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# ABLOY® DA460 SWING DOOR OPERATOR

Installation and commissioning manual

# APPROVALS / STANDARDS

73/23/EEC (Low Voltage directive)

93/68/EEC (Low Voltage directive)

89/336/EEC (EMC directive)

Statement of fire doors by Technical Research Centre of Finland



----- THIS MANUAL CONTAINS IMPORTANT SAFETY INSTRUCTIONS -----

Warning - IT IS IMPORTANT FOR SAFETY OF PERSONS TO FOLLOW THESE INSTRUCTIONS.

----- SAVE THESE INSTRUCTIONS -----

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Do not allow children to play with fixed controls.

Frequently examine the installation for imbalance and signs of wear or damage to cables, springs and mountings. Do not use if repair or adjustment is necessary.

Disconnect the supply when cleaning or other maintenance is being carried out.

Before installing the operator, check that the operator is in good mechanical condition and it opens and closes properly.

Ensure that entrapment between door and the surroundings is avoided.

Ensure that the operator is suited for installation. Check temperature, humidity, door weights, etc. restriction in line with specifications applicable in the manual or other Abloy® Oy material.

Note!

Instructions, design specifications and illustrations which are contained in this manual are not binding. Abloy Oy reserves the right as part of ongoing product development to make changes without previous notice.

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# REVISION

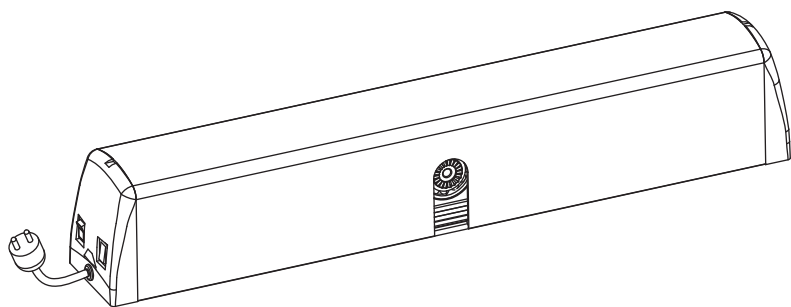
Following pages have been revised:

Page	Revision
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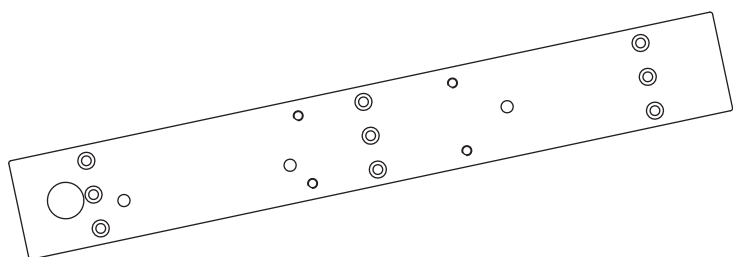
21	DA007 connection added
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As at 1.07.2016.

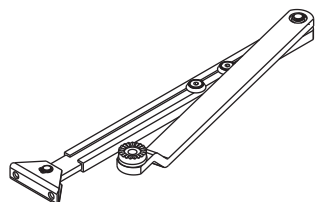
# CONTENT OF DELIVERY



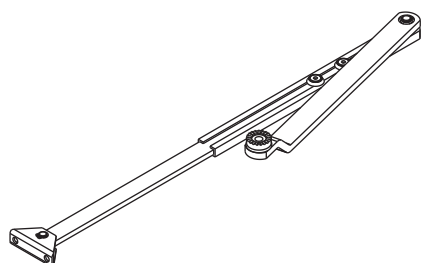
**DA460** Swing door operator  
- screws 4 pcs M8x22



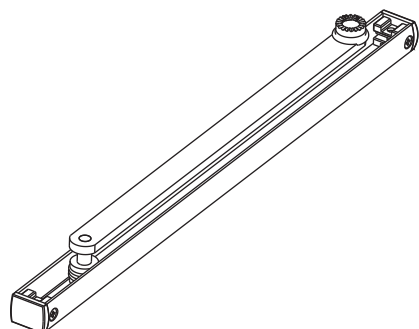
**DA103** Mounting plate  
- screws 6 pcs 5,5x32  
-included in the delivery



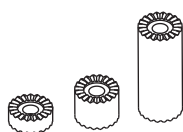
**DA147** Standard arm  
- screws 2 pcs 5,5x32 and  
1 pcs M8x30  
-ordered separately



**DA148** Extended arm  
- screws 2 pcs 5,5x32 and  
1 pcs M8x30  
-ordered separately



**DA149** Sliding arm  
- screws 2 pcs 5,5x50 and  
1 pcs M8x30  
-ordered separately



**DA150** Extension piece  
- 10 mm + M8x35  
- 20 mm + M8x35 + M8x45  
- 60 mm + M8x90  
-ordered separately

# GENERAL INFORMATION

## Technical data

### Measures

- 595 (L) x 85 (H) x 107 (W) mm
- Weight 6,5 kg

- Supply voltage 90-264 VAC, 47-63 Hz
- Rated output 70 W
- Enclosure class IP20

### Temperature range

- Storage -30...+85°C (in dry premises)
- Operation: -15...+50°C (in dry premises)
- The automatic swing door operator must not be installed in applications where it is subjected to water or snow.

### Interfaces

- Voltage output 24 VDC, stabilized, output current 500 mA
- Voltage output 12 VDC, stabilized, output current 1,0 A
- The total load must not exceed 12W
- Potential free relay output, preset to operate 2 seconds  
2 A @ 30 VDC resistive load

## Features

- Usage for heavy density of pedestrian traffic
- Push&Go as a standard feature
- Normal and delayed impulse
- Adjustable hold open time 0...60 s or sequential use
- Fire detector connection
- Free Swing operation
- Door hold force
- Prepull before opening
- Secondary DC inlet for power back up (24 VDC ( $\pm 15\%$ ), 3A)
- Maximum opening angles:
  - With standard arm 100 degrees
  - With sliding arm on the opening side 100 degrees
  - With sliding arm on the closing side 90 degrees

# OPERATION

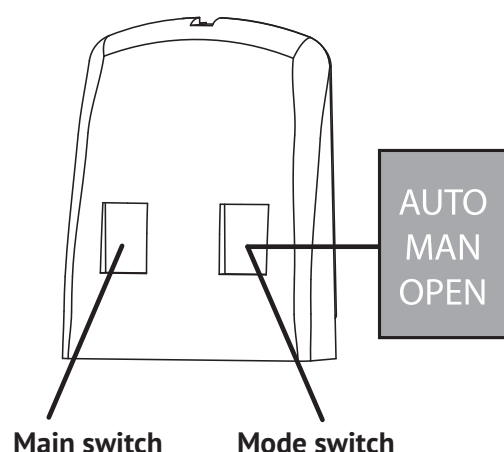
ABLOY® DA460 is an electromechanical swing door operator for heavy use. The door operator includes new free swing function: when using the door manually it operates lightly without motor's resistance and the door can be left in open position when required. It can be used on both single and double, internal and external, fire and emergency exit doors.

## Safety features

**Opening cycle:** If the door is obstructed in opening cycle. The door is set free and hold open time is started. After 1 second, new trial is done to open the door. Maximum amount for trials is 4. If this is exceeded or hold open time is end, the door is closed.

**Closing cycle:** If the door is obstructed in closing cycle. The door is set free and 4 new trials are done to close the door. If the closing is still obstructed, the operator tries to close the door at one minute intervals.

## MAIN SWITCH AND MODE SWITCH



When the power is switched on, the mains switch lights up.

**1**= on

**0**= off

Functions of mode switch

### **AUTO:**

The operator opens the door for the duration of the hold open time.

### **MAN:**

Manual use.

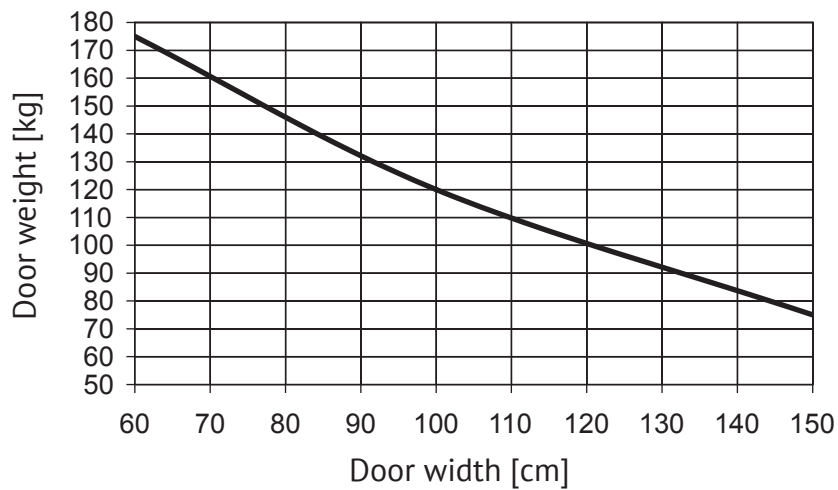
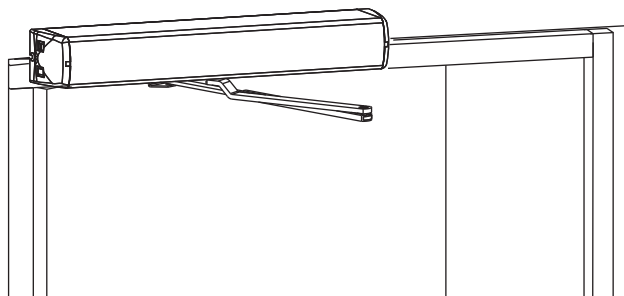
### **OPEN:**

The door is held permanently open.

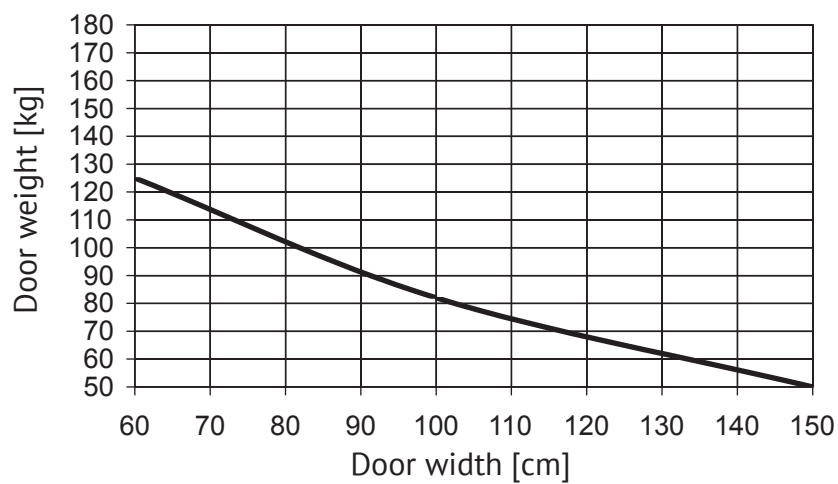
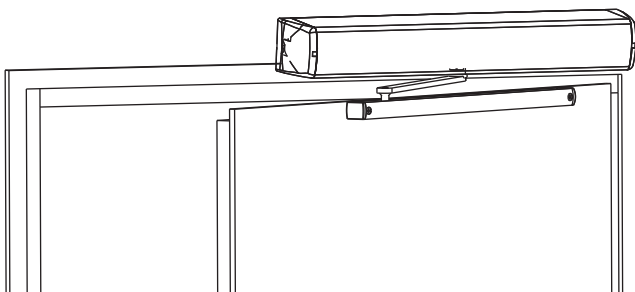
**NOTE!** There is 3 seconds constant delay when mode switch is changed from position OPEN to AUTO or MAN.

# DOOR WEIGHT

## Standard arm



## Sliding arm





# INSTALLATION

## Tools required

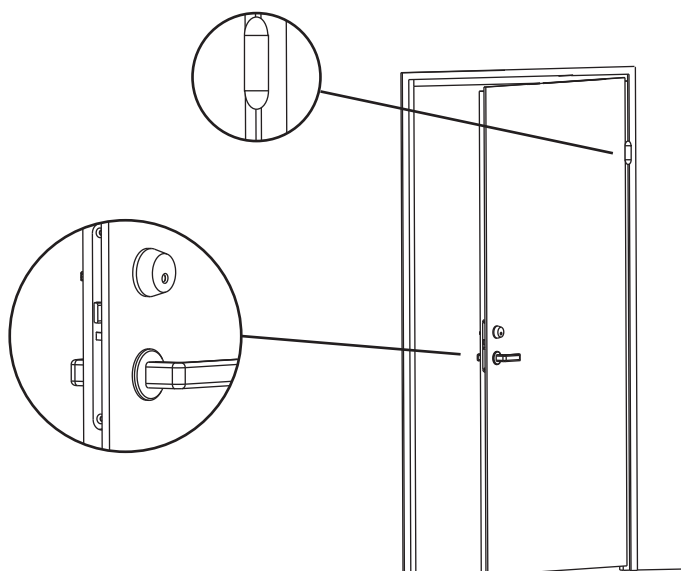
- Drill
- Set of ball ended allen wrenches
- # 2 Phillips head screwdriver
- Flat blade screwdrivers, 2 pcs

## Steps of installation

- Preparing installation
- Installing the mounting plate
- Mounting the operator and the arm
- Connecting the operator to mains
- Commissioning
- Testing
- Connecting impulse devices

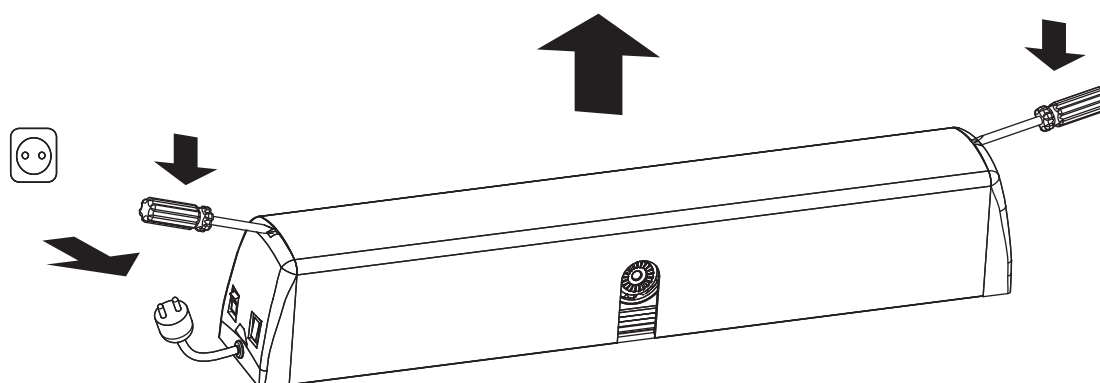
## Preparing installation

- Check the proper function of the door
  - hinges
  - door clearance
- Check the proper function of the lock
  - lock case
  - striker plate



## Removal of housing

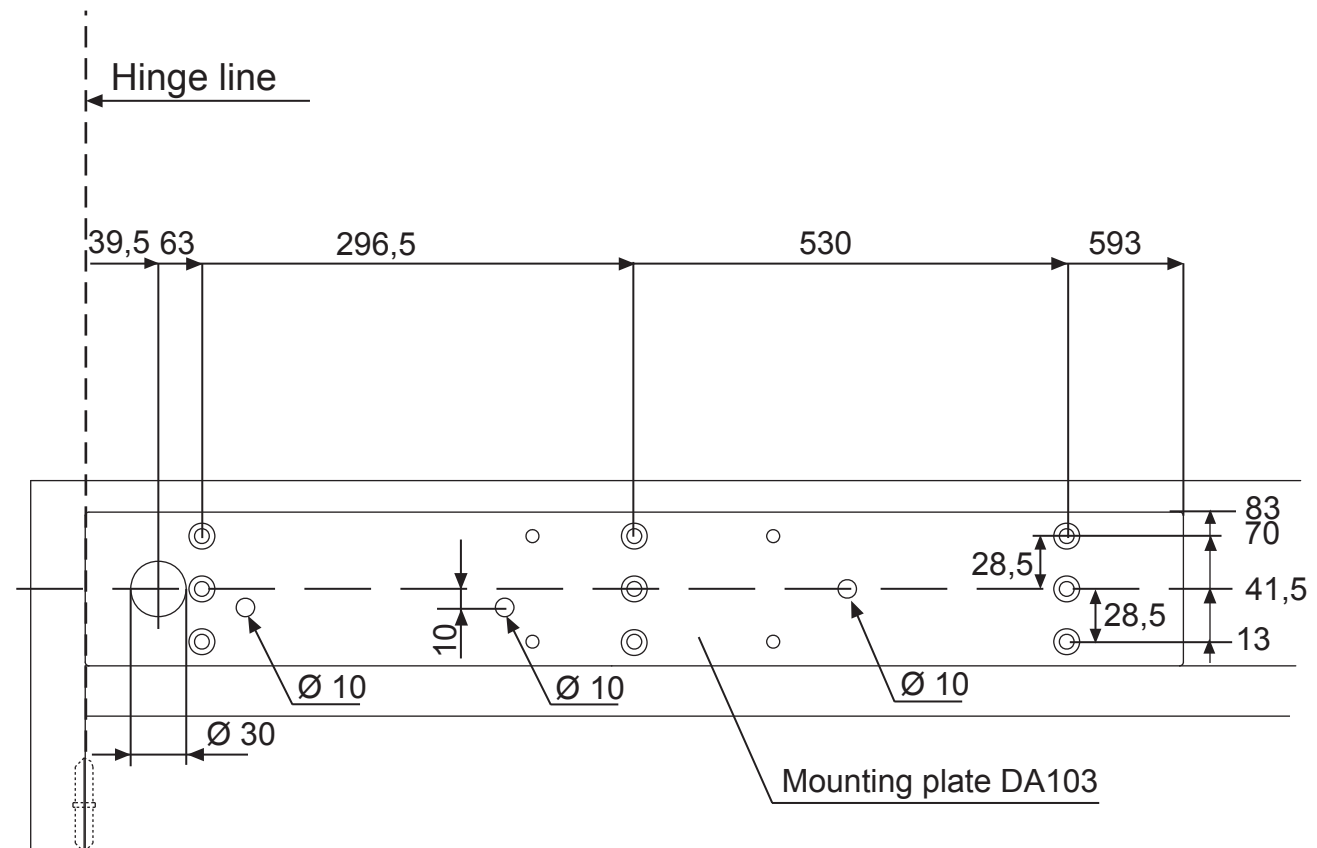
Note! Remove the protective earth wire from cover and connect it back after installation.  
Keep the mains disconnected when removing or mounting cover.



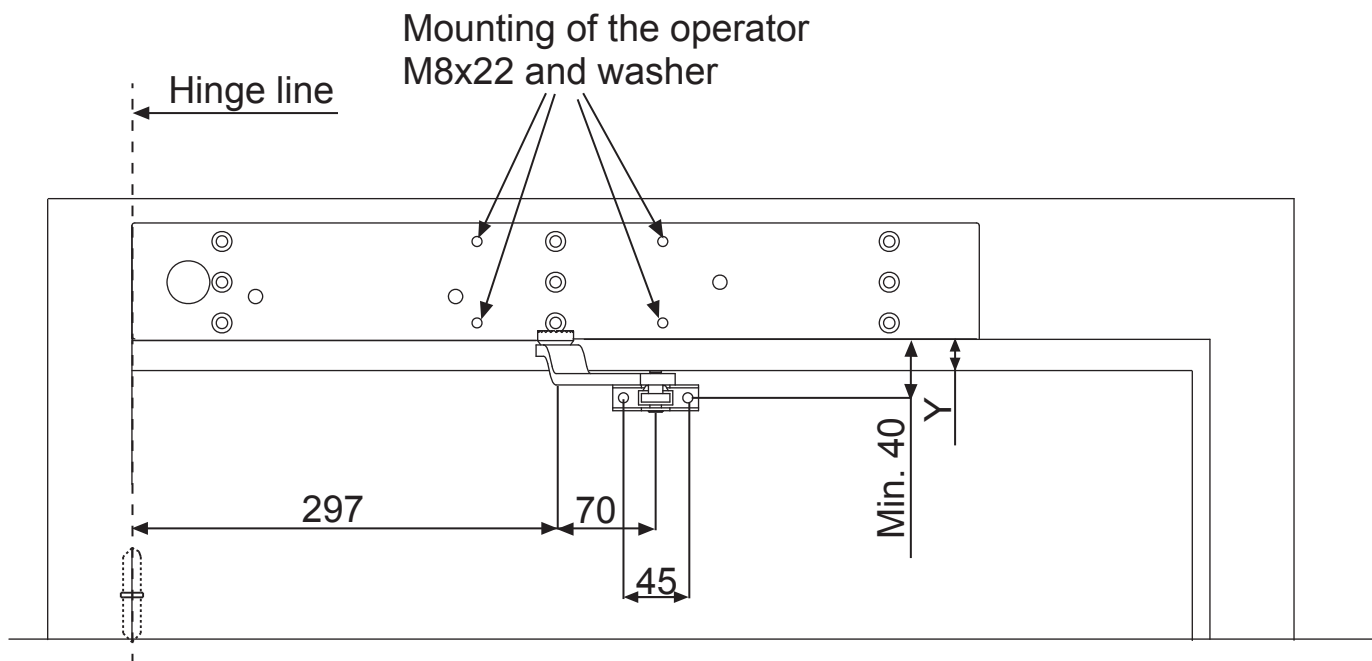
## Installing the mounting plate

Operator is to be installed on the transom, with the main switch located towards the hinge. Use the mounting plate DA103 with the door operator ensuring the installation base is level and securely fixed to a flat surface. Minimum requirement for wall profile is 5 mm (steel).

Installation measurements for the standard arms DA147, DA148 and sliding arm DA149 to closing side.

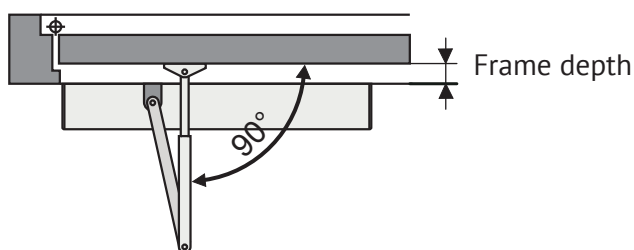
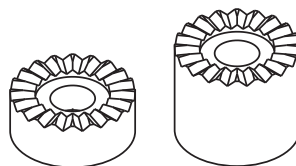


## Assembly of the operator and the standard arm to the closing side

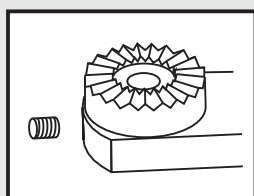
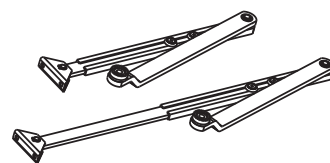


### Mounting of the arm to the operator M8x30 and washer

Y (mm)	Length of extension piece
0	No extension piece
10	10 mm (DA150/01)
20	20 mm (DA150/02)
30	30 mm (DA150/01, DA150/02)
40	40 mm (DA150/02 * 2 kpl)
60	60 mm (DA150/06)

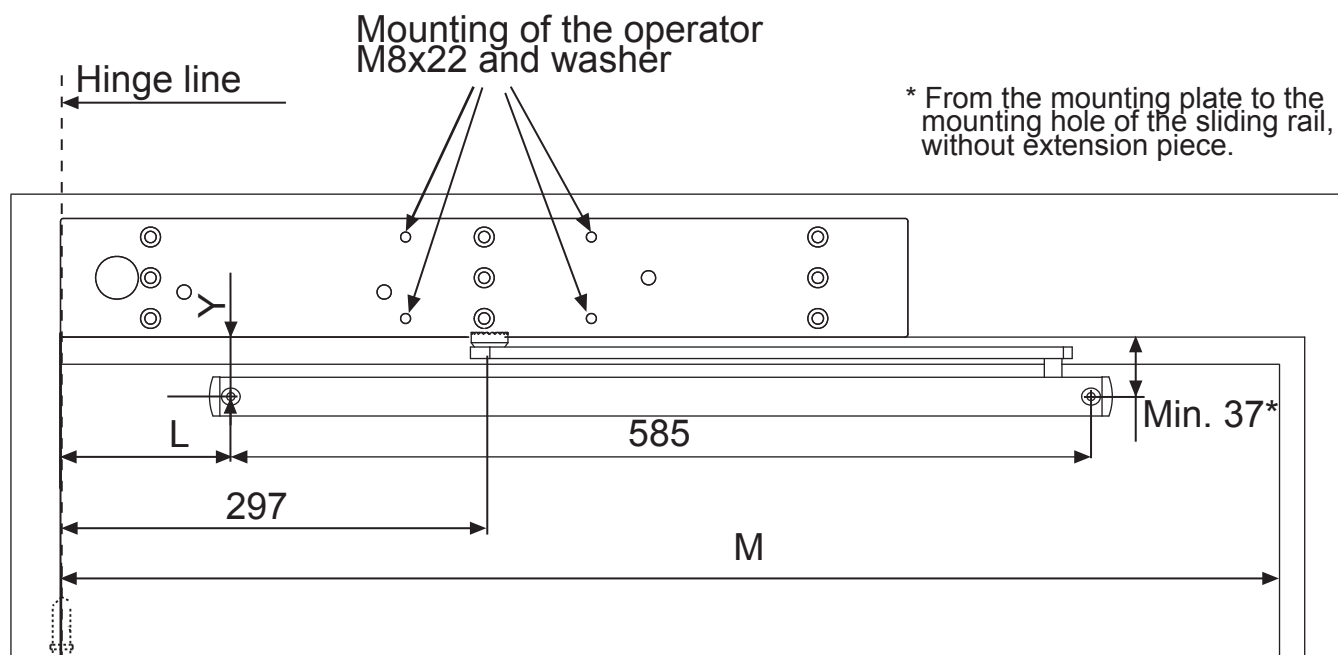


DA147	Frame depth 0-150mm
DA148	Frame depth 150-250mm



- After installation, ensure that the arm and door are properly adjusted.
- Mount a door stop to the door open position so that wind will not drive the door against the wall, resulting in damage.
- **Tighten the holding screw.**

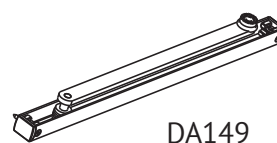
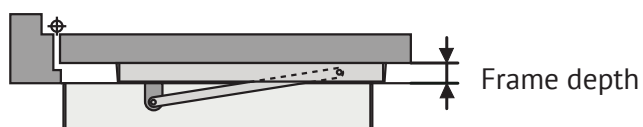
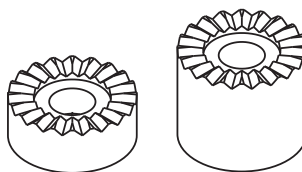
## Assembly of the operator and the sliding arm DA149 to the closing side



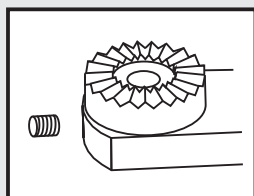
### Mounting of the arm to the operator M8x30 and washer.

It is always recommended to use 10 mm extension piece.

Y (mm)	Length of extension piece
47	10 mm (DA150/01)
57	20 mm (DA150/02)
67	30 mm (DA150/01, DA150/02)
77	40 mm (DA150/02 2 pcs)
97	60 mm (DA150/06)

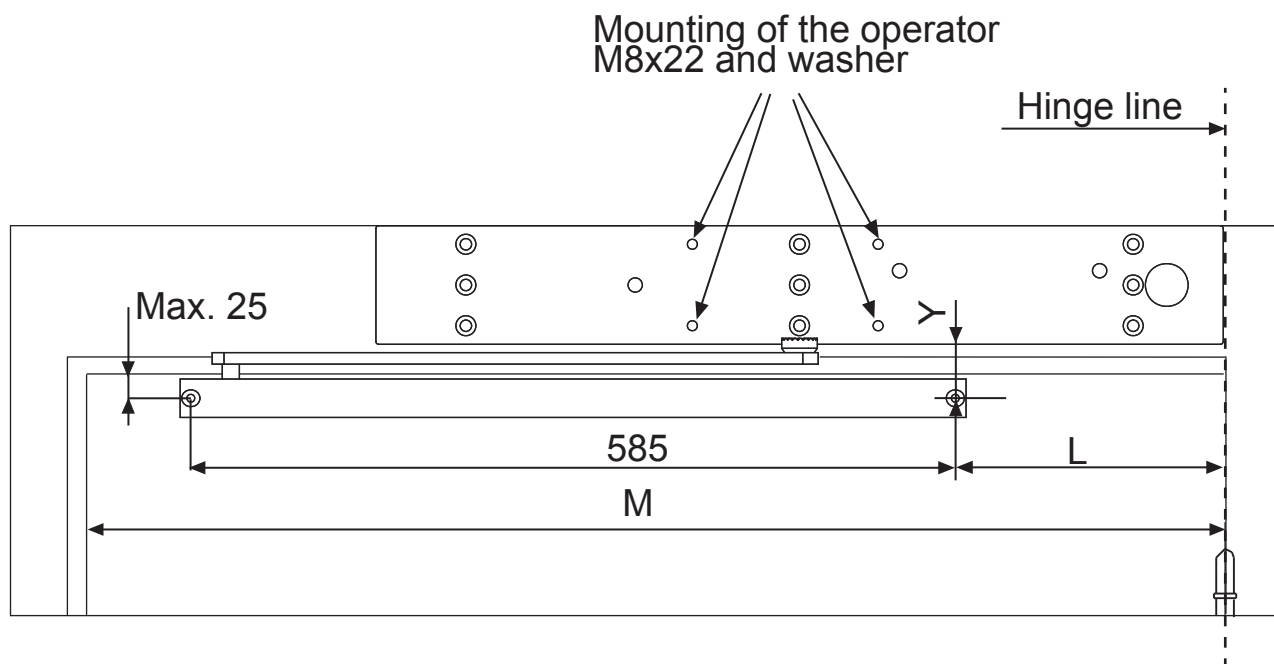


Frame depth H/mm	Arm distance L/mm	Minimum door width M/mm
0-24	130	750
25-75	120	740
75-100	115	735



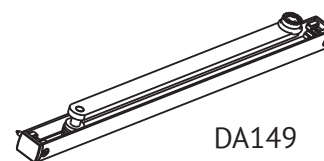
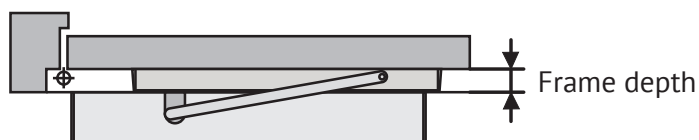
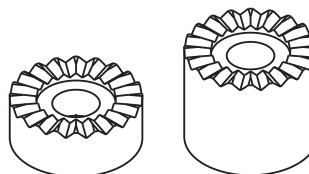
- After installation, ensure that the arm and door are properly adjusted.
- Mount a door stop to the door open position so that wind will not drive the door against the wall, resulting in damage.
- **Tighten the holding screw.**

## Assembly of the operator and the sliding arm DA149 to the opening side

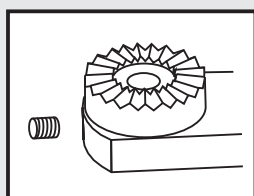


## Mounting of the arm to the operator M8x30 and washer

Y (mm)	Length of extension piece
37	No extension piece
47	10 mm (DA150/01)
57	20 mm (DA150/02)
67	30 mm (DA150/01, DA150/02)
77	40 mm (DA150/02 * 2 kpl)
97	60 mm (DA150/06)



Frame depth H/mm	Arm distance L/mm	Minimum door width M/mm
0-50	185	800
50-100	205	820
100-150	235	850
150-200	270	885

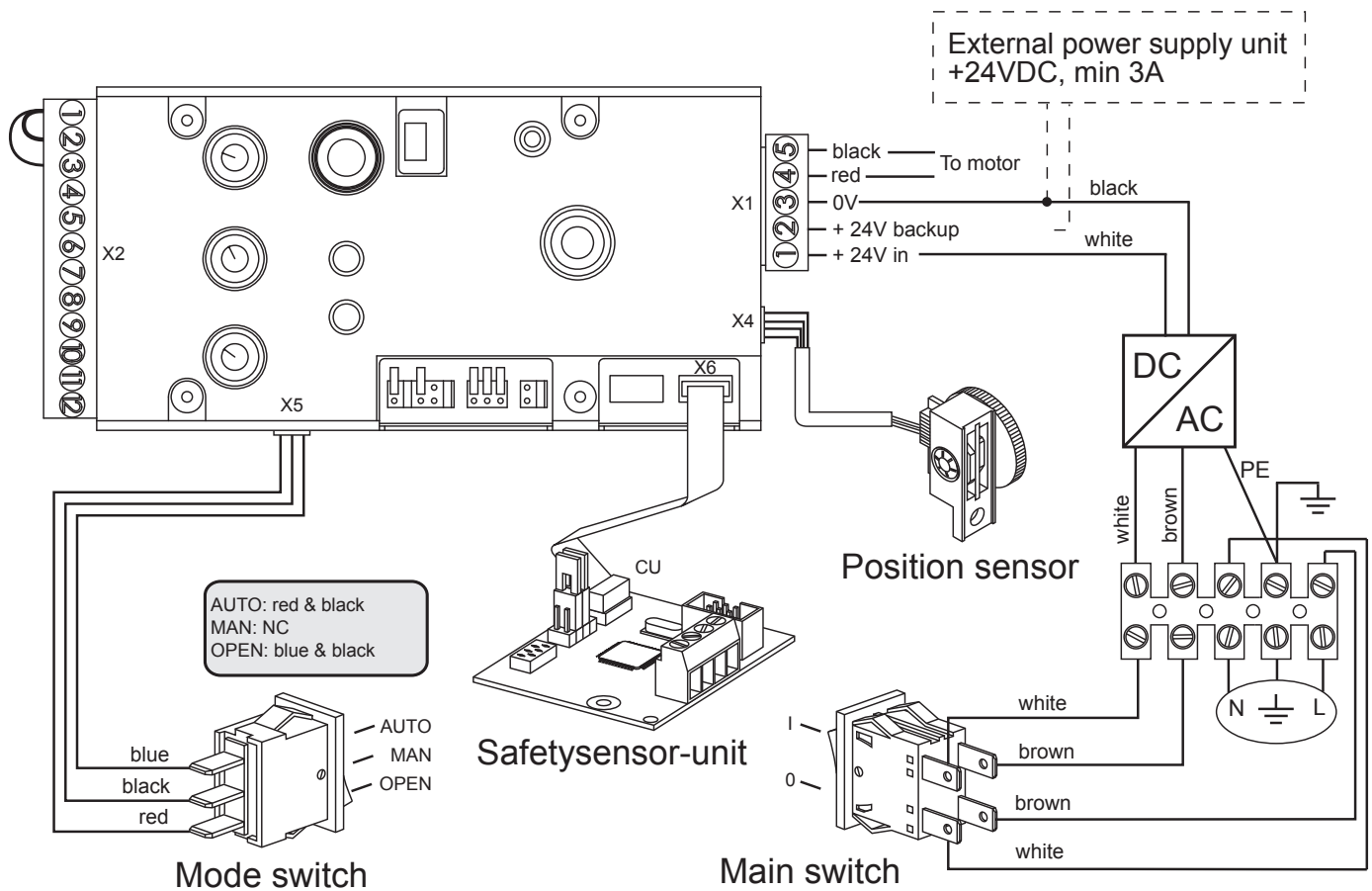


- After installation, ensure that the arm and door are properly adjusted.
- Mount a door stop to the door open position so that wind will not drive the door against the wall, resulting in damage.
- **Tighten the holding screw.**

# INTERNAL CONNECTIONS



- Electrical connections should be made by a qualified electrician.
- The power plug must have an easy access.
- If permanent connection is made unit must be equipped with an external switch providing all pole disconnection.
- Keep the mains disconnected during installation.

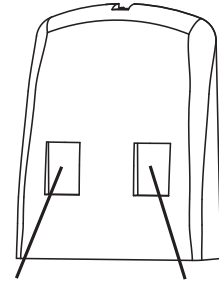


## DC supply back-up

When not mains operated, or for back-up supply, the external 24 VDC (min. 3A) supply can be connected to X1 connectors 2 and 3. Connect + from DC supply back-up to X1 connector 2 and GND to X1 connector 3. No battery charging or maintenance is provided by DA460.

# COMMISSIONING

- 1 Check the free movement of the door.
- 2 Turn mode switch to **MAN**.  
The mode switch is located in the head panel.
- 3 Plug in the mains and turn main switch on.  
The main switch is located in the head panel.



Main switch

Mode switch

- 4 Choose the type of the arm



ARM

The jumpers are located on the control board.



Jumper is connected.



Jumper is disconnected.

- 5 Check the DOOR



DOOR

”Sealed” enables motorized closing pull before opening and final pull when closing. Select this to ensure the proper function of the lock when prepull and final pull are needed. Final pull will be activated 20 - 30 mm before the doors closed position. Final pull is activated 1 second, when door is closed position.



DOOR

When hold closed jumper is selected, operator pushes the door against the frame.



DOOR

Push&Go is in operation, when mode switch is in AUTO position. When door is pushed or pulled manually operator opens the door. Operator opens the door to adjusted opening angle and closes the door after 3 second hold open time.

Note! It is not possible to use Push&Go and free swing options at the same time.

# COMMISSIONING

## 6 Check the OPTION



If the jumper is connected then operator requires N.C. output from the fire detector.  
If the jumper is disconnected then operator requires N.O. output from the fire detector.

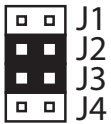
OPTION



When jumper is connected the door can opened and closed manually. When opening impulse comes, the door is opened to fully open position and closed after adjusted hold open time. Free swing is in operation when mode switch is in AUTO position. Note! It is not possible to use Push&Go and free swing options at the same time.

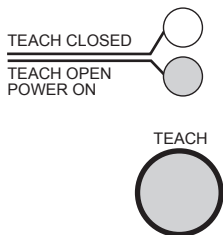
OPTION

## 7 Safety sensor monitoring



Self diagnostics is in use when **J2** (OS=opening side) and **J3** (CS=closing side) are connected.

## 8 Teach door open and closed position (is functional in program selector positions MAN and AUTO)



- **Push TEACH-button briefly to enter learning mode.**
- **Teach the door closed position**  
Yellow led blinks: close the door and push **TEACH-button**
- **Teach the door open position**  
Green led blinks: Open the door to the desired angle and push **TEACH-button**.
- Yellow "TEACH CLOSED" led blinks: Close the door manually
- The green light remains lit. Door open and closed position is taught.

## 9 Operators force, opening speed and hold open time

Force



The operator's force requires adjustment to suit door weight. Use lowest possible value to ensure the smooth function of safety feature.

Start the adjustment by putting the force potentiometer to middle position (= 50%) and fine-tune it after opening speed adjustment.

Note! Important: as less force as possible



# COMMISSIONING



## Adjust the opening speed.

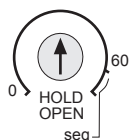
	Time (sec.)	Door weight (kg)			
		60	80	100	120
Door	800	2,7	3,2	3,5	3,9
width	1000	3,4	4,0	4,4	4,8
(mm)	1200	4,1	4,7	5,3	5,8
	1300	4,5	5,1	5,8	6,3

Minimum safe opening and closing times for door of various widths and weights are summarized in the table.

## Hold open times

Adjust first hold open time for delayed impulse and then hold open time for normal impulse.

### Adjusting the hold open time for delayed impulse



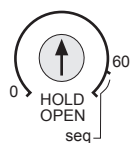
Entering the mode:

- Turn mode switch to AUTO position.
- Press TEACH button at least 3 seconds.
- In the programming mode green led is lit, yellow led is flashing 3 times, pause, 3 times, pause...
- Adjust the hold open time for delayed impulse (0...60 sec). Time starts when the door is in open position. Full right position (seq) of the potentiometer means that every other impulse either opens or closes the door.

Back to normal mode:

- Press TEACH button at least 3 seconds or wait 2 minutes.
- Turn mode switch to MAN position.

### Adjusting hold open time for normal impulse



Adjust the hold open time (0...60 s). Time starts when the door is in open position. Full right position (seq) of the potentiometer means that every other impulse either opens or closes the door.

Note! For safe operation, always use low force, speed and long hold open time.

## 10 Test the operation

- Turn mode switch to **AUTO**.
- Test the operation
- If the function is not desired, repeat steps 4 to 9.

## Resetting operator to factory settings (operator is moved to new door)

- Turn mode switch to **OPEN**.
- Push TEACH-button briefly. After that push TEACH-button 5 sec.  
Door open and closed position information is removed from the memory.

# A SAFE DOOR

The safety of the door operator is controlled by basic adjustments; operator force, speeds, and hold open times.

- The operator force is an important adjustment. A high value affects to the safety feature and also to its sensitivity.
- High speeds increases the energy transferred in the door causing it not stop correctly.
- With hold open times the distance from impulse device to door is preset.

1. Adjust low speeds.
2. Adjust the operator force to a low setting ensuring the safety feature activates on door moving.
3. Adjust the hold open times.

By following these basic procedures the operator is safe in operation.

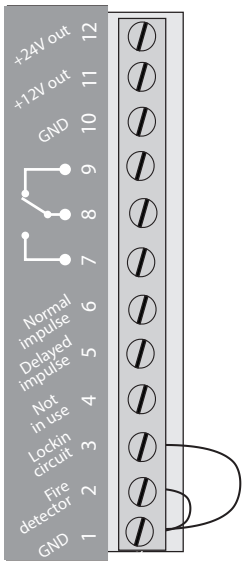
Note!!! High speeds and safety is only possible by fitting of Safety sensors.

## **REMEMBER!**

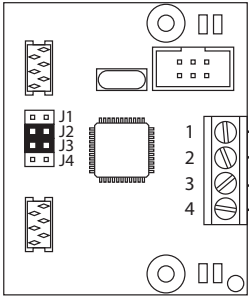
**With using safety sensors to opening and closings sides and activating self diagnostics, the door environment will be safe and meets the EN 16005-standards.**

**Note. fill the included EN 16005 checklist.**

# EXTERNAL CONNECTIONS



- 12 +24 VDC, 500 mA output
- 11 +12 VDC, 1,0 A output
- 10 Ground
- 7, 8, 9 Potential free relay output for lock drive
- 6 Normal impulse
- 5 Delayed impulse. Door will open after 1,0 seconds delay
- 4 Not in use
- 3 Locking circuit (Inhibits the opening if the lock bolt is out. Grounding this input allows the opening)
- 2 Fire detector
- 1 Ground



- 1 Monitoring
- 2 Opening side safetyimpulse
- 3 Closing side safetyimpulse
- 4 Ground

## Fire detector

Take connection loop between 1 and 2 away if fire detector is connected. Connect fire detector between 1 and 2 and check fire jumper (fire n.c.). After fire alarm, one manual opening is required to re-energise the operator to chosen program selector mode.

## Safety Sensor

The Safety Sensor is connected to terminals 1 and 4. More information on page 21. Safetysensor safetyimpulse outputs (white and violet) are equipped with normally closed (NC) relays. Choose jumpers J2 (opening side) and J3 (Closing side) on to switch on safety sensor monitoring.

**If you do not use safety sensors remember to short circuit 4-3-2 terminals and remove jumpers J2 and J3 on the card.**

- Do not strip any cables for unnecessary length. Loose wires may cause unwanted contacts.

# EXTERNAL CONNECTIONS

## Impulse inputs

The closing contact drive (NO) must be potential free. The impulse device, like a push button or motion sensor, must be installed within direct sight of the door. Maximum length of the impulse device cable is 30 meters. The total resistance of the control switch and its wiring must not exceed 100 ohm, when switch is closed.

Delayed impulse: delay = 1,0 seconds. When the operator receives the opening impulse, the lock is released immediately and door is opened after 1,0 seconds.

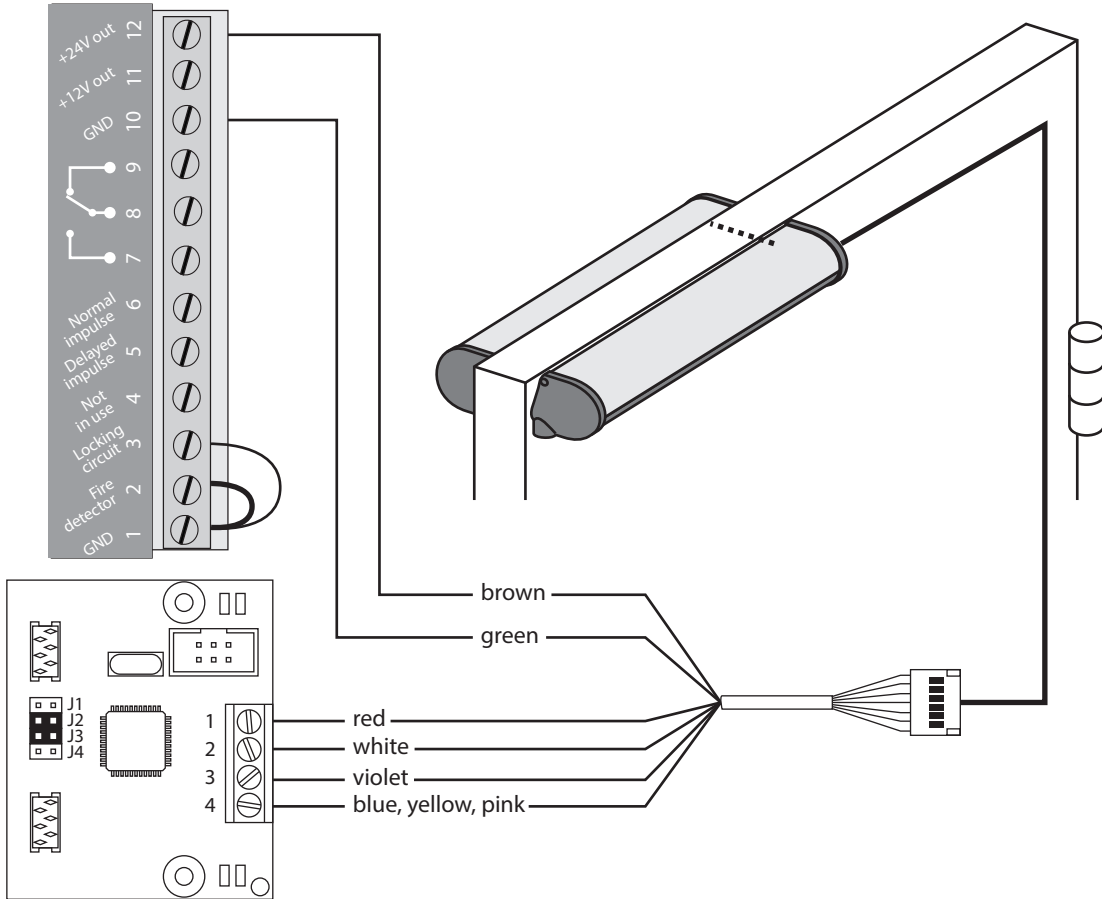
Normal impulse: Door is opened immediately.



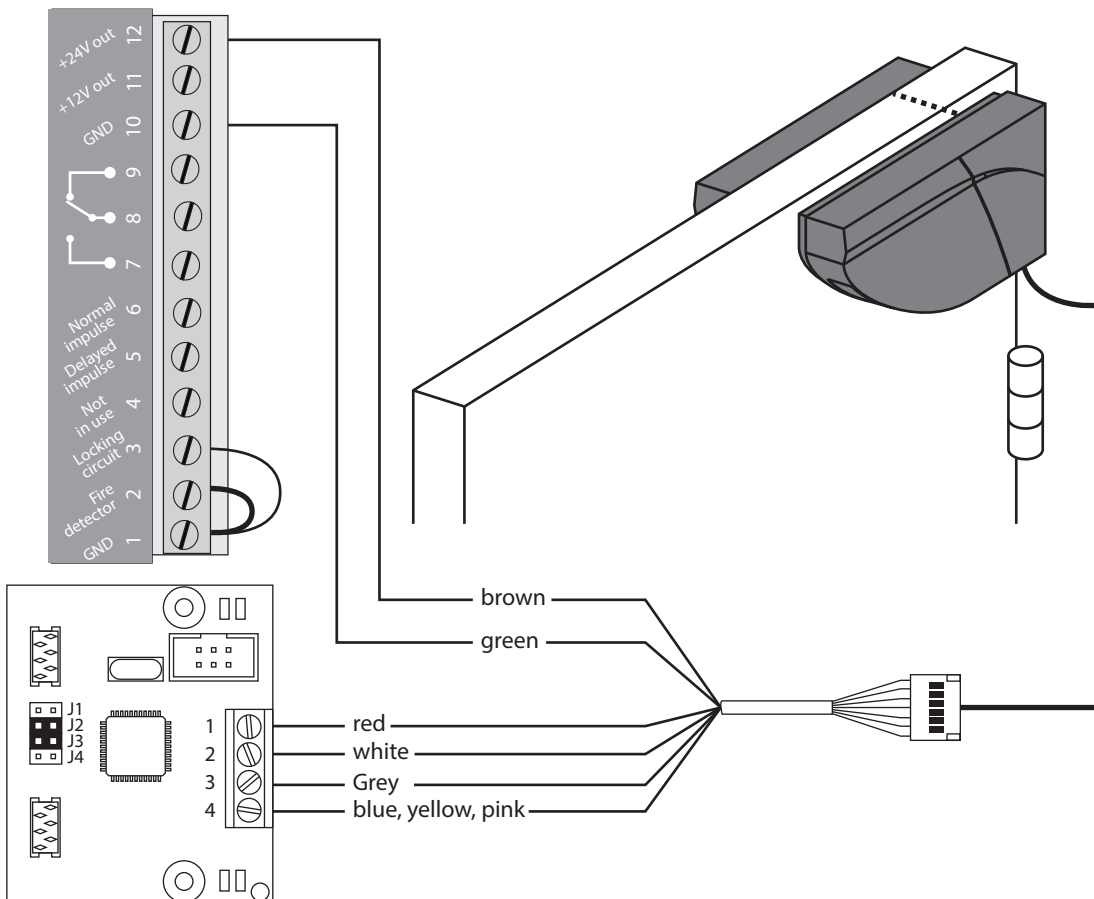
- Do not strip any cables for unnecessary length.  
Loose wires may cause unwanted contacts.

# CONNECTION EXAMPLES

## Safety sensor DA004 and DA005

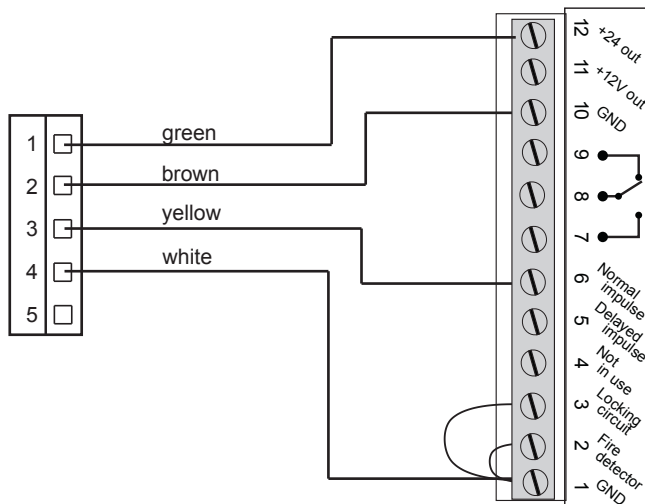
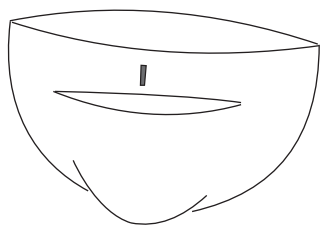


## Safety sensor DA007

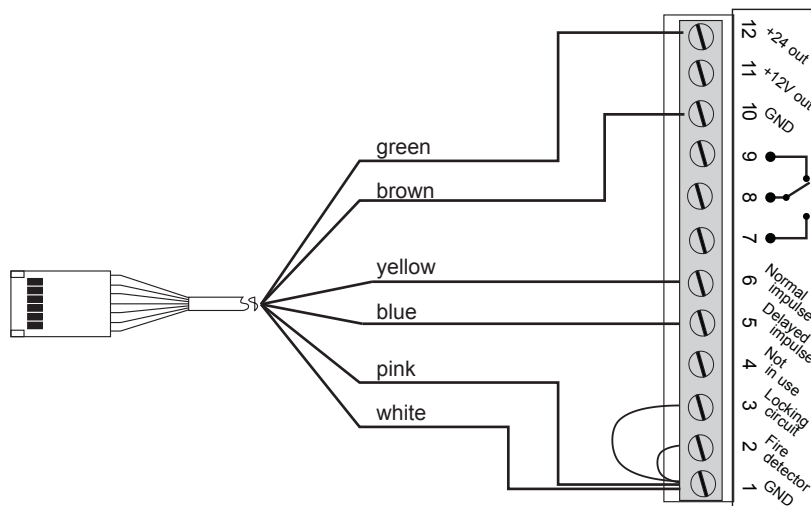
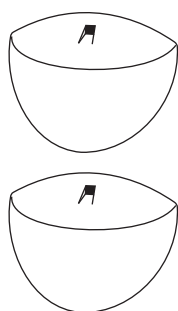


# CONNECTION EXAMPLES

## DA061 Microwave motion sensor

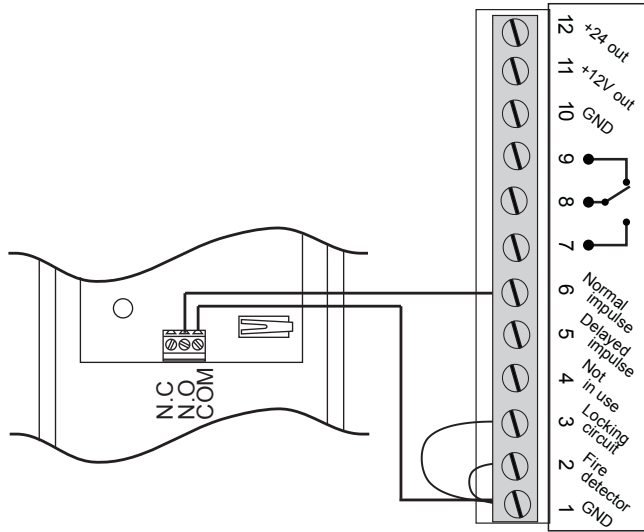


## DA063 Microwave motion sensor

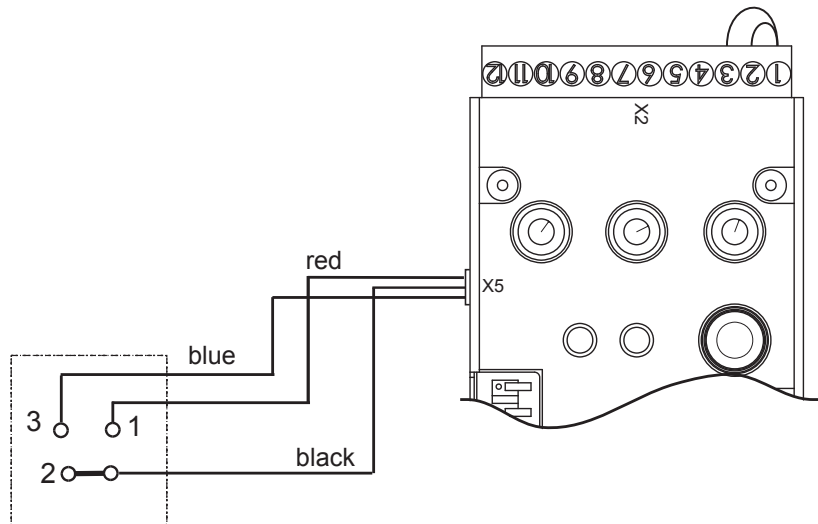
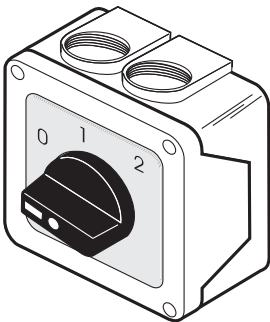


# CONNECTION EXAMPLES

## DA033 Elbow switch



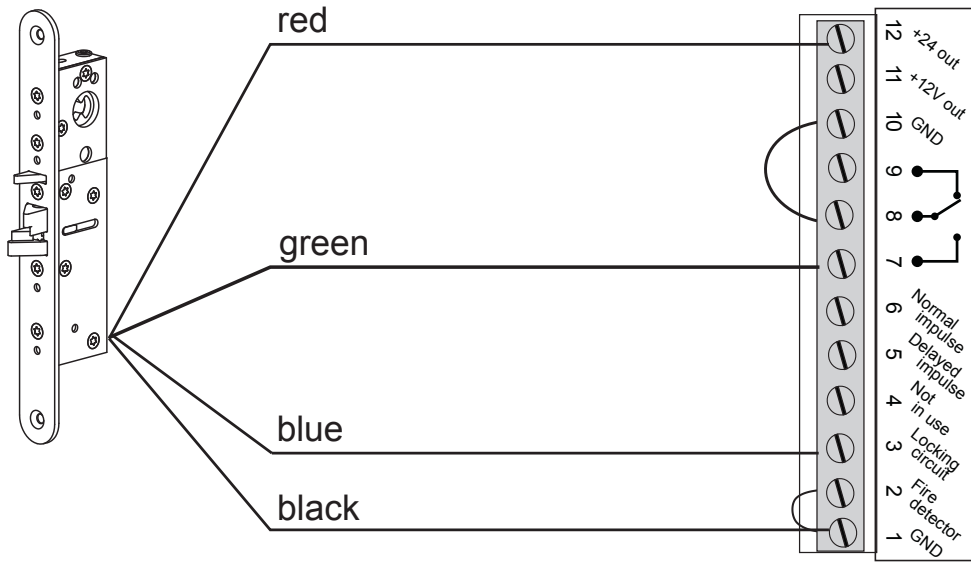
## DA039 and DA049 rotary switch



MANUAL = no connection  
 AUTOM = 2...1  
 AUKI = 2...3

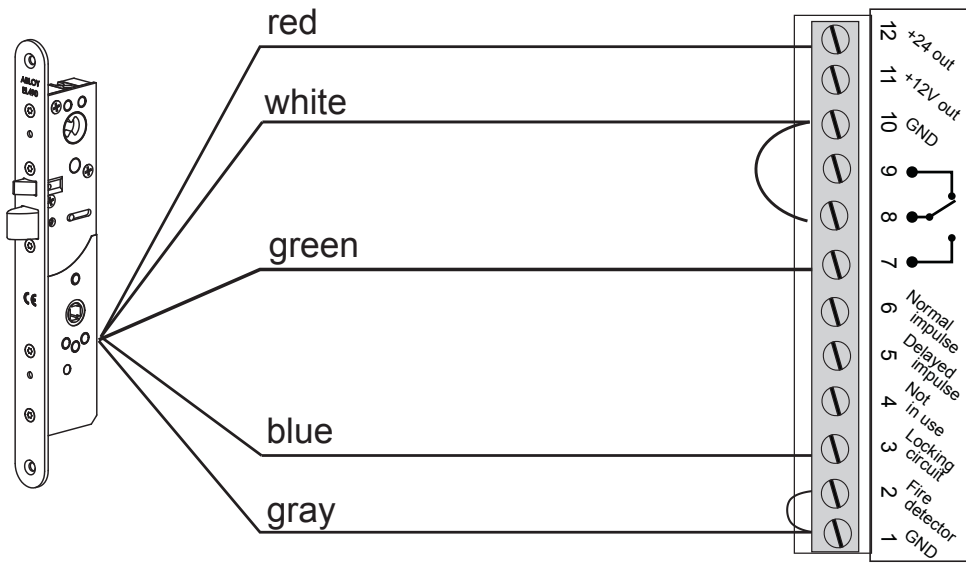
# CONNECTION EXAMPLES

## Electric locks EL402, EL404, EL502



**NOTE!** Not to be installed in doors with seal force. Bolt and trigger bolt have to be lubricated when lock is installed and when necessary.

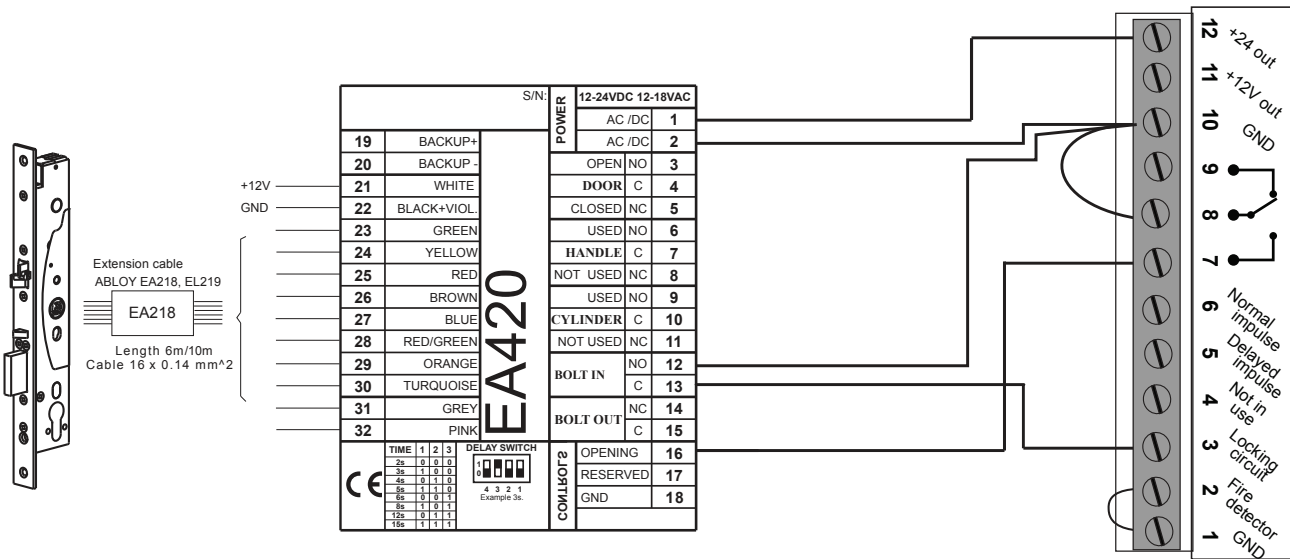
## Motor locks EL490, EL590





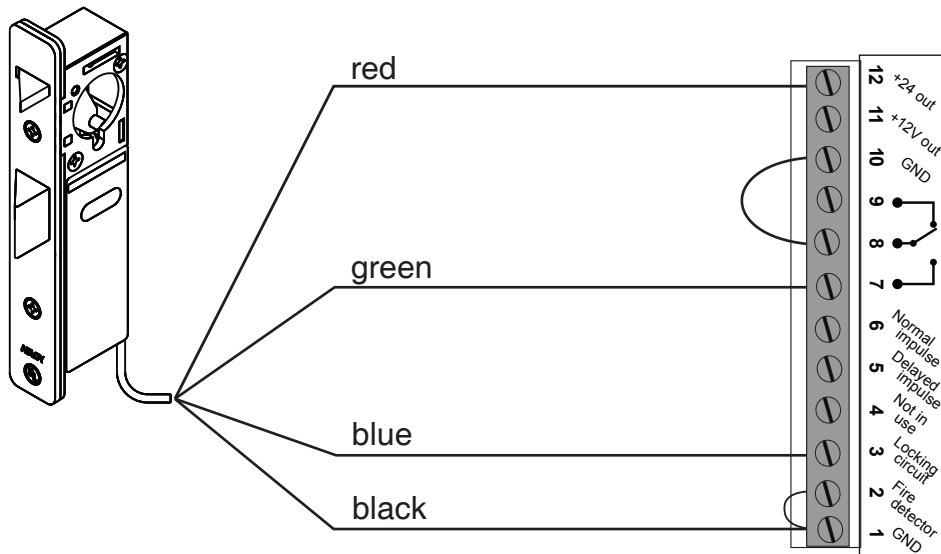
# CONNECTION EXAMPLES

## Motorlocks EL420, EL520



EL520 consumes max. 600mA current.

## Electric lock EL410



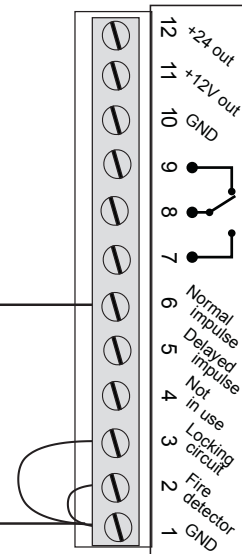
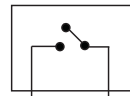
# CONNECTION EXAMPLES

## Rebated doors

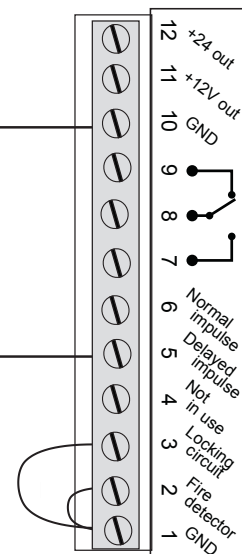


### ACTIVE DOOR


Impulse device



### PASSIVE DOOR

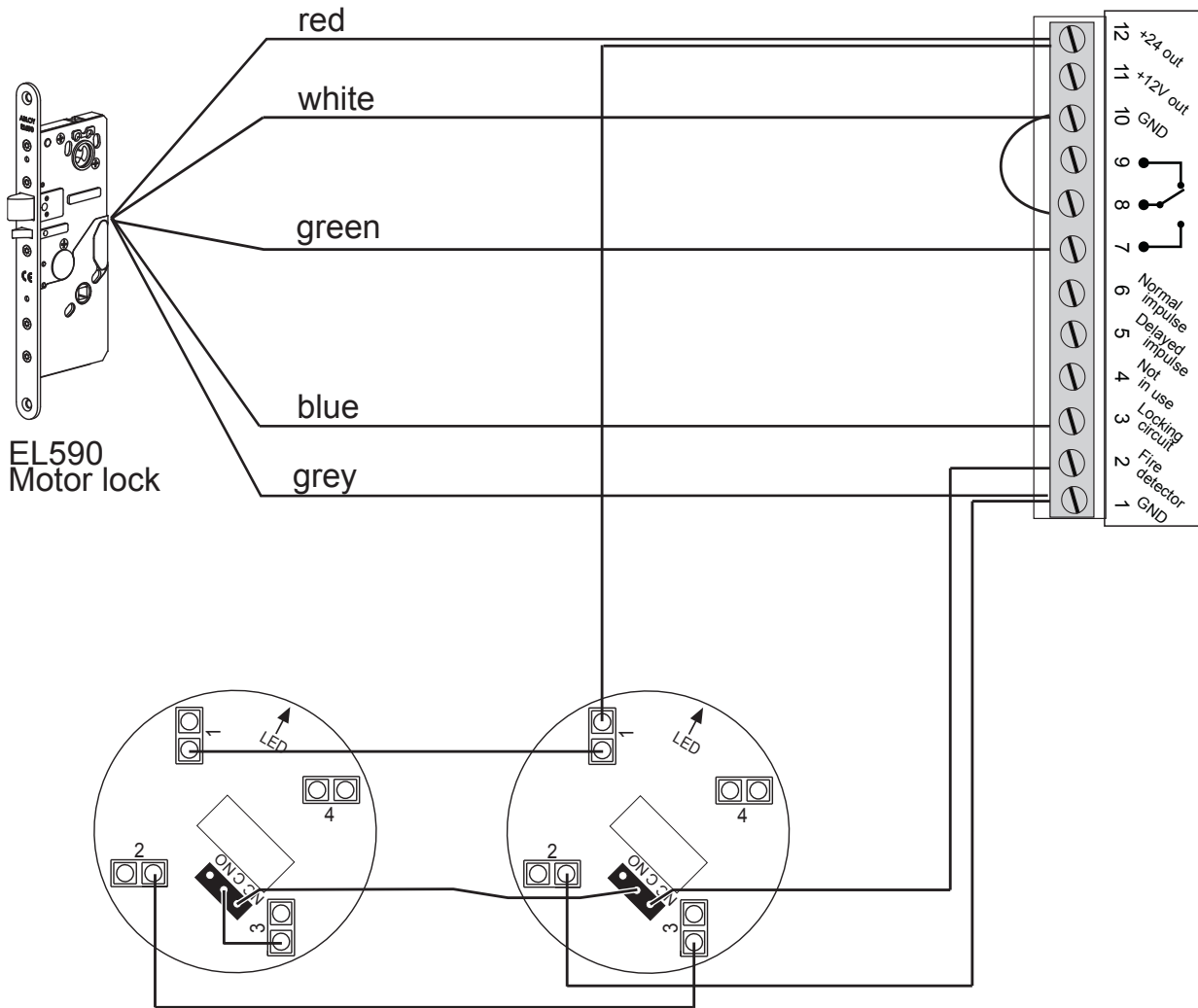


Passive door opens after constant delay 1,0 seconds.  
Adjust the hold open time for passive door 1 - 2 seconds shorter than active door.

 - Mechanical coordinator ensures that double doors close correctly!

# CONNECTION EXAMPLES

## Fire door system



### OPERATION:

When detector reacts, it's relay switches on. Then the GND (-) is disconnected from the operator's control unit (connector 2). The operator doesn't open the door from impulse but it have to be opened manually. The operator closes the door after manual opening.

In fire door use the operator have to be connected to external battery back-up (24VDC, min. 3A).

In case of fire -> the door closes

After fire alarm, one manual opening is required to re-energise the operator to chosen program selector mode.



A mechanical door coordinator is needed to ensure correct closing in double fire doors!

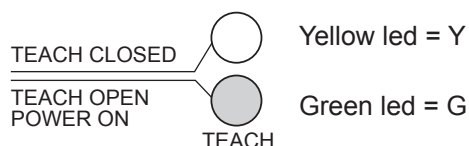
## SELF DIAGNOSTICS (CONTROL UNIT)

The means of diagnostic features is to

- detect malfunctions
- try to take care of safety during malfunction
- get the operator to recover from the defected state

In case the result of the diagnostics shows unrecoverable malfunctions, the door operator is considered as unsafe, and the door is set free for manual use. The user is informed by blinking both of the LED's in control unit.

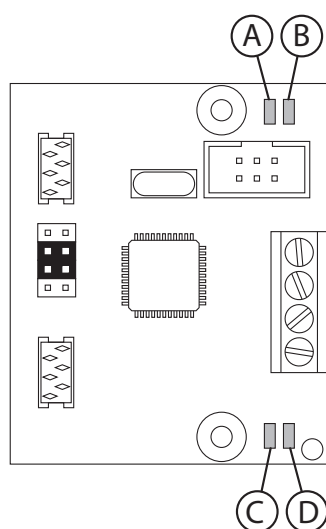
### Ohjauskeskuksen LED:it



Indication	Possible fault	Corrective user interventions in defined order
<b>G</b> not lit <b>Y</b> not lit	No power. Faulty power supply unit. Faulty control board.	<ol style="list-style-type: none"> <li>1. Check the mains.</li> <li>2. Remove 12 pin connector from the control board.</li> <li>3. Measure the voltage from 5 pin connector, connection points 1 and 3. If voltage is under 24VDC, change the power supply unit</li> <li>4. Measure the voltage from 12 pin connector, +24V out against GND. If voltage is not 24 VDC, change the control board.</li> </ol>
<b>G</b> lit <b>Y</b> lit	The door “close” and “open” positions are not successfully taught. Impulse device is active all the time. Fire detector is active.	<ol style="list-style-type: none"> <li>1. Teach the door open and close positions.</li> <li>2. Check all impulse devices and connections.</li> <li>3. Check fire detector connection and fire N.C. jumper.</li> </ol>
<b>G</b> lit <b>Y</b> flas	Flash short...short...short...: 1000 ohm resistor is missing or cable of safety sensor is cut.  Flash short...long...short...long...: Safety sensor is active or cable of safety sensor is short-circuited.	<ol style="list-style-type: none"> <li>1. Check that 1000 ohm resistor is connected in control board or in safety sensor.</li> <li>2. Check that cables are not damaged.</li> </ol> <ol style="list-style-type: none"> <li>1. Move obstacle from safety sensor detection area.</li> <li>2. Check that cables are not damaged.</li> </ol>
<b>G</b> flash <b>Y</b> flash	Internal fault in the control board. Door motion is stopped.	<ol style="list-style-type: none"> <li>1. Switch main switch off for 10 seconds.</li> <li>2. Check that all applicable jumpers are in place (one of the two arms is selected, “single” is selected).</li> <li>3. Teach the door open and close positions.</li> <li>4. Change a spare control board.</li> </ol>
<b>G</b> flash <b>Y</b> flash alternates	Internal fault in the position sensor board. Door motion is stopped.	<ol style="list-style-type: none"> <li>1. Switch main switch off for 10 seconds.</li> <li>2. Check that all applicable jumpers are in place (one of the two arms is selected, “single” is selected) Check position sensor’s cable and connector.</li> <li>3. Teach the door positions.</li> <li>4. Change a spare position sensor.</li> </ol>

## SELF DIAGNOSTICS (SAFETYSENSOR-UNIT)

Indication	Possible fault	Corrective user interventions in defined order
<b>A</b> lit	Normal state of safetysensor closing side	
<b>C</b> lit	Normal state of safetysensor opening side	
<b>B</b> lit	Closing side safetysensor alert	1. Check sensor field for obstacles 2. Check the condition of safety sensor cables.
<b>D</b> lit	Opening side safetysensor alert	1. Check sensor field for obstacles 2. Check the condition of safety sensor cables.
<b>A</b> flash <b>B</b> flash <b>C</b> flash <b>D</b> flash	Monitoring error	Check safetysensor connections



## MAINTENANCE

Requirements for trouble-free use of the operator

Installation, commissioning and maintenance is made by trained and qualified technician.

Door leaf is moving sensitively and locking works well.

Regular annual services are made:

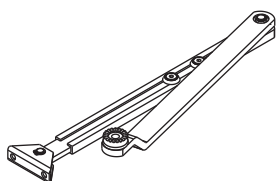
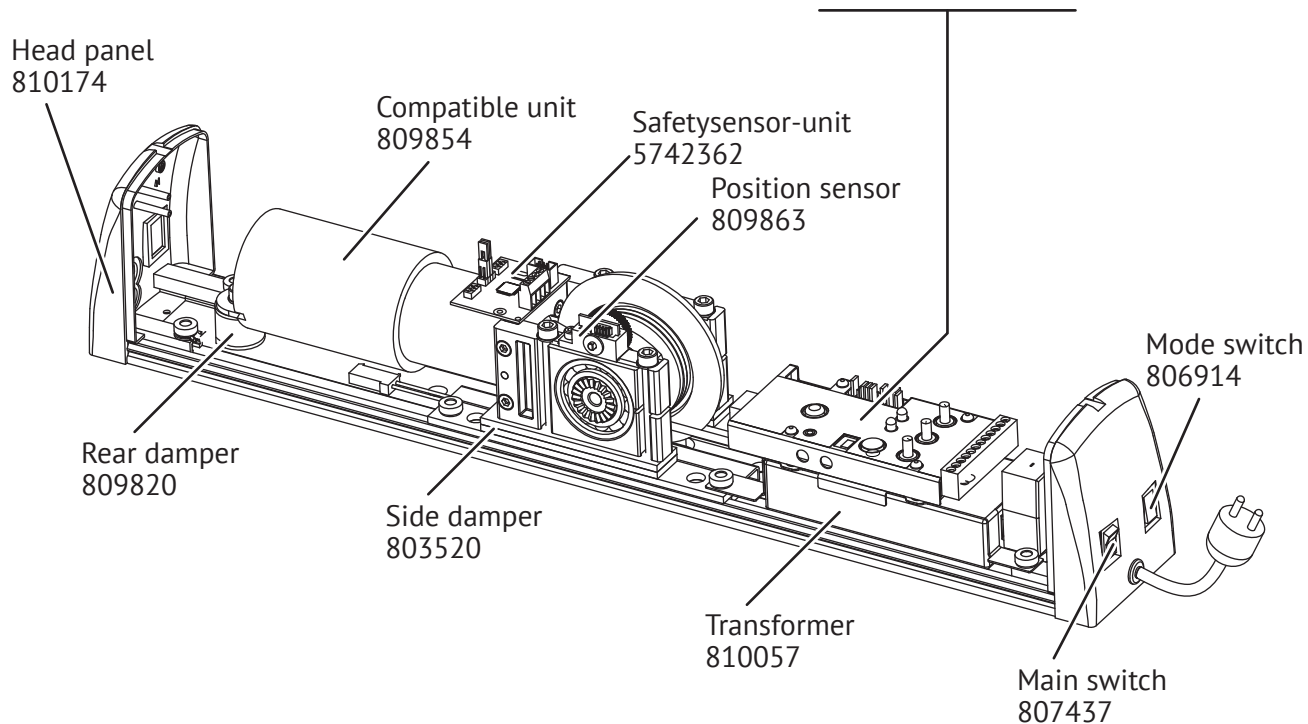
- Under 100 openings per day; service once a year
- 100 ... 500 openings per day; service two times a year
- Over 500 openings per day; service 3... 4 times a year

Inspections made in the service:

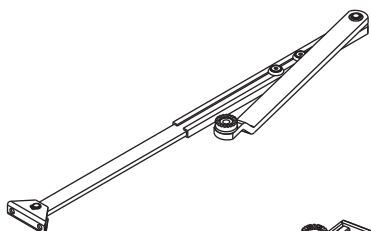
- Greasing of the bevel gears, use for example Molykote 165 LT
- Fixing of the operator and arm
- Function and adjustments of impulse and safety devices
- Programming and adjustments of the operator

# DA460 SPARE PARTS

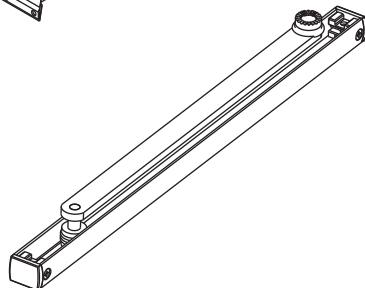
Control unit  
 809877 – serial number of the operator up to 9095  
 922067 – serial number greater than 9096 (operator with safety sensor unit)



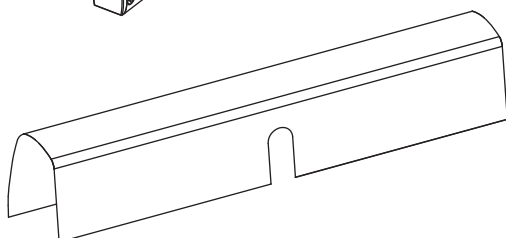
DA147



DA148



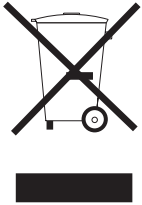
DA149



Cover aluminium 410358

Cover white 410357





**This product contains materials, such as electronics, which require specialist recycling techniques.**

**When the product is taken out of use, disassemble it and sort and recycle the different materials as per valid recycling instructions.**

**We reserve the right to make alterations to the products described in this leaflet.**



ABLOY secures people, property, and business operations on land, at sea, and in the air – in all circumstances.

ASSA ABLOY is the global leader in door opening solutions, dedicated to satisfying end-user needs for security, safety and convenience.

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