mode (Counterclockwise position) which will conduct an output when sensing light is not received or broken by a part on the conveyor line.

ITEM 2.4 – Power supply cable. Cable hardwired at the sensor end and routed back to the OptiFlex Automatic Line Gap Trigger unit. Supplied cable is 9 meters long. Cable has 5 individual conductors, brown is 120VAC phase, blue is 120VAC neutral, yellow is the relay common, black is the relay NO contact and white is not being used. Reference schematic for more wiring details.

Begin alignment with line-of-sight positioning of emitter and receiver. Apply power to emitter and receiver and advance gain adjustment to maximum (clockwise end of rotation), using a small flat-blade screwdriver. The gain control is clutched at both ends to avoid damage, and will “free-wheel” when either endpoint is reached. If the sensor is receiving its light signal, the red LED alignment indicator will be ON and flashing at a rate proportional to the signal strength (faster=more signal). Move the sensor up-down-left-right to find the center of the movement zone within which the LED indicator remains ON. Reducing the Gain setting will reduce the size of the movement zone, and enable more precise alignment. Repeat the alignment motions after each Gain reduction. When optimum alignment is achieved, mount sensor(s) solidly in that position. Increase the Gain to maximum.

Test the sensor by placing the object to be detected in the sensing position, then removing it.. The Alignment Indicator LED should go OFF when the beam is broken(dark operate condition).

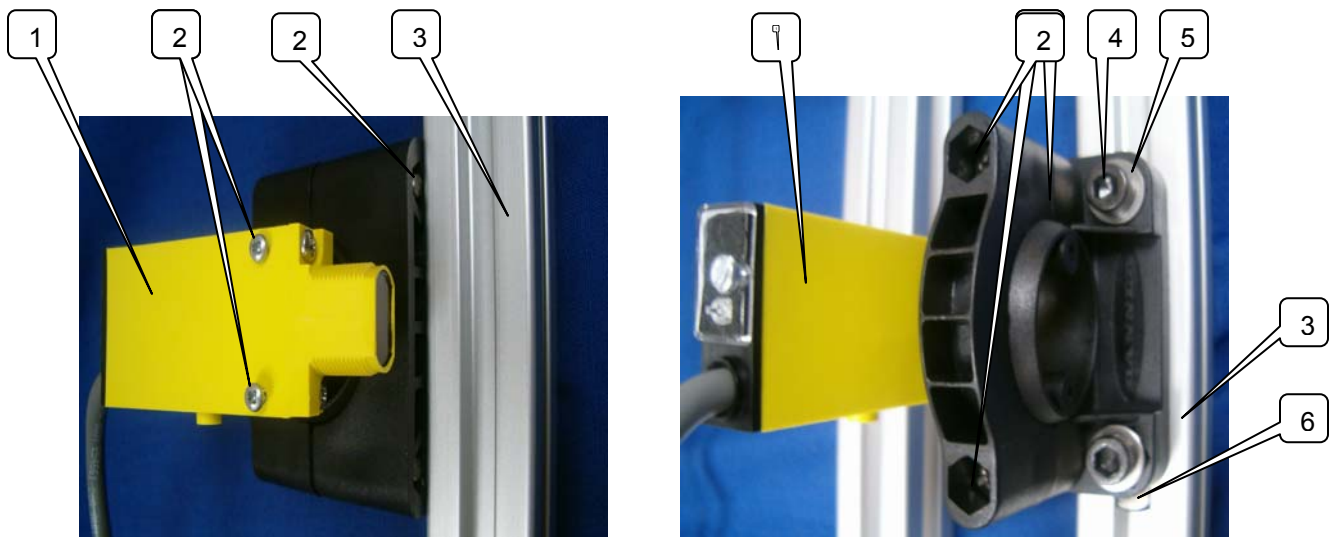


Photo Eye Emitter and Receiver Mounting Brackets and Hardware

ITEM 1 – Photo eye emitter and receiver as supplied from factory mounted to photo eye brackets and aluminum extrusions.

ITEM 2 – Photo eye mounting bracket and supplied hardware.

ITEM 3 – Vertical aluminum extrusions used to mount photo eye and for securing to booth vestibule.

ITEM 4 – ¼-20 Allen head bolt used to mount photo eye bracket

ITEM 5 – ¼-20 flat washer

ITEM 6 – ¼-20 Tee Nut used to secure photo eye bracket to aluminum extrusion

OptiFlex Automatic Line Gap Trigger Troubleshooting Guide

FAULT	CAUSE	CHECK	REPLACEMENT PART NO. OR REFERENCE
Gun will not trigger ON	Powder pump not connected or air stream blocked	Verify pump connected and no air blockages	
	Powder hose not connected to powder pump and gun	Verify powder hose is connected to powder pump and gun	
	Photoeye receiver not correctly set	Verify photo eye receiver is set to "Dark" Operate Mode	Reference pages 23 and 24 for more details
	Spray "Off" Timer mode not correctly set	Verify Spray "Off" Timer is set to the "SF" operating mode	
	Timers "Range" and/or "Units" not set correctly	Verify timers range is set to "0-30" and units is set to "seconds"	
	End User PLC controlled system	Contact end user	

Spare Parts List

Ordering Spare Parts

When ordering spare parts for powder coating equipment, please indicate the following specifications:

1. Type and serial number of your powder coating equipment
2. Order number, quantity and description of each spare part.

Example:

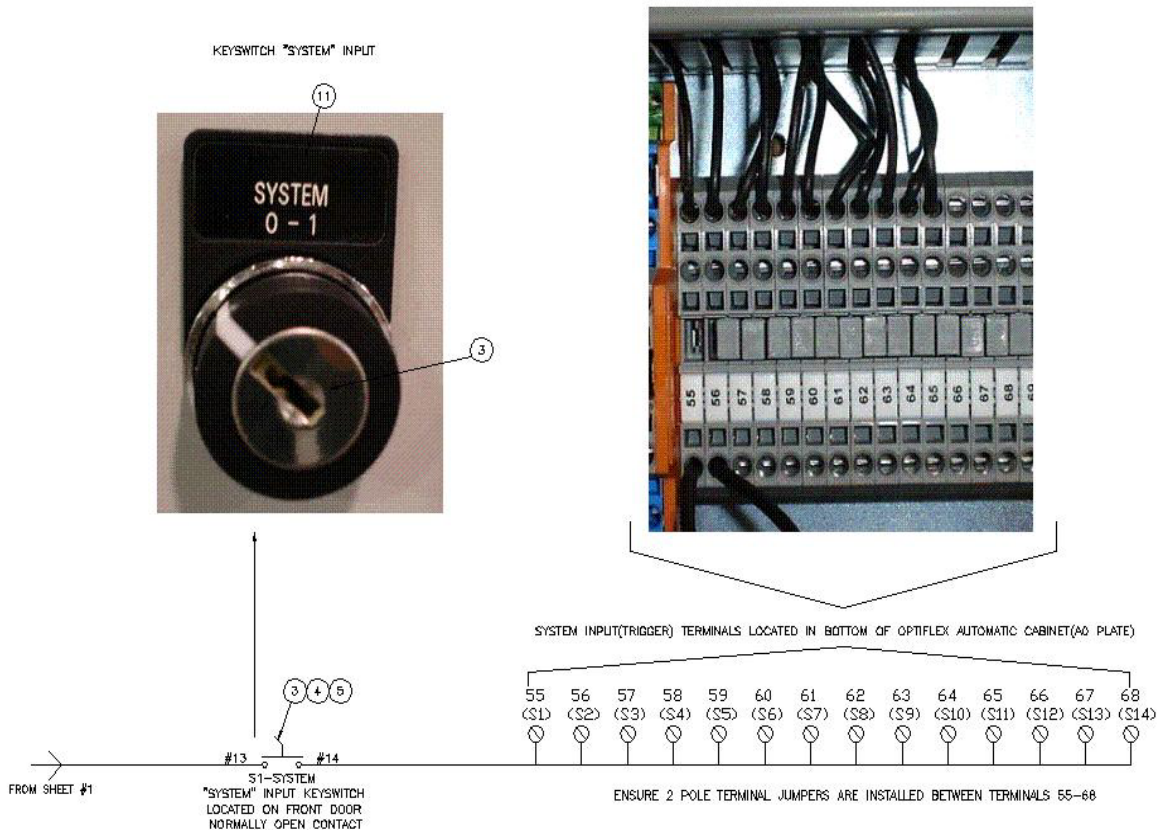
Type	Serial No.	Part No.	Description	Quantity
OptiFlex F	1730XXXXXX	1002006	Fluidizer Unit	1
		135533	Type 66 hose	100 ft.

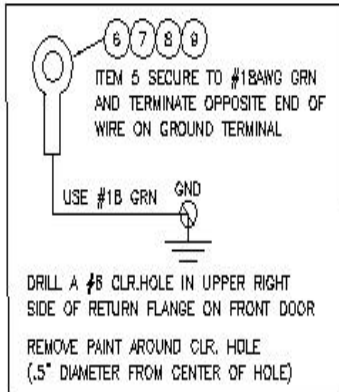
When ordering cable or hose material the length required in yards/meters/feet must also be given. The spare part numbers for these types of items are marked with an asterisk (*). Wear parts are marked with the pound symbol (#).

All dimensions of plastic hoses are given as external and internal diameters:
e.g. 8/6mm: 8mm=Outside Diameter and 6mm=Inside Diameter

SPARE PARTS LISTING

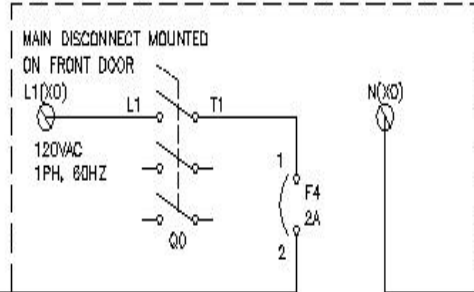
Item No.	Description	Part No.
1	TERMINAL BLOCK,GRAY,10-24G,DIN	127575
2	TERMINAL BLOCK,BLUE,10-24G,DIN	127574
3	SWITCH,KEY,PINLMNT,SYINPUT	268020
4	SWITCH,KEY,HOUSING,NOSYSINPUT	267821
5	KEY,SYSTEM INPUT SWITCH,AS02	260908
6	SCREW,MACH,HEAD,#6	111542
7	NUT,HEX,STD,#6-32UNC,STL	107389
8	WASHER,FLAT,#6,CAD	107381
9	TERMINAL,RING,22-16AWG,#6STUD	107370
11	LABEL,SWITCH,SYSTEM,BLACK,0:1	135493
12	TIMER,LOGIC,ON-DELAY,120V,DPDT	134721
13	TIMER,LOGIC,OFF-DELAY,120V,DPD	134722
14	TIMER,BASE,DINRAIL,FOR 134721	134723
15	TIMER,BASE,DINRAIL,FOR 134722	134724
16	PHOTO EYE,120VAC,EMITTER,30'CA	134732
17	PHOTO EYE,120VAC,RECEIVER,30'C	134733
18	LABEL, TOP,ONTIMER,1.7X1.5,VINY	134737
19	LABEL, TOP,OFFTIMER,1.7X1.5,VIN	134738
20	LABEL, TERMINAL,WHITE,"1"	130117
21	LABEL, TERMINAL,WHITE,"2"	130118
22	BOLT,CAP,SOC.HD,0.25-20UNCX0.7	107559
23	WASHER,FLAT,0.25,LIGHT,CAD	107380
24	BRACKET,MNT,PHOTOEYE,BANNER	129828
25	FRAME,28MMX28MM,ALUM,4'LONG	134740
26	NUT,T-SLOT,0.25X20UNC	134734





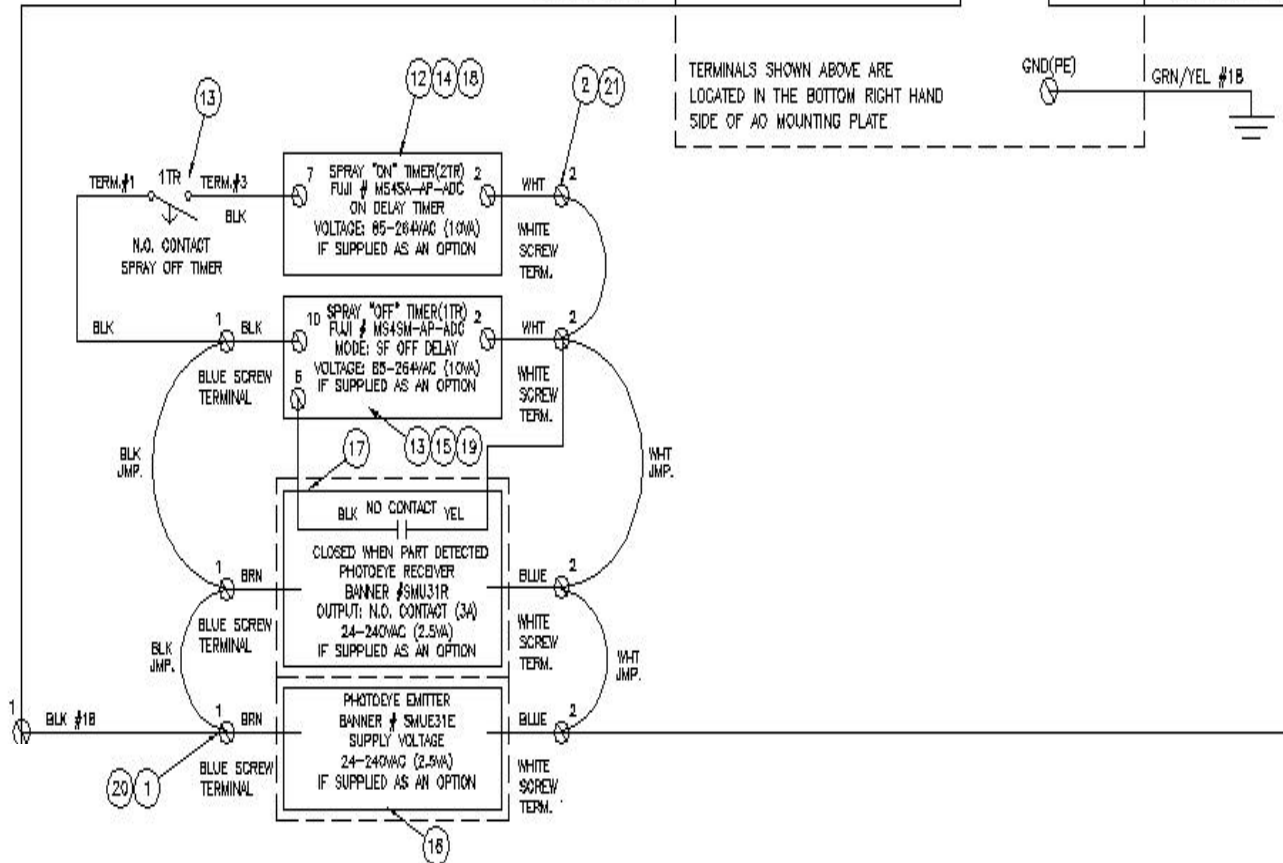
AO MOUNTING PLATE LOCATED IN BOTTOM OF OPTIFLEX STANDARD AUTOMATIC CABINET

ALL ITEMS INDICATED IN HIDDEN LINES ARE ALREADY SUPPLIED IN OPTIFLEX STANDARD AUTOMATIC CABINET



USE #18 BLACK

USE #18 WHITE



TERMINALS SHOWN ABOVE ARE LOCATED IN THE BOTTOM RIGHT HAND SIDE OF AO MOUNTING PLATE



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