HySecurity

Simple. Reliable. Secure.®

SwingRiser - HRG

Relay manual

DISCLAIMER

HySecurity relay-controlled hydraulic gate operators do not meet current UL 325 Safety Standards and that HySecurity recommends decommission and replacement of all manufacturers' relay-controlled operators with modern Smart Touch™ based operators, which fully comply with UL 325 safety standards. By downloading and using this document you acknowledge that HySecurity no longer provides parts or technical support for those older operators.

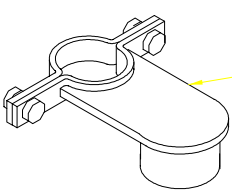
Note

HySecurity accepts no responsibility, implied or express, for claims arising from continued use of pre-2001 relay-controlled operators.

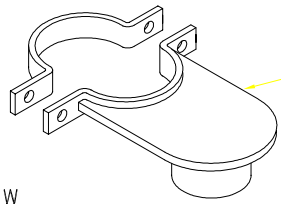
Hy-Security Gate Operators

HRG 220 SWING GATE OPERATOR, SINGLE
HRG 222 SWING GATE OPERATOR, PAIR
HANDBOOK

Manufacturers and Designers of Hydraulic Systems



MSWTC 007 P
TOP CAP, 4 ½" POST MOUNT



MSWTC 005 P
TOP CAP, 6 5/8" POST MOUNT

MSWTC 001 W
TOP CAP, PILASTER MOUNT

MPTBE 022 4
UHMW BEARING, 6 5/8"

MFABS 006 016N
BUTTON HEAD SCREW

MSWCO 004
UPPER ACCESS COVERS

ESWLS 220 K
CLOSE LIMIT SWITCH

ESWLS 220 K
OPEN LIMIT SWITCH

MSWCO 002
W/CLOSE LIMIT TAB (OPPOSITE SIDE)

MPTBE 022 4
UMHW BEARING, 6 5/8"

MSWBC 001
BASE PEDESTAL

HSFQD 002
QUICK DISCONNECT

MFABS 006 016N

MSWSH HD1—SEE DETAIL 'A'
SHAFT, CAM, FOLLOWERS & BUSHING

MSWCY HRG KITN
CYLINDER KIT W/HOSES

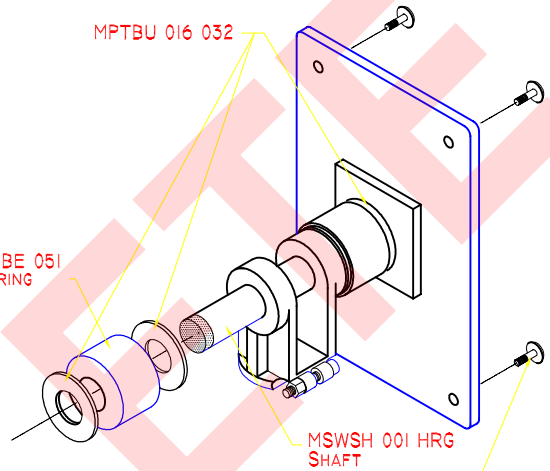
MSWSH 016 LOWER CYLINDER SHAFT
MFAER 016 E-CLIPS, LOWER CYLINDER SHAFT

AUXILIARY HINGE
MSWHG 004

MSWBS 001
BASE COVER

DETAIL 'A'

UPPER CYLINDER
SHAFT & BEARING ASSEMBLY



REPLACEMENT SHAFT KIT
MSWSH HD1 - SHAFT & BEARING
MSWSH HD1 PO - SAME AS ABOVE + COVERS

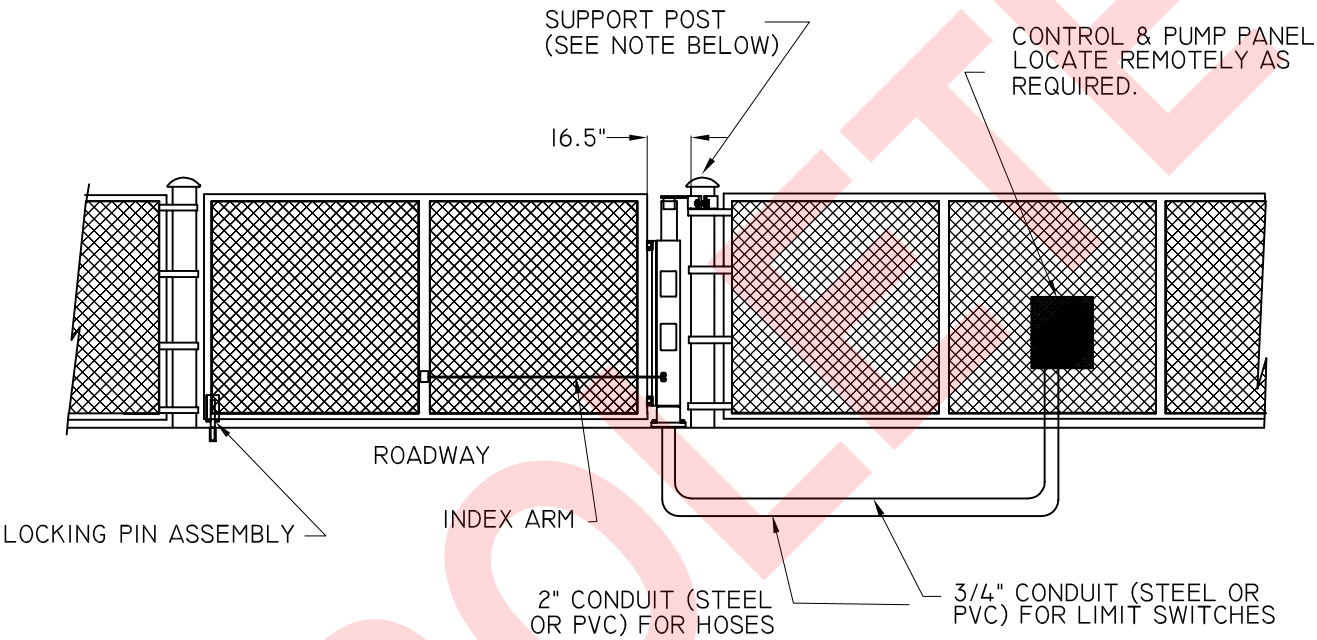
Hy-Security Gate Operators
SEATTLE, WASHINGTON

TITLE

HRG SWING GATE POST, TYPICAL

DRAWN KERI	DATE 6/15/00	THIRD ANGLE PROJECTION		REV C
CHECKED	DATE	ERN NUMBER -	DATE -	
APPROVED	DATE	DRAWING NUMBER: HR14		SHT 1 OF 1

PLAN VIEW



FRONT VIEW

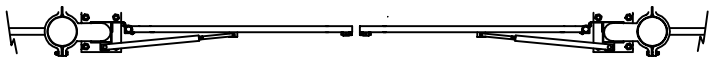
NOTES:

SEE DRAWING HR34 FOR POST ELEVATIONS AND PLAN VIEW

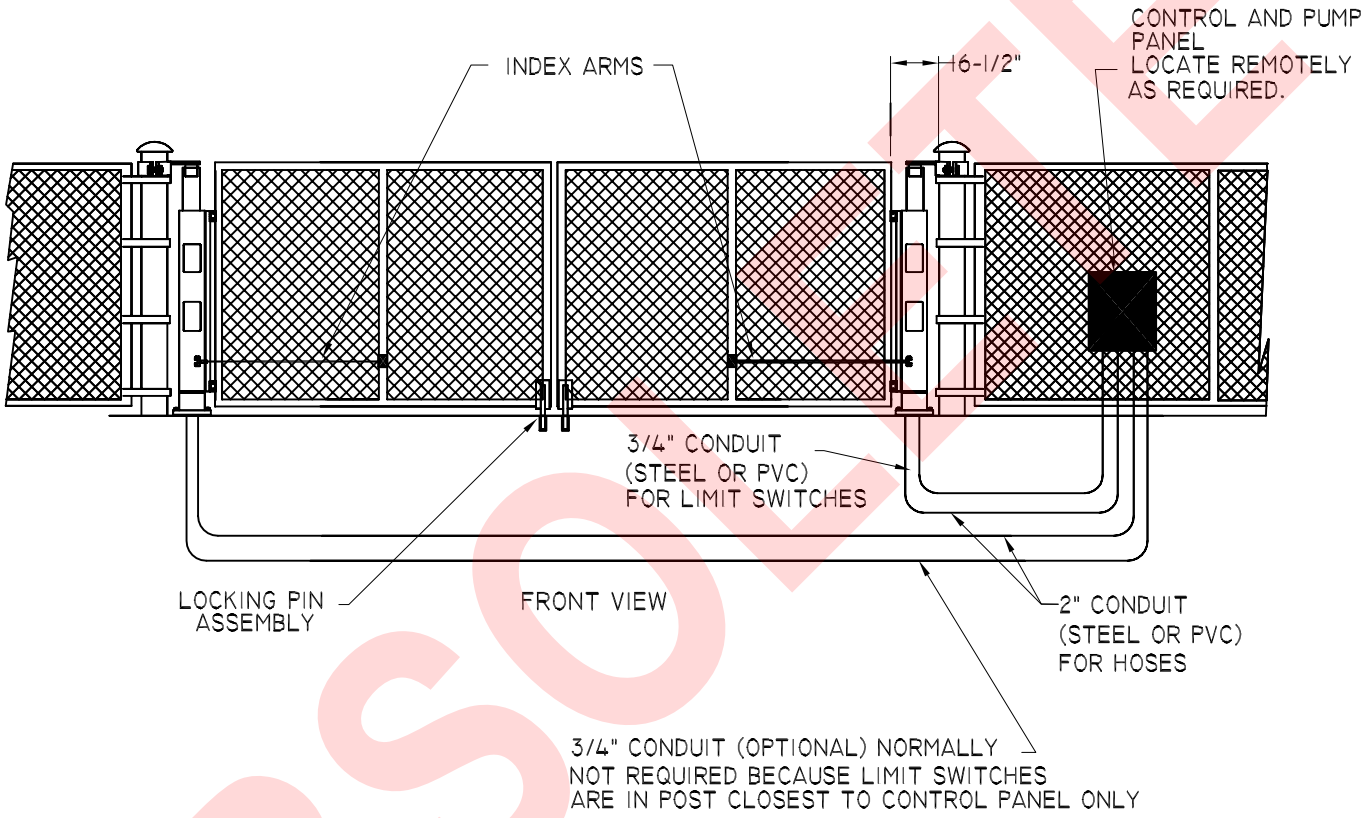
SEE DRAWING HR29 FOR HARDWARE DETAILS

ALL STRUCTURAL SUPPORT AGAINST TIP OVERLOADS MUST BE PROVIDED BY OTHERS. THE OPERATOR POST ASSEMBLY PROVIDES SUPPORT FOR TORSIONAL LOADS ONLY.

Hy-Security Gate Operators, SEATTLE, WASHINGTON	TITLE: HRG 220 SINGLE SWING GATE OPERATOR	DRAWN: KERI	DATE: 6/13/00	THIRD ANGLE PROJECTION	REV: --
		CHECKED: SHOP	DATE: MM/YY/DD	PART NUMBER: N/A	
		APPROVED: ENGRNG	DATE: MM/YY/DD	DRAWING NUMBER: HR32	SHT 1 OF 1



PLAN VIEW



NOTE:

SEE DRAWING HR34 FOR POST ELEVATIONS AND PLAN VIEW

SEE DRAWING HR29 FOR HARDWARE DETAILS

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HY-SECURITY Gate Operators, SEATTLE, WASHINGTON	TITLE: HRG 222 PAIR SWING GATE OPERATORS	DRAWN: KERI	DATE: 6/12/00	THIRD ANGLE PROJECTION	REV: --
		CHECKED: SHOP	DATE: MM/YY/DD	PART NUMBER: N/A	
		APPROVED: ENGRNG	DATE: MM/YY/DD	DRAWING NUMBER: HR33	SHT 1 OF 1

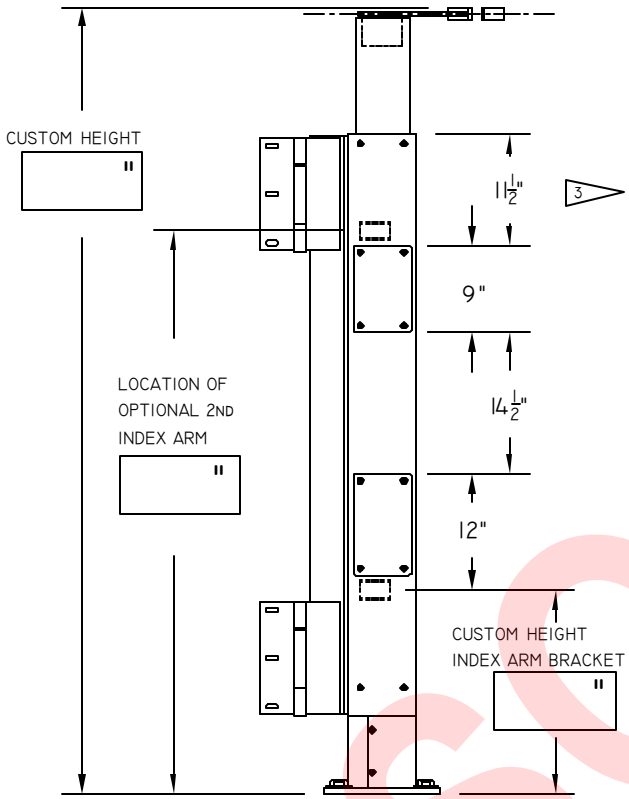
1 CUSTOM DIMENSIONS MUST BE APPROVED BY FACTORY BEFORE ORDER IS ACCEPTED.

2 SINGLE POST SHOWN. OPPOSITE POST SIMILAR MIRROR IMAGE.

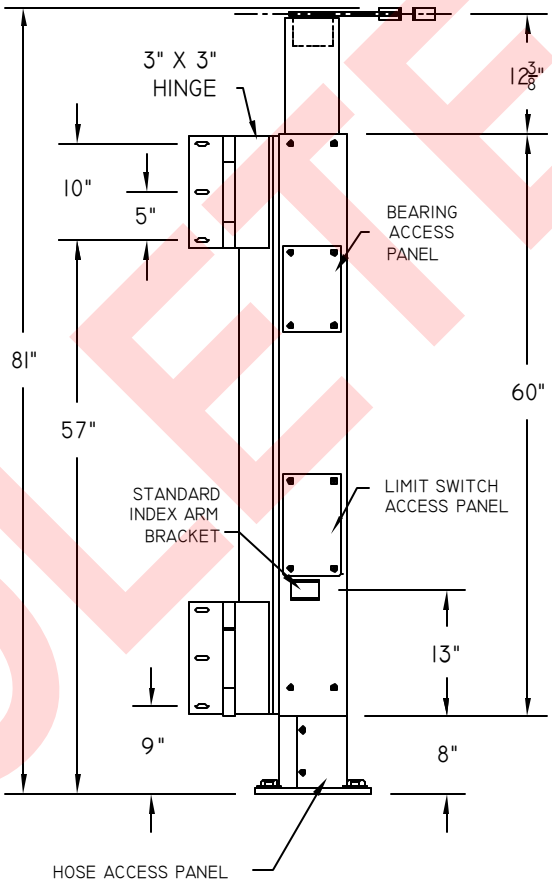
3 CUSTOM HEIGHT ADDS TO THIS DIMENSION.

NOTE: ALL LATERAL FORCES MUST BE SUPPORTED BY BACKING POST/PILASTER.

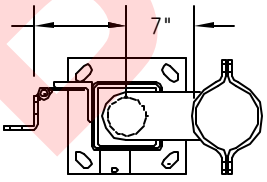
CUSTOM REQUEST 1

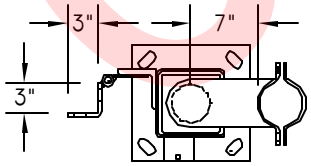


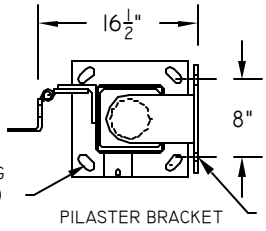
STANDARD DIMENSIONS 2



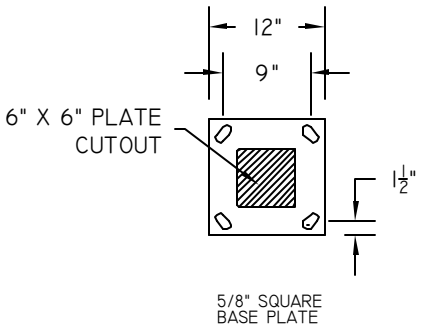
TYPICAL TOP CAP INSTALLATIONS







FOOTPRINT DIMENSIONS

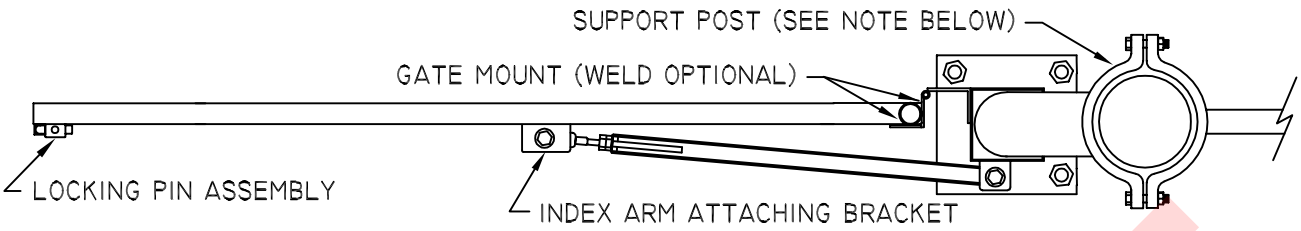


seattle, washington

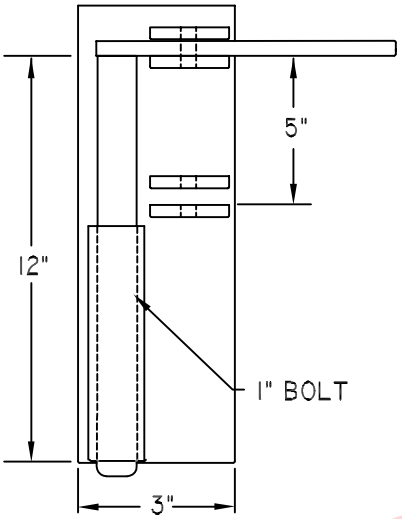
TITLE

HRG Swing Gate Post Details

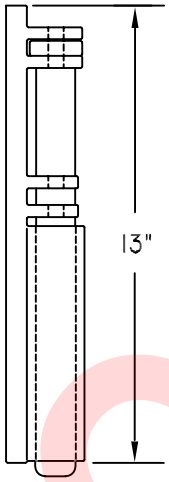
DRAWN KERI	DATE 6/23/00	ENGRNG REL NOTICE ERN000043	REV A
CHECKED	DATE	PART NUMBER N/A	
APPROVED	DATE	DRAWING NUMBER: HR34	SHT 1 OF 1



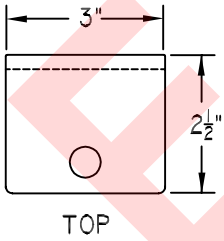
PLAN VIEW, GATE PANEL, OPERATOR POST, INDEX ARM AND LOCKING PIN



FRONT VIEW

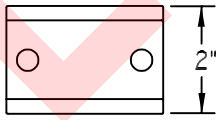


END VIEW

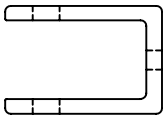


TOP

NOTE:
SHIM WITH SAE 1/2"
FLAT WASHERS
(10 PROVIDED)



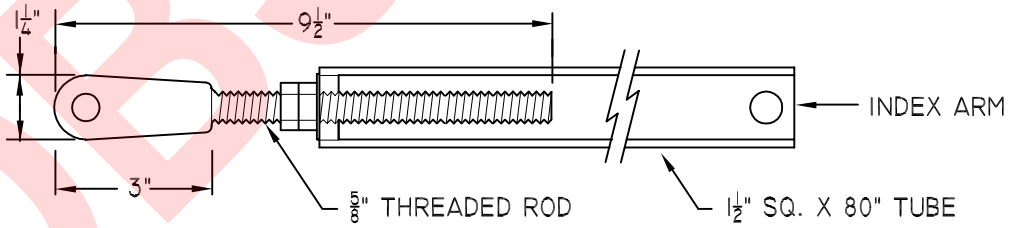
FRONT



SIDE

LOCKING PIN ASSEMBLY

ATTACHING BRACKET
(GATE MOUNTED)



INDEX ARM EXTENTION

NOTE:
ALL STRUCTURAL SUPPORT AGAINST TIP OVERLOADS MUST BE PROVIDED BY OTHERS. THE OPERATOR POST ASSEMBLY PROVIDES SUPPORT FOR TORSIONAL LOADS ONLY.

Hy-Security Gate Operators, SEATTLE, WASHINGTON	TITLE: INDEX ARM BRACKET AND LOCKING PIN FOR HRG OPERATOR	DRAWN: D. B.	DATE: 05/08/00	THIRD ANGLE PROJECTION	REV: A
		CHECKED: -	DATE: -	ERN NUMBER: -	DATE: -
		APPROVED: -	DATE: -	DRAWING NUMBER: HR29	SHT: 1 OF 1

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Operator Maintenance

Hydraulic System

Fluid Level: Under normal conditions, hydraulic systems do not consume oil. Before adding any oil, check the system thoroughly for leaks. Remove the bright metal plug in the tank, fill to plug level, then replace plug. We recommend our *Uniflow* hydraulic oil, part number H-004, which is sold in one gallon containers by our distributors. Automatic transmission fluid may be used, although its performance in cold weather will be sluggish unless the operator is well heated. *Do not use brake fluid.*

Look for leaks: Occasionally there may be slight seeping at the fittings after some usage. Tightening of the fittings will usually correct the problem. If the leaking persists, replace "O" rings, fittings or hoses, if required. No further leaks should occur.

Oil Change: A hydraulic system does not foul its oil, unlike a gas engine, so oil changes do not need to be frequent. Rather, heat breakdown is the main concern in a hydraulic system. If the unit is subjected to high use, especially in a warm climate, change the oil more frequently. In general, we recommend draining the reservoir and replacing the oil at five or ten year intervals.

There are several ways to change the hydraulic oil, depending on the type of operator being serviced. If you don't know how to drain the oil, contact your distributor for directions. Refill with new *Uniflow* hydraulic oil (available from your distributor). To avoid overfilling, never pour into the port where the black breather cap is located. Instead, remove only the bright metal plug in the tank. Slowly pour the oil into the tank until the oil is within one inch of the filler port. Replace the plug and wipe up any spilled oil.

Cold Weather:

1. Check that your reservoir is filled with *Uniflow* high performance oil.
2. Ice can partly or totally jam gate operation. Check by operating the gate manually.

Electrical Controls

Before servicing, turn off power disconnect switch

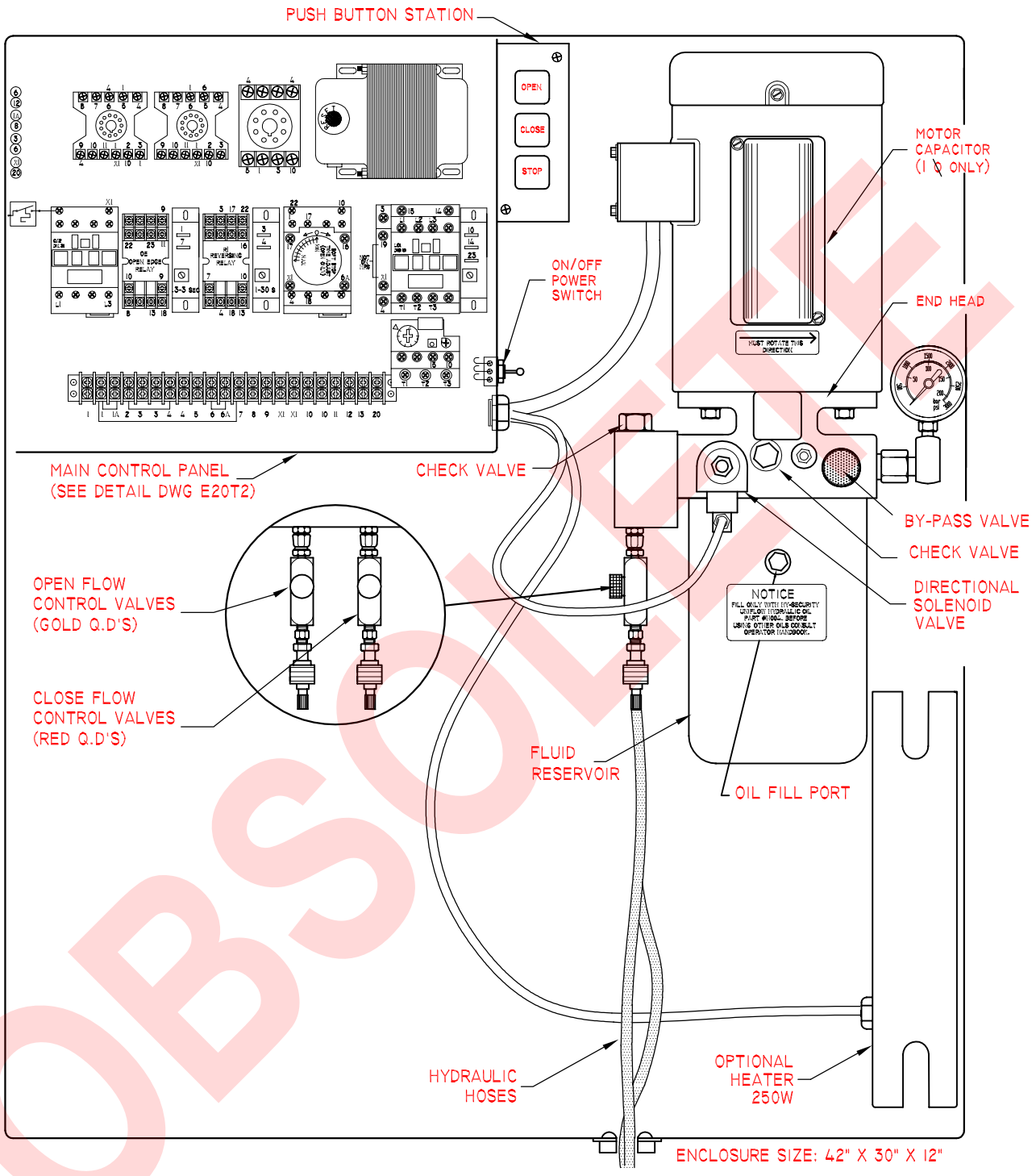
No routine maintenance is needed for the electrical system or controls. If the environment is very sandy or dusty, seal all holes in the electrical enclosure. Blow dust out of the electric panel with compressed air. A qualified electrician may troubleshoot with the aid of the electrical drawings in Appendix 4.

If it is necessary to call a distributor for assistance, be sure to have your model and serial number ready. Other helpful information would include the name of the job, approximate date of installation, and the service record of the operator, especially any work that has been done recently. Be prepared to describe as exactly as you can what the machine is or is not doing. Describe any unusual sounds or location of oil leaks.

How to Adjust the Pressure Relief Valve: To check your relief valve setting, first disconnect one of the hoses. Run the operator either open or closed (the gate will not move with the hose disconnected. The relief valve is found on the rear of the hydraulic power unit. It has a hex adjusting head and lock nut. To adjust, loosen the lock nut and screw the threaded bolt clockwise for increased pressure, counterclockwise to decrease pressure.

MODEL	FACTORY SETTING
111 Series	*750 psi*
SS, E Models	*1000 psi*
EX Model	*1300 psi*
444 Series	*1300 psi*

Do not attempt to use the relief valve as an entrapment protection device. Photocells or gate edges are the best methods to protect pedestrians and reserve power to the drive gate.



NOTE:
BE CERTAIN TO MATCH THE COLOR CODING ON THE QUICK DISCONNECTS, BOTH AT THE FLOW CONTROL VALVES AND AT THE BASE OF THE OPERATOR POST. THIS IS TO ASSURE A CORRECT CONNECTION.

Hy-Security Gate Operators
SEATTLE, WASHINGTON

TITLE
HRG 220 POWER PACKAGE (TYP) PUMP AND ELECTRICAL PANEL

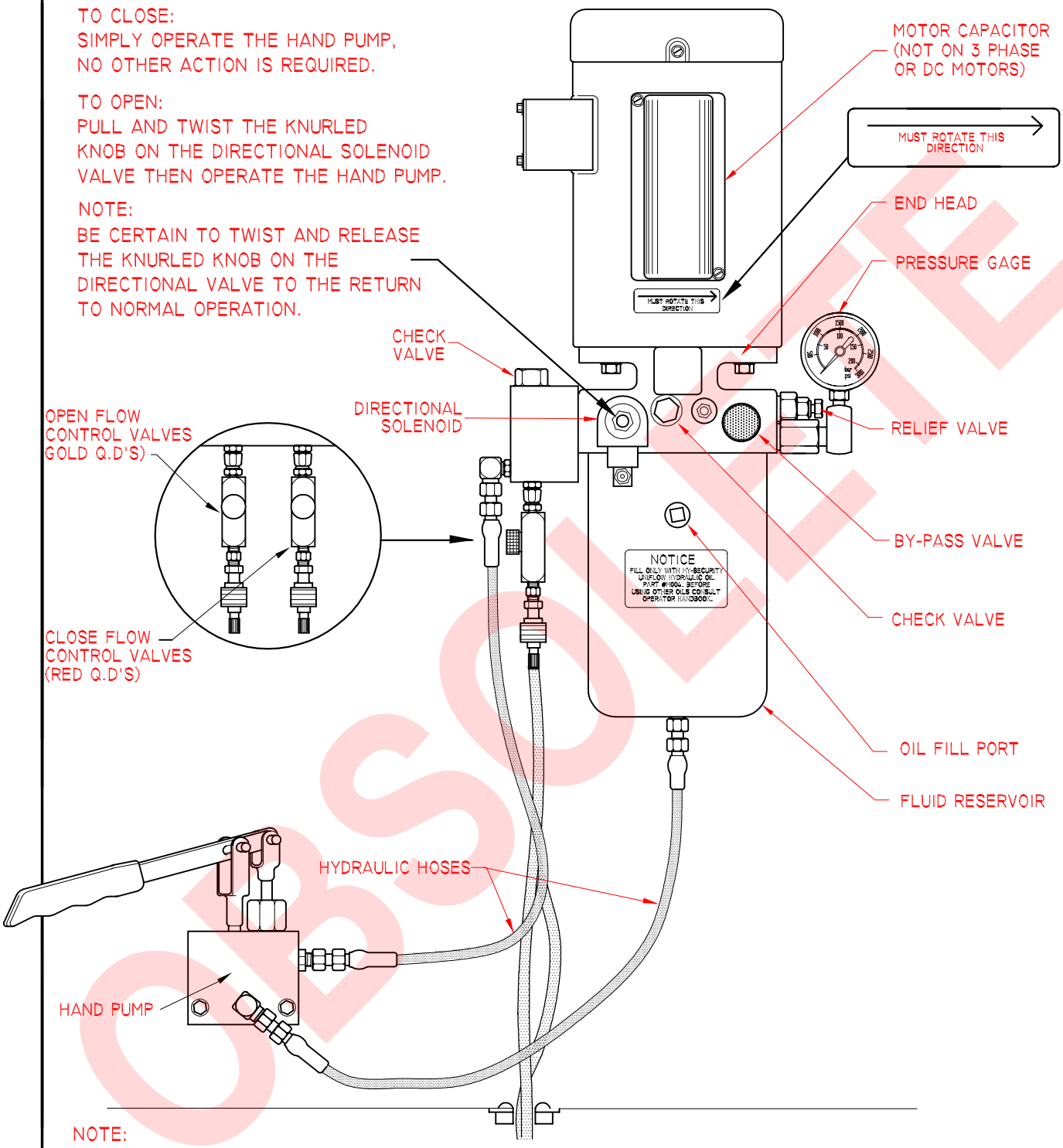
DRAWN D. B.	DATE 05/08/00	THIRD ANGLE PROJECTION		REV A
CHECKED -	DATE -	ERN NUMBER -	DATE -	
APPROVED -	DATE -	DRAWING NUMBER: HR36		SHT 1 OF 1

HAND PUMP OPERATION (FOR UNITS EQUIPPED WITH THIS OPTION)

TO CLOSE:
SIMPLY OPERATE THE HAND PUMP,
NO OTHER ACTION IS REQUIRED.

TO OPEN:
PULL AND TWIST THE KNURLED
KNOB ON THE DIRECTIONAL SOLENOID
VALVE THEN OPERATE THE HAND PUMP.

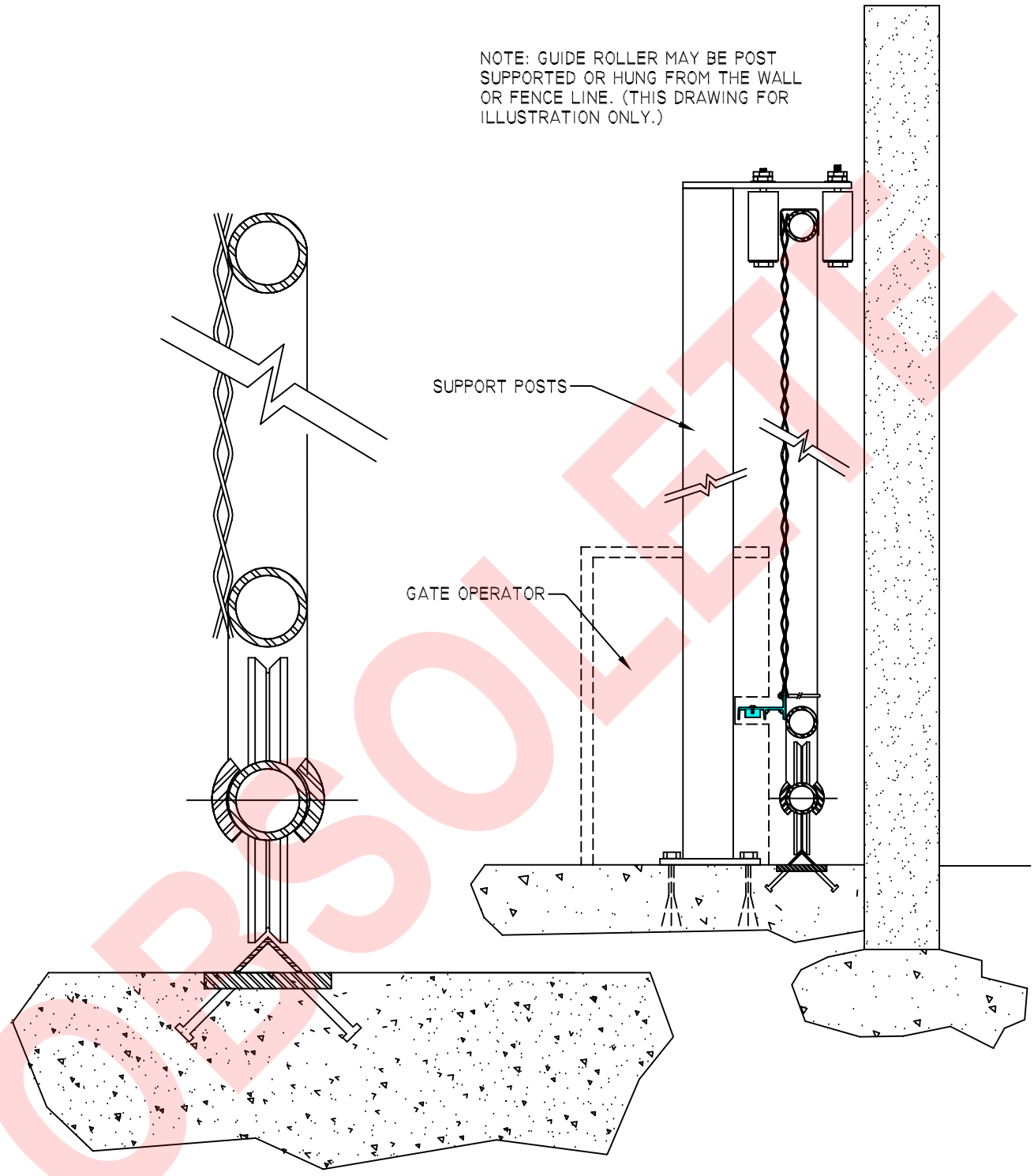
NOTE:
BE CERTAIN TO TWIST AND RELEASE
THE KNURLED KNOB ON THE
DIRECTIONAL VALVE TO THE RETURN
TO NORMAL OPERATION.



NOTE:
BE CERTAIN TO MATCH THE COLOR CODING ON THE QUICK DISCONNECTS, BOTH AT THE FLOW CONTROL VALVES AND AT THE BASE OF THE OPERATOR POST. THIS IS TO ASSURE A CORRECT CONNECTION.

Hy-Security Gate Operators, SEATTLE, WASHINGTON	TITLE: **HRG HAND PUMP OPTION**	DRAWN D.B. / DATE 05/08/00	THIRD ANGLE PROJECTION	REV A
		CHECKED / DATE	ERN NUMBER / DATE	
		APPROVED / DATE	DRAWING NUMBER: HRI6	SHT 1 OF 1

NOTE: GUIDE ROLLER MAY BE POST SUPPORTED OR HUNG FROM THE WALL OR FENCE LINE. (THIS DRAWING FOR ILLUSTRATION ONLY.)



ABOVE GRADE RAIL

NOTE: THESE DETAILS ARE FOR GENERAL INFORMATION ONLY. FOR PURPOSES OF ILLUSTRATION. 4" X 6" TUBES ARE SHOWN ½" FLATBAR AND 1½" ANGLE IRON TRACK. WHEEL IS APPROX.9" DIA.

Hy-Security Gate Operators
SEATTLE, WASHINGTON

TITLE

TYPICAL CHAIN LINK GATE TRACKS

DRAWN D.B.	DATE 05/19/00	THIRD ANGLE PROJECTION		REV A
CHECKED -	DATE -	ERN NUMBER -	DATE -	
APPROVED -	DATE -	DRAWING NUMBER: H35/36		SHT 1 OF 1

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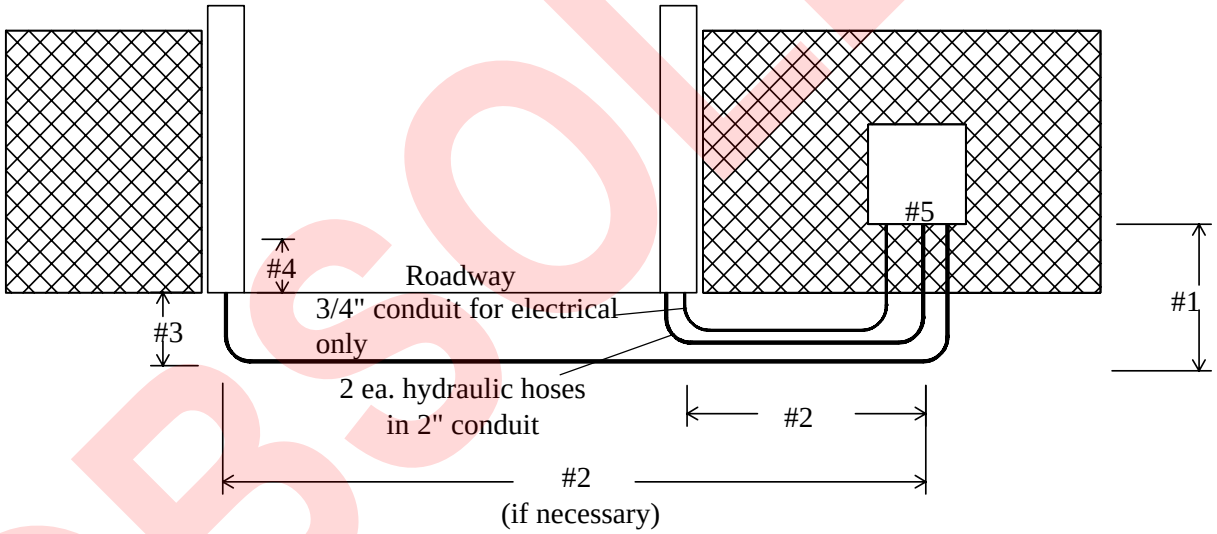
Field Hose Measurements for HVG and HRG Operators

When field measuring for the necessary hose length to order, the following may be helpful:

There is little room in the base of the HRG or the HVG operators and limited room in the control/power panel, therefore, your field measurements must be very accurate when calculating the length of the necessary hydraulic hoses. If your dimensions are too little, you will not reach the connections, if your measurements are too long, you will have trouble finding space for the excess hose.

Remember that two hoses are needed for each motor or each cylinder. This means that you need four hoses when you are dealing with a HVG operator and also when you are installing a HRG 222 (pair) operator.



Be sure to measure accurately the following distances: (the best way is to pull a cord through the conduit, mark it, and then measure it.)

1. The bottom of the pump/control panel to the bottom of the trench.
2. The total distance across the trench.
3. The distance back up to the bottom of the operator.
4. Add approximately 6" for the hoses to reach up into the operator.
5. Add approximately 24" for the hoses to reach up into the power/control panel.

The part numbers for the hoses are:

1/4" hose for HRG: H SFHO 004 SW
3/8" hose for HVG: H SFHO 006 4216

For assistance call your distributor.

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INSTALLATION INSTRUCTIONS FOR HRG SWING GATE OPERATOR

1. Permanent Wiring Shall Be Employed. Run wire in conduit and wirenut to the loose wires that are connected to the disconnect switch. The disconnect switch is located on the baffle surrounding the electric control panel.

Note 1: Proper grounding is required and grounding wire is located in the disconnect switch area.
Note 2: Before servicing or opening electrical panel, be certain to turn off all electric power.

2. Button Station Operation: Install the push button control station within sight of the gate. Be sure gate opening is clear before operating gate. Connect the push button to the terminal strip as detailed on drawing E57. If the distance is greater than 200 feet, see E71 for details on long range pushbutton control.

3. Entrapment Protection - minimum safeguards:

A. Since automatic gates are not intended for pedestrian use, always install a separate pedestrian walkway and access gate. Install signs which direct persons to use the pedestrian gate, and to not enter through the vehicle gate.

B. Be certain that all operating switches are located at least a six foot distance from the gate, to reduce the possibility of any attempt to reach through in order to operate the gate.

C. Be certain to mount at least two of the enclosed 8-1/2" x 11" warning placards on each side of the gate to warn users of the hazards of a power operated gate.

D. Automatic Operation: Entrapment protection sensors must be installed to guard both the opening and closing of the gate. Install two photo electric eyes, or attach a minimum of two edge sensors to create a reversing function for each direction of gate travel. All sensors guarding the closing direction connect to terminals #1 and #6 in the control box. All sensors guarding the opening direction connect to terminal #9 and #6. See drawing E41 for mounting and connection details of the edge sensors.

Caution: Vehicle detectors are not entrapment protection sensors.

4. Using 5/8"-3/4" anchor bolts, mount operator base with proper clearance from square tube to backing post. See drawing HR34 for dimensions. It is important that the finished installation be plumb and true. Use shims if necessary to level the operator base.

5. Attach the top of the operator to the backing post or supporting wall, using the bracket provided. The attaching bracket "sleeves" inside the top of the operator post. **Note:** The backing post/column, (provided by others) must accomodate all of the "tip over" loads imposed by the gate panel.

6. Mount the controller box near the gate operator. See drawing G39.

7. Pull six wires minimum (eight wires if close position indication is required) from control panel to junction area in the base of the operator post assembly. This may be either by underground conduit or by a seal-tight conduit mounted into the side of the base.

8. HRG operators normally do not ship with the hydraulic hoses included, until the exact length is specified by the installer. See HV/HR45 and verify correct length has been ordered.

9. Pull the hoses in a 2" minimum conduit and connect, being certain to match the color coded ends. Also be certain that the connectors are firmly snapped together.

10. Remove the lowest cover plate to expose the limit switches and connect the limit switch wiring according to the tagged terminal numbers on the prewired cords. See HRG Electrical Connection Diagrams for more information.

11. Remove the shipping plug on the pump manifold and replace with the vented cap that is provided.

12. Connect appropriate power wiring to match voltage and phase of the operator. Be certain to oversize feeder wires to allow for voltage drop (see wire size schedule, E16a & E16b), especially for single phase machines. Machines to operate on high voltages (above 120 VAC) do not need a neutral wire. Wirenut the power feeders to the loose wires at the back of the On/Off switch.

13. Verify that the primary tap of the control transformer is connected to match the supplied voltage. It is especially important to distinguish between 208 and 230 volt supplies. The various voltage taps are identified by a label on the transformer or in the electrical drawings.

14. Test basic functions of the operator first, before connecting any external control wiring. If your operator is equipped with vehicle detectors, be certain that they are connected to a loop or unplugged so that they do not cause interference with the function of the machine. If the motor turns, but nothing moves, reverse two poles of a three phase power source. Also check that the by-pass valve is closed. Push in the round black knob that is located on the right side of the pump manifold. Also be certain that the hose quick connectors are firmly engaged.

15. After testing the basic functions, follow our electrical connection diagrams to add any accessories or external control wiring. Test the operator functions again.

16. Check the "soft stop" open timer, which is mounted on top of the control relay. The label on the timer dial shows the minimum and maximum settings. In operation the timer only needs to be set long enough for the gate to coast to a smooth stop after opening. There is no bad effect if the timer is set for too long, except that the operator cannot be started closed until this timer times out.

Additional instructions, gate tensioner and lock pin assembly

1. Install the gate using the clamps provided and adjust for the correct clearance between the gate and the road surface. Allow three inches clearance at the far end of the gate panel. See drawings for gate panel clearance dimensions.

2. Clamp the index arm mounting bracket near the bottom of a vertical member of the gate. The best attachment point is at the one-third to one-half of the gate length from the gate hinge.

3. Cut the index arm arm to the correct length. Connect the threaded rod end to the mounting bracket on the gate panel. Drill a ½" hole and bolt the other end of the index arm to the mounting bracket on the operator post assembly.

4. Mount the locking pin mechanism on the lower corner of the free end of the gate panel in such a position that the pin penetrates 2" into a lock receptacle when the gate is fully closed.

5. Bury a tube in the roadway to act as a receptacle for the locking pin. The tube should have an angular cut on the tip and project about two inches above the grade to act as a "catch" for the locking pin. Use a 3-1/2" x 1-1/2" tube of appropriate length for this purpose. Use blacktop or grout to create a mound around the exposed tube, so passing vehicles encounter a smooth bump.

NOTICE: If the locking pin mechanism is not used, security of this system is adversely affected and the operator drive shaft may be exposed to high stresses by wind loading or vandals. If the lock pin receptacle is not built or installed to create a strike stop for the gate, the lock pin may not always align with the receptacle.

6. Adjust the threaded end of the index arm rod to place the far end of the gate in an exact position for the locking pin to strike and slide down into the receptacle as the gate closes. The most reliable index arm adjustment will allow the gate to swing slightly past center so that the lock pin firmly strikes the back of the receptacle and is held firmly in that position. Tighten all parts of the index arm assembly firmly for trouble free operation.

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ADJUSTMENT OF FLOW CONTROL REGULATING VALVES ON SWING GATE OPERATORS

HRG 220 swing gate operators have at least two flow control regulating valves. The flow control valve(s) need to be adjusted correctly for proper performance of the gate operator. The flow control valve is the small square brass valve device with the knurled adjusting knob, located just above the quick-disconnect fitting to the hydraulic hoses. The most important flow control adjustment is the one governing the closing of the gate. The closing flow control is the valve just above the quick-disconnect fitting that is painted red. Because the gate drops as is closes, gravity could over-accelerate the gate, depending on it's weight. The job of the flow control valve is to regulate the closing speed by preventing over-acceleration in the close cycle. The flow control is not intended to be used as a true speed adjusting control valve because it would create a tremendous inefficiency if over-tightened.

To Adjust the close flow control valve correctly, start with the valve fully open, (all color bands exposed) and turn clockwise until you have achieved proper gate control in the closed direction. Because of the low flow rate of the HRG operator, correct adjustment will be at the bottom third of the color bands on the flow control valve. The most crucial part of the closing of the swing gate is when the lock pin strikes it's receptacle. The flow control valve adjustment is most helpful for maintaining control at this point of operation. (Other important adjustments are available for correct locking. See separate instructions on "Adjustment of Indexing Arm")

Adjustment of the flow control valve affecting the opening, is much less important. Set the valve at approximately 3 turns from fully closed, or in a position that creates the smoothest operation.

The HRG 222 pair of swing gates will have two flow control valves for the close direction and two for the open direction. The close flow control valves adjust the same as single HRG operators except that the valve governing the master post (post with the limit switch) must be set to cause the master gate post to operate slightly slower than the slave gate post. Because there is only one limit switch for two gate posts, it is important that the slave post reach the fully closed position before the master post. The master post will shut down power to both posts when it reaches the fully closed position. The flow control valves for the open direction are adjusted only to slightly slow the master opening speed to assure the same delay in limit function. The only other use for the flow control valves is to help prevent the force of wind gusts from over-accelerating the gate.

Caution: Over-tightening of the flow control valves will cause the operator to draw more motor horsepower than necessary or desirable.

Be certain to tighten the set screws on the adjusting knobs to lock your adjustments.

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Operation Instructions for Manual or Emergency Situations HRG Swing Gate Operator

The procedure for manual operation follows. During a power failure, accident or serious malfunction of the equipment, it is important to follow this procedure.

1. Turn off electrical power switch to the controller.

2. Unlock the locking pin (at the far end of the gate panel) and lift the pin out of it's receptacle.

3. Remove the bolt , or padlock, from the index arm mount on the operator post assembly and swing away the entire index arm assembly. The gate panel is now free to swing on its auxiliary hinges.

4. If your operator is equipped with an optional accessory hand pump, manual operation can be achieved from the control enclosure without using any mechanical releases. **TO CLOSE THE GATE:** *Simply operate the hand pump*, located in the lower portion of the control enclosure. **TO OPEN THE GATE**: *pull and twist the knurled knob* on the solenoid directional valve, (below the electric motor on the hydraulic pump) then operate the hand pump.

NOTE: To return the valve to normal operation, be certain to release the knurled knob on the directional valve by *twisting it clockwise*.

For assistance call your local Distributor.

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Wire Size Schedules

for 1/2-hp through 5-hp motors

Supplying a gate operator with the right electrical service is crucial to the way the performance of the operator the life of its electrical components. If the wire size used is too small, the voltage loss—especially during motor starting—will prevent the motor from attaining its rated horsepower. The percent of horsepower lost is far greater than the percentage of the voltage loss. A voltage loss could also cause the control components to chatter while the motor is starting, substantially reducing their life due to the resultant arcing. There is no way to restore the lost performance resulting from undersized wires, except to replace them; therefore it is much more economical to choose a sufficient wire size at the initial installation.

The tables on the following page are based on copper wire and allow for a 5% voltage drop. The ampere values shown are the service factor ampere rating (maximum full load at continuous duty) of the motor.

Always connect in accordance with the National Electrical Code, article 430, and other local codes that may apply.

The maximum distance shown is from the gate operator to the power source; assuming that source power is from a panel box with adequate capacity to support the addition of this motor load. The values are for one operator, with no other loads applied to the branch circuit. For two operators applied to one circuit, reduce the maximum allowed distance by half.

Use this chart to determine maximum allowable control wiring distance. If the location required exceeds the distances listed on the chart at the right, addition of a long range interface will be neccessary.

Pushbutton Control Wiring	
16 ga	*125' Maximum*
14 ga	*200' Maximum*
12 ga	*300' Maximum*
10 ga	*500' Maximum*

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Wire Size for Voltage Drop Over Distance

Wire Sizes for Power Wiring, Single Phase

Distances are shown in the unshaded boxes

Wire Gauge

	115 V, SINGLE PHASE						*208 V, SINGLE PHASE*						*230 V, SINGLE PHASE*					
Amps	10.0	11.06	14.4	27.2	NA	NA	5.5	6.1	7.6	14.2	16.2	NA	5.0	5.8	7.2	13.6	14.8	27.0
Horse Power	1/2hp	3/4hp	1hp	2hp	3hp	5hp	1/2hp	3/4hp	1hp	2hp	3hp	5hp	1/2hp	3/4hp	1hp	2hp	3hp	5hp
12ga	90	75	60	30			290	260	205	110	100		350	300	245	130	120	65
10ga	140	120	100	50			460	415	330	175	155		560	480	385	205	190	105
8ga	220	190	155	80			725	650	525	280	245		880	760	610	325	300	165
6ga	350	300	245	130			1,150	1,040	835	445	390		1,400	1,120	975	515	475	260
4ga	555	480	385	205			1,825	1,645	1,320	710	620		2,220	1,915	1,550	815	750	410
2ga	890	765	620	330			2,920	2,630	2,110	1,130	1,000		3,550	3,060	2,465	1,305	1,200	660

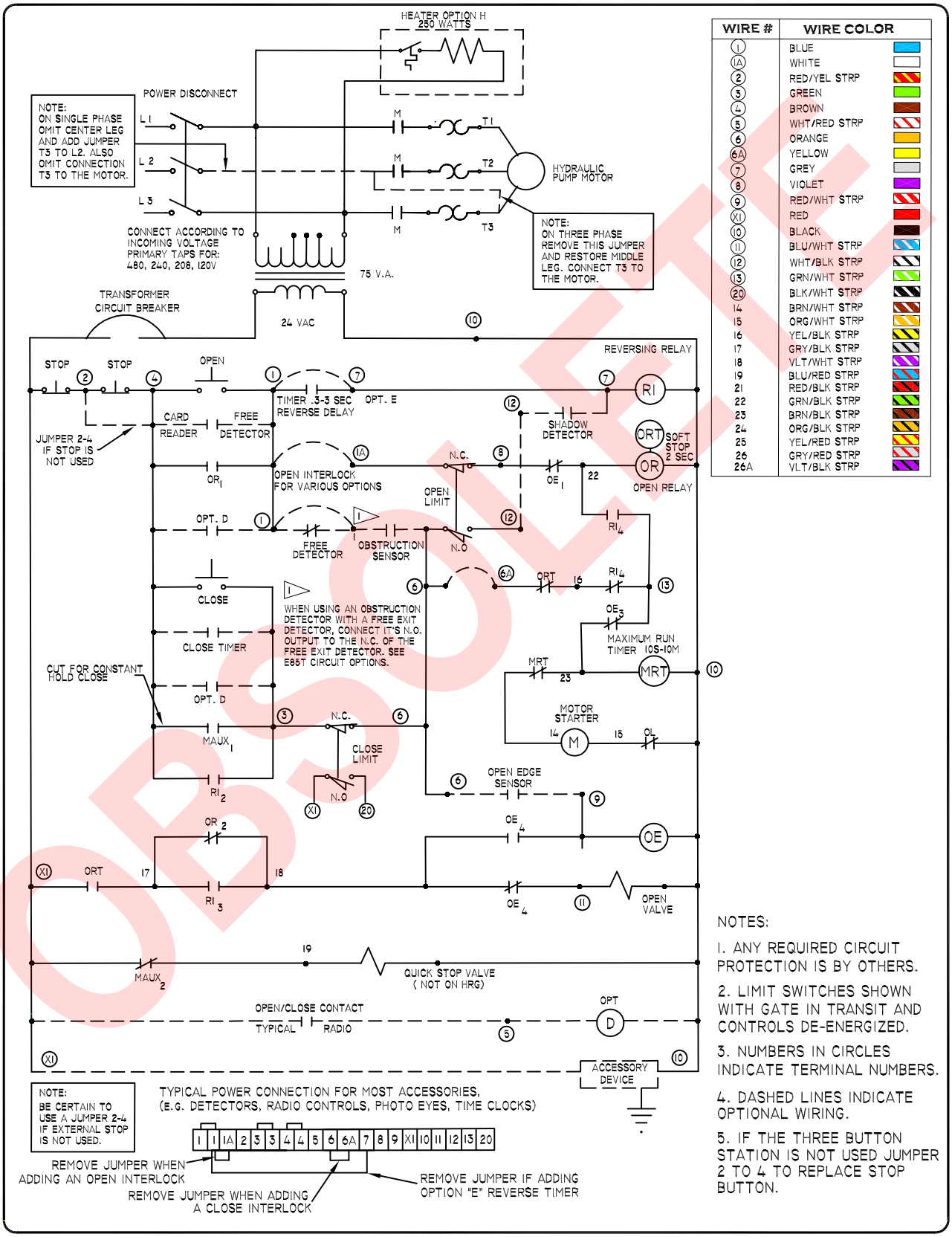
Wire sizes for Power Wiring, Three Phase

Distances are shown in the unshaded boxes

Wire Gauge

	208 V, THREE PHASE						*230 V, THREE PHASE*						*460 V, THREE PHASE*					
Amps	2.7	3.1	4.2	6.5	6.7	16	2.4	3.0	3.8	6.2	6.4	15.4	1.2	1.5	1.9	3.1	3.2	7.7
Horse Power	1/2hp	3/4hp	1hp	2hp	3hp	5hp	1/2hp	3/4hp	1hp	2hp	3hp	5hp	1/2hp	3/4hp	1hp	2hp	3hp	5hp
12ga	590	510	375	245	235	100	730	585	460	280	270	115	2,915	2,350	1,850	1,130	1,100	455
10ga	930	810	600	390	375	160	1,160	930	730	450	435	180	4,640	3,710	2,930	1,800	1,740	725
8ga	1,475	1,285	950	615	595	250	1,835	1,470	1,160	710	690	285	7,340	5,870	4,650	2,840	2,750	1,150
6ga	2,350	2,045	1,510	975	945	400	2,925	2,340	1,845	1,130	1,095	455	11,700	9,350	7,400	4,550	4,400	1,800
4ga	3,720	3,240	2,390	1,545	1,500	630	4,625	3,700	2,920	1,790	1,735	720	18,500	14,800	11,700	7,200	7,000	2,900

Always connect in accordance with the National Electrical Code, article 430, and other local codes that may apply.



WIRE #	WIRE COLOR
1	BLUE
1A	WHITE
2	RED/YEL STRP
3	GREEN
4	BROWN
5	WHT/RED STRP
6	ORANGE
6A	YELLOW
7	GREY
8	VIOLET
9	RED/WHT STRP
XI	RED
10	BLACK
11	BLU/WHT STRP
12	WHT/BLK STRP
13	GRN/WHT STRP
20	BLK/WHT STRP
14	BRN/WHT STRP
15	ORG/WHT STRP
16	YEL/BLK STRP
17	GRY/BLK STRP
18	VLT/WHT STRP
19	BLU/RED STRP
21	RED/BLK STRP
22	GRN/BLK STRP
23	BRN/BLK STRP
24	ORG/BLK STRP
25	YEL/RED STRP
26	GRY/RED STRP
26A	VLT/BLK STRP

NOTES:

1. ANY REQUIRED CIRCUIT PROTECTION IS BY OTHERS.
2. LIMIT SWITCHES SHOWN WITH GATE IN TRANSIT AND CONTROLS DE-ENERGIZED.
3. NUMBERS IN CIRCLES INDICATE TERMINAL NUMBERS.
4. DASHED LINES INDICATE OPTIONAL WIRING.
5. IF THE THREE BUTTON STATION IS NOT USED JUMPER 2 TO 4 TO REPLACE STOP BUTTON.

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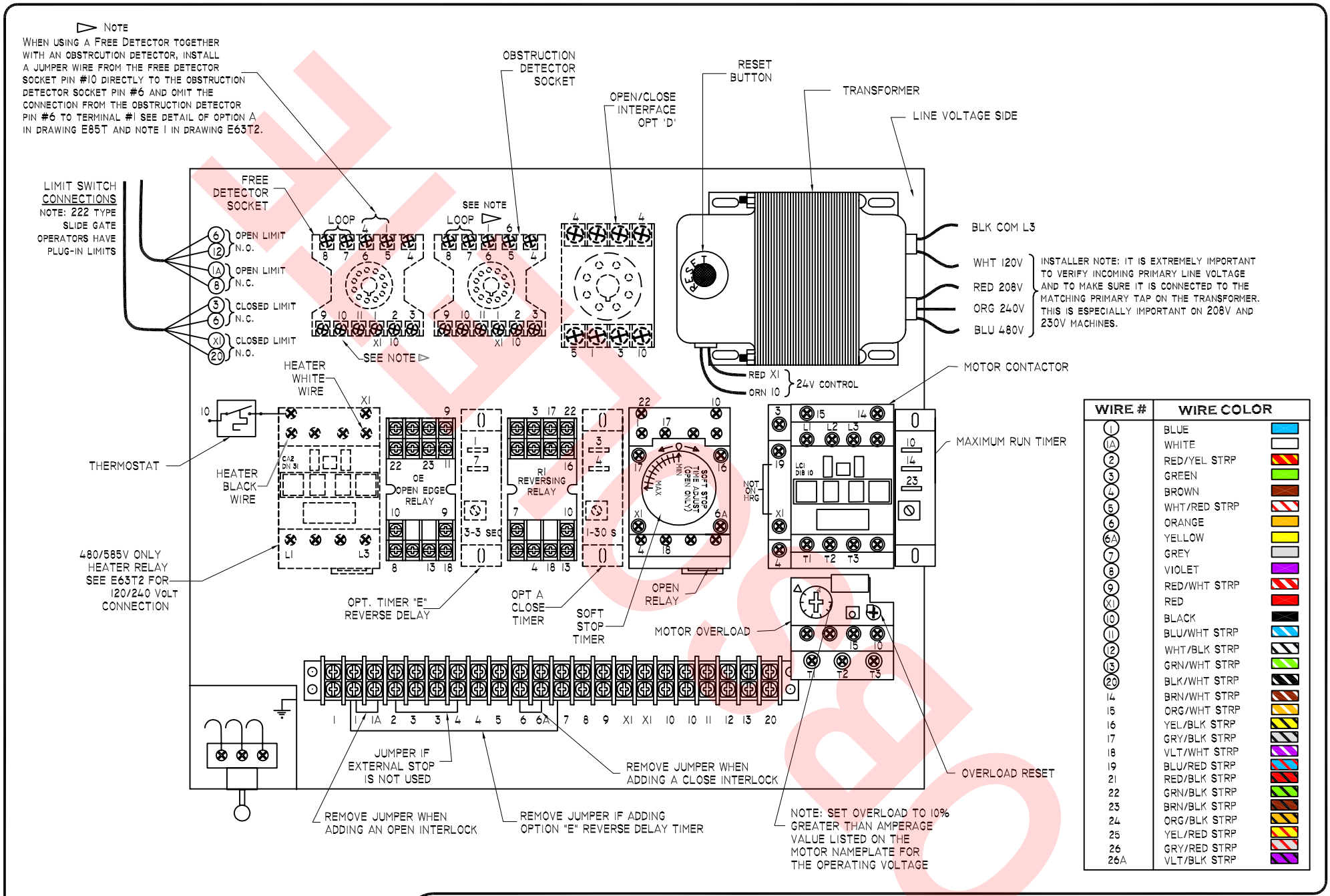
TITLE

LOGIC DIAGRAM FOR HRG, 444, 333, 222 MODELS

(ALL MODELS EXCEPT CF, HS OR DC VERSIONS)

DRAWN DB	DATE 05/02/00	THIRD ANGLE PROJECTION		REV	A
CHECKED -	DATE -	ERN NUMBER -	DATE -		
APPROVED -	DATE -	DRAWING NUMBER E63T2		SHT 1	OF 1



WIRE #	WIRE COLOR
1	BLUE
1A	WHITE
2	RED/YEL STRP
3	GREEN
4	BROWN
5	WHT/RED STRP
6	ORANGE
6A	YELLOW
7	GREY
8	VIOLET
9	RED/WHT STRP
X1	RED
10	BLACK
11	BLU/WHT STRP
12	WHT/BLK STRP
13	GRN/WHT STRP
20	BLK/WHT STRP
14	BRN/WHT STRP
15	ORG/WHT STRP
16	YEL/BLK STRP
17	GRY/BLK STRP
18	VLT/WHT STRP
19	BLU/RED STRP
21	RED/BLK STRP
22	GRN/BLK STRP
23	BRN/BLK STRP
24	ORG/BLK STRP
25	YEL/RED STRP
26	GRY/RED STRP
26A	VLT/BLK STRP

BE CERTAIN TO JUMPER 2-4 IF AN EXTERNAL STOP IS NOT USED.

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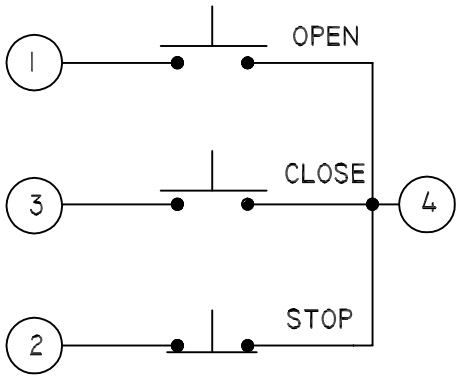
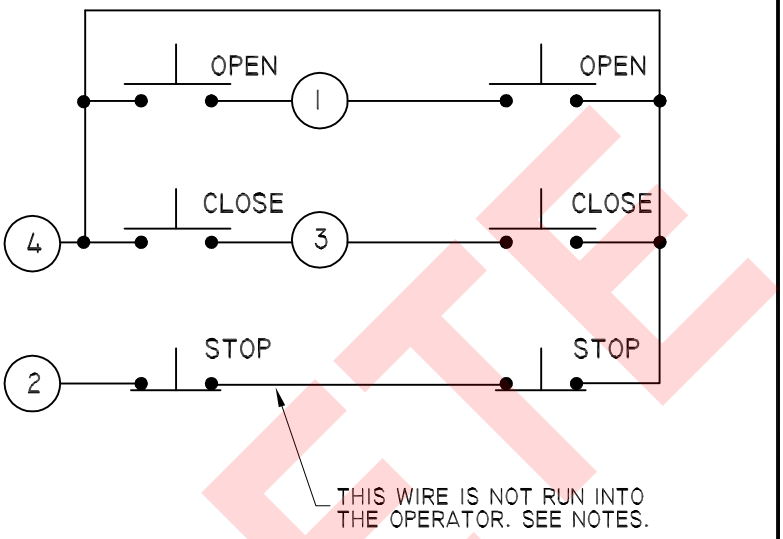
TITLE:
ELECTRICAL COMPONENTS HRG, 444, 333, 222 (ALL MODELS EXCEPT CF, HS OR DC VERSIONS)

DATE: 12/3/98	PART NUMBER: N/A
REV. NO: 1	PAGE	OF
REV. DATE: 5/22/00	DRAWING NUMBER: E20T2





NOTE:
WIRING FOR ALL REMOTE 24 VAC CONTROL PUSHBUTTONS. EXCEPT HTG 320.

SINGLE BUTTON STATION REQUIRE 4 CONDUCTORS.

FIRST STATION IN MULTIPLE STATION GROUP REQUIRES FIVE CONDUCTORS (SEE EXAMPLE).

NOTE:
ON MULTIPLE STATONS BE SURE TO CUT JUMPER (CLOSE TO STOP) IN FIRST STATION AND ADD WIRE BETWEEN THE TWO STOP BUTTONS.

SINGLE BUTTON STATIONS
EXCLUDING OPERATOR MOUNTED

A

MULTIPLE BUTTON STATIONS
EXCLUDING OPERATOR MOUNTED

B

THE NUMBERS IN THE CIRCLES ARE WIRES THAT CORRESPOND TO THE CONTROL CIRCUIT. CONNECT THE PUSHBUTTON STATION TO THE TERMINAL STRIP INSIDE THE CONTROL BOX. MATCH WIRE NUMBER TO THE TERMINAL NUMBER.

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TITLE
REMOTE 4 WIRE PUSHBUTTON WIRING

DRAWN DB	DATE 05/04/00	THIRD ANGLE PROJECTION		REV A
CHECKED -	DATE -	ERN NUMBER -	DATE -	
APPROVED -	DATE -	DRAWING NUMBER E57		SHT 1 OF 1

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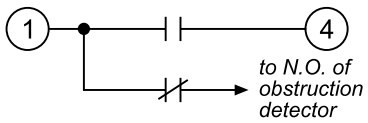
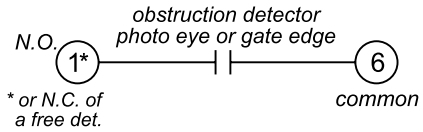
Electrical Circuit Options Applies to all operators except HTG 320 models

A Any Open Device or Free Detector



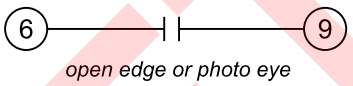
Any device used to open the gate, such as a pushbutton, key switch or detector, connects to #1 to #4. The gate will be held in the open position if contact is maintained.

B Closing Obstruction Sensor



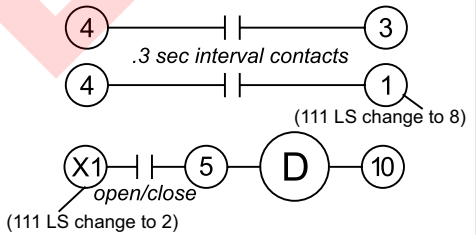
This input allows connection of an obstruction sensor to guard the closing of a gate. Connect the sensor output to #1 and #6. If the sensor is a vehicle detector and is used with a free detector, connect the N.O. of the obstruction detector to the N.C. of the free detector, as shown at left. If tripped while closing, the gate will reverse to the full open position.

C Opening Obstruction Sensor



This input allows connection of an obstruction sensor to guard the opening of a gate. If tripped while opening, the gate will reverse slightly, and then self-disable for two seconds. Connect a N.O. contact (edge sensor or photo eye) to terminals #6 and #9.

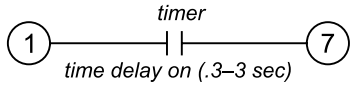
D Open/Close Interface



This special interface allows one contact, two-way control: the gate can be closed only after opening fully, but can be opened from any position. For 222SS models only, option D must be ordered with option E, Reverse Delay. Refer to the connection diagram for detailed wiring information.

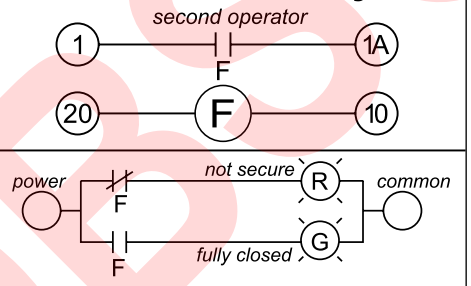
E Reverse Delay

—not available on 111LS— standard with all operators except 222SS



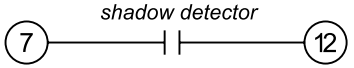
This option delays start in the open direction. It is also used to delay instant reverse. It can be added by itself or as part of several factory modifications necessary to convert operators to 'E' type. Remove the jumper between #1 and #7 when installing the reverse delay.

F Interlock & Relay



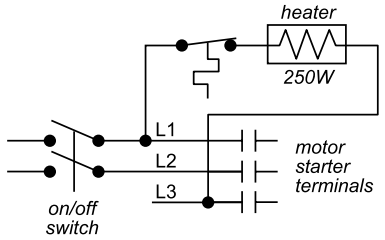
To interlock two Hy-Security machines connect a N.O. pole of the 'F' relay to the other operator (in all but the 111LS), and remove the jumper between #1 and #1A. In the 111LS, remove open limit wire #8 and wire in series with 'F' relay N.O to #8.

G Shadow Detector



Swing gates require an additional loop and detector for the area under the arc of the gate. This detector can hold the gate when open, but is turned off when the gate begins to close.

H Heater



We recommend a heater be installed in colder climates; use one rated for the supplied voltage. Connect to terminals L1 and L3 of the motor starter. On 480 VAC systems an additional relay is required.

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Long Range Pushbutton Control
Connection Diagram

Voltage loss over distance is caused as a function of control amperage multiplied by the resistance of the wiring, and may be expressed: Voltage loss = (**wire resistance**) X (**control amperage**). This limits pushbutton control wiring to the following schedule:

16 ga. wire= up to 125 feet max 12 ga. wire = up to 300 feet max
14 ga. wire = up to 200 feet max 10 ga. wire = up to 500 feet max

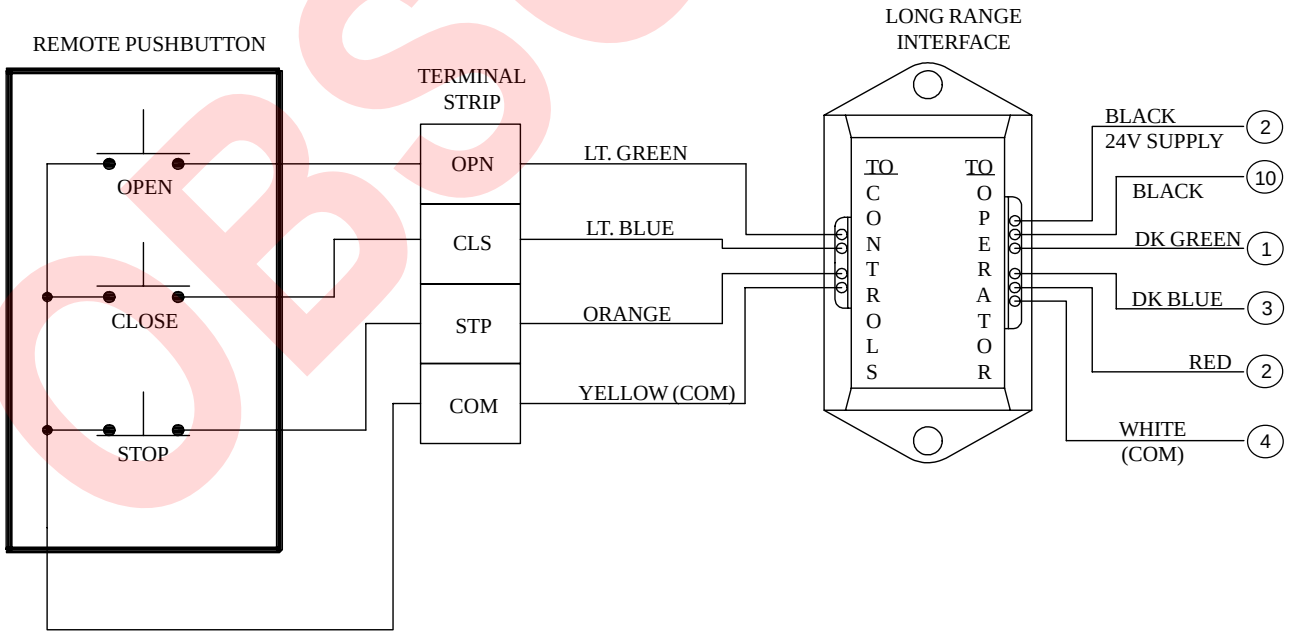
For applications requiring pushbutton controls from a long distance, or circuits of limited current, order the factory modification, long range interface. The following schedule indicates the improved control range using the long range interface:

16 ga. wire = up to 50 miles 20 ga. wire = up to 19 miles
18 ga. wire = up to 30 miles 22 ga. wire = up to 12 miles

FOR BEST PERFORMANCE
USE 20 GAUGE WIRE OR LARGER

Be certain to remove factory-installed jumper (#2 to #4) and also verify that no other external stop button is connected at #2 and #4.

When the long range interface option is used in conjuction with a pushbutton control, connect to the operator as shown below:



NOTE:
The part number for the long range interface, installed at the factory, A EIIF 001 OCS
The same part designation for the long range interface, in kit form, A EKIF 001 OCS

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Master/Slave Interconnection Instructions

FOR ALL MODELS EXCEPT: HTG 320

Operation of two Hy-Security gate operators as a master/slave pair is simply a matter of correctly interconnecting the two control circuits. Join the following four wires from the master operator to the slave:

Terminal #1 master to terminal #1 slave,
Terminal #3 master to terminal #3 slave,
Terminal #4 master to terminal #4 slave,
*Terminal #10 master to terminal #10 slave

All stop control inputs must be connected to the master operator only. The slave operator must not have any connection between terminal #2 and terminal #4, such as a stop button or jumper.

*On DC battery powered operators, interconnect the black wires (-) to the on/off switch instead of the #10 wires. This prevents one operator from powering the other when the disconnect switch is off.

For assistance call your Distributor.

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Installation Instructions For Gate Reversing Sensing Edge

1. Securely bolt the edge sensor to the edge of the gate. The edge should line up with the lower corner of the gate frame.

2. If the reversing edge is to wire directly to the gate operator:

A. Locate a mounting position for a curl cord attatchment, or retracting cord reel holder where there will be no possibility of the cord rubbing on the moving gate panel.

B. Attatch the cord to the gate in a position that is roughly near the position of the automatic operator, when the gate is closed.

C. Route the wires to the leading edge of the gate and join to the wires of the reversing edge. Wirenut and thoroughly tape the connections so that they are not prone to vibrate loose.

D. Join the fixed end of the cord reel or curl cord directly to terminal numbers 1 and 6 inside the control box of the operator.

3. If the reversing edge is to transmit to the gate operator:

A. Mount the reversing edge transmitter (Multi Elmac Model #3022, or equivalent) onto the gate panel near the upper corner of the leading edge of the gate.

B. Join the wires of the reversing edge to the two terminals inside of the edge transmitter. Set a unique code on the “DIP” switches inside the transmitter. Remount the cover of the transmitter and tighten the screws firmly so that no water will leak inside.

If a receiver for the reversing edge has been prewired inside the operator, proceed directly to step #3D.

C. Mount a commercial style radio receiver* (one with a connector for an external antenna) on the inside of our operator enclosure. Connect the 24 Volt supply wires to terminal numbers X1 and 10 on the terminal strip. Connect the radio contact wires to terminal numbers 1 and 6 on the terminal strip.

D. Mount an external antenna onto the top of a fixed post of the fence near the operator. Connect the antenna into the socket on the radio receiver.

E. Set the “DIP” switches in the receiver to match the same code used in the edge transmitter.

*If there is also to be a radio receiver for a hand held transmitter to operate the gate, be certain to use a two channel commercial receiver.

4. Test the operation of the reversing edge to be certain that it is functioning. Advise the user of the gate to be certain to retest this vital function weekly.

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Photoelectric Eye, Reflector Adjustment Instructions

Correct installation and alignment of a retro-reflective photo eye and its reflector are important for a trouble free installation. Systems operating at a range of 15' or more are prone to weather caused reductions in range. We feel that if care is taken in the initial mounting and alignment of the 13" reflector then the chance of problems is greatly reduced. Taking steps to protect the reflector from being exposed to fog and being absolutely certain the photo eye is perfectly aligned will greatly increase the apparent power of the photo eye.

The ideal mounting for the reflector is suspended inside a 12" long piece of 3" P.V.C. conduit. Cut the opening of the 3" P.V.C. conduit at a 45 degree angle to act as a drip shield. The reflector is held against the backside of the 3" conduit by attaching a 3" male connector. Do not cement the connector so that the reflector can be reached for future cleaning. To create a mounting base, attach a 3" aluminum meter hub or flange to the connector. The whole package can now be mounted to any flat surface.

Locating the reflector in the center of the invisible beam of infrared light is important to achieve the most sensitive alignment. The center is determined by the following test. While holding the reflector in your hand, slowly raise it until the beam is no longer returned and the photo eye trips. Mark this maximum height. Now lower your hand and determine the lower limit of the infrared beam by watching the trip point. Mark this position well. Repeat the same procedure for left and right at the center elevation of the beam, as determined by the previous test. Once the four limits have been determined, either mount the reflector in the center of the area outlined or realign the eye for the position of the reflector. If the photo eye is realigned, be sure to perform the centering test again to verify that the reflector is truly in the center.

As a last tip, smearing dish soap on the reflector will also help to repel any possibility of fogging from moisture that gets into the 3" pipe. With all of these steps taken, the optimum performance of the retro-reflective photo eye system will be achieved.

Note: To cover greater distances, or to operate in adverse weather conditions, consider a through-beam photo eye.

For Assistance call your Distributor.

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Detector Installation Guide

Loop Basics

The vehicle detector passes a small current flow through the "loop" which then becomes an inductive coil. When a vehicle passes over a loop the detector senses the resultant drop in the inductance, and actuates it's output relay.

Loop Configurations

Configurations differ depending on the application. In parking applications with our HTG320 operator, a loop may be as small as 3' x 6'. In traffic applications employing one of our sliding gate operators, or swing gate operators, the smallest loop should not be less than six feet square.

Rules to Follow for Security Gate Applications

1. The side of the loop closest to the gate shall be located at least four (4) feet distant from it's line of travel.

2. The shortest side of the loop shall be between six (6) and eight (8) feet in length. The longest side of the loop shall be between six (6) and twenty (20) feet in length. For applications that need to span a wide area, use several smaller loops. Do not exceed a maximum of 200 square feet of loop area to only one detector.

3. In applications with multiple loops, keep each loop at least six feet apart. This avoids "cross talk". It is possible to have loops closer together by selecting different frequencies.

4. For greater sensitivity and less chance of false calls caused by the motion of the gate, it is better to use two smaller loops, connected in a series circuit, to one detector instead of one large, single loop.

5. To avoid interference, keep loops at least two (2) inches above any reinforcing steel. Do not route loop wires with, or in close proximity to, any other conductors, including other loop leads, unless shielded lead-in cable is used.

6. Loop and lead-in wire should be one continuous piece. Avoid splices, if possible. If a splice is necessary for any reason, "pot" the splice in epoxy or use heat shrink to ensure that the quality of the splice covering is the same as the original wire jacket.

7. Use only number 12, 14, or 16 gauge stranded wire with a direct burial jacket. Cross linked polyethylene insulation types, such as, XLPE or XHHW, will last much longer and are less prone to damage during installation than conventional insulation types. Preformed loops can be used before road surfacing or under pavers.

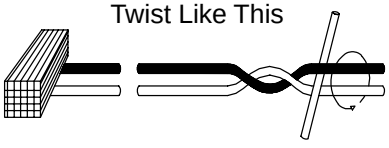
8. Twist loose tails of lead-in wires tightly, approximately ten times per foot.

Twist lead-in at least 10 turns per foot

Like This

Not Like This

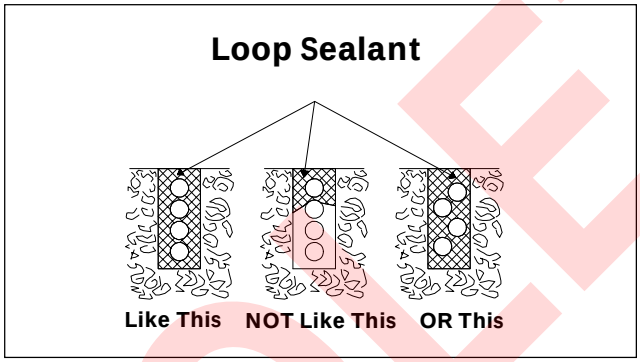
Twist Like This



continued from previous page...

9. Follow this guide for the correct number of turns in the loop;
   12 to 20 sq. ft = 5 turns 20 to 60 sq. ft. = 4 turns 60 to 240 sq. ft. = 3 turns

10. This guide is written from a design perspective, but installation workmanship practices are equally important to insure proper operation and long loop life. The best way to insure a quality installation is to employ a professional installer experienced with detector loops. A few important practices are: **A.** The slot in the surface should be cut ¼" wide x 1 ½" deep. **B.** The corners of the cut must be at an angle or core drilled to relieve stress on the wires. **C.** After the wire is installed, the slot must be completely backfilled with a non-hardening sealer. Note that if the loop wires are able to move in the slot after the sealer has set, the detector may give false calls.



Detector Logic

Hy-Security Gate Operators recommends that vehicle detectors be used for free open and obstruction sensing logic only. The exception is in parking applications with our HTG320 operator where detectors may be also used to close the gate. In applications employing our swing , vertical lift, or sliding gate operators, closing logic cannot be used. Because of their slower speeds, closing logic is a poor choice for security gate systems. Since there are several ways that the gate may be left standing open and because there is a loss of safety. Our circuit has not been designed to accomodate "detect to close" logic.

Loop Diagnostics

The following tests cannot guarantee a functioning loop, but failure of either test means that the loop is definitely suspect, even though it may still be functioning at the time.

Test #1:

Resistance of the loop and lead-in wire should not exceed 4.0 Ohms.

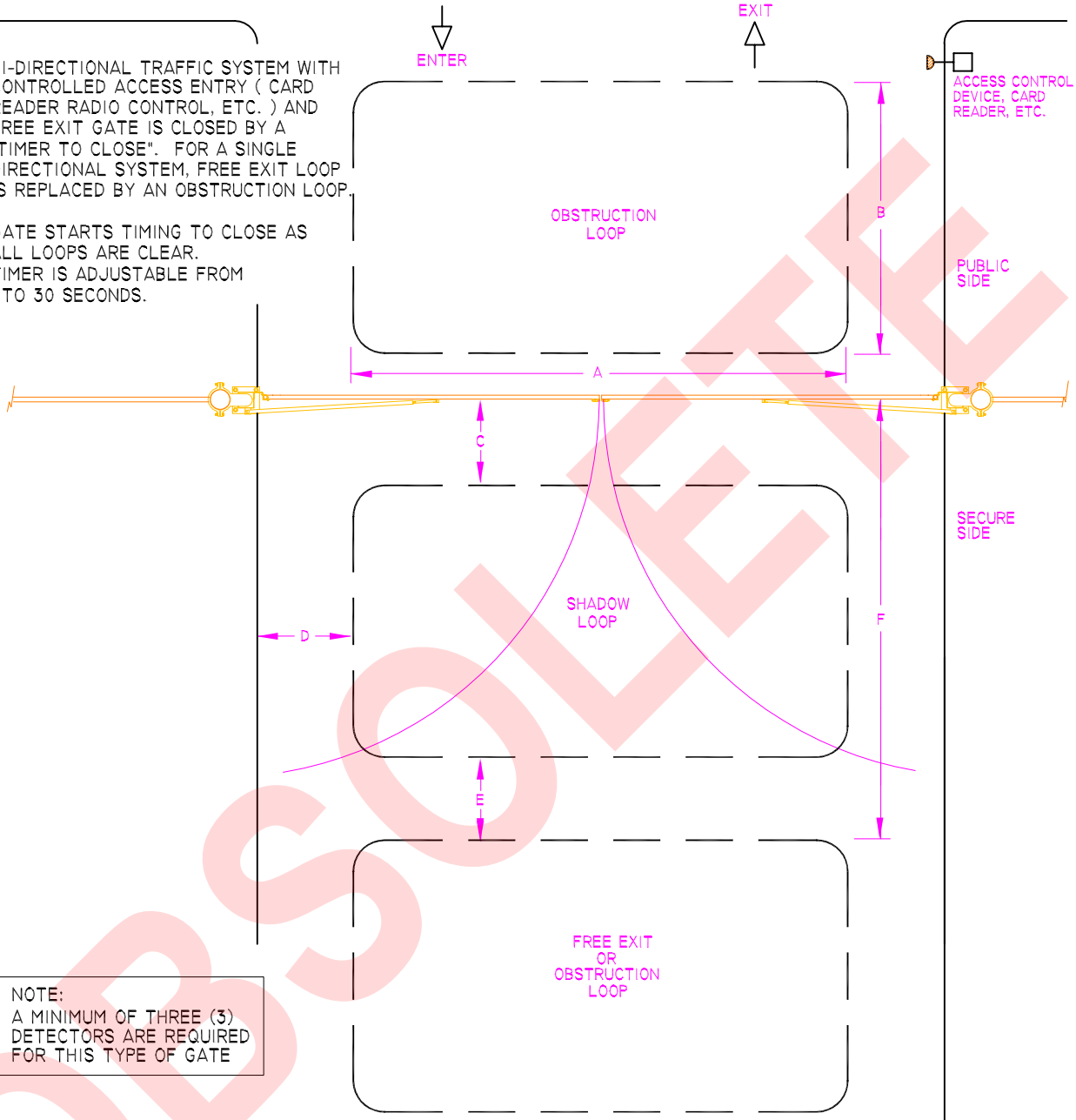
Test #2:

The resistance to earth, as measured with a 500V "Megger", should be 100 Megohms or more. Loops may function at 10 Megohms or less but will not be reliable (e.g. when the ground is wet from rainfall). Low resistance indicates broken or moisture saturated insulation. This is common if inappropriate wire insulation has been used.

FOR OPENINGS LESS THAN 30 FEET
(SEE E92 FOR TWIN LOOP SYSTEM)

BI-DIRECTIONAL TRAFFIC SYSTEM WITH CONTROLLED ACCESS ENTRY (CARD READER RADIO CONTROL, ETC.) AND FREE EXIT GATE IS CLOSED BY A "TIMER TO CLOSE". FOR A SINGLE DIRECTIONAL SYSTEM, FREE EXIT LOOP IS REPLACED BY AN OBSTRUCTION LOOP.

GATE STARTS TIMING TO CLOSE AS ALL LOOPS ARE CLEAR.
TIMER IS ADJUSTABLE FROM 1 TO 30 SECONDS.



NOTE:
A MINIMUM OF THREE (3) DETECTORS ARE REQUIRED FOR THIS TYPE OF GATE

DIMENSION "A" = 6 TO 20 FEET
DIMENSION "B" = 6 TO 8 FEET
DIMENSION "C" = MAINTAIN 4 FEET
DIMENSION "D" = MAINTAIN 5 FEET BETWEEN LOOP AND EDGE OF ROADWAY. NO VEHICLE CAN PASS THROUGH SUCH A SMALL AREA AND ESCAPE DETECTION

DIMENSION "E" = 4 FEET MAXIMUM. VEHICLES MUST BE ABLE TO PASS FROM ONE LOOP TO THE NEXT WITHOUT LOSS OF DETECTION.

DIMENSION "F" = DISTANCE FROM GATE TO FREE EXIT LOOP IS GATE PANEL LENGTH PLUS 4 FEET.

Hy-Security Gate Operators
SEATTLE, WASHINGTON

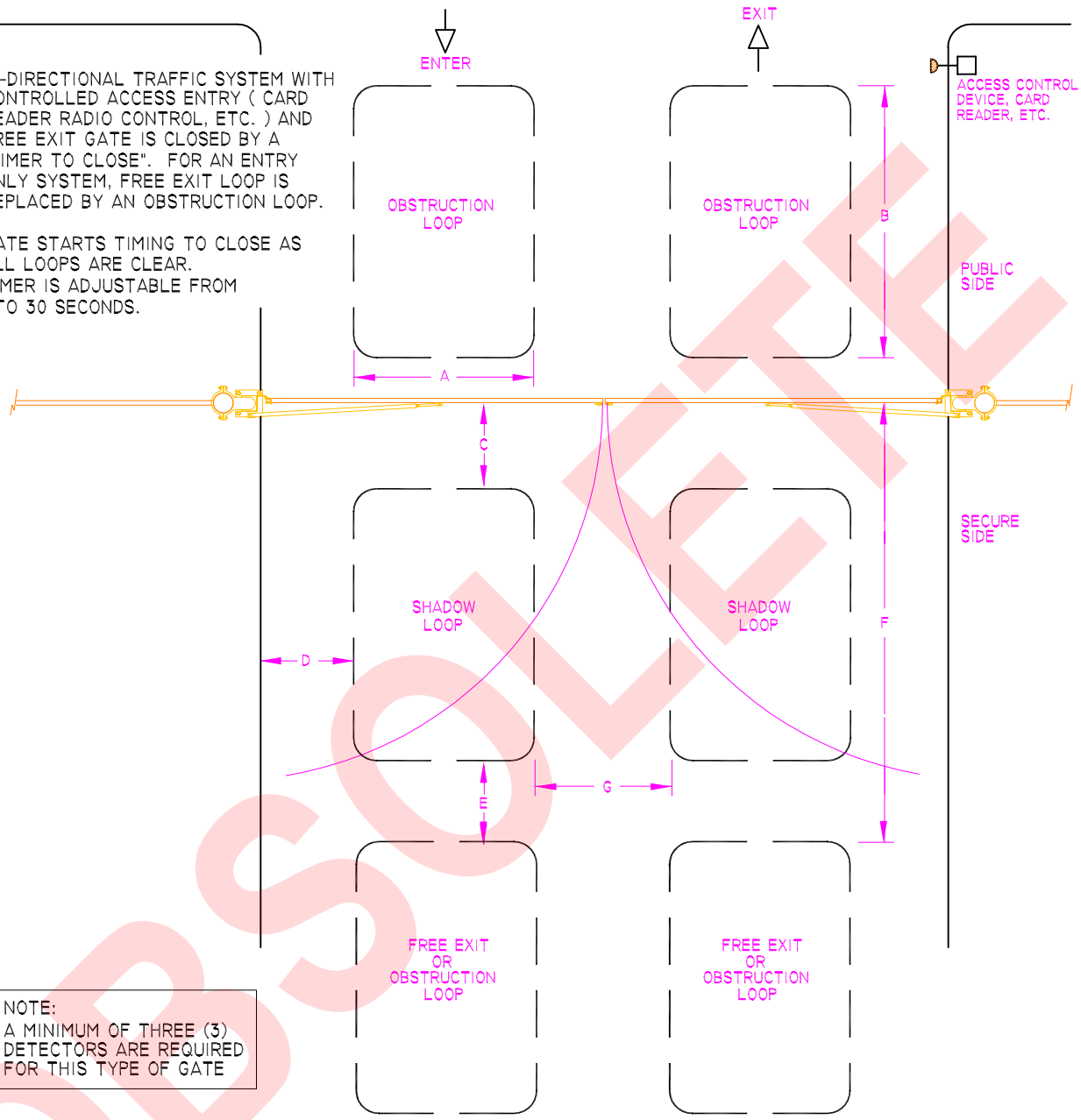
TITLE
HRG220 AND HRG222 SWING GATE LOOP LAYOUT UNDER 28' WIDE

DRAWN DB	DATE 05/04/00	THIRD ANGLE PROJECTION		REV A
CHECKED -	DATE -	ERN NUMBER -	DATE -	
APPROVED -	DATE -	DRAWING NUMBER E91		SHT 1 OF 1

FOR OPENINGS GREATER THAN 28 FEET
(SEE E91 FOR SINGLE LOOP SYSTEM)

BI-DIRECTIONAL TRAFFIC SYSTEM WITH CONTROLLED ACCESS ENTRY (CARD READER RADIO CONTROL, ETC.) AND FREE EXIT GATE IS CLOSED BY A "TIMER TO CLOSE". FOR AN ENTRY ONLY SYSTEM, FREE EXIT LOOP IS REPLACED BY AN OBSTRUCTION LOOP.

GATE STARTS TIMING TO CLOSE AS ALL LOOPS ARE CLEAR.
TIMER IS ADJUSTABLE FROM 1 TO 30 SECONDS.



NOTE:
A MINIMUM OF THREE (3) DETECTORS ARE REQUIRED FOR THIS TYPE OF GATE

DIMENSION "A" = 6 TO 8 FEET
DIMENSION "B" = 6 TO 12 FEET
DIMENSION "C" = MAINTAIN 4 FEET
DIMENSION "D" = MAINTAIN 5 FEET BETWEEN LOOP AND EDGE OF ROADWAY. NO VEHICLE CAN PASS THROUGH SUCH A SMALL AREA AND ESCAPE DETECTION

DIMENSION "E" = 4 FEET MAXIMUM. VEHICLES MUST BE ABLE TO PASS FROM ONE LOOP TO THE NEXT WITHOUT LOSS OF DETECTION.

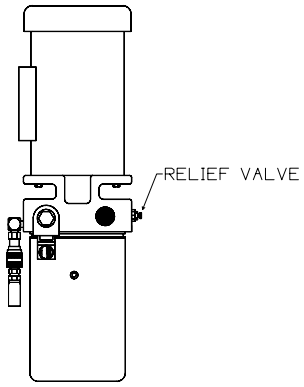
DIMENSION "F" = DISTANCE FROM GATE TO FREE EXIT LOOP IS GATE PANEL LENGTH PLUS 4 FEET.

DIMENSION "G" = 4 TO 6 FEET

Hy-Security Gate Operators, SEATTLE, WASHINGTON	TITLE: HRG220 AND HRG222 SWING GATE LOOP LAYOUT OVER 28' WIDE	DRAWN DB	DATE 05/15/00	THIRD ANGLE PROJECTION
		CHECKED -	DATE -	ERN NUMBER - / DATE -
		APPROVED -	DATE -	DRAWING NUMBER E92
				REV A
				SHT 1 OF 1

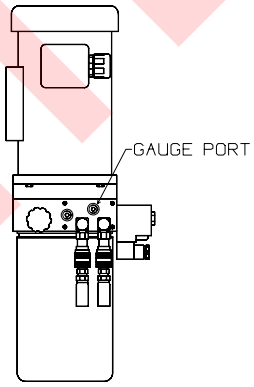
Hy-Security Gate Operators
Phone: 1-800-321-9947 • Fax: (206) 286-0614 • Web: www.hy-security.com • 1200 W Nickerson St • Seattle, WA. 98119

Pressure Relief Valves
Adjustment Procedures



Side View

Model	Factory Setting
111 Series	750 psi
222 SS, E	1000 psi
222 EX	1300 psi
444 Series	1300 psi
HRG Series	1300 psi
HVG Series	2000 psi
HTG 360	1000 psi
HTG 320-6	1000 psi
HTG 320-3	1000 psi
HTG 320-2	700 psi



Front View

The relief valve can be found on the back side (gate side) of the hydraulic power unit. It is the only component located here and has a hex adjusting head and lock nut. To adjust setting, loosen the lock nut screw the threaded bolt CW for increased pressure, turn CCW to decrease pressure.

Pressure relief valves are preset at the factory to utilize maximum available horsepower. The relief valve can be lowered to smooth starting if necessary. This is most easily done by decreasing the pressure until the gate operation slows, and then increasing the pressure just enough to provide normal gate speed.

It must be understood that if you reduce the pressure setting, you will lose horsepower to move the gate if additional resistance (old gate hardware, snow and ice, etc.) is encountered.

Do not attempt to use the relief valve as an entrapment protection device. A photo eye or a gate edge is the best method to protect pedestrians and reserve power to drive the gate.

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Maintenance Procedures
HRG Swing GateOperator

OPERATOR POST

The Hy-Security Swing Gate Operator is designed to require a minimum amount of maintenance.

There is no required lubrication of any part of the operator, including the cam followers located at the center of the operator. The cam followers are permanently lubricated at the factory.

Inspect the white UHMW plastic bearings at inside top & bottom of the 7" square post. If the gap between the bearing and the 5-1/2" round post exceeds 3/8", replace the bearing.

Inspect the open and close operation of the gate for speed and smoothness of travel. If adjustment is necessary, refer to the information on adjustment of the flow control valves.

The adjustment of the indexing arm may have to be altered to hold the gate in the correct position and allow alignment of the locking pin with it's receptacle. Adjustment is usually required only after the gate has been hit by a vehicle or otherwise been damaged. To adjust, unbolt the tension where it attaches to the gate and screw the adjustor, in or out as needed.

The most reliable operation occurs when the indexing arm is adjusted to slightly "over close" the gate. The goal is to have the locking pin strike its receptacle firmly then the closing tension will aid in keeping the locking pin aligned into the receptacle.

For assistance, contact your distributor.

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Conversion of Primary Operator Voltage

These instructions do not apply to conversions from single phase to three phase or vice versa. Conversion from one phase to another is not recommended.

Steps required to convert the voltage of an operator within the same phase:

1. *The overload must be changed to match the motor current at the new operating voltage.*
To do this, remove the overload device from the contactor by loosening the three screws T1, T2 and T3 on the contactor. Remove all the wires on the overload and replace them exactly the same position on the new overload. Mount and tighten screws firmly. Be certain the new overload is adjusted to match the motor nameplate amps that correspond to the new voltage. Note that the existing overload has sufficient range to accommodate adjustment from 208 volts to 230 volts or vice versa.

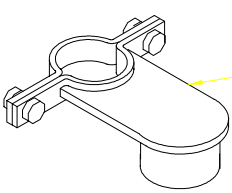
2. *The primary tap on the control transformer must be changed to the new voltage.*
This is accomplished by first reading the label on the top of the control transformer to determine which color primary lead corresponds to the new voltage to be used. Disconnect the existing primary lead (**Caution**: Do not disconnect the primary "Common" lead) and reconnect the primary lead to the same location.

3. *The power leads to the motor must be reconnected in the motor junction box to match the new voltage.*
You must remove the cover from the junction box on the electric motor. Reconnect the primary leads in the new configuration shown on the motor nameplate that matches the new voltage. Note this step does not need to be performed for conversion between 208 volts and 230 volts.

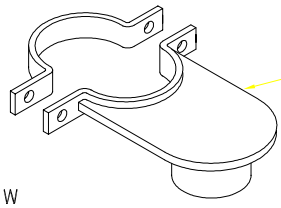
4.*The operator must be re-labeled to indicate the new voltage.*
Apply new labels to the operator so that the correct primary voltage is indicated.

5. To add a heater you need the following parts: (includes thermostat wire and all mounting hardware):

120 VAC	AEKHE 120 250
208-240 VAC	AEKHE 240 250
480 VAC (includes relay)	AEKHE 480 250



MSWTC 007 P
TOP CAP, 4 ½" POST MOUNT



MSWTC 005 P
TOP CAP, 6 5/8" POST MOUNT

MSWTC 001 W
TOP CAP, PILASTER MOUNT

MPTBE 022 4
UHMW BEARING, 6 5/8"

MFABS 006 016N
BUTTON HEAD SCREW

MSWCO 004
UPPER ACCESS COVERS

ESWLS 220 K
CLOSE LIMIT SWITCH

ESWLS 220 K
OPEN LIMIT SWITCH

MSWCO 002
W/CLOSE LIMIT TAB (OPPOSITE SIDE)

MPTBE 022 4
UMHW BEARING, 6 5/8"

MSWBC 001
BASE PEDESTAL

HSFQD 002
QUICK DISCONNECT

MFABS 006 016N

MSWSH HD1—SEE DETAIL 'A'
SHAFT, CAM, FOLLOWERS & BUSHING

MSWCY HRG KITN
CYLINDER KIT W/HOSES

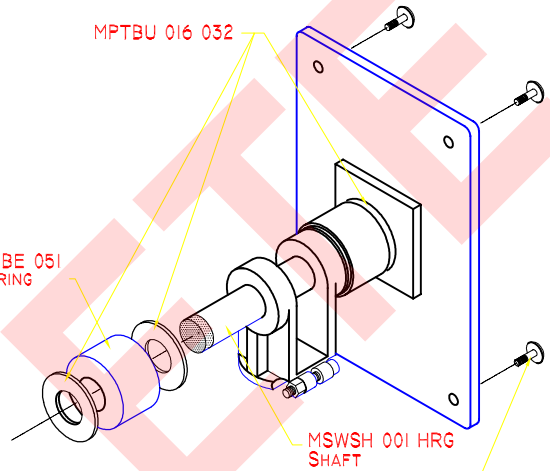
MSWSH 016 LOWER CYLINDER SHAFT
MFAER 016 E-CLIPS, LOWER CYLINDER SHAFT

AUXILIARY HINGE
MSWHG 004

MSWBS 001
BASE COVER

DETAIL 'A'

UPPER CYLINDER
SHAFT & BEARING ASSEMBLY



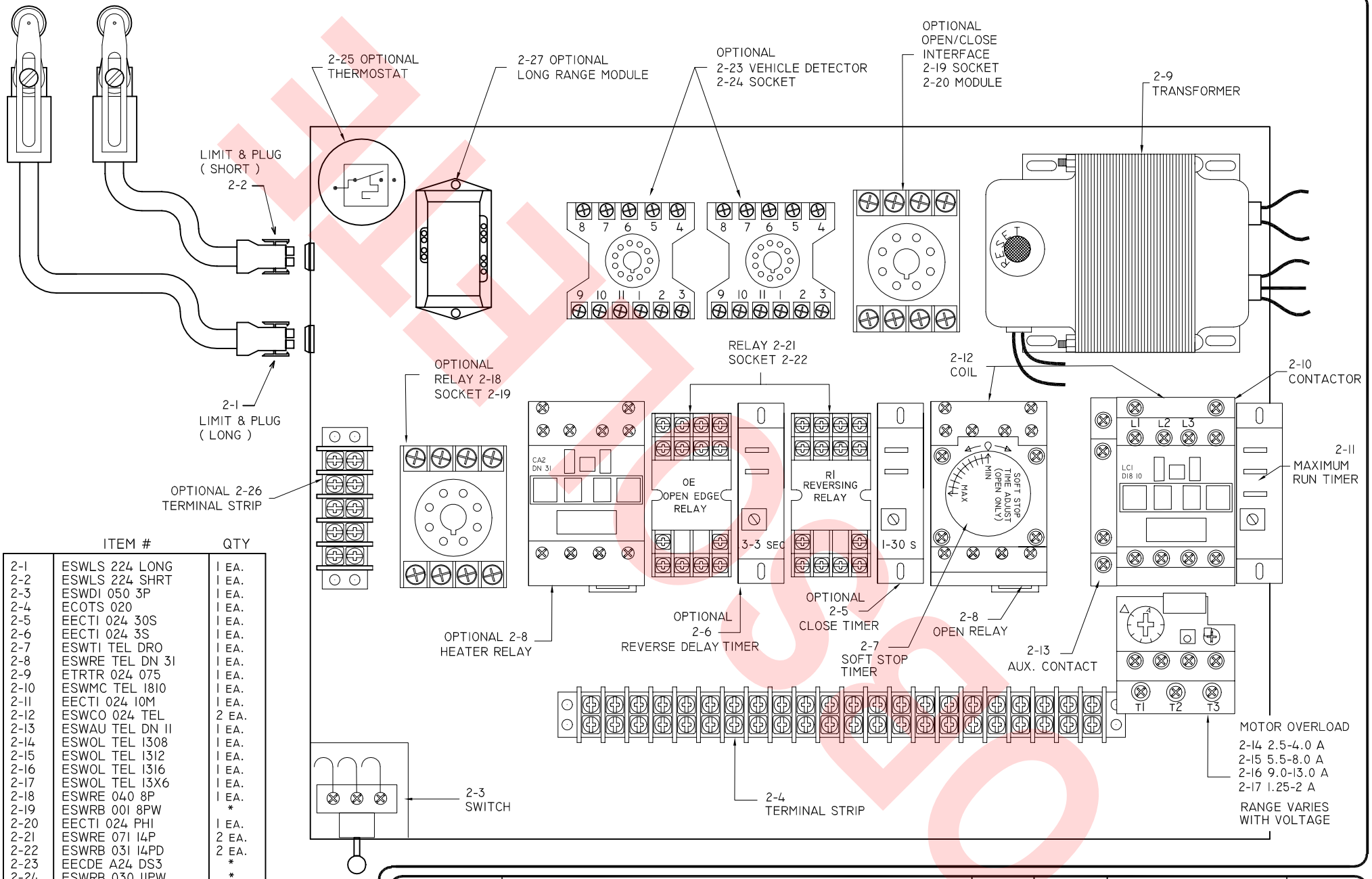
REPLACEMENT SHAFT KIT
MSWSH HD1 - SHAFT & BEARING
MSWSH HD1 PO - SAME AS ABOVE + COVERS

Hy-Security Gate Operators
SEATTLE, WASHINGTON

TITLE

HRG SWING GATE POST, TYPICAL

DRAWN KERI	DATE 6/15/00	THIRD ANGLE PROJECTION		REV C
CHECKED	DATE	ERN NUMBER -	DATE -	
APPROVED	DATE	DRAWING NUMBER: HR14		SHT 1 OF 1



ITEM #		QTY
2-1	ESWLS 224 LONG	1 EA.
2-2	ESWLS 224 SHRT	1 EA.
2-3	ESWDI 050 3P	1 EA.
2-4	ECOTS 020	1 EA.
2-5	EECTI 024 30S	1 EA.
2-6	EECTI 024 3S	1 EA.
2-7	ESWTI TEL DRO	1 EA.
2-8	ESWRE TEL DN 31	1 EA.
2-9	ETRTR 024 075	1 EA.
2-10	ESWMC TEL 1810	1 EA.
2-11	EECTI 024 10M	1 EA.
2-12	ESWCO 024 TEL	2 EA.
2-13	ESWAU TEL DN 11	1 EA.
2-14	ESWOL TEL 1308	1 EA.
2-15	ESWOL TEL 1312	1 EA.
2-16	ESWOL TEL 1316	1 EA.
2-17	ESWOL TEL 13X6	1 EA.
2-18	ESWRE 040 8P	1 EA.
2-19	ESWRB 001 8PW	*
2-20	EECTI 024 PHI	1 EA.
2-21	ESWRE 071 14P	2 EA.
2-22	ESWRB 031 14PD	2 EA.
2-23	EECDE A24 DS3	*
2-24	ESWRB 030 11PW	*
2-25	EACTH B10 019	1 EA.
2-26	ECOTS 005	1 EA.
2-27	EECRE 003 024	1 EA.
*	QTY. & USE VARIES	*

Hy-Security Gate Operators
SEATTLE, WASHINGTON

TITLE

ELECTRICAL COMPONENTS HVG, HRG 444, 333 & 222
(ALL MODELS, EXCEPT FOR DC MODELS)

DRAWN DB	DATE 05/12/00	THIRD ANGLE PROJECTION	REV A
CHECKED -	DATE -	ERN NUMBER -	DATE -
APPROVED -	DATE -	DRAWING NUMBER SS40T	SHT 1 OF 1

LIMITED WARRANTY

(Hydraulically Powered Operators)

Hy-Security Gate Operators warrants all of its manufactured products to the end-user to be free of defects in material and workmanship. The model 111LS is warranted for a period of three years from date of shipment. **All other hydraulic operators are warranted for a period of five years from date of shipment.** Drive wheels for slide gate operators are warranted for a period of two years. Batteries in DC operators and individual replacement parts (that are a design component of the gate operator) are warranted for one year from the date of shipment. Even though included as part of a Hy-Security gate operator, accessories carrying another manufacturers name plate, (unless a design component of the gate operator) shall carry only the warranty of the specific manufacturer.

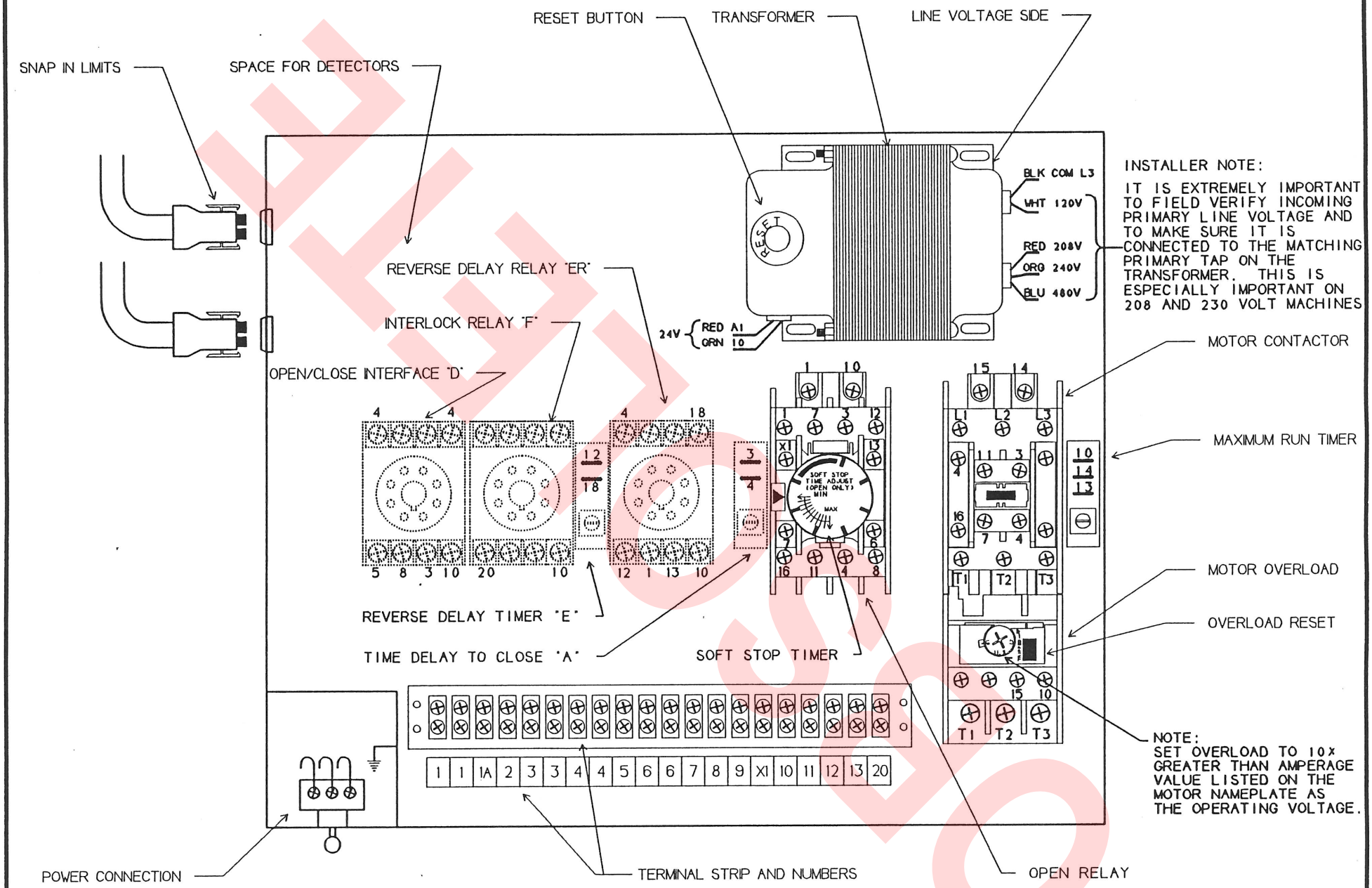
Any modification made to factory products will void the warranty unless the modifications are approved in writing by the factory, in advance of the change. This exclusion does not apply to normal installation of approved accessories and/or safety devices. This warranty shall not apply to equipment which has been improperly installed, subjected to negligence, accident, damage by circumstances beyond Hy-Security Gate Operators' control, or because of improper operation, maintenance, storage or to other than normal use or service.

Labor to install new parts or remove defective parts, travel time, or standby time is specifically excluded from this warranty. Freight (surface or air) and all other incidental costs are NOT covered by this warranty. There are no obligations or liabilities on the part of Hy-Security Gate Operators for consequential damages arising out of, or in connection with, the use or performance of this product. Hy-Security Gate Operators assumes no responsibility for other indirect damages with respect to loss of property, profit or revenue. This Limited Warranty is valid only in the 50 United States, the District of Columbia and the Commonwealth of Puerto Rico. Implied warranties, including those of merchantability and fitness for a particular purpose or application, are limited to one year from date of shipment.

Defective products that are in warranty should be returned to our factory. At our option, we may elect to repair or replace, free of charge, any such parts. An invoice will be sent at the time replacement parts are shipped, and a credit will be issued only after the parts have been returned undamaged and accepted as defective. No warranty credits will be allowed without written permission from the factory, and the return of the defective part, together with a completed Merchandise Return Form (see our Terms of Sale policy for additional details on the return procedure.) Replacement parts shall carry the remainder of the original limited warranty or 90 days, whichever is longer.

This Limited Warranty gives you specific rights. You may have others, which vary from state to state. This Hy-Security Gate Operators' limited warranty is in lieu of all other

warranties expressed or implied. This Limited Warranty supersedes all other warranties.

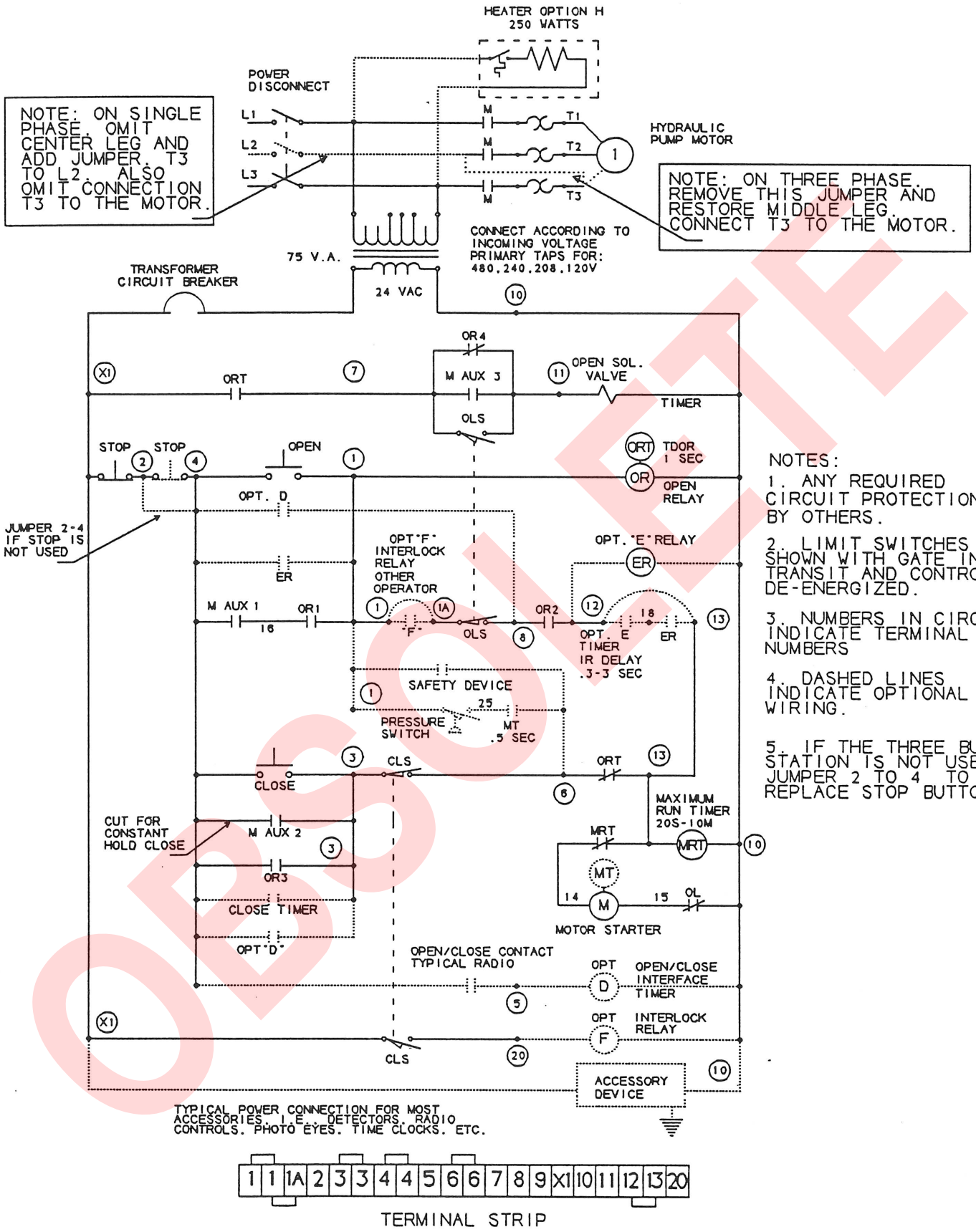


HY-SECURITY GATE OPERATORS

ELECTRICAL COMPONENTS. 222 SS

ELPAN3

DATE 3/4/91 | REV 10/4/91 | DWG E 20A



NOTES:

1. ANY REQUIRED CIRCUIT PROTECTION IS BY OTHERS.
2. LIMIT SWITCHES SHOWN WITH GATE IN TRANSIT AND CONTROLS DE-ENERGIZED.
3. NUMBERS IN CIRCLES INDICATE TERMINAL NUMBERS
4. DASHED LINES INDICATE OPTIONAL WIRING.
5. IF THE THREE BUTTON STATION IS NOT USED. JUMPER 2 TO 4 TO REPLACE STOP BUTTON.

212CRT2

Hy-Security Gate Operators

LOGIC DIAGRAM FOR 222 SS. E. CF. HRG. HTG360 AND HVG OPERATORS

(NOT FOR HTG 316. 333 MSVS & "EX" MODELS) | Date: 10/8/91 | Dwg: E 63A