S450H

24V Hydraulic Swing Gate Operator

FAAC

CONTENTS

⚠   Read this instruction manual before you begin installing the product.

= Information regarding personal safety and proper maintanence of the product.

FAAC Model S450H - Rev: 02 - JUN 2012

Model S450H 24V Hydraulic Swing Gate Operator

1. DESCRIPTION AND TECHNICAL SPECIFICATIONS

The FAAC S450H automated system for swing-leaf gates consists of an electrical pump and an hydraulic piston transmitting the leaf movement, assembled in a single block.

The model with hydraulic locking does not require the installation of electric locks and guarantees that the leaf is mechanically blocked when the motor is not in operation. The model without hydraulic locking always needs one or more electric locks to guarantee that the leaf mechanically locks. **The S450H automated systems have been designed and built to automate swing-leaf gates. Avoid any other use, whatsoever.**
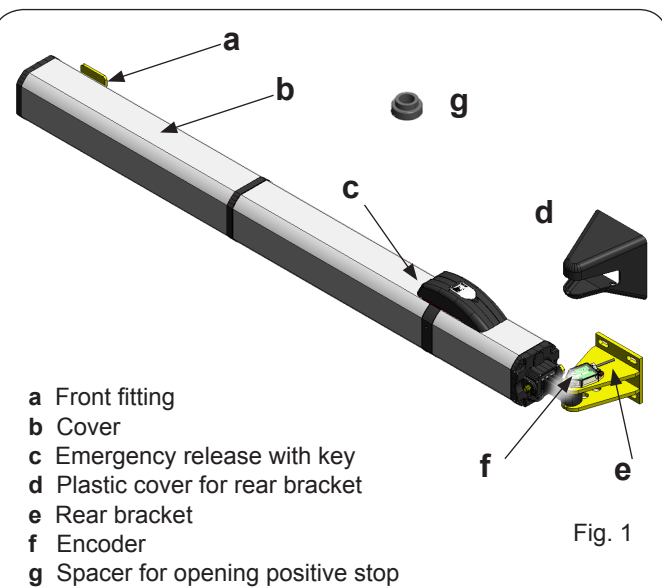

a Front fitting
b Cover
c Emergency release with key
d Plastic cover for rear bracket
e Rear bracket
f Encoder
g Spacer for opening positive stop

Fig. 1

TECHNICAL SPECIFICATIONS	CBAC OPERATOR	SB OPERATOR
Power Supply (VDC)	24 - 36	
Power Consumption (W)	70 (nominal) - 288 (maximum)	
Protection Class	IP 55	
Operating Temperature	-4°F to +113°F	
Hydraulic Lock	Installed	Not installed
Max. Traction/Thrust Force (lbf)	1124	
Maximum leaf length (feet)	14	17
Duty cycle at 68 °F	Continuous	
Class of Operation	Residential, Commercial	
Linear Rod Speed	adjustable up to 1"/sec	
Effective Rod Stroke (inches)	12 1/4	
Operator Weight (lbs)	15.6	15.2

1.1 DIMENSIONS
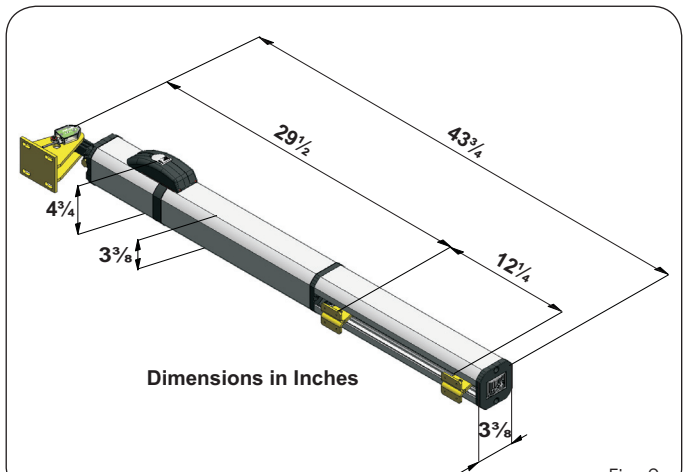

Dimensions in Inches

Fig. 2

2. ELECTRICAL SETUP
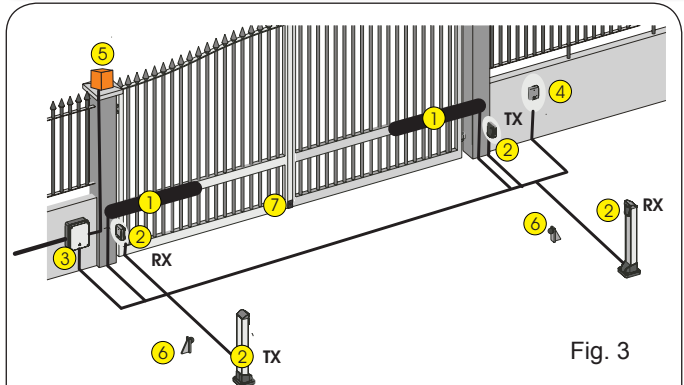

Fig. 3

❶ S450H 2 x AWG 14 (max 30')   AWG 12 (max 50')
           AWG 10 (max 100')
   encoder 2 x AWG 20
❷ RX Photocells (receiver) 4 x AWG 20
❷ TX Photocells (transmitter) 2 x AWG 20
❸ Electronic control unit AC power 3 x AWG 14
❹ Key-operated push-button 2 x AWG 20
❺ Flashing lamp 24 V dc 2 x AWG 16
❻ Opening positive stops*
❼ Electric lock and closing mechanical stop 2 x AWG 14

* Not necessary when using built in positive stops (Fig.1 Ref. g).

3. INSTALLING THE OPERATOR

Ensure that the following conditions have been met to ensure safety and the efficient operation of the automated system:

- The gate structure must be suitable for automation. Verify that it is sufficiently strong and that its dimensions correspond to those stated in the technical specifications.
- Verify the smooth and uniform movement of leaves, without irregular friction during the entire travel.
- Verify the good condition of hinges.
- Remove any locks and bolts.
- Carry out any metalwork operations before installing the automated system.

- *If the gate structure does not allow the stable fixing of the front fitting, create a firm bearing surface in the leaf structure.*
- *It is advisable to grease all fixing pins - Opening and closing stops must always be installed - Pay special attention not to damage the operator rod.*

3.1 INSTALLATION DIMENSIONS

3.1.1 APPLICATION WITH BRACKET FASTENED TO THE COLUMN

ATTENTION: do not cut the rear bracket for any reason.
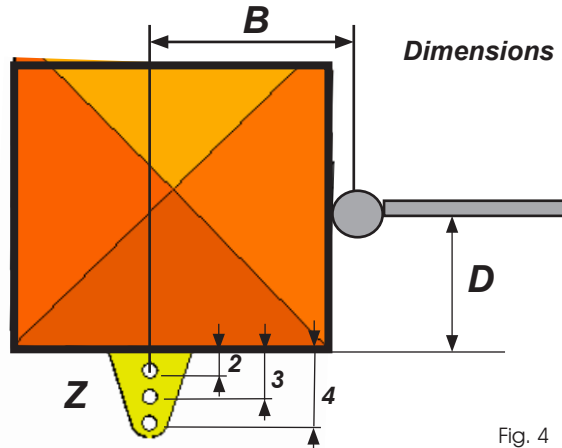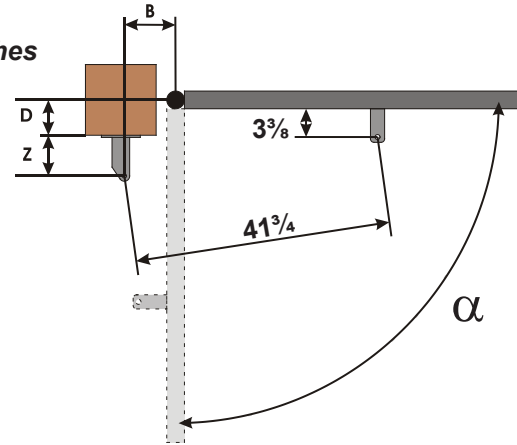Refer to Figures 4 and 5 and Table 1 to determine the installation position of the operator.

Dimensions in Inches

Fig. 4

Fig. 5

Dimensions in Inches

INSTALLATION DIMENSION "B" (SEE FIGURES 4 and 5)

INSTALLATION DIMENSION "D" (SEE FIGURE 5)

| TAB. 1		B	
		XXX	XXXX
D	XXX	120° (3)	120° (3)
	XXX	110° (2)	110° (2)
	XXX	115° (1)	110° (1)
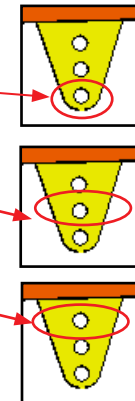
α° (3)　→　(3) HOLE TO BE USED ON THE REAR BRACKET
α° (2)　→　(2)
α° (1)　→　(1)

- INTERSECT THE DIMENSIONS "D" AND "B" TO OBTAIN THE MAXIMUM VALUE OF OPENING ANGLES.
- ATTENTION: USE POSITIVE STOPS IN ORDER NOT TO EXCEED THE MAXIMUM OPENING ANGLES STATED IN TABLE 1 AND GUARANTEE THE CORRECT OPERATION OF THE AUTOMATED SYSTEM.

| TAB. 1		B									
		2.95-3.3	3.35-3.7	3.75-4.0	4.1-4.45	4.5-4.85	4.9-5.25	5.3-5.65	5.7-6.0	6.1-6.45	6.5-6.85
D	0.75-0.95					110° (3)	110° (3)	115° (3)	108° (3)	100° (3)	100° (3)
	1.0-1.3					108° (3)	110° (3)	110° (3)	103° (3)	100° (3)	94° (3)
	1.35-1.7			100° (3)	107° (3)	108° (3)	104° (3)	111° (2)	104° (2)	100° (2)	
	1.75-2.1			100° (3)	105° (3)	106° (3)	100° (3)	106° (2)	100° (2)	96° (2)	
	2.15-2.5		97° (3)	100° (3)	105° (3)	99° (3)	107° (2)	100° (2)	96° (2)	92° (2)	
	2.6-2.9	93° (3)	97° (3)	100° (3)	100° (3)	110° (2)	101° (2)	96° (2)	102° (1)	98° (1)	
	2.95-3.3	90° (3)	95° (3)	100° (3)	105° (2)	102° (2)	111° (1)	105° (1)	98° (1)	94° (1)	
	3.35-3.7	90° (3)	90° (3)	95° (3)	100° (2)	104° (2)	96° (2)	104° (1)	100° (1)	94° (1)	90° (1)
	3.75-4.0	90° (3)	90° (3)	95° (3)	100° (2)	96° (2)	106° (1)	98° (1)	96° (1)	90° (1)	
	4.1-4.45	90° (3)	90° (3)	95° (2)	97° (2)	103° (1)	99° (1)	94° (1)	92° (1)		
	4.5-4.85	90° (3)	90° (2)	95° (2)	98° (1)	100° (1)	94° (1)				
	4.9-5.25	90° (2)	90° (2)	95° (1)	98° (1)	94° (1)					
	5.3-5.65	90° (2)	90° (2)	95° (1)	94° (1)						
	5.7-6.0	90° (1)	90° (1)	94° (1)							
	6.1-6.45	90° (1)	90° (1)								
	6.5-6.75	90° (1)									
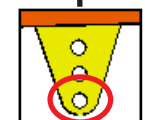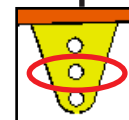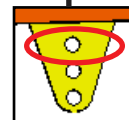
HOLE TO BE USED ON THE REAR BRACKET

3.1.2 APPLICATION WITH BRACKET FASTENED TO SIDE WALL

ATTENTION: do not cut the rear bracket for any reason.
Refer to Figures 4[1] and 5[1] and Table 2 to determine the installation position of the operator.
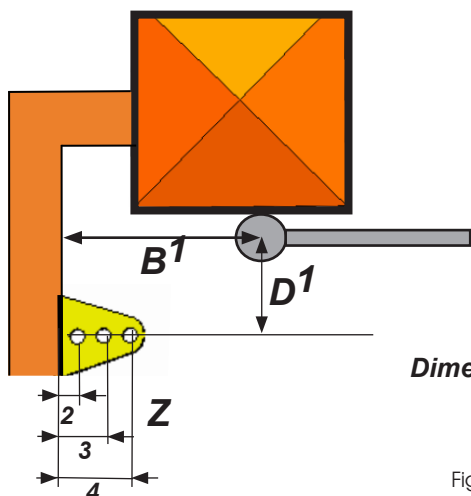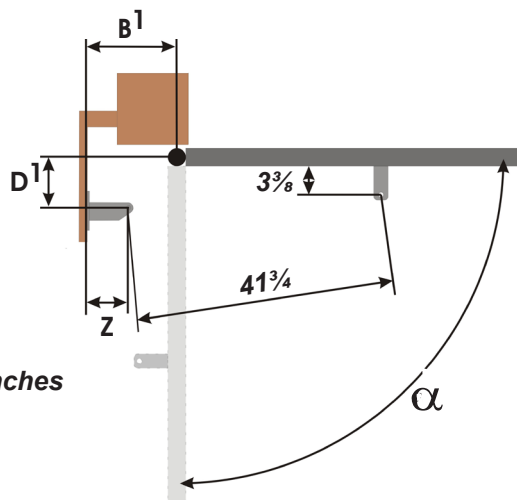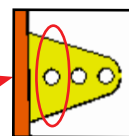

Dimensions in Inches

Fig.4[1]   Fig.5[1]

INSTALLATION DIMENSION " B¹ "
(SEE FIGURE 4¹-5¹)

Dimensions in Inches

TAB.2		B¹	
		XXX	XXXX
D¹	XXX	115° (1)	115° (1)
	XXX	110° (2)	110° (2)
	XXX	100° (3)	100° (3)

α° (1) → **(1)**
α° (2) → **(2)**
α° (3) → **(3)**

HOLE TO BE USED ON THE REAR BRACKET

INSTALLATION DIMENSION " D¹ " (SEE FIGURE 4¹-5¹)
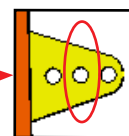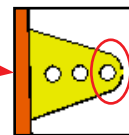
- INTERSECT THE DIMENSIONS " D¹ " AND " B¹ " TO OBTAIN THE MAXIMUM VALUE OF OPENING ANGLES.
- ATTENTION: USE MECHANICAL LIMIT SWITCHES IN ORDER NOT TO EXCEED THE MAXIMUM OPENING ANGLES STATED IN TABLE 2 AND GUARANTEE THE CORRECT OPERATION OF THE AUTOMATED SYSTEM.

TAB. 2	B¹														
D¹	5.0 - 5.25	5.5-5.65	5.7-6.0	6.1-6.45	6.5-6.85	6.85-7.25	7.3-7.65	7.7-8.0	8.1-8.45	8.5-8.8	8.85-9.2	9.25-9.6	9.65-10.05	10.1-10.4	10.45-10.75
4.75-4.85					110°(1)	110°(1)	115°(1)	108°(1)	100°(1)	100°(1)	108°(2)	100°(2)	100°(2)	100°(3)	100°(3)
4.9-5.25					108°(1)	110°(1)	110°(1)	103°(1)	100°(1)	94°(1)	103°(2)	100°(2)	94°(2)	100°(3)	94°(3)
5.25-5.65				100°(1)	107°(1)	108°(1)	104°(1)	100°(1)	96°(1)	92°(1)	100°(2)	96°(2)	92°(2)	96°(3)	92°(3)
5.65-6.0				100°(1)	105°(1)	106°(1)	100°(1)	96°(1)	90°(1)	100°(2)	96°(2)	90°(2)	96°(3)	90°(3)	
6.1-6.45			97°(1)	100°(1)	105°(1)	99°(1)	94°(1)	92°(1)	99°(2)	94°(2)	92°(2)	94°(3)	92°(3)		
6.5-6.85		93°(1)	97°(1)	100°(1)	100°(1)	96°(1)	100°(2)	100°(2)	96°(2)	100°(3)	96°(3)				
6.85-7.20		90°(1)	95°(1)	100°(1)	96°(1)	95°(2)	100°(2)	96°(2)	100°(3)	96°(3)					
7.25-7.65	90°(1)	90°(1)	95°(1)	97°(1)	90°(2)	95°(2)	97°(2)	95°(3)	97°(3)						
7.65-8.0	90°(1)	90°(1)	95°(1)	90°(2)	90°(2)	95°(2)	90°(3)	95°(3)							
8.0-8.45	90°(1)	90°(1)	90°(2)	90°(2)	90°(2)	90°(3)	90°(3)								
8.5-8.8	90°(1)	89°(2)	90°(2)	90°(2)	90°(2)	90°(3)	90°(3)								
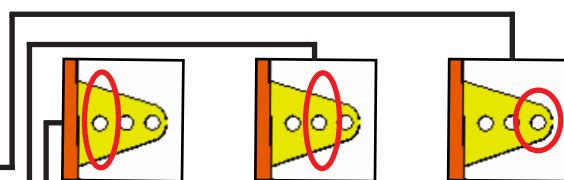
HOLE TO BE USED ON THE REAR BRACKET

3.2   INSTALLING THE OPERATOR

1. Check the perfect level then weld the rear fitting to the pillar or fix it by means of suitable screws, dowels / threaded inserts. Observe the dimensions stated in Tab.1 (never cut the rear fitting; moreover it must be installed with the word "UP" facing up as shown in Figure 6 Ref. a).

INSTALL THE BRACKET WITH THE WORD "UP" FACING UP

a

Fig. 6
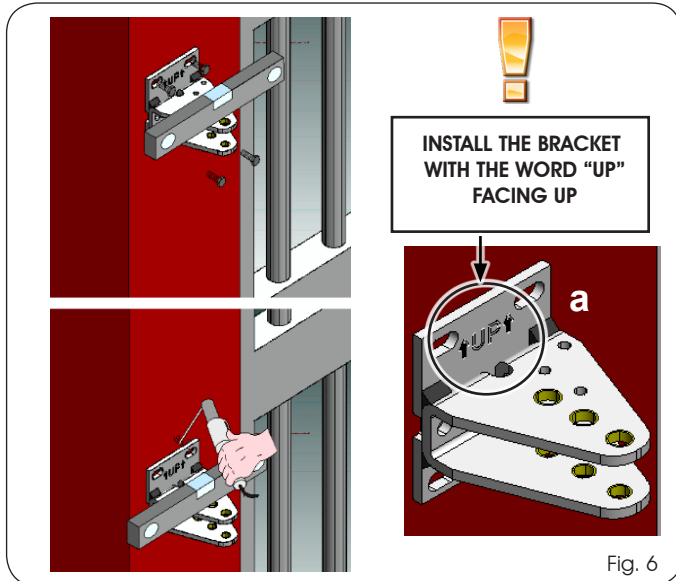
2. While referring to Table 1 (see white or grey boxes), choose the fixing hole on the rear bracket and install the fork (Fig. 7 Ref. a) by assembling it with the special pin supplied (Fig. 7 Ref. b).

b

xx°(1)

xx°(2)

a

xx°(3)

Fig. 7

b

a

c
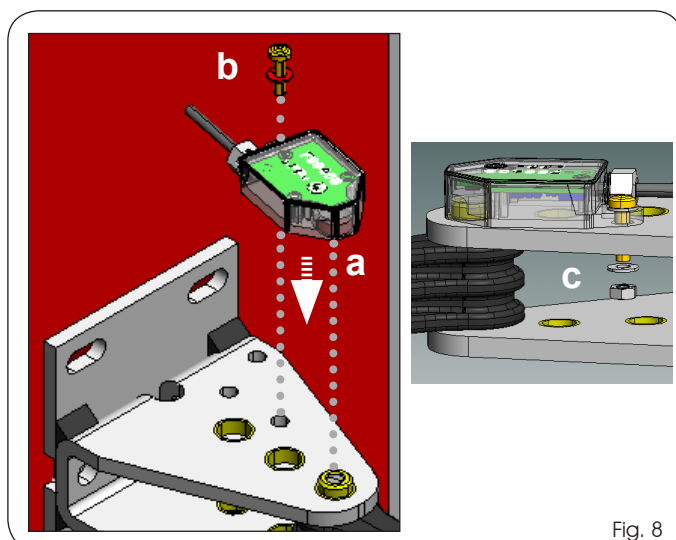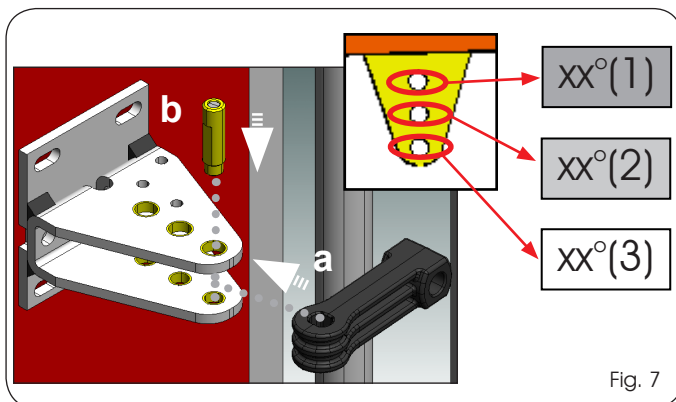
Fig. 8

3. Install the encoder on the rear bracket by correctly engaging it on the pin, then fix it with the screw and nut supplied (Fig. 8 Ref. a, b and c).

4. Slightly press the protection cover on the rear bracket until it locks in position (Fig. 9).

HOLE FOR ENCODER CABLE ROUTING

Fig. 9
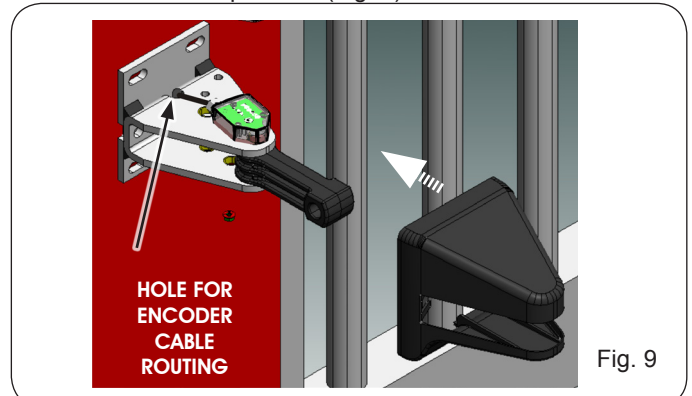
5. Assemble the operator and the rear bracket by means of the pin and nut supplied (Fig. 10 Ref. a - b).

a

b

Fig. 10
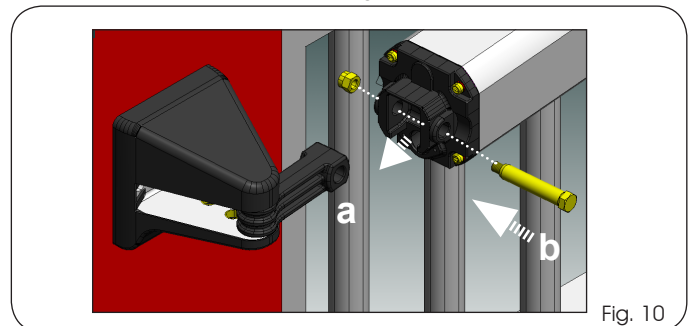
6. Screw the swivel joint halfway into the piston rod (Fig. 11 Ref. a).

7. Unlock the operator according to Section 4.

8. If no external mechanical stop at close is present, you may use the stop point inside the operator (extend the rod completely up to its internal stop point).

9. If an external mechanical stop at close is present, extend the rod completely and then insert it 0.25 in.

10. Close the gate leaf and install the front bracket on the rod as shown in Fig. 11 Ref. b.

b

a

Fig. 11

If an external mechanical stop at close is present, extend the rod completely and then insert it 0.25 inches.
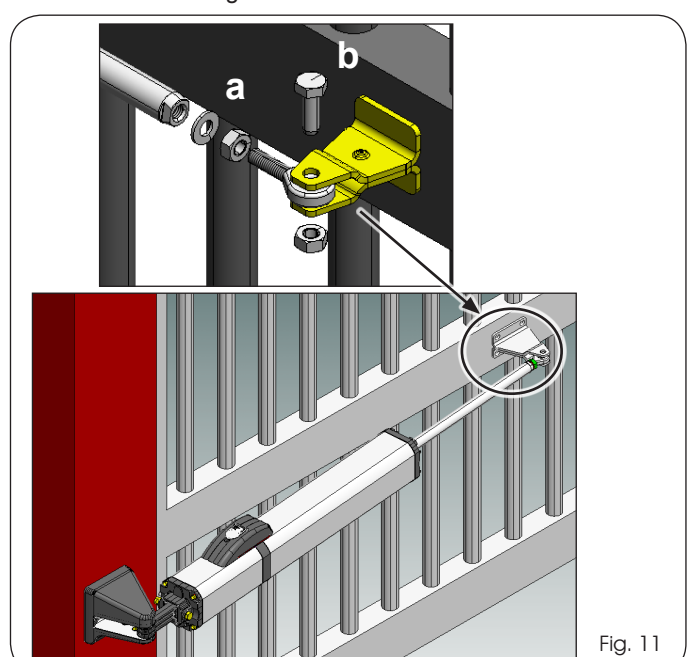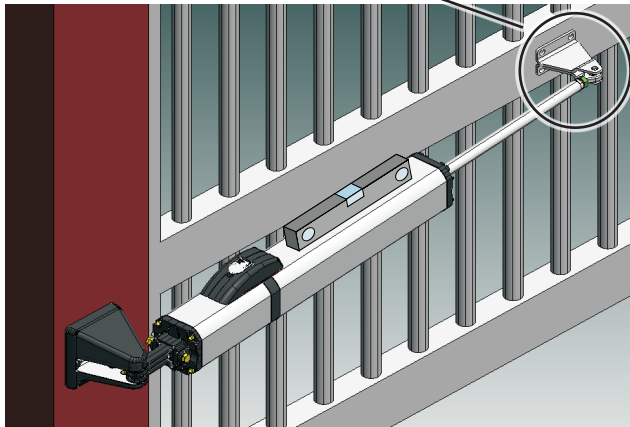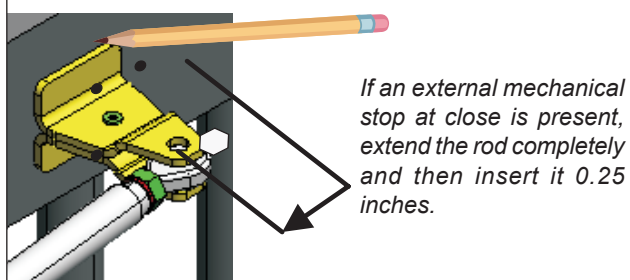
Fig. 12

11. Establish the fixing position of the front bracket on the leaf and mark the fixing points (Fig. 12) (the operator must be perfectly level).

12. Disassemble the operator from the front bracket to avoid damaging the rod when the front fixing is installed on the gate.

13 Weld the front bracket directly on the leaf or screw it by means of threaded inserts.

14. If an opening mechanical stop on the ground is not installed, spacers can be used (Fig. 1 Ref. 7). Remove the front articulated joint and insert on the rod the number of spacers required to reach the desired opening angle (Fig. 14).
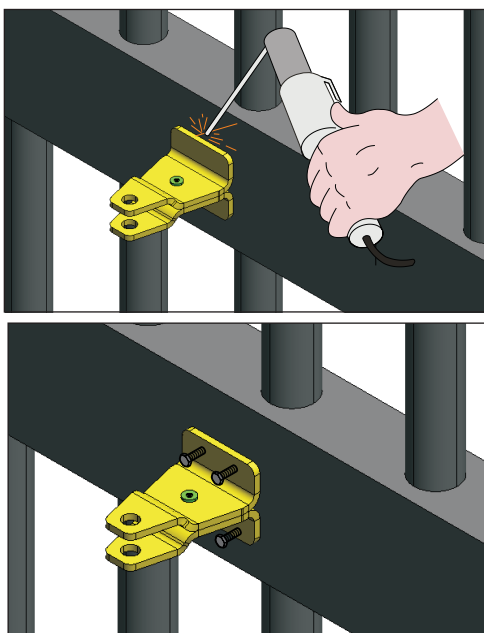
Fig. 13

15. Secure the operator to the front bracket (Fig. 15).

16. Remove the bleed screw (Fig.16 Ref. a) paying special attention to leave the sealing O-Ring in its seat.

17. Install the metallic protection cover as shown in Fig. 16, insert and tighten both tie-rods.

18. Connect the cable to the operator using the two screws supplied, as shown in Fig. 17.

Fig. 14

Fig. 15

a

Fig. 16

MINIMUM BENDING RADIUS 2.5 INCHES

MINIMUM BENDING RADIUS 2.5 INCHES
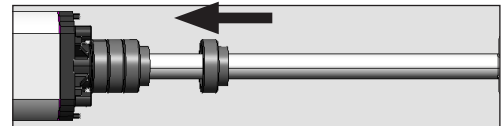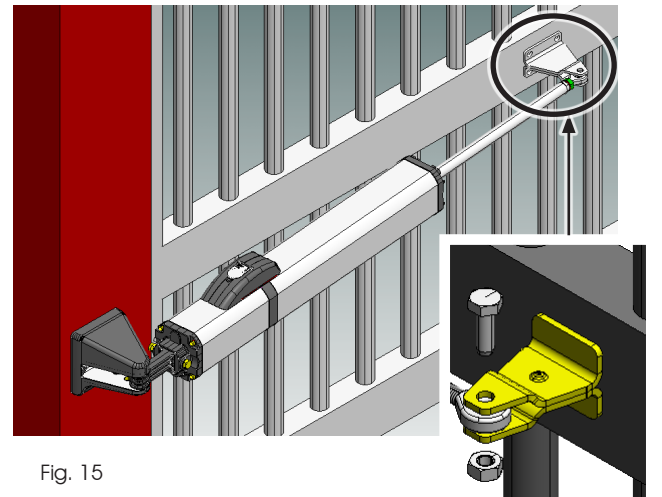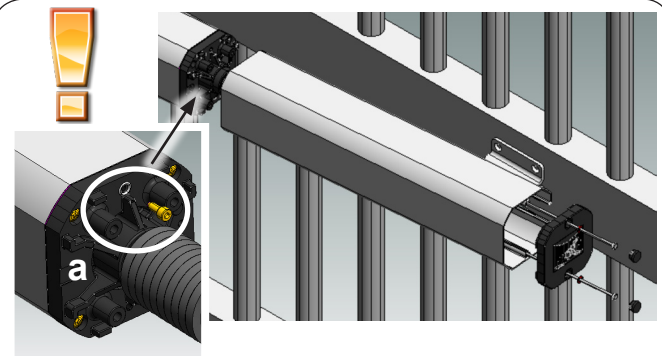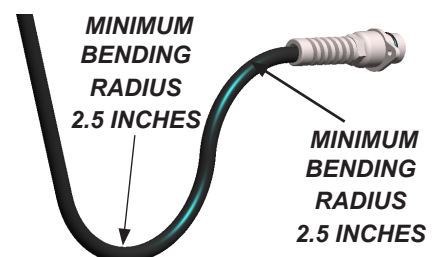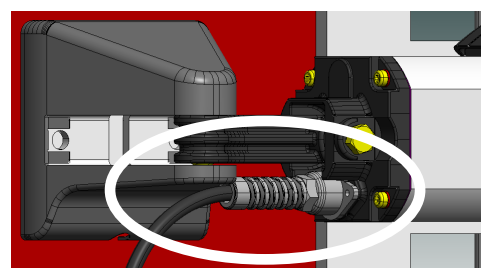
Fig. 17

4.   MANUAL OPERATION

If the gate is to be operated manually because of a power failure or an automated system fault, activate the release device.

1.   Lift the protection lid (Fig. 18, Ref. a) and insert the key in the lock (Fig. 18, Ref. b).

2.   Turn the key 90° clockwise to open the cover and lift it.

3.   Turn the release knob (Fig. 18, Ref. c) counter-clockwise until it stops.

4.   Open or close the leaf manually.

To restore the normal operation of the automated system, perform the above described operations in reverse order.
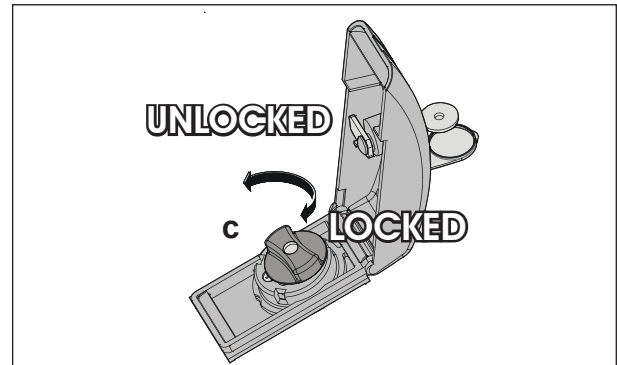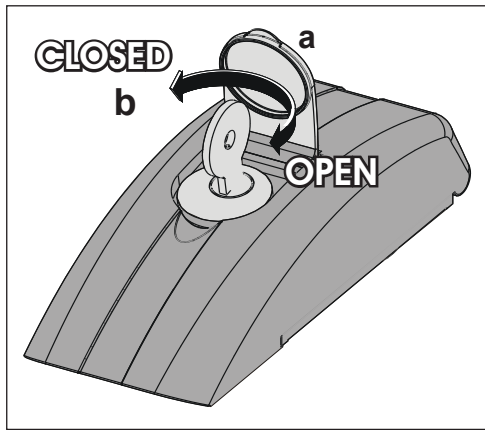
Fig. 18

☞ *The model S450H SB is not equipped with a manual release because, thanks to the particular configuration of the hydraulic distributing flange, you do not need to release the operator to manually move the leaf.*

5.   ELECTRICAL CONNECTION OF THE ENCODER

The S450H operator is equipped with an encoder system. The proper assignment of the leaf to the corresponding encoder depends on the connection of the two encoder wires (leaf 1- encoder 1; leaf 2 - encoder 2).

THE ENCODER WIRES MUST BE CONNECTED TO THE BUS CONNECTOR OF THE E024U CONTROL BOARD.

To verify the proper combination **LEAF 1 - ENCODER 1 - MOTOR 1** and **LEAF 2 - ENCODER 2 - MOTOR 2**, refer to the LEDs on the encoders, as shown in Table 2 and Figures 19, 20 and 21.

To invert the leaf-encoder combination, change the encoder polarity by swapping its wires until the right LEDs are lit.

☞ The LEDs on the encoder also remain visible when the rear bracket protection cover is installed.

DL 1: must always be ON to ensure the right connection between encoder and board.
DL 2: identifies the leaf to which the encoder is installed.

 If the encoder is installed on leaf 1, the DL 2 LED is ON.
  If the encoder is installed on leaf 2, the DL 2 LED is OFF.

DL 3: when blinking at regular intervals, it signals the pulse reading during the leaf movement. When the gate leaf is stationary, DL 3 is OFF.

TABLE 3			
LED	ON	BLINKING	OFF
DL 1	Power supply ON and BUS - board communication	Power supply ON but no BUS communication (e.g.: cabling fault)	Power supply OFF and no BUS communication (e.g.: missing or broken connection)
DL 2	Encoder associated to leaf 1	/	Encoder associated to leaf 2
DL 3	/	Pulse reading during leaf movement	Leaf stationary

Fig. 19

LEAF 1*   LEAF 2

THROUGH THE BRACKET COVER OF LEAF 1, VERIFY THAT THE LEDS DL1 AND DL2 ARE ON WHEN THE MOTOR IS NOT IN OPERATION

LEAF 1

TWO LEDS ON

THROUGH THE BRACKET COVER OF LEAF 2, VERIFY THAT THE LED DL1 IS ON WHEN THE MOTOR IS NOT IN OPERATION

LEAF 2

ONE LED ON

Fig. 20

LEAF 2   LEAF 1*

THROUGH THE BRACKET COVER OF LEAF 2, VERIFY THAT THE LED DL1 IS ON WHEN THE MOTOR IS NOT IN OPERATION

LEAF 2

ONE LED ON

THROUGH THE BRACKET COVER OF LEAF 1, VERIFY THAT THE LEDS DL1 AND DL2 ARE ON WHEN THE MOTOR IS NOT IN OPERATION

LEAF 1

TWO LEDS ON

Fig. 21

* LEAF 1 OPENS FIRST AND CLOSES AFTER LEAF 2. IF LEAF 1 AND LEAF 2 DO NOT OVERLAP, ON THE ELECTRONIC CONTROL BOARD, IF AVAILABLE, THE LEAF DELAY CAN BE SET TO ZERO.

BY SWAPPING THE ENCODER WIRES, THE ENCODER ASSOCIATED TO LEAF 1 CAN BE COUPLED TO LEAF 2 AND VICE VERSA (see example Fig. 22)

ENCODER WIRES SWAPPING

ENCODER LEAF 1 → **ENCODER LEAF 2**
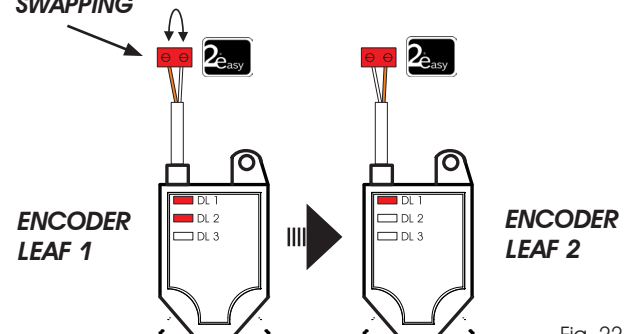
Fig. 22

6.   BLEEDING

1. Loosen the tie-rods (Fig. 23 ref. a) and remove the metal
    protective housing (Fig. 23 ref. b).
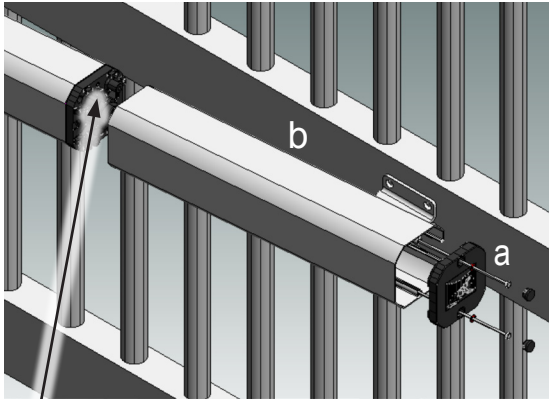
Remove the upper tie-rod and be careful with the O-ring that must remain it its seat.

Fig.23

2. Remove the screw in Fig. 24 ref.d from the front fitting
3. Remove the joint (Fig.24 ref.f) from the operator stem. (Fig. 24 ref. g).
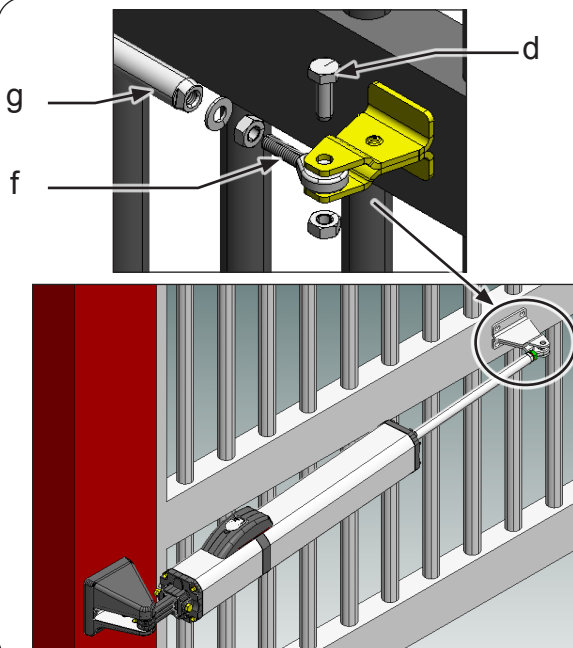
Fig.24

4. Remove all spacers, if present (Fig. 25).
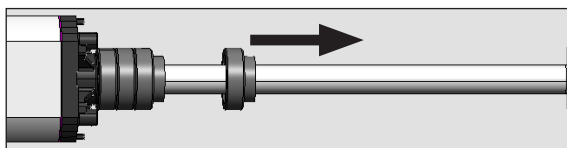
Fig.25
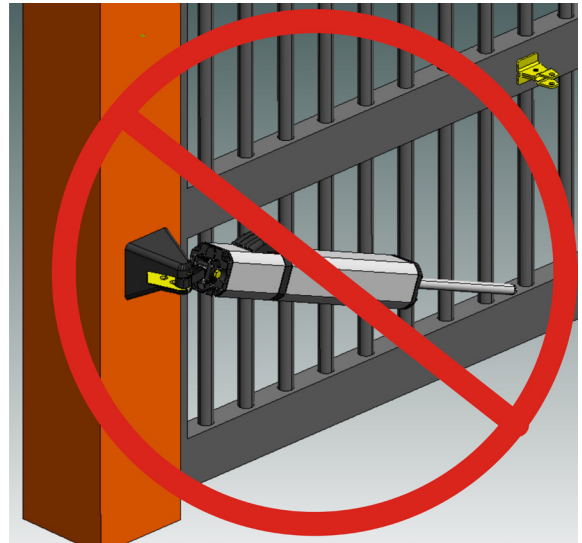
☞ *TO PREVENT OIL LEAKAGE FROM THE BREATHER HOLE, DO NOT TILT THE OPERATOR DOWNWARD*

Fig.26

5. Tilt the operator upward as much as possible. Do not force the rear fitting too much.
6. Power the operator and repeatedly move the stem in and out, over its complete stroke, until reaching a smooth movement (Fig. 27).

Fig.27

7. After bleeding, repeat the operations described above in reverse order.

7.   S450H PARTS DIAGRAMS

FAAC S450H
Hydraulic Operator
Diagram 1
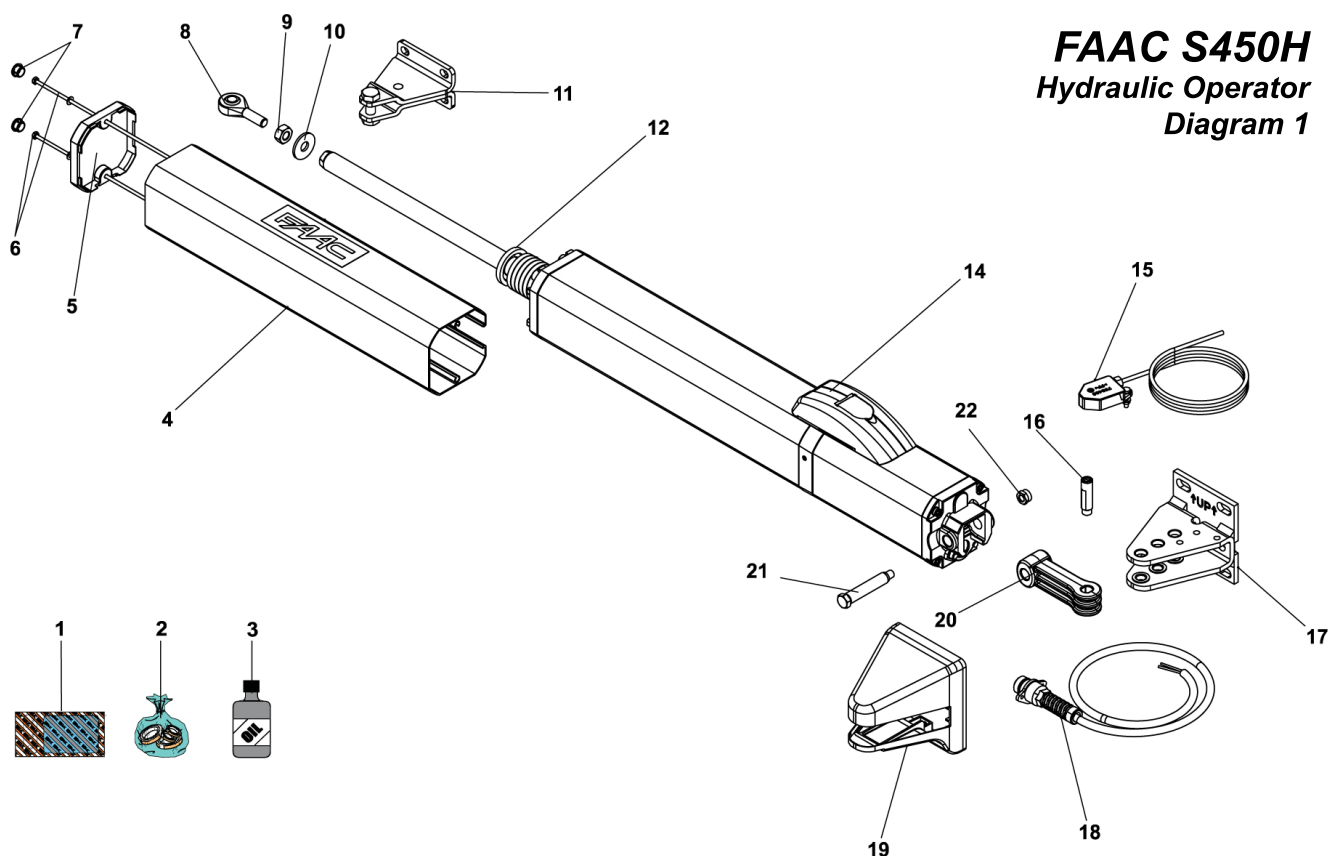
Part	Part Number	Description
01	63001885	S450H SKINPACK
02	63000606	SEAL KIT S450H
03	714017	HYDRAULIC OIL FAAC HP OIL LT. 1
04	63001895	S450H CARTER WITH FAAC LABEL
05	4170015	CARTER 400/87
06	63001905	SCREW FOR CARTER S450H
07	7119405	CAP FOR HOLES COVER CARTER
08	7073035	M10 JOINT
09	702101	HEX. NUT 10 5588 5S Z
10	703027	WASHER 10 6593 CAT. C R40 Z
11	63001945	S450H FRONT FASTENING

Part	Part Number	Description
12	63001975	SPACERS KIT FOR S450H
14	63001985	RELEASE ASSY S450H
15	63001875	S450H ENCODER
16	63001965	S450H SHORT PIN
17	63001915	REAR BRACKET FOR S450H
18	96001935	S450H MOULDED CABLE FEMALE KIT
19	63001925	S450H BRACKET COVERING
20	63001955	REAR EYE TIE ROD FOR S450H
21	7182175	LONG PIN
22	702302	NUT AUT. 8 7474 5S Z

FAAC S450H
Hydraulic Operator
Diagram 2
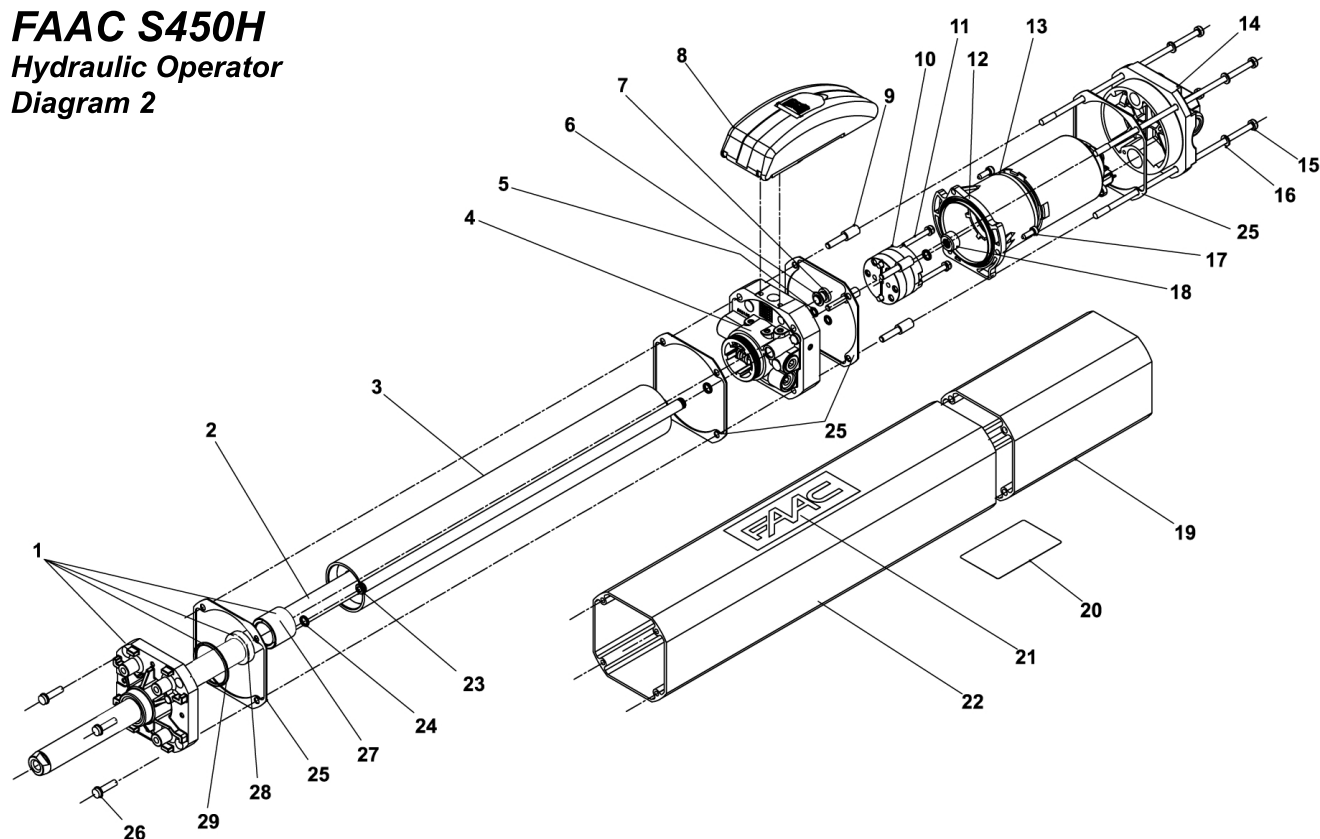
Part	Part Number	Description
01	63000716	S450H FRONT FLANGE
02	63000656	S450H RIVETED PISTON
03	63000646	CYLINDER PISTON S450H
04	63000676	S450H CB GEAR FLANGE
05	7090010015	SEAL OR 4.48X1.78 (2018)
06	63000756	S450H PLUG SEAL
07	63000766	DIN 908 M8X1 PLUG
08	63001985	REALEASE ASSY S450H
09	63000746	S450H TANK SCREW
10	63000696	10010 S09-169 1.5 L/MIN (S450H) PUMP
11	701996	TC M4X30 TORX T20 INOX DE 7
12	63000626	S450H MOTOR COVER KIT
13	63000636	S450H MOTOR ASSEMBLY
14	63000806	S450H REAR FLANGE
15	63000786	S450H TIE ROD
16	703121	WASHER GROWER M5 A2 UNI 1751 (INOX)

Part	Part Number	Description
17	701985	TC M4X12 TORX T20 INOX DE 7
18	63000706	S450H SPLINED JOINT
19	63000776	S450H MOTOR CARTER
20	903122	ETICH.PET+TRANSPARENT ARGENTO 45X75
21	63001865	FAAC STICKER FOR S450H
22	63000736	S450H TANK
23	63000726	RETRACT TUBE S450H
24	7090815	-
25	63000013	S450H GASKET D80 SPARE PART
26	701829	SCREW TC TORX M5X20 INOX WITH GROWER
27	708009	BUSHING 20X28X24.5 20E7
28	63000315	EU 2028/SP-Z20 SEAL
29	7090350025	GASKET OR 34.60X2.62 (3137)

FAAC S450H
Hydraulic Operator
Diagram 3: Distribution Flange
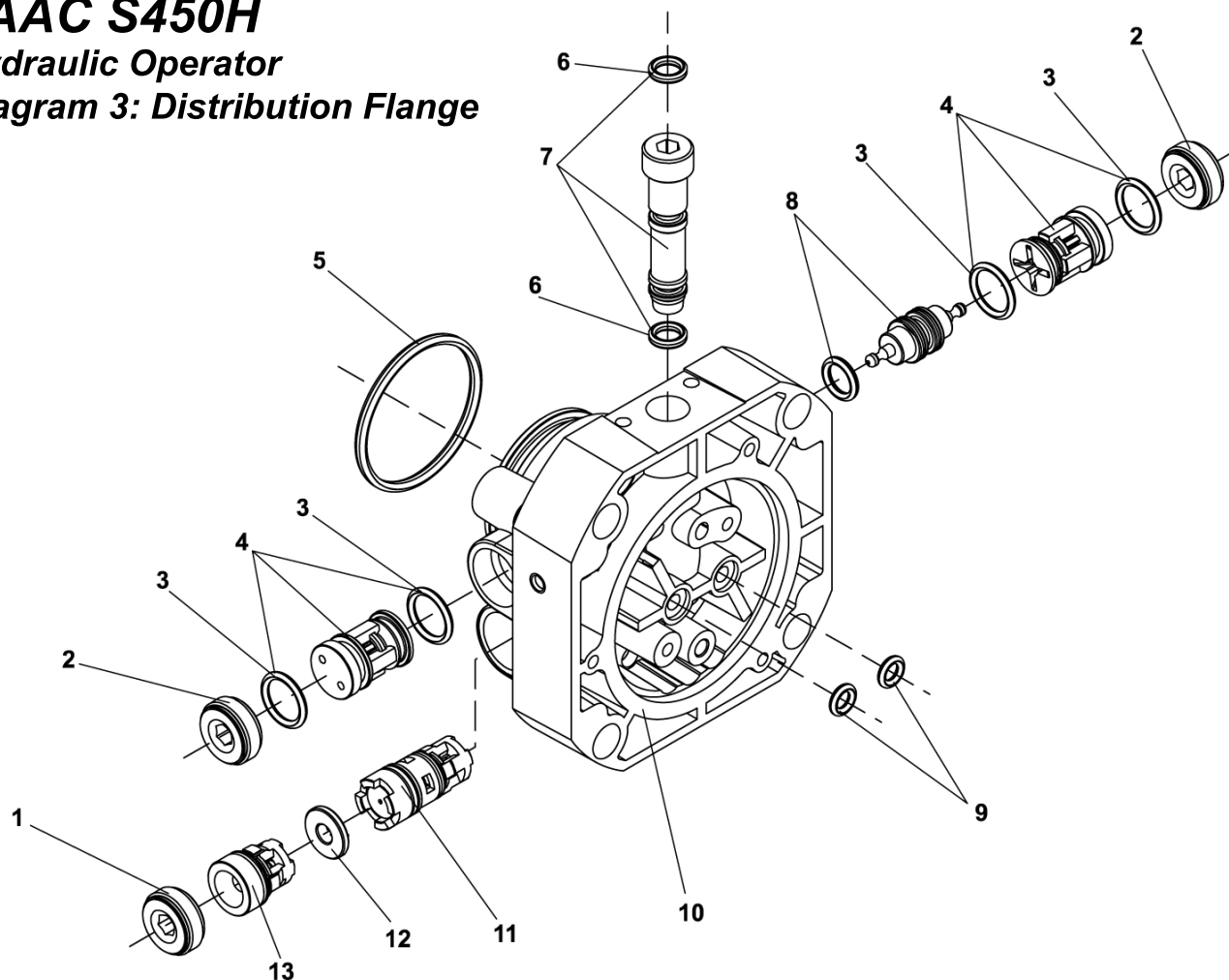
Part	Part Number	Description
01	63000816	VALVE RING NUT
02	63000816	VALVE RING NUT
03	7090050015	GASKET OR 10.82X1.78 (2043)
04	4404085	STOP VALVE IN ZAMACK
05	7090350025	GASKET OR 34.60X2.62 (3137)
06	7090280015	GASKET OR 5.28X1.78 (2021)
07	63000826	RELEASE VALVE S450H

Part	Part Number	Description
08	4180315	593-595 COMMUTATING PISTON
09	7090010015	SEAL OR 4.48X1.78 (2018)
10	63000676	S450H CB GEAR FLANGE
11	4404095	2006 SUCTION VALVE
12	63000836	VALVE SPACER FOR S450H
13	4404065	SUCTION VALVE WITH SPRING

FAAC S450H
Hydraulic Operator
Diagram 4: Emergency Lock Release
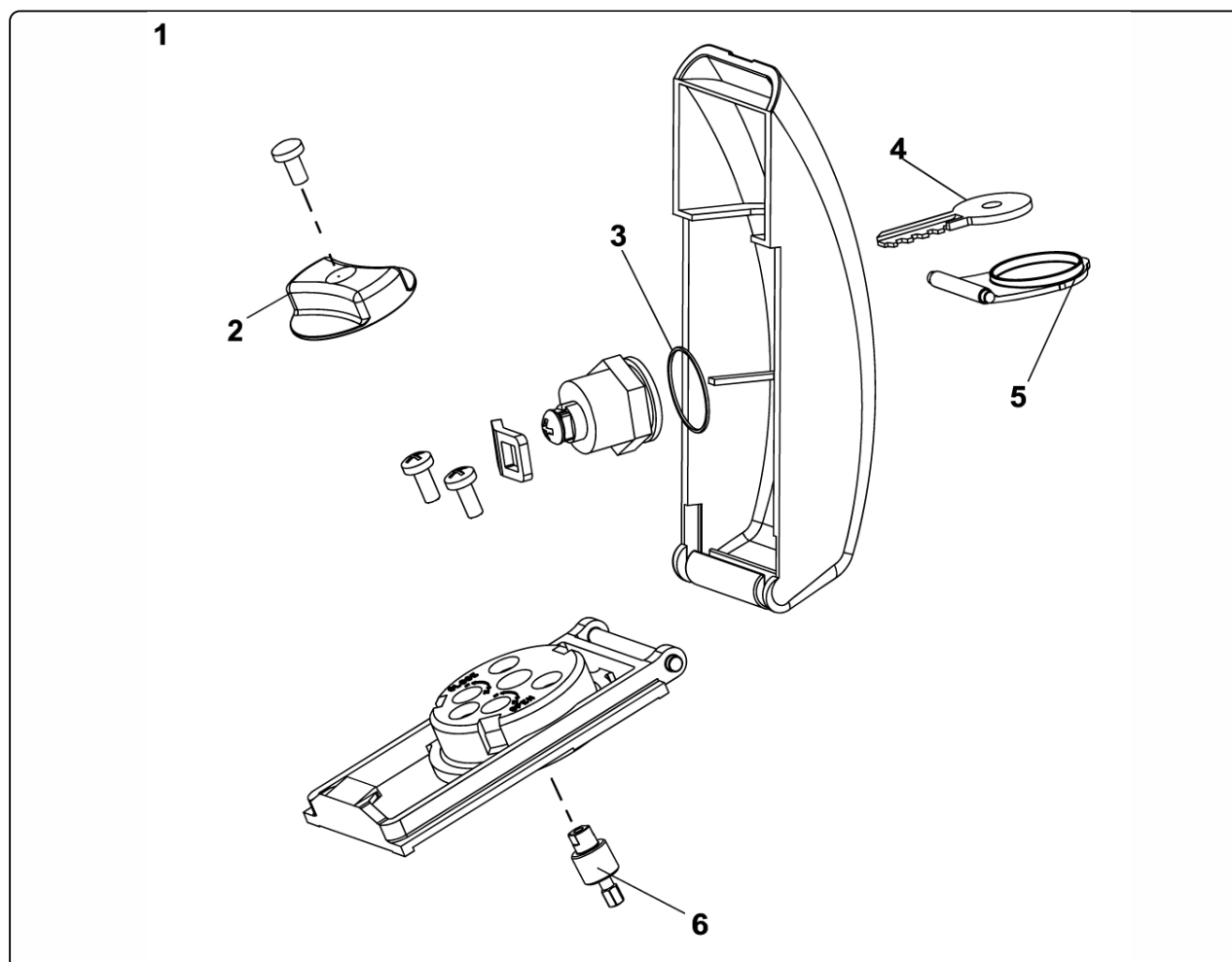
Part	Part Number	Description
01	63001985	RELEASE ASSY S450H
02	7290445	2005 RELEASE HAND GRIP
03	7090895	21X2 N70B200V SEAL
04	7131005	KEY MOD. 3889.0913
05	7275275	CAP FOR LOCK 400/422 RELEASE 2005
06	63000666	S450H RELEASE PIN

1. E024U CONTROL BOARD DESCRIPTION & CHARACTERISTICS
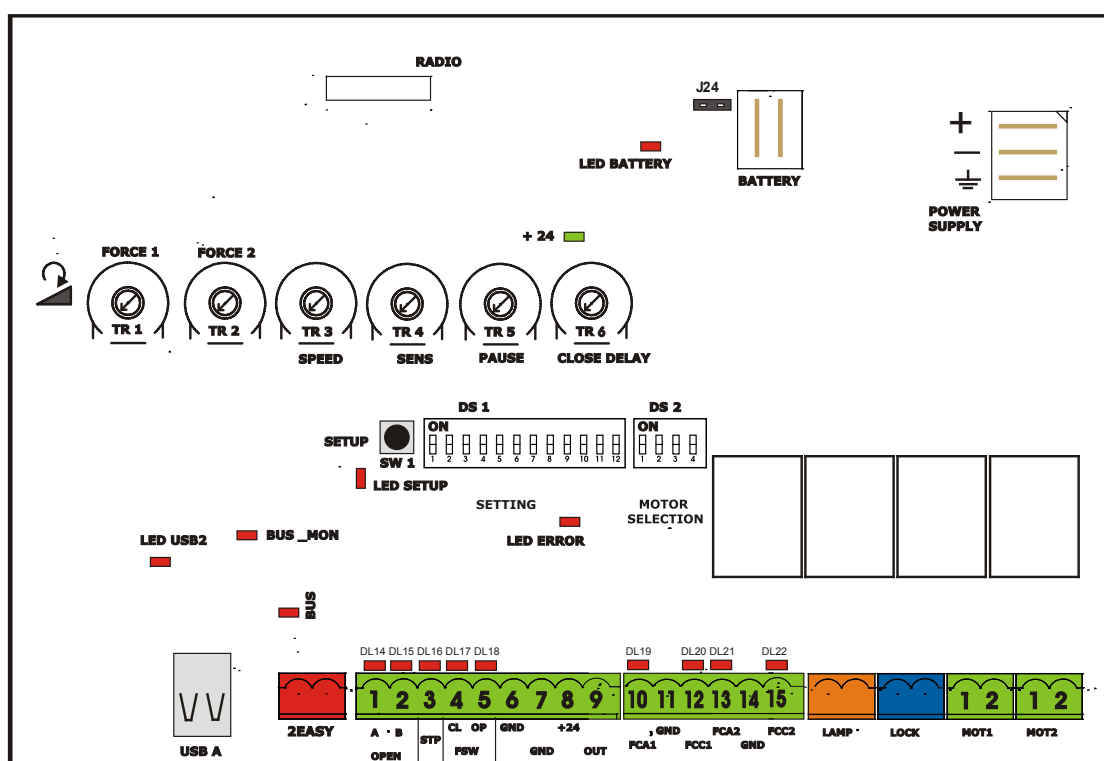
Fig. A1

1.1 TECHNICAL SPECIFICATIONS

Main power supply	115/230 V~ 50/60 Hz switchable
Secondary power supply	24 Vdc - 16 A max. (min. 20 Vdc. - max. 36 Vdc.)
Power consumption	stand-by = 4W max. = 400 W
Max load per motor	7 A
Accessory power supply	24 Vdc - 500 mA
Battery charge current	150 mA
Operating temperature	-4 °F.........+131 °F
Protection fuses	All self-resetting
Main power fuse	2.5 A Timed
Operating Logics	E, A, S, EP, AP, SP, B, C
Operating time out	10 min.
Pause time	Programmable (0 to 4 min) with trimmer
Motor force, speed, obstacle sensitivity, closing delay	Programmable with dedicated trimmer
Connector inputs	Power supply, Battery, Radio receiver, USB
Terminal strip inputs	Encoder, Open A, OpenB, Stop, Open safety fotocell, Closing safety fotocell, Limit switches
Terminal strip outputs	Lamp, Buzzer, Motors, Lock, Programmable OUT, accessory power supply
Programming	With trimmers, dipswitches and pushbutton

1.2 LAYOUT AND COMPONENTS

RADIO	Connector for the radio receiver
BATTERY	Connector for the backup battery
J24	Jumper to disable battery charging (With the jumper present the battery is charged)
POWER SUPPLY	DC Power supply input
TR1 to TR6	Programming Trimmers
+24 LED	DC power indicator
SW1 - SETUP	Pushbutton for automatic setup
DS1 - DS2	Programming dipswitches
LED ERROR	Troubleshooting indicator
USB A	USB connection for software upgrade

1.3 RADIO CONNECTION

On the radio connector it's possible to plug in receivers RP and RP2. With a single channel radio RP it will be possible to activate only the OPEN A input, with a dual channel radio RP2 it will be possible to activate both OPEN A and OPEN B inputs. Plug in the radio board with the component side towards the internal part of the board.

⚠️

Make sure you insert or disconnect the board ONLY with the power off.

2.   INPUT / OUTPUT DESCRIPTION
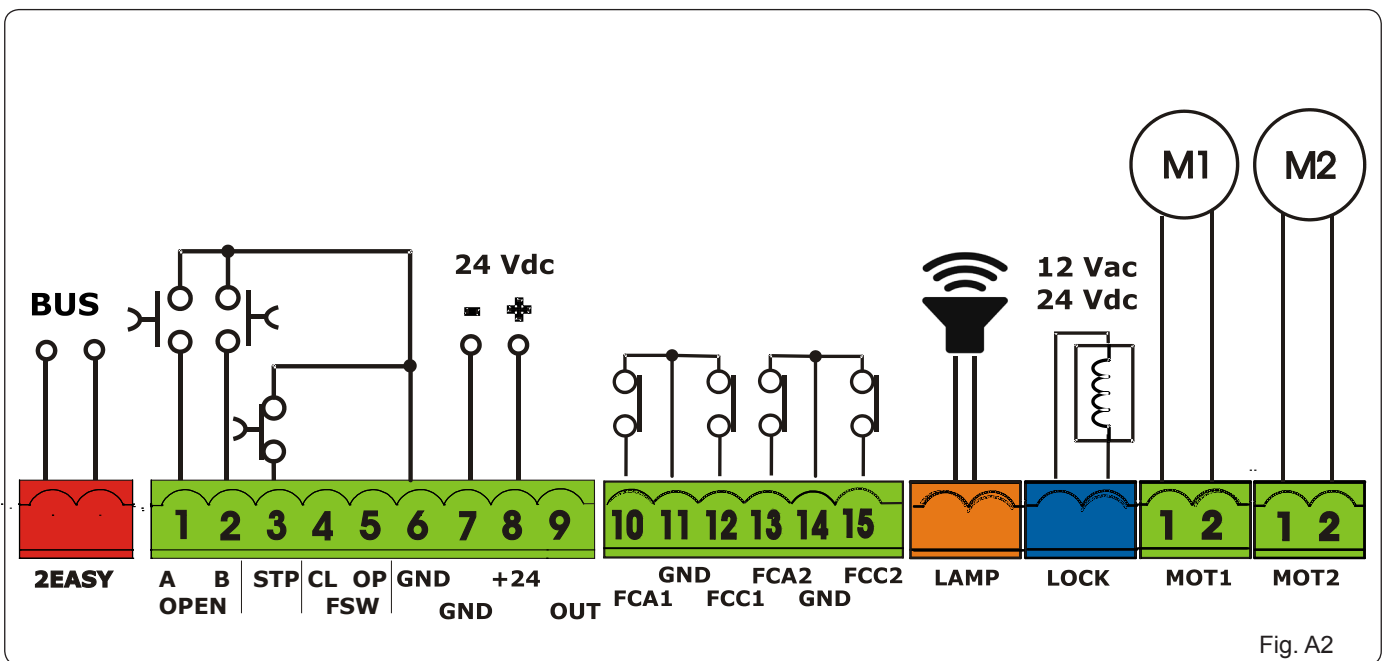
Fig. A2

PIN	LABEL	FUNCTION
2 EASY	2 EASY	Input for bus 2easy accessories (encoder)
1	OPEN A	N.O. Contact for total opening command
2	OPEN B / CLOSE	OPEN B: N.O. Contact for opening of leaf 1 only (with only one leaf the opening stops at 50% of traveling) CLOSE (LOGIC B-C): N.O. Contact for closing command
3	STOP	N.C. Contact for stop command
4	FSW CL	N.C. Contact for closing safety
5	FSW OP	N.C. Contact for opening safety
6	GND (-)	24 Vdc negative
7	GND (-)	24 Vdc negative
8	+ 24	24 Vdc positive
9	OUT (-)	Programmable output (See: DS1 SW 11-12)
10	FCA 1	Open limit switch Motor 1
11	GND (-)	24 Vdc negative
12	FCC 1	Close limit switch Motor 1
13	FCA 2	Open limit switch Motor 2
14	GND (-)	24 Vdc negative
15	FCC2	Close limit switch Motor 2
LAMP	LAMP	Audio alarm output (DS1 SW11=OFF) Output for flashing light 24Vdc 15W max (DS1 SW11=ON)
LOCK	LOCK	Output for electrical lock, max 5A pulse (DS2 - SW 4=OFF) 12 Vac / 24Vdc Always ON (maglock): max 1 A (DS2 - SW 4=ON) 24 Vdc
MOT1	MOT 1	Motor 1 output (first moving motor)
MOT2	MOT 2	Motor 2 output (second moving motor)
USB A	USB	Firmware upgrade input

3. PHOTOCELLS CONNECTIONS

How to connect Normally Open contacts.
(Connect them in parallel)

Fig. A3

How to connect Normally Close contacts.
(Connect them in series)

Fig. A4
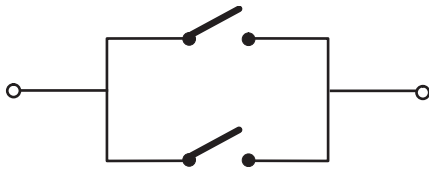
The E024U board allows the connection of several safety devices (for example photocells). With photocells you can activate the FAILSAFE function, which, before each movement of the operator, tests each fotocells. In case the test fails the movement is inhibited. To activate this function set to ON the dip-switch N. 11 and 12 of DS1, and connect the negative of the transmitter to the OUT pin (No.9).

The photocells must be connected depending on which area they must protect. (See Fig. A5)

Closing Safety D : These photocells protect the area covered by the gate during the closing movement. They have no effect during the opening movement.

Opening Safety B-C : These photocells protect the area covered by the gate during the opening movement. They have no effect during the closing movement.

Opening/Closing Safety A : These photocells protect the area covered by the gate both during the opening and the closing movements.

Fig. A5

3.1 CONNECTIONS TO NORMALLY CLOSE (N.C.) PHOTOCELLS

Connection of a pair of closing photocells and a pair of opening/closing photocells

FSW
STP | CL OP |

1 2 3 4 5 6 7 8

6 GND

RX= Photocell Receiver
TX= Ptotocell Transmitter
CL= Closing
OP= Opening

RX CL
1
2
3
4 −
5 +

6 −
8 +

TX CL
− 1
+ 2

− 6
+ 8

TX OP/CL
1 −
2 +

6 −
8 +

RX OP/CL
1
2
3
− 4
+ 5

− 6
+ 8

Fig. A6

☞ To use the FAIL-SAFE mode connect the negative power supply of the transmitters to OUT (pin 9), and set dip-switch 11 and 12 to ON on DS1

FAAC   FAAC

Connection of two pairs of closing photocells

FSW
STP | CL OP

1 2 3 4 5 6 7 8

6 GND

Other optional safety devices to connect in series

RX CL1   TX CL1

6 –
8 +

TX CL2   RX CL2

6 –
8 +

RX= Photocell Receiver
TX= Ptotocell Transmitter
CL= Closing
OP= Opening

☞ To use the FAIL-SAFE mode connect the negative power supply of the transmitters to OUT (pin 9), and set dip-switch 11 and 12 to ON on DS1

☞ When using the FAIL-SAFE mode also the safety inputs not used (FSW CL , FSW OP) must be connected to OUT (pin No. 9)

Fig. A7

Connection of a pair of closing photocells, a pair of opening photcells and a pair of opening/closing photocells

FSW
STP | CL OP

1 2 3 4 5 6 7 8

6 GND

RX CL   TX CL

6 –
8 +

TX OP/CL   RX OP/CL

6 –
8 +

RX= Photocell Receiver
TX= Ptotocell Transmitter
CL= Closing
OP= Opening

RX OP   TX OP

6 –
8 +

☞ To use the FAIL-SAFE mode connect the negative power supply of the transmitters to OUT (pin 9), and set dip-switch 11 and 12 to ON on DS1

Fig. A8

Connection of a pair of closing photocells and a pair of opening photocells

FSW
STP | CL OP |

1 2 3 4 5 6 7 8

6 GND

TX CL

1
2
3
4 −
5 +

6
8 − +

RX CL

− 1
+ 2

− 6
+ 8

RX= Photocell Receiver
TX= Ptotocell Transmitter
CL= Closing
OP= Opening

TX OP

1 −
2 +

6
8 − +

RX OP

1
2
3
− 4
+ 5

− 6
+ 8

☞ To use the FAIL-SAFE mode connect the negative power supply of the transmitters to OUT (pin 9), and set dip-switch 11 and 12 to ON on DS1

Fig. A9

Connection of no safety or stop devices
(NOT RECOMMENDED)

FSW
STP | CL OP |

1 2 3 4 5 6 7 8

Fig. A10

Connection of a generic closing safety device and a generic open safety device

FSW
STP | CL OP |

1 2 3 4 5 6 7 8

GND
6

Fig. A11

Connection of one pair of opening photocells

FSW
STP | CL OP |

2 3 4 5 6 7 8

GND
6

Other optional safety devices to connect in series

RX OP

1
2
3
4 −
5 +

6
8 − +

TX OP

1 −
2 +

− 6
+ 8

☞ To use the FAIL-SAFE mode connect the negative power supply of the transmitters to OUT (pin 9), and set dip-switch 11 and 12 to ON on DS1

☞ When using the FAIL-SAFE mode also the safety inputs not used (FSW CL , FSW OP) must be connected to OUT (pin No. 9)

Fig. A12

4. PROGRAMMING

4.1 DIP SWITCH DS1 SETTINGS FOR OPERATING LOGIC

OPERATING LOGIC

DS 1: SW 1 - SW 2 - SW 3

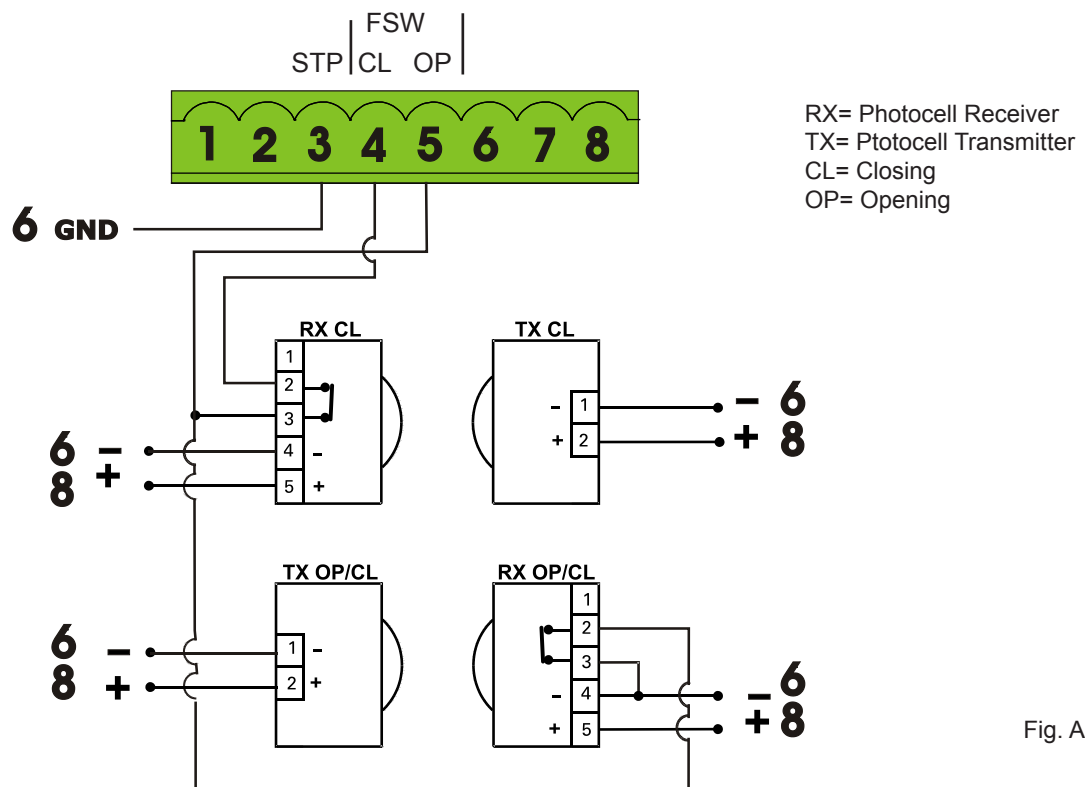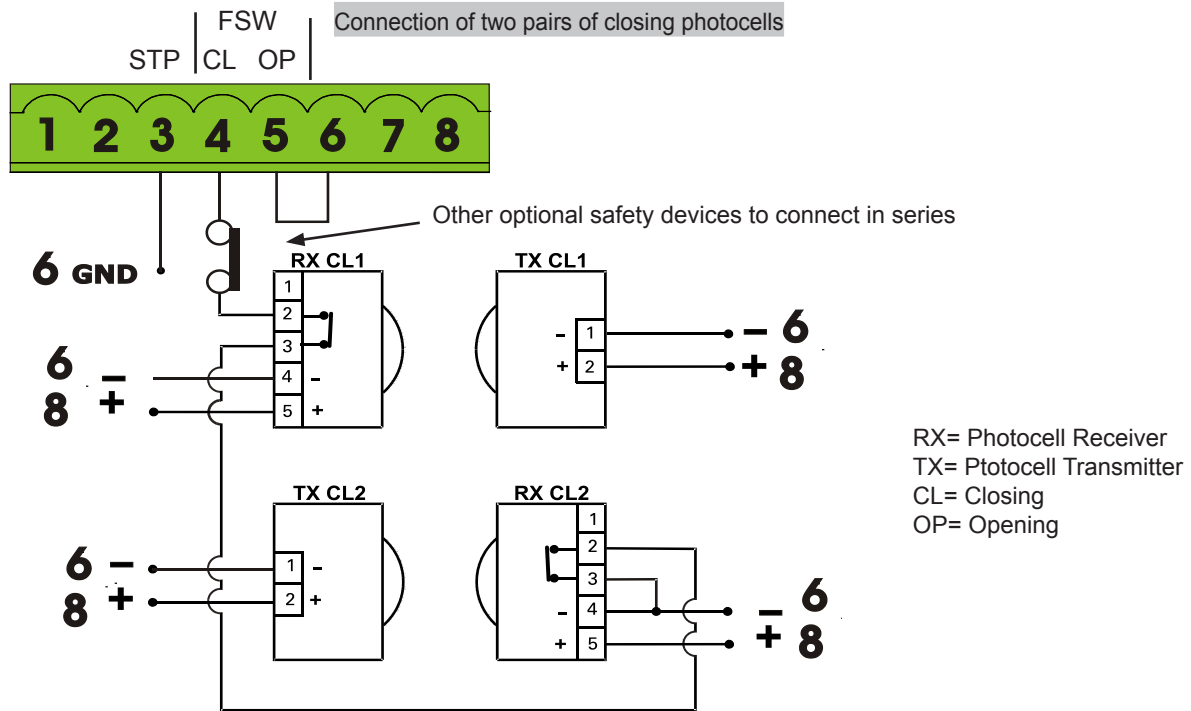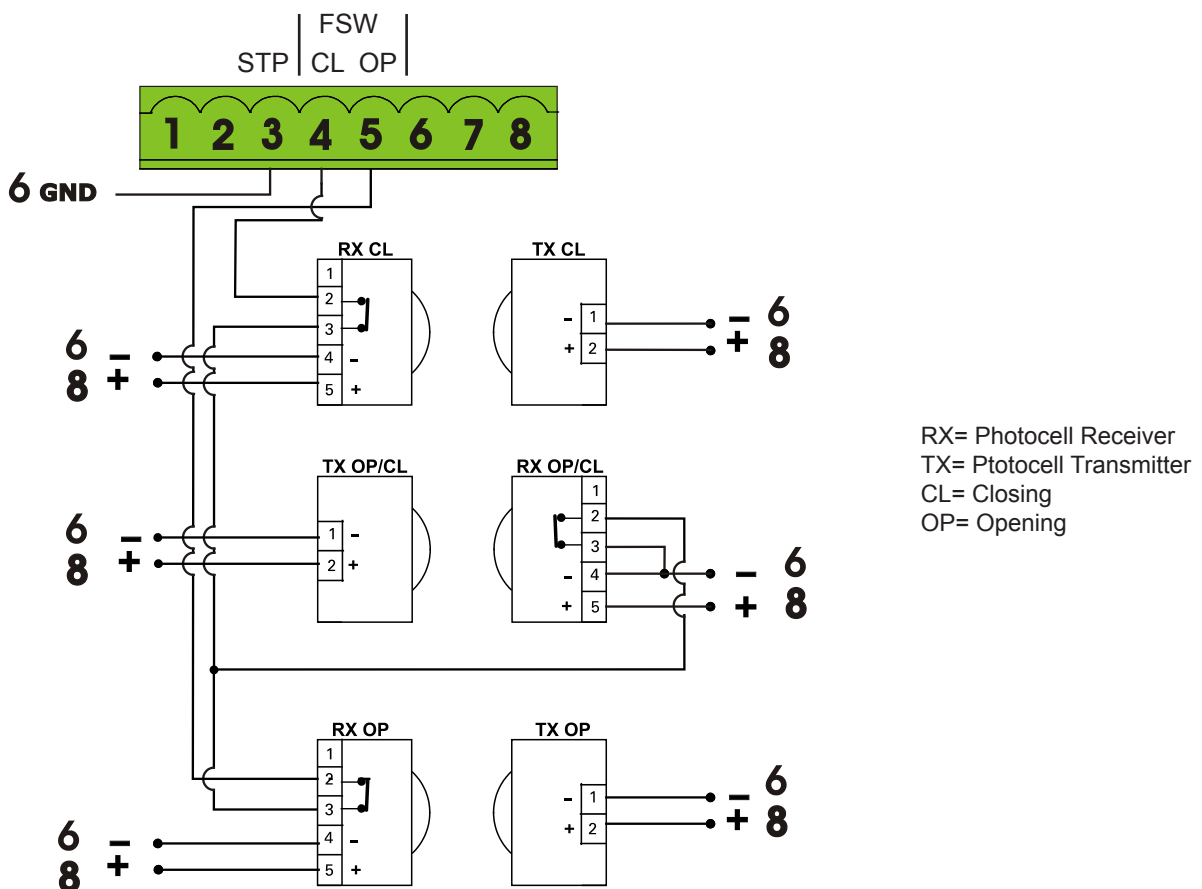| LOGIC	SW 1	SW 2	SW 3	PAUSE TIME	DESCRIPTION
E (default) Semiautomatic	OFF	OFF	OFF	NO	One command opens, the next one closes. A command during opening stops the gate
A Automatic	ON	ON	ON	0 - 4 min	One command opens, waits for the pause time an then closes automatically
S Security	OFF	OFF	ON	0-4 min	One command opens, waits for the pause time and then closes automatically. If the closing safety is activated or another command is given during the pause time it closes
EP Semiautomatic step by step	OFF	ON	OFF	NO	One command opens, the next one closes. During the movement a command stops the gate
AP Automatic step by step	OFF	ON	ON	0-4 min	One command opens, waits for the pause time and then closes automatically. A command during the pause time holds the gate open
SP Security step by step	ON	OFF	OFF	0-4 min	One command opens, waits for the pause time and then closes automatically. If the closing safety is activated during pause time the gate closes in 5 s. A command during pause time holds open the gate
B Manned Pulsed	ON	OFF	ON	NO	An open A command opens the gate, an open B command closes the gate
C Manned Constant	ON	ON	OFF	NO	Holding open A active opens the gate, holding Open B active closes the gate

☞   For more details on the operating logics please refer to Chapter 12 - Function Logics

4.2 ADJUSTING TRIMMERS
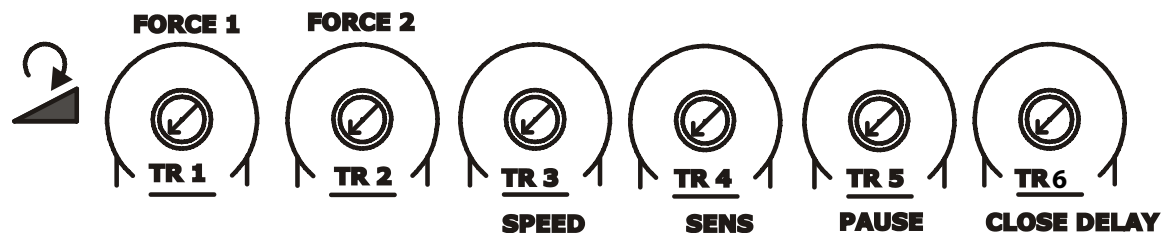
TR1 – FORCE ADJUSTMENT MOTOR 1
Turn clockwise to increase the opening and closing force

TR 2 – FORCE ADJUSTEMENT MOTOR 2
Turn clockwise to increase the opening and closing force

TR 3 – SPEED ADJUSTMENT FOR MOTOR1 AND MOTOR 2
Turn clockwise to increase the opening and closing speed

TR 4 – SENSITIVITY ADJUSTEMENT FOR OBSTACLE DETECTION FOR MOTOR 1 AND MOTOR 2
Turn clockwise to increase the sensitivity for obstacle detection.

With this trimmer you can adjust the reaction time for the board to invert the motion of the gate in case of obstacle detection, or the complete stop in case the board is in the positive stop detection zone.
If an obstacle is detected during the gate movement the board will invert the motor rotation until the gate goes back to the original starting position. If in the successive movement an obstacle is detected again the board will be put in alarm mode and won't take any more commands until the STOP input is activated (Alarm Reset) or power is cycled

TR 5 – PAUSE TIME ADJUSTMENT (0 - 4 min.)
Turn clockwise to increase the pause time.
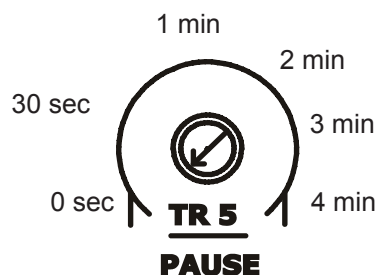
Dip switches DS1: 1 to 3 need to be set for an operating mode with PAUSE time for this adjustment to have any effect

TR6 - CLOSING DELAY OF LEAF 1 OVER LEAF 2 ADJUSTMENT (0 - 15 sec)
Turn clockwise to increase the delay

4.3 DIP SWITCH DS1 SETTINGS FOR BOARD SETUP

BOARD SETUP
DS 1: SW 4 to SW 12

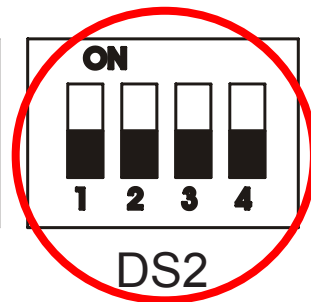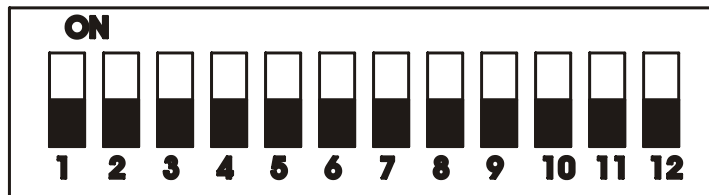|		
OPENING DELAY	SW 4	The opening of leaf 2 is delayed after the opening of leaf 1. This is to avoid that the gate's leafs interfere with each other during the initial part of the movement. In case there is only one leaf is has no effect.
0 sec (default)	OFF	
2 sec	ON	
REVERSE AND LAST STROKE	SW 5	If active, before opening, while the gate is closed, the motors thrust to close for 2 s to facilitate the release of the electric lock. At closing the motors are activated for a final stroke after slowdown to facilitate locking of the electric lock.
inactive (default)	OFF	
active	ON	
MAX THRUST AT STARTUP	SW 6	With this fuction active the motors work at maximum force at startup (regardless of the force setting) during the initial phase of the movement. Useful for heavy leafs
inactive (default)	OFF	
active for 3 sec	ON	
AUTOMATIC OPENING IN CASE OF POWER FAILURE	SW 7	If active and with the optional backup battery installed, the board will open the gate after one minute from the power failure and keep it open. Within the minute wait it's always possible to open and close the gate with a command. If the logic used has a pause time the board will close the gate when the power comes back.
inactive (default)	OFF	
active	ON	
CLOSING SAFETY LOGIC	SW 8	With this function you can choose the behaviour of the closing safety. With SW8 OFF the gate movement will be reversed as soon as the safety is active, with SW8 ON the gate will stop when the safety is active and it will reverse only when the safety is deactivated again.
immediate reverse (default)	OFF	
reverse when cleared	ON	
PREFLASHING	SW 9	This function activates the flashing lamp for 5s before the movement of the gate
inactive (default)	OFF	
active for 5 sec	ON	
EXTRA SENSITIVITY TO OBSTACLE DETECTION	SW 10	If active this function allows to have an immediate reverse in case the gate hits a rigid obstacle, while keeping the motor active in case of a gradual increment of resistance, like with wind pressure on the gate or increased friction
inactive (default)	OFF	
active	ON	
ORANGE TERMINAL FUNCTION	SW 11	If OFF after the second consecutive obstacle detection this output is activated until the STOP contact is open or the power is cycled if ON the output can be connected to a warning lamp. NOTE: for UL325 compliance this switch must be left OFF
Audio Alarm (default)	OFF	
Warning Lamp	ON	
OUT FUNCTION (pin 9) max 100mA	SW 12	if OFF: use pin 9 as power supply negative for a warning lamp. The lamp will be active during opening, pause and stop. Flashing during close, off when the gate is closed
Lamp	OFF	If ON: use pin 9 as power supply negative for the safety photocells. Before any movement the board will check for the presence of the safety photocells. If the test fails the gate will not move.
Photocells FAIL SAFE active	ON	

4.4 DIP SWITCH DS2 SETTINGS FOR OPERATOR TYPE AND LOCK MODE

☞ **IMPORTANT**

DS 2			
OPERATOR SELECTION			
OPERATOR TYPE	SW 1	SW 2	SW 3
S450H, S800H	OFF	OFF	OFF
S418	OFF	OFF	ON
415, 390, 770	ON	OFF	OFF

DS 2	
LOCK OUTPUT MODE	
OUTPUT MODE	SW 4
Active only for 3 sec. after an open impulse (from gate closed)	OFF
Active always except 3 sec. before an opening	ON

5. LED DIAGNOSTICS
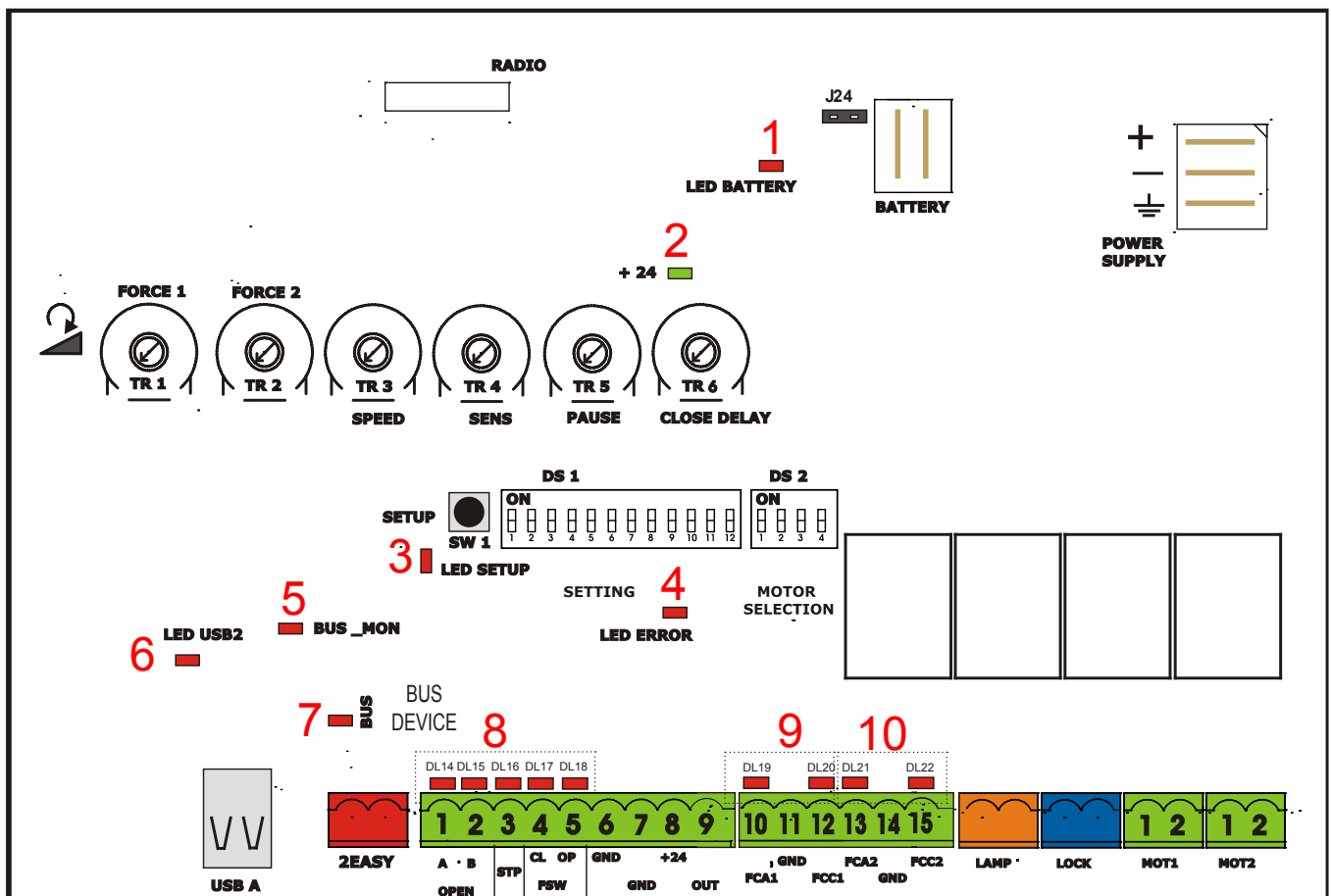
LED	DESCRIPTION	LED STATUS In BOLD the normal state with gate closed and working		
		ON STEADY	OFF	BLINKING
1	LED BATTERY	Board working on AC power	Board working on battery power or ext supply	Battery charging
2	LED +24	**Main power present**	Main power OFF	
3	LED SET-UP		**Normal operation**	SLOW BLINK (1 sec. ON - 1 sec. OFF) SET-UP needed
				FAST BLINK (0.5 sec. ON - 0.5 sec OFF) SET UP in in progress
4	LED ERROR	Board malfunction	**No errors**	Error conditions. See LED ERROR DISPLAY table
5	LED BUS_MON	**Communication on Bus "2easy" OK**	Communication bus "2Easy" inactive. Verify the bus "2Easy" devices for shorts	Bus 2Easy devices with the Same address. Verify dip switch Setting on photocells or Encoder LEDs
6	LED USB		**Software update done or USB key not present**	USB key inserted and software Update in progress (DON'T Remove the USB key)
7	RESERVED			
8	LED DL 14 OPEN A INPUT (N.O.)	OPEN A active	**OPEN A not active**	
	LED DL 15 OPEN B INPUT (N.O.)	OPEN B active	**OPEN B not active**	
	LED DL 16 STOP INPUT (N.C.)	**STOP non active**	STOP active or wiring error	
	LED DL 17 FSW CL INPUT (N.C.)	**Closing safety devices clear**	Closing safety devices triggered or wiring error	
	LED DL 18 FSW OP INPUT (N.C.)	**Opening safety devices clear**	Opening safety devices triggered or wiring error	
9	LED DL 19 FCA1 OPEN LIMIT SWITCH MOTOR1 (N.C.)	**Limit switch OFF or not used**	Limit Switch activated	
	LED DL 20 FCC1 CLOSE LIMIT SWITCH MOTOR1 (N.C.)	Limit switch OFF or not used	**Limit Switch activated**	
10	LED DL 21 FCA2 OPEN LIMIT SWITCH MOTOR2 (N.C.)	**Limit switch OFF or not used**	Limit Switch activated	
	LED DL 22 FCC2 CLOSE LIMIT SWITCH MOTOR2 (N.C.)	Limit switch OFF or not used	**Limit Switch activated**	

👉 The diagnostic LED shows only one error condition at a time, with the priority of the below table. In case there is more than one error once one is eliminated the LED will show the next

LED ERROR DISPLAY

NUMBER OF FLASHES	ERROR CONDITION	SOLUTION
1	OBSTACLE DETECTION	Remove the obstacle
2	BOARD IN SLEEP MODE (Slow blinking means that the automatic open in case of power failure function is active)	Verify the presence of AC power
3	MOTOR 1 FAILURE	Replace motor 1
4	MOTOR 2 FAILURE	Replace motor 2
5	ENCODER on motor 1 or motor 2 broken or wiring error	Verify the encoder wiring and LED status. If they are correct replace the encoder
6	FAIL SAFE FAILED	Verify the photocells wiring and alignement
7	BOARD THERMAL PROTECTION ACTIVE	Turn off the board and wait until the components cool down
8	MAX RUN TIME REACHED WITHOUT FINDING THE POSITIVE STOP (10 min.)	- Verify that the operator manual release is not engaged - Verify that the board recognizes the mechanical stop, in case redo the setup procedure

6. TIME LEARNING (SET-UP)

After powering up the board for the first time or when the board will need it the setup LED will blink at a slow frequency to indicate that the setup procedure to learn the running times is needed.

The setup can be redone at any time by pressing and holding the setup button as indicated below.

After the setup first movement, if the leafs are opening instead of closing you need to reverse the wires going to the motor that moves in the wrong direction

6.1 AUTOMATIC TIME LEARNING

WARNING: If the time learning setup is done automatically then the slow down points are set by the board on his own

<u>Move the leafs to the mid position</u>
<u>Very important for a good result</u>

1. Press and hold the SETUP button until the SETUP LED lights up, wait about 3 sec. until it turns off and then release it immediately. NOTE: If you wait too long to release it the manual set-up will start. The LED will blink during the setup procedure
2. Leaf 2 (if present) starts to move slowly in closing direction, stopping when it reaches the mechanical stop or FCC2.
3. Leaf 1 begins to move slowly in closing direction, stopping when it reaches the mechanical stop, or FCC1.
4. Leaf 1 starts to move slowly in opening direction, followed by leaf 2 (if present) still slowly.
5. When they both reach the open mechanical stop or FCA1 and FCA2 they stop and reverse, leaf 2 (if present) automatically starts closing at full speed followed by leaf 1.

6. When they reach the close mechanical stop or FCC1 and FCC2 both leafs stop and leaf 1 restarts automatically opening at full speed followed by leaf 2 (if present).
7. If you selected an automatic logic the board will wait for the pause time and then closes the gate automatically. Otherwise you have to give an OPEN command to close the gate.

6.2 MANUAL TIME LEARNING

WARNING: If the manual time learning setup is done then the slow down points must be set by the installer during the procedure

<u>Move the leafs to the mid position</u>
<u>Very important for a good result</u>

1. Press and hold the SETUP button until the SETUP LED lights up, keep it pressed for about 3 sec. until it turns off and keep it pressed more until the leaf 2 (if present) starts moving slowly. The LED will blink during the setup procedure
2. Leaf 2 will move in closing direction until it reaches the mechanical stop or FCC2
3. Leaf 1 starts moving slowly until it reaches the mechanical stop or FCC1
4. Leaf 1 starts moving in opening direction at the set speed (trimmer speed).
5. At the point where you want the slowdown to start give an OPEN A command with the push button or the remote that is already stored in memory. Leaf 1 starts to slow down and stops when it reaches the mechanical stop or FCA1.
6. Leaf 2 starts moving in opening direction at the set speed (trimmer speed)

7. At the point where you want the slowdown to start give an OPEN A command with the push button or the remote that is already stored in memory. Leaf 2 starts to slow down and stops when it reaches the mechanical stop or FCA2.

8. Leaf 2 starts to close at the set speed (trimmer speed).

9. At the point where you want the slowdown to start give an OPEN A command with the push button or the remote that is already stored in memory. The leaf 2 starts to slow down and stops when it reaches the mechanical stop or FCC2.

10. Leaf 1 starts to close at the set speed (trimmer speed).

11. At the point where you want the slowdown to start give an OPEN A command with the push button or the remote that is already stored in memory. Leaf 1 starts to slow down and stops when it reaches the mechanical stop or FCC1.

12. The manual time learning procedure is complete.

6.3 OBSTACLE DETECTION FUNCTION

The obstacle detection function is achieved by controlling the current absorption and / or through the encoder connected to the motors.

If the gate encounters an obstacle during the movement of opening or closing, the obstacle detection function is activated and the operator reverses the direction of the gate.

In case of a second consecutive obstacle the operator stops the gate right away and any further command is inhibited. To re-enable the automation, you must remove power or open the STOP contact input. Until this "reset" the Audio Alarm output will be active.

7.   ENCLOSURE

The E024U board is supplied on a panel that fits in a 16x14" enclosure.
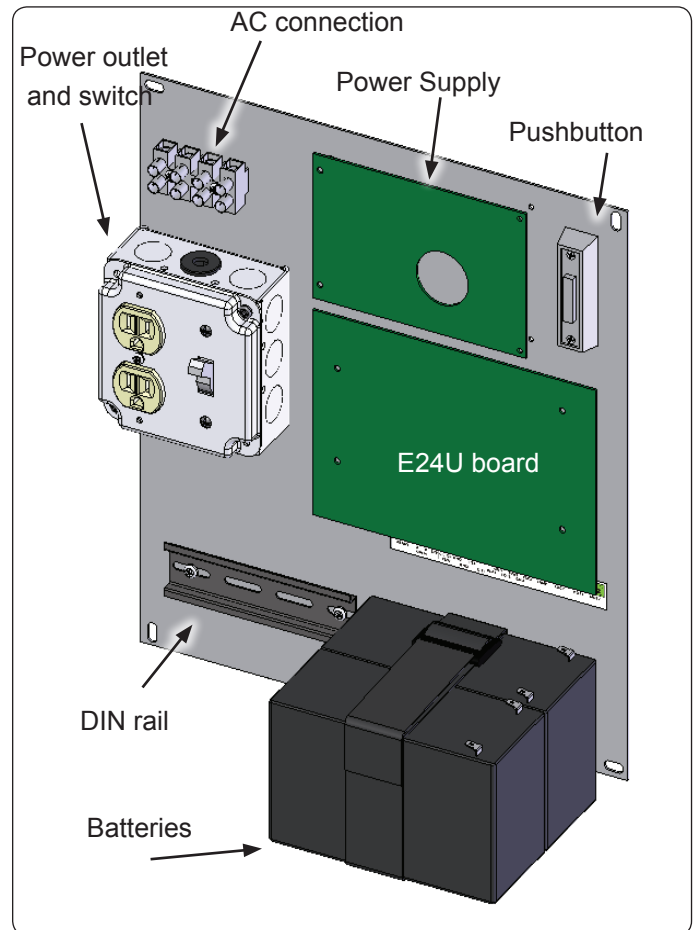
On the back panel are installed the control board, the power supply and additional accessories.
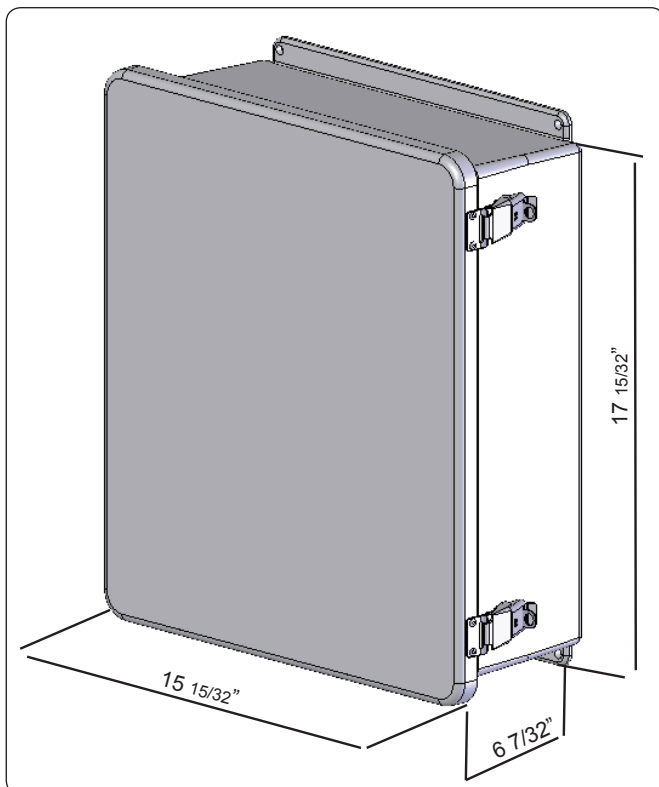
8.   POWER CONNECTION

AC POWER GUIDELINES:

THE E024U control board and power supply uses a single phase AC power line to operate, charge the batteries, and power gate accessories. Use the following guidelines when installing the AC power:

1. Check the local wiring codes in all cases and follow all local building codes. Wiring and hookup should be performed by a qualified electrician/installer only.

2. AC power should be supplied from a circuit breaker panel and must have its own dedicated circuit breaker. This supply must include a green ground conductor.

3. Use copper conductor wires with liquid tight flexible conduit UL listed for electric cable protection

14 AWG, 600V, 80°C

Terminal Block max Torque 2.1 Nm

4. Properly ground the gate operator to minimize or prevent damage from power surges and/or lightning. Use a grounding rod if necessary. A surge suppressor is recommended for additional protection.

AC POWER CONNECTION

To connect AC power to the controller:

1. Turn the circuit breaker for the AC gate operator power OFF before connecting the AC input wires.

2. Turn OFF the Power Switch located on the left side of enclosure before connecting the AC input wires.

3. Connect the AC input wires to the AC terminal located on the top left of the control box. See diagram below.

4. Batteries must be installed after the AC power is on. See Battery Power Connection.

115V 60Hz 2.5A
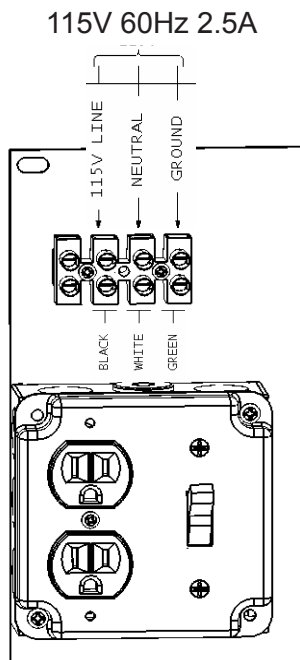
8.1 POWER SUPPLY

The E024U board is powered by a high efficiency switching power supply that takes 115V or 230V in input and provides 36VDC to power the board. The power supply is preset for 115V at the factory, consult with FAAC Tecnical Support for 230V wiring options.
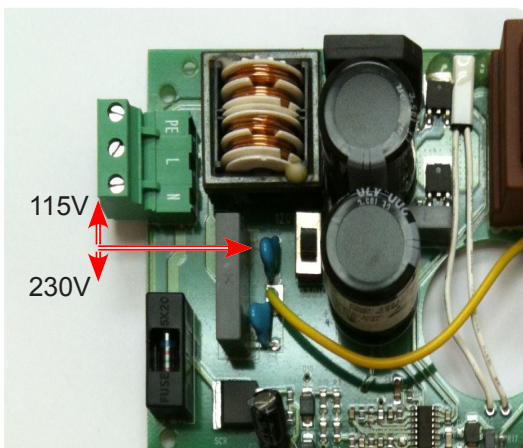
9. BACKUP BATTERY

The E024U board allows the connection of a 24V backup battery to provide power to operate the gate during blackouts. For more details about how the boards handles the loss of main power and how to configure its behaviour please see par 4.3 and DS1 switch 7.

To connect the battery use the provided cable and plug it on the BATTERY connector on the board. Plug the other end of the cable to the batteries, red wire to +24 and black wire to GND.
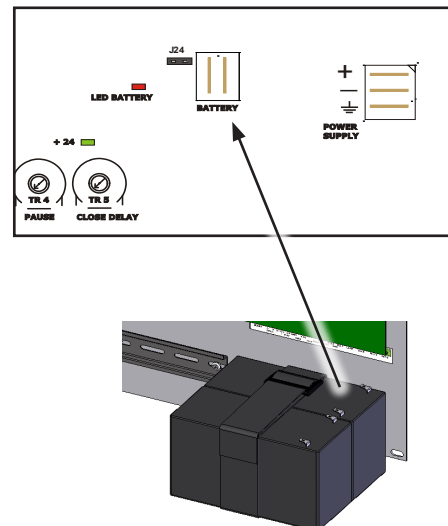
9.1 DISABLE THE BATTERY CHARGER

To disable the battery charger unplug jumper J24

J24 PRESENT = BATTERY CHARGING ACTIVE
J24 NOT PRESENT = BATTERY CHARGING NOT ACTIVE
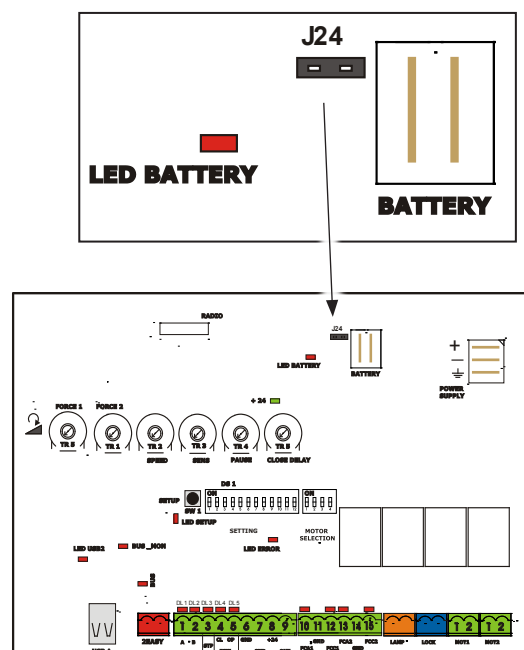
10. FIRMWARE UPGRADE

The E024U board keeps the operating firmware in a field programmable memory, it can be easily upgraded through the on board USB port

For the upgrade you need a USB Flash Drive, where you have to copy the file supplied by FAAC. Then follow these steps:

1. Disconnect the batteries if they are present.
2. Turn the AC power off and insert the Flash Drive into the USB A input on the board
3. Turn the AC power back on. The USB2 LED will start to flash to confirm the beginning of the software update. (WARNING: DON'T TURN THE POWER OFF OR REMOVE THE FLASH DRIVE UNTIL THE USB2 LED TURNS OFF.
4. Wait until the USB 2 LED turns off
5. Remove the USB Flash drive.
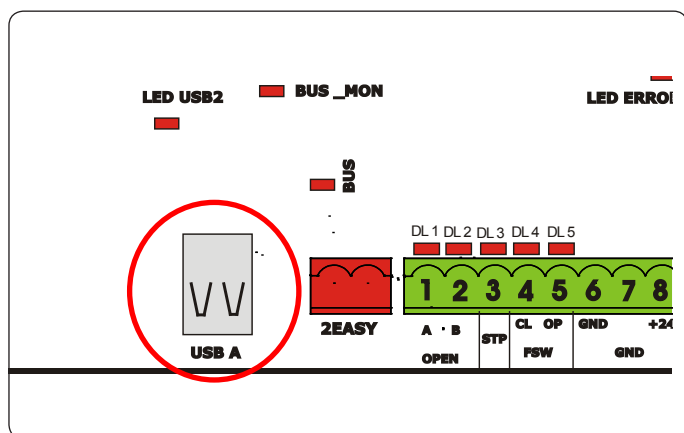6. Cycle power, reconnect the batteries if needed and execute a new SETUP procedure (See chapter 6)

⚠️

WARNING: Only upgrade the firmware with the proper file supplied by FAAC. otherwise the board could be damaged

11. FUNCTION LOGICS

LOGIC "E"	PULSES						
SYSTEM STATUS	OPEN A	OPEN B	CLOSE	STOP	FSW OP	FSW CL	FSW CL/OP
CLOSED	opens the leaves	opens leaf 1	no effect	no effect (OPEN disabled)	no effect (OPEN disabled)	no effect	no effect (OPEN disabled)
OPENING	stops operation (1)	stops operation	recloses leaves immediately	stops operation	immediately reverses at closing	no effect	stops and opens at release (OPEN stops - saves CLOSE)
OPEN	recloses leaves immediately (1)	recloses leaves immediately	recloses leaves immediately	no effect (OPEN/CLOSE disabled)	no effect	no effect (CLOSE disabled)	no effect (OPEN/CLOSE disabled)
CLOSING	reopens leaves immediately	reopens leaves immediately	no effect	stops operation	no effect	reverses at opening	stops and opens at release (OPEN stops - saves CLOSE)
BLOCKED	closes leaves	closes leaves	closes leaves	no effect (OPEN/CLOSE disabled)	no effect (OPEN disabled)	no effect (CLOSE disabled)	no effect (OPEN stops - saves CLOSE)

(1) if the cycle began with OPEN-B (leaf 1), both leaves are activated at opening

LOGIC "A"	PULSES						
SYSTEM STATUS	OPEN A	OPEN B	CLOSE	STOP	FSW OP	FSW CL	FSW CL/OP
CLOSED	opens and closes after pause time	opens leaf 1 and closes after pause time	no effect	no effect (OPEN disabled)	no effect (OPEN disabled)	no effect	no effect (OPEN disabled)
OPENING	no effect (1)	no effect	recloses leaves immediately	stops operation	reverses at closing	no effect	stops and opens at release (saves CLOSE)
OPEN IN PAUSE	reloads pause time (1)	reloads pause time of released leaf	recloses leaves immediately	stops operation	no effect	recharges pause time (CLOSE disabled)	recharges pause time (CLOSE disabled)
CLOSING	reopens leaves immediately	reopens leaves immediately	no effect	stops operation	no effect	reverses at opening	stops and opens at release (saves CLOSE)
BLOCKED	closes leaves	closes leaves	closes leaves	no effect (OPEN/CLOSE disabled)	no effect (OPEN disabled)	no effect (CLOSE disabled)	no effect (OPEN/CLOSE disabled)

(1) if the cycle began with OPEN-B (leaf 1), both leaves are activated at opening

LOGIC "S"	PULSES						
SYSTEM STATUS	OPEN A	OPEN B	CLOSE	STOP	FSW OP	FSW CL	FSW CL/OP
CLOSED	opens and closes after pause time	opens released leaf and closes after pause time	no effect	no effect (OPEN disabled)	no effect (OPEN disabled)	no effect	no effect (OPEN disabled)
OPENING	no effect (1)	no effect	recloses leaves immediately	stops operation	reverses at closure	continues to open and recloses immediately	stops and opens at release (saves CLOSE)
OPEN IN PAUSE	recloses leaves immediately (1)	recloses leaves immediately	recloses leaves immediately	stops operation	no effect	stops and, at release, closes	stops and, at release, closes
CLOSING	reopens leaves immediately	reopens leaves immediately	no effect	stops operation	no effect	reverses at opening (see DS1-SW8) and closes immediately at end	stops and opens after release and closes immediately at end
BLOCKED	closes leaves	closes leaves	closes leaves	no effect (OPEN/CLOSE disabled)	no effect (OPEN disabled)	no effect (CLOSE disabled)	no effect (OPEN/CLOSE disabled)

(1) if the cycle began with OPEN-B (leaf 1), both leaves are activated at opening

LOGIC "EP"	PULSES						
SYSTEM STATUS	OPEN A	OPEN B	CLOSE	STOP	FSW OP	FSW CL	FSW CL/OP
CLOSED	opens the leaves	opens leaf 1	no effect	no effect (OPEN disabled)	no effect (OPEN disabled)	no effect	no effect (OPEN disabled)
OPENING	stops operation (1)	stops operation	recloses leaves immediately	stops operation	immediately reverses at closure	no effect	stops and opens at release (OPEN stops - saves CLOSE)
OPEN	recloses leaves immediately (1)	recloses leaves immediately	recloses leaves immediately	no effect (OPEN/CLOSE disabled)	no effect	no effect (CLOSE disabled)	no effect (OPEN/CLOSE disabled)
CLOSING	stops operation	stops operation	no effect	stops operation	no effect	reverses at opening	stops and opens at release (OPEN stops - saves CLOSE)
BLOCKED	restarts moving in opposite direction. Always closes after STOP	restarts moving in opposite direction. Always closes after STOP	closes leaves	no effect (OPEN/CLOSE disabled)	no effect (OPEN disabled)	no effect (CLOSE disabled)	no effect (OPEN stops - saves CLOSE)

(1) if the cycle began with OPEN-B (leaf 1), both leaves are activated at opening

LOGIC "AP"	PULSES						
SYSTEM STATUS	OPEN A	OPEN B	CLOSE	STOP	FSW OP	FSW CL	FSW CL/OP
CLOSED	opens and closes after pause time	opens leaf 1 and closes after pause time	no effect	no effect (OPEN disabled)	no effect (OPEN disabled)	no effect	no effect (OPEN disabled)
OPENING	stops operation (1)	stops operation	recloses leaves immediately	stops operation	reverses at closing (saves OPEN)	no effect	stops and opens at release (OPEN stops - saves CLOSE)
OPEN IN PAUSE	stops operation (1)	stops operation	recloses leaves immediately	stops operation	no effect	recharges pause time (CLOSE disabled)	recharges pause time (CLOSE disabled)
CLOSING	reopens leaves immediately	reopens leaves immediately	no effect	stops operation	no effect	reverses at opening (see DS1-SW8)	stops and opens at release (OPEN stops - saves CLOSE)
BLOCKED	closes leaves	closes leaves	closes leaves	no effect (OPEN/CLOSE disabled)	no effect (OPEN disabled)	no effect (CLOSE disabled)	no effect (OPEN/CLOSE disabled)

(1) if the cycle began with OPEN-B (leaf 1), both leaves are activated at opening

LOGIC "SP"	PULSES						
SYSTEM STATUS	OPEN A	OPEN B	CLOSE	STOP	FSW OP	FSW CL	FSW CL/OP
CLOSED	opens and closes after pause time	opens leaf 1 and closes after pause time	no effect	no effect (OPEN disabled)	no effect (OPEN disabled)	no effect	no effect (OPEN disabled)
OPENING	stops operation (1)	stops operation	recloses leaves immediately	stops operation	reverses at closure	continues to open and recloses immediately	stops and opens after release and closes immediately at end (OPEN stops - saves CLOSE)
OPEN IN PAUSE	recloses leaves immediately (1)	recloses leaves immediately	recloses leaves immediately	stops operation	no effect	stops and, at release, closes	stops and, at release, closes
CLOSING	stops operation	stops operation	no effect	stops operation	no effect	reverses at opening	stops and opens at release (saves CLOSE)
BLOCKED	restarts moving in opposite direction. Always closes after STOP	restarts moving in opposite direction. Always closes after STOP	recloses leaves immediately	no effect (OPEN/CLOSE disabled)	no effect (OPEN disabled)	no effect (CLOSE disabled)	no effect (OPEN/CLOSE disabled)

(1) if the cycle began with OPEN-B (leaf 1), both leaves are activated at opening

LOGIC "B"	PULSES						
SYSTEM STATUS	OPEN A	OPEN B	CLOSE	STOP	FSW OP	FSW CL	FSW CL/OP
CLOSED	opens the leaves	no effect	no effect	no effect (OPEN disabled)	no effect (OPEN disabled)	no effect	no effect (OPEN disabled)
OPENING	no effect	closes leaves	closes leaves	stops operation	reverses at closure	no effect	stops and, at release, closes (saves OPEN/CLOSE)
OPEN	no effect	closes leaves	closes leaves	no effect (OPEN/CLOSE disabled)	no effect	no effect (CLOSE disabled)	no effect (OPEN/CLOSE disabled)
CLOSING	opens the leaves	no effect	no effect	stops operation	no effect	reverses at opening	stops and opens at release (saves OPEN/CLOSE)
BLOCKED	opens the leaves	closes leaves	closes leaves	no effect (OPEN/CLOSE disabled)	no effect (OPEN disabled)	no effect (CLOSE disabled)	no effect (OPEN/CLOSE disabled)

LOGIC "C"	CONTINUOS COMMANDS			PULSES			
SYSTEM STATUS	OPEN A	OPEN B	CLOSE	STOP	FSW OP	FSW CL	FSW CL/OP
CLOSED	opens the leaves	no effect	no effect	no effect (OPEN disabled)	no effect (OPEN disabled)	no effect	no effect (OPEN disabled)
OPENING	no effect	closes leaves	closes leaves	stops operation	reverses at closure	no effect	stops and, at release, closes (saves OPEN/CLOSE)
OPEN	no effect	closes leaves	closes leaves	no effect (OPEN/CLOSE disabled)	no effect	no effect (CLOSE disabled)	no effect (OPEN/CLOSE disabled)
CLOSING	opens the leaves	no effect	no effect	stops operation	no effect	reverses at opening	stops and opens at release (saves OPEN/CLOSE)
BLOCKED	opens the leaves	closes leaves	closes leaves	no effect (OPEN/CLOSE disabled)	no effect (OPEN disabled)	no effect (CLOSE disabled)	no effect (OPEN/CLOSE disabled)