Motorised WARP

Service Manual
Issue 0.9

ADB
Lighting Technologies

Foreword

This version 0.9 of the Service Manual for Motorised WARP precedes the complete manual for the Motorised WARP.

The latest version of ADB Service Manuals is available from the ADB website.
www.adblighting.com

For WARP and Motorised WARP
www.adblighting.com > ADB Products > Theatre Luminaires > WARP Motorised

The latest software version is available on the ADB TTV R&D web site.

http://adbttv.dyndns.org/index.php?title=Warp&article=warp

Personalities for various lighting control desks can be downloaded from the ADB website.
www.adblighting.com

Zaventem, 15 June 2006

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1 Introduction

About This Guide

This manual is for the service and maintenance of WARP/M. It is intended to serve as a reference for personnel who are trained in the service and repair of the WARP/M.

WARP/M is warranted for one (1) year from the date of purchase. ADB assumes no responsibility for damage to units occurring from improper service or being adjusted contrary to these instructions. These units will not be covered by this warranty.

The following procedures are designed to be performed by a qualified service technician. This document is intended as a guide and does not provide the detail necessary for a novice to make repairs.

“Spare Parts Kit” list contains the parts required to make repairs described in this document.

Always disconnect the power to the system before dismantling any component to avoid shorts and possible component damage.

2 Level Maintenance Description

2.1 Level Description

The following chart describes three Maintenance levels:

Level	Description	Documentation
Level 1	Who: ▪ Users ▪ Theatre Technician Action: ▪ Usual Maintenance ▪ Cleaning ▪ Head Adjusting ▪ Change Fuses ▪ Clean IR Sensor ▪ All access into Web Page ▪ Load a new Software	User Manual
Level 2	Who: ▪ Technician with ADB Training Action: ▪ Access to all functions for normal operator ▪ Replace mechanical sub-assembly ▪ Replace Board ▪ Change Ring Compartment ▪ Send Back sub-assembly to ADB After Sales	User Manual + Service Manual
Level 3	Who: ▪ ADB After Sales or equivalent Action: ▪ All access	Internal ADB Documentation

This guide is for qualified service technician level 2 and level 3.
To become a qualified service technician level 2 a special training is necessary.
Information about the level 2 trainings, please ask your local dealer or contact ADB.

3 Tools

Adequate tools are required to service the WARP/M. ADB assumes no responsibility for damage to units occurring from improper tools. These units will not be covered by this warranty.

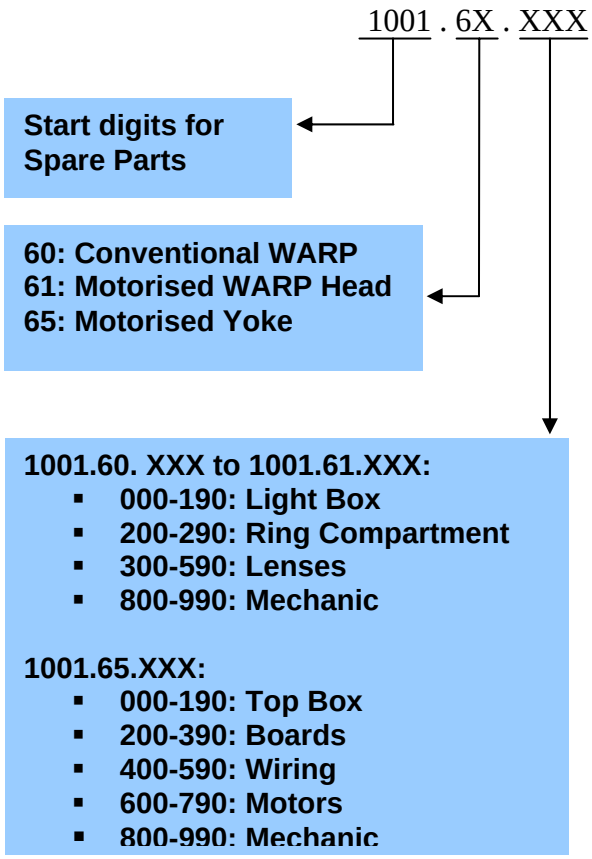
List of tools:

- Screwdriver Philips Standard # 0
- Screwdriver Philips Standard # 1
- Screwdriver Philips Standard # 2
- Screwdriver Positive Standard # 0
- Screwdriver Positive Standard # 1
- Screwdriver Positive Standard # 2
- Screwdriver Flat 1
- Screwdriver Flat 2
- Screwdriver Flat 3
- Nut driver set metric
- Hex. driver set metric
- Pliers
- Cutter, pliers wrench set

4 Spare Parts

4.1 Code Description

The chart below describes how the "**Spare part numbers"** are build-up.



Example : 1001.61.000
1001 => spare part
61 => Motorised WARP Head
000 => Light Box

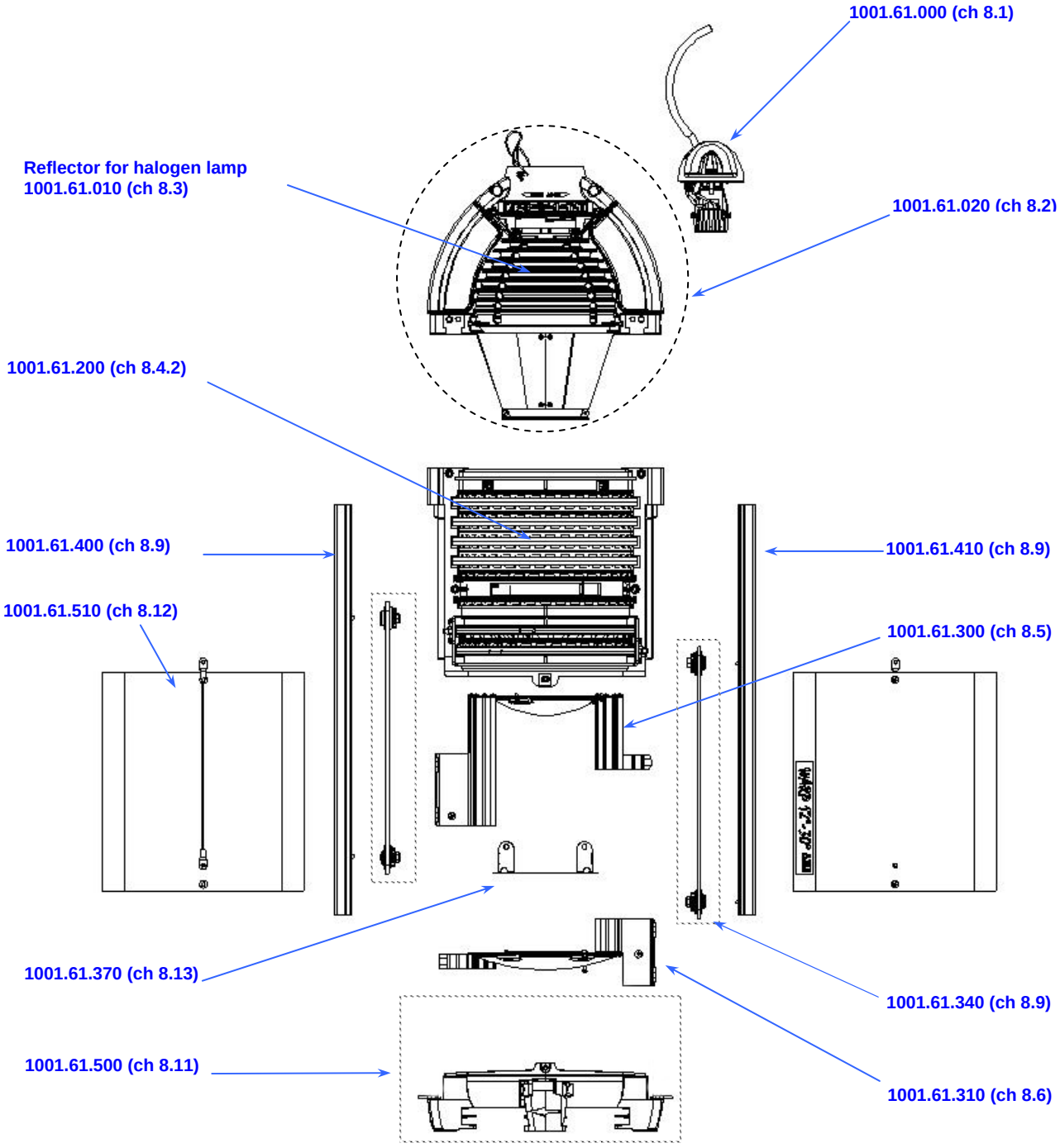
4.2 Spare Parts for the Motorised WARP Head

Warning: Spare parts for Motorised WARP head (luminaire) are different from conventional WARP.

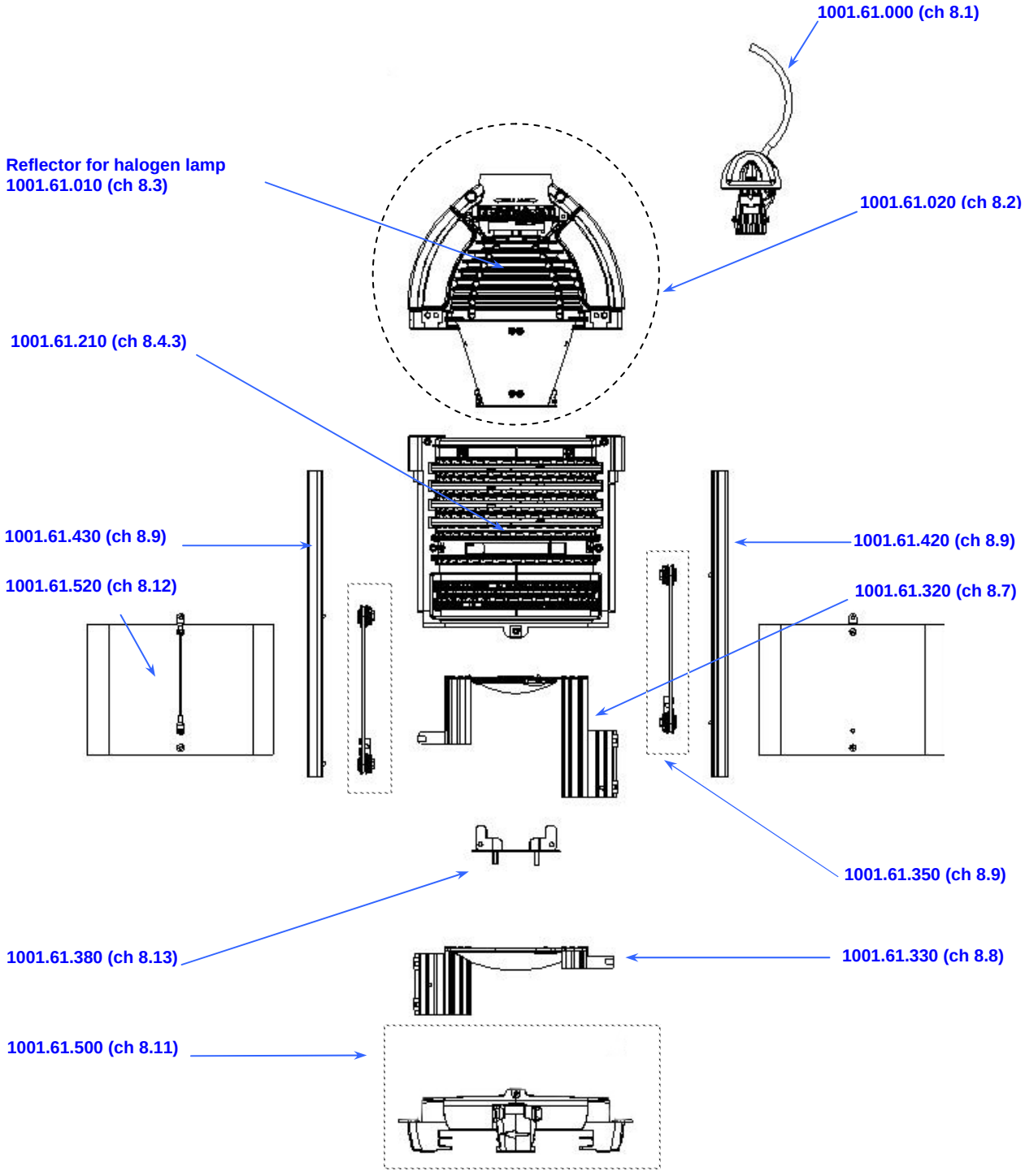
The chart describes the sub assembly, the code number and the chapter refer to the technical information in this manual.

Sub Assembly	Code Number	Chapter
WARP Lamp Assembly	1001.61.000	8.1
Reflector for halogen lamp	1001.61.010	8.3
Complete Light Box	1001.61.020	8.2
Sub Assembly	Code Number	Chapter
Complete Ring Compartment 12°-30°	1001.61.200	8.4.2
Complete Ring Compartment 22°-50°	1001.61.210	8.4.3
Sub Assembly	Code Number	Chapter
Rear Lens 12°-30° Kit	1001.61.300	8.5
Front Lens 12°-30° Kit	1001.61.310	8.6
Rear Lens 22°-50° Kit	1001.61.320	8.7
Front Lens 22°-50° Kit	1001.61.330	8.8
Belt Kit for WARP/M 12°-30°	1001.61.340	8.9
Belt Kit for WARP/M 22°-50	1001.61.350	8.9
Teflon Ring Kit	1001.61.360	8.10
Diaphragm 12°-30°	1001.61.370	8.13
Diaphragm 22°-50°	1001.61.380	8.13
Sub Assembly	Code Number	Chapter
Focus Arm 12°-30°	1001.61.400	8.9
Zoom Arm 12°-30°	1001.61.410	8.9
Focus Arm 22°-50°	1001.61.420	8.9
Zoom Arm 22°-50°	1001.61.430	8.9
Sub Assembly	Code Number	Chapter
Colour Filter Cassette	1001.61.500	8.11
Lenses Cover 12°-30°	1001.61.510	8.12
Lenses Cover 22°-50°	1001.61.520	8.12

4.2.1 Spare Parts for WARP Motorised head 12°-30°



4.2.2 Spare Parts for WARP Motorised head 22°-50°



4.3 Spare Parts for the Motorised Yoke

The chart describes the sub assembly, the code number and the chapter refer to the technical information in this manual.

Sub Assembly	Code Number	Chapter
Top Box Front panel Assembly	1001.65.000	7.5
24 v DC Power Supply	1001.65.010	7.4
Top Box Plate	1001.65.020	7.2
Top Box Handle	1001.65.030	7.11
Sub Assembly	Code Number	Chapter
Pan & Tilt Motordriver + Cooling Assy	1001.65.200	7.8
Left Motordriver + Cooling Assy	1001.65.210	7.9
Right Motordriver + Cooling Assy	1001.65.220	7.7
Kit Magnet Sensor	1001.65.230	7.12 to 7.15
Kit PCB Lamp Control	1001.65.240	7.10
Kit Infra Red Sensor Right	1001.65.260	7.26
Kit Infra Red Sensor Left	1001.65.270	7.26
Kit XLR-4 pts	1001.65.280	7.3
Top Box Board	1001.65.290	7.6
Fuses Kit	1001.65.300	6.3.1
Sub Assembly	Code Number	Chapter
Main Power Supply Cable	1001.65.400	6.1
Lamp Cable	1001.65.410	6.1
Cable Kit Top Box	1001.65.420	6.1
Kit WARP Link	1001.65.430	6.1
WARP Link 1	1001.65.431	6.1
WARP Link 2	1001.65.432	6.1
WARP Link 3	1001.65.433	6.1
Kit IR Sensor Cable	1001.65.440	6.1
Kit AMR Sensor Cable	1001.65.450	6.1
Kit cable loom Right Motor	1001.65.460	6.1
Kit cable loom Left Motor	1001.65.470	6.1
Kit cable loom Pan&Tilt Motor	1001.65.480	6.1
Kit XLR 4 pts Cable	1001.65.490	6.1
Kit Cable Lamp Control	1001.65.500	6.1
Sub Assembly	Code Number	Chapter
Pan Motor Assy	1001.65.600	7.23
Tilt Motor Assy	1001.65.610	7.19
Zoom Focus Motor Assy	1001.65.620	
Shutter Motor Assy Bottom	1001.65.630	
Shutter Motor Assy Top	1001.65.640	
Gobo Motor Assy Top	1001.65.650	
Gear Ring Kit	1001.65.660	
Pan Belt	1001.65.670	7.25
Tilt Belt	1001.65.680	7.16
Sub Assembly	Code Number	Chapter
Pan & Tilt Pulley	1001.65.800	7.23
Coarse Gear with Magnet	1001.65.810	7.21 – 7.25
Pan Axis	1001.65.820	7.25
Tilt Axis	1001.65.830	7.20
Motor Wing Covers	1001.65.840	7.3
Top Yoke cover	1001.65.850	7.1
Complete Yoke Structure	1001.65.870	

Connector cable Power	1001.65.880	7.17
Motorised right arm	1001.65.890	7.18

5 Trouble Shooting

5.1 Problems with the lamp

This Trouble shooting for WARP without Internal Dimmer

Trouble/Symptom	Origin	Solution
Lamp flasher at power On	Normal on old Version NO	Start the WARP/M with lamp Dimmer at 0%
Lamp stays off after power On	No Lamp NO	Put a Lamp in
	No good inserted lamp NO	Fully the lamp insert
	No Power from Dimmer NO	Connect to an external dimmer
	No Direct Power NO	Connect to mains
	Lamp OFF on Web page NO	See Web Page (User Manual)
	Lamp OFF on Display NO	Go to Menu Man/Lamp/AUTO or ON into Display
	Relay PCB is faulty NO	Change Relay PCB (see chapter 7.10)
	Pan & Tilt Board Lost Software (LEDs on the board stay off) NO	Replace Pan &Tilt Board(see chapter 7.8)
	Topbox board never Starts	Replace topbox board (see chapter 7.5 and 7.6)
	No 24 V Power Supply (Power LED is off)	Replace power supply board (see chapter 7.4)

5.2 Problems with Top-Box and Display

Trouble/Symptom	Origin	Solution
No Display after 1 min. power On	Main Supply Fuse is blown  24 V Cable Unplugged or Ground and +24 v wire inverted (see chapter 6.1 for electrical connection)  24 V Supply Out of order (see chapter 6.3.1 to verify voltages)  Top Box Board Out of order	Control and Change Main Fuse (see user Manual) Control 24 V power supply Connection Replace 24 V power supply (see chapter 7.4) Replace top Box Board (see chapter 7.5)
No Control of the WARP by Art Net	Bad Ethernet Connection  Bad Ethernet Configuration	Control and replace external Data Cable (Ethernet LED must flicker) Control Sub-net and Universe on the WARP Web Page

5.3 Problems with Pan & Tilt

Important: On this chapter, consider that Top Board and 24V Power Supply are not damaged

Trouble/Symptom	Origin	Solution
Pan "or" Tilt don't Move	Move the yoke manually and control if there is motor resistance NO Pan "or" Tilt Fuse is warm NO Pan & Tilt Board is out of order	 Replace warm fuse (see chapter 6.3.3) Replace Pan & Tilt Board
Pan "or" Tilt is not Stable	Bad Calibration of Pan or Tilt NO One of the 2 sensors (fine and coarse) is disconnected NO One of the 2 sensors (fine and coarse) is damaged NO Pan and Tilt Board is damaged	Re- Calibrate Pan & Tilt Control all Sensor connections and wiring Replace Fine and Coarse AMR sensors (See chapter 7.12 for Pan and 7.13 for Tilt) Replace Pan & Tilt Board (see chapter 7.8)
Pan "or" Tilt make noise at 0 or Full after resetting	Bad Calibration of Pan or Tilt NO Wiring problem between AMR Sensors and Board NO One of the 2 sensors (fine and coarse) is damaged	Re- Calibrate Pan "or" Tilt Control and change damaged wire Replace Fine and Coarse AMR sensors (See chapter 7.12 for Pan and 7.13 for Tilt)

5.4 Problems with Shutters

Important: On this chapter, consider that Top Board and 24V Power Supply are working properly

Trouble/Symptom	Origin	Solution
Some shutters don't respond	WARP Link 1 Damaged  Right Board is damaged (orange LED is off)  Left Board is damaged (orange LED is off)	Control and replace WARP Link 1 Replace Board 1001.65.220 (see Chapter 7.7) Replace Board 1001.65.210 (see chapter 7.9)
Calibration on Shutters A and D always fails	Too much dust or oil (from smoke machine)  **Right** IR sensor is disconnect or **Right** IR sensor cable is damaged  A and D IR Sensor is damaged	Clean all IR sensors (right and left) with air cleaner or alcohol Control connection and replace cable if necessary Replace **Right** IR sensor (see chapter 7.26)
Calibration on Shutters B and C always fails	Too much dust or oil (from smoke machine)  **Left** IR sensor is disconnect or **Left** IR sensor cable is damaged  A and D IR Sensor is damaged	Clean all IR sensors (right and left) with air cleaner or alcohol Control connection and replace cable if necessary Replace **Left** IR sensor (see chapter 7.26)

Trouble/Symptom	Origin	Solution
One shutter has always bad reset (*but no error message on display*)	Bad Calibration  Dusty sensor  Silver white index mark on the ring is erased  The motor wing is not well placed (IR sensor not in front of Ring Index)  Motor of the failed shutter is mechanically forced (noises in motor gear, motor slips or skids)	Calibrate the failed shutter Clean all IR Sensors Use special silvered paint and a small brush to paint the index Place the motor correctly (see chapter 7.22.2) Place correctly the corner plate behind motors: small mechanical clearance behind all 3 motors (See Chapter 7.28)

5.5 Problems with accessories

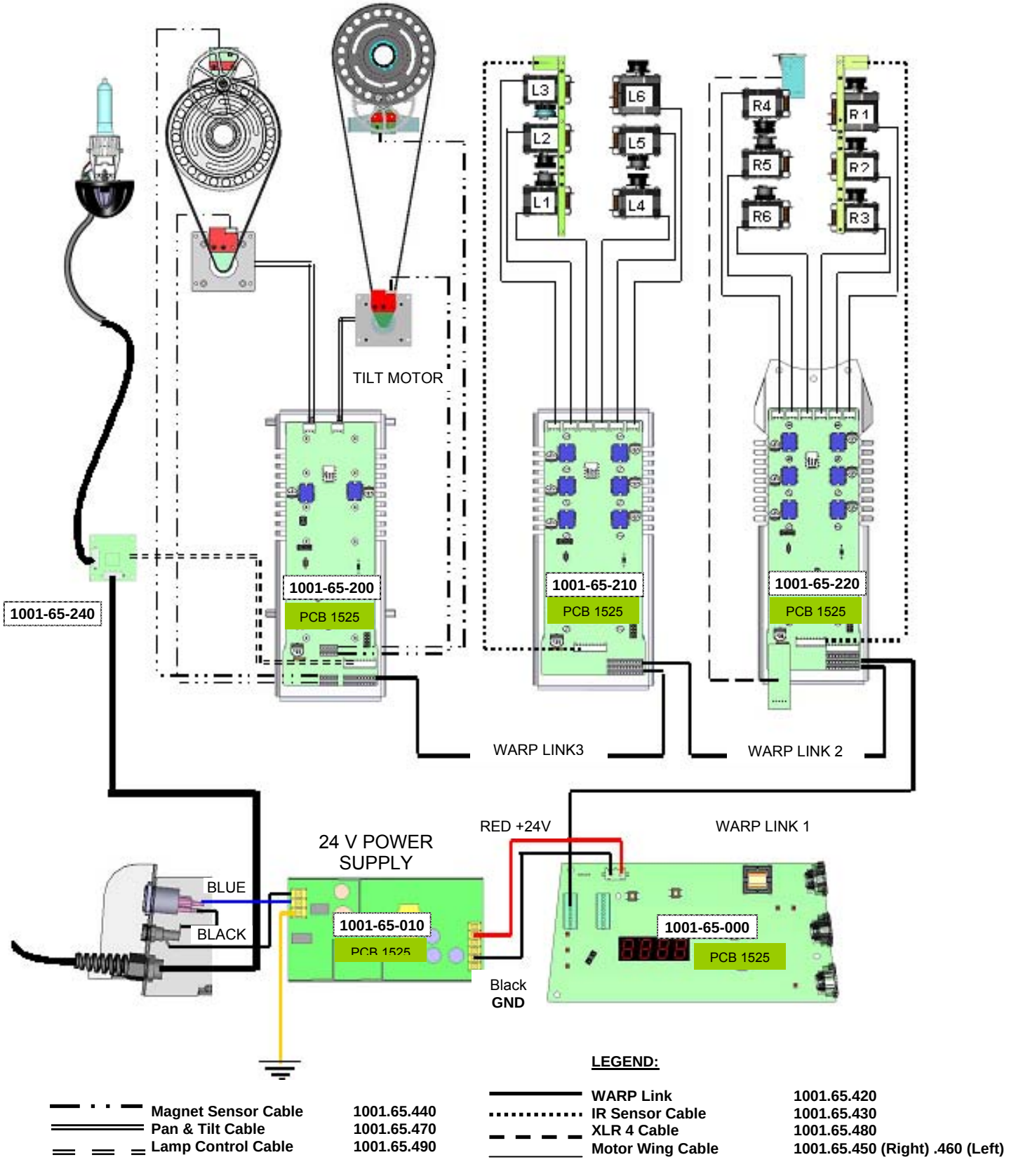
Trouble/Symptom	Origin	Solution
Calibration on one Accessory always fails	Too much dust or oil (from smoke machine)  **Right or Left** IR sensor is disconnected **Right or Left** IR sensor cable is damaged  Accessory IR Sensor is damaged	Clean all IR sensors (right and left) with air cleaner or alcohol Control connection and replace cable if needed Replace **Right** or **Left** IR sensor (see chapter 7.25)
One Accessory has always bad reset (*but no error message on display*)	Bad Calibration  Dusty sensor  Index on the ring is erased  The motor wing is not well placed (IR sensor not in front of ring Index)  Motor of the failed Accessory is mechanically forced (noises in motor gear, motor slip or skid)	Calibrate the failed Accessory Clean all IR Sensor Use special silvered paint and a small brush to paint the index Place the motor correctly (see chapter 7.22.2) Place correctly the corner plate behind motors: small mechanical clearance behind all 3 motors (see Chapter 7.28)

5.6 Problems with lenses

Trouble/Symptom	Origin	Solution
Front Lens has poor repeatability	One lens cover is inversed and the Safety Cable blocks the Lens 	Replace correctly the lens cover
	Plastic gears between Motor and Ring are damaged 	Replace All Gears on the Front Lens Motor (See chapter 7.29)
	Motor of the front Lens is mechanically forced (noises in motor gear, motor slips or skids)	Place correctly the corner plate behind motors: small mechanical clearance behind all 3 motors (see Chapter 7.28)

6 Technical Description

6.1 Electrical Description – Interconnection diagram



6.2 Explanation of the interconnection diagram

WARP/M has 14 “3 phase steppers”. Those steppers are controlled by 3 drive-boards (PCB 1525). The position of the steppers for pan/tilt is detected by Magneto-resistance sensors; for the other functions by Opto sensor. All control and feedback information is centralized in the Main processor board; top box (PCB 1525).
The communication, between the different parts is called WARP link protocol.

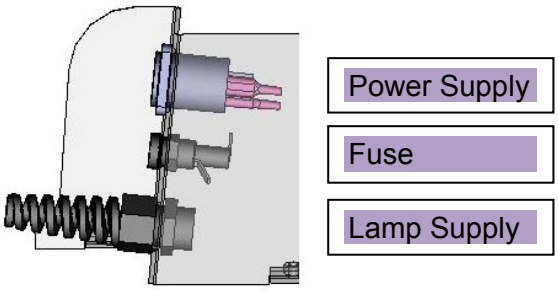
Below each part in detail:

6.2.1 24 V Power Supply

6.2.1.1 Description

SPARE PART CODE	1001.65.010
LOCATION	TOP BOX
LINKS	In: Mains Voltage
	Out: Top Board

The WARP/M is powered with 198 - 264 V AC, +/- 50/60 Hz (optional: universal power supply 90 – 264 V, +/- 50/60 Hz). The connector is Neutrix PowerCon locking.
The WARP/M is protected with a fuse of 6.3 A 250V SPT 5 x 20 mm.
The lamp power is coming from an external dimmer.



6.2.1.2 How to know that the 24 V Power Supply present.

It the “power” LED is on at power up of the WARP/M the 24 V supply is present. If the power LED is off the 24 V power supply is not available. (refer to chapter 7.4.)

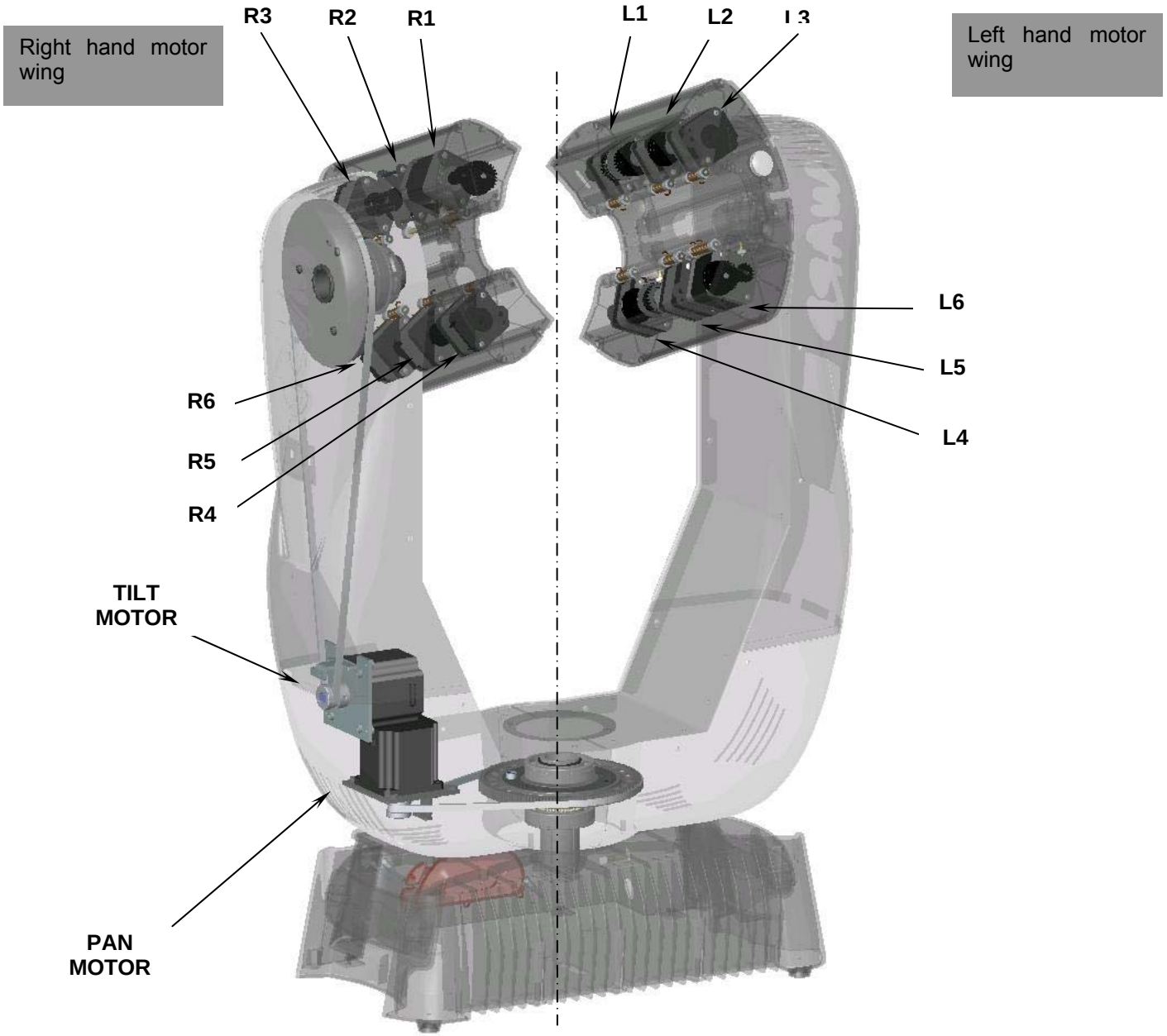
For the early production units (production batch 1 to 10) the LED will only light up after the booting of the WARP/M (+/- 1 min). A quick way to check if the 24 V power supply is present is trying to move the yoke just after power on. If Pan & Tilt Motors give resistance, the 24 V is present; if not, control the supply (refer to chapter 7.4.).

6.2.2 Motors functionalities

The drawing below defines each motor with his associated function.

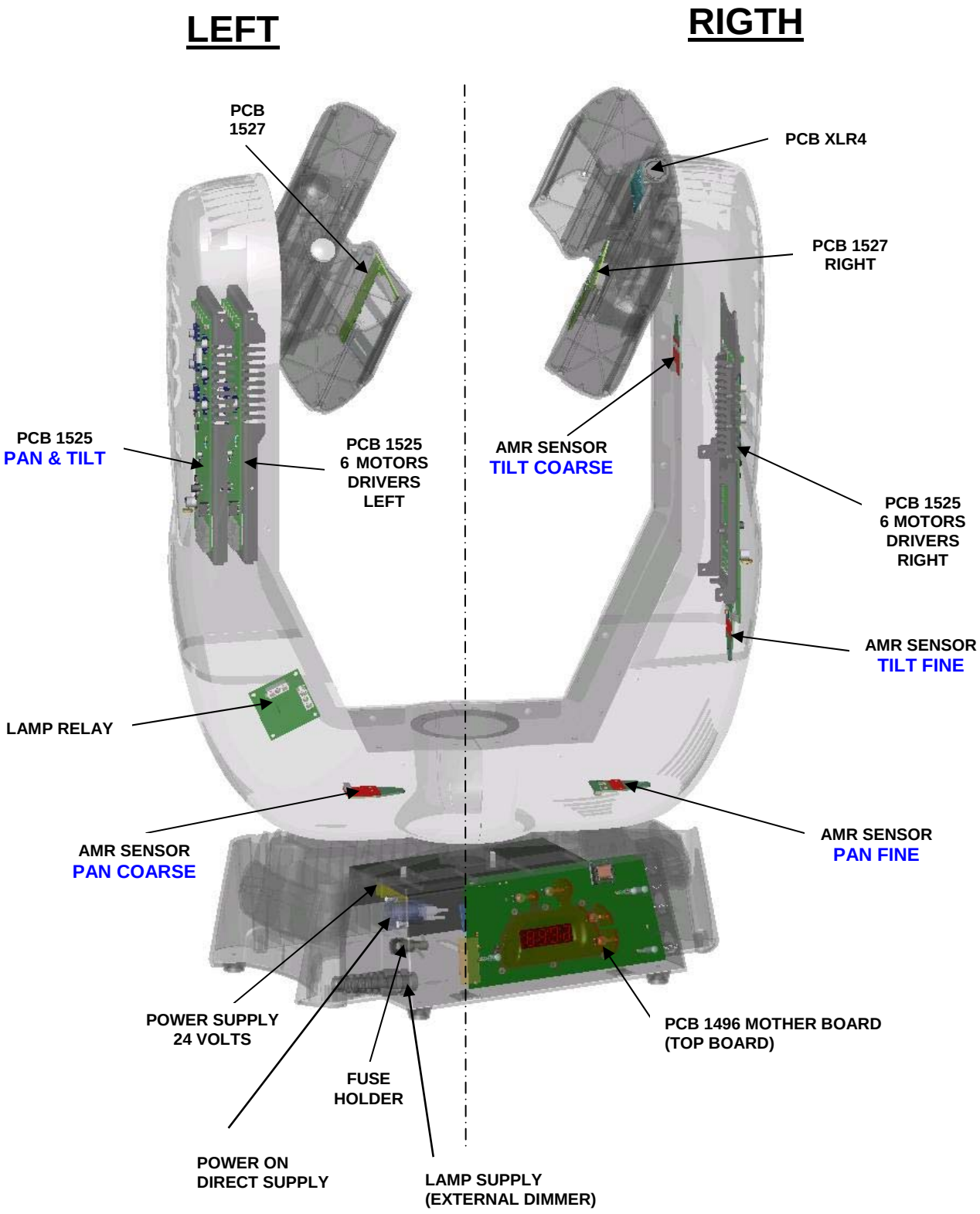
R1	Focal
R2	Shutter 4
R3	Shutter 1
R4	Accessory 1 (rear)
R5	Shutter 4
R6	Shutter 1

L1	Shutter 2
L2	Shutter 3
L3	Accessory 2 (front)
L4	Shutter 2
L5	Shutter 3
L6	Zoom



6.2.3 Boards Description – Names and location of the boards

The drawing below defines each board (PCB) with his associated function.

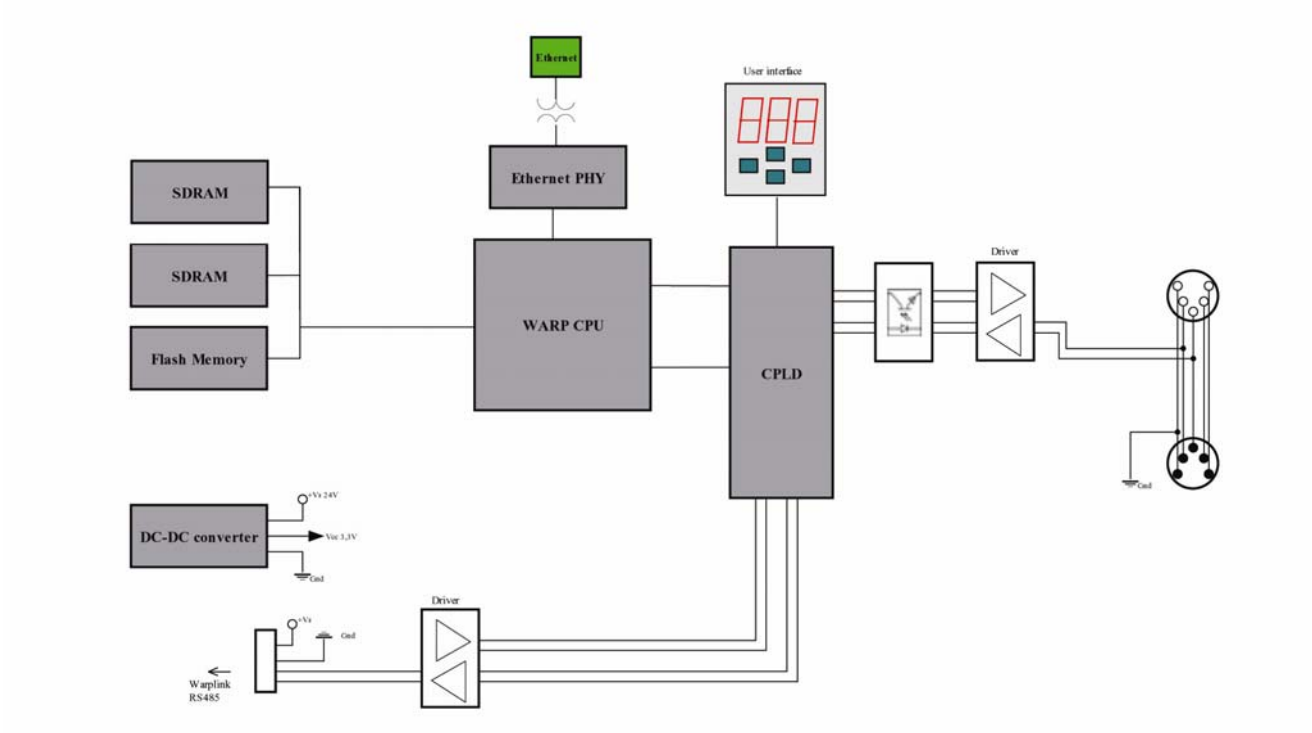


6.3 General description

- The WARP/M is a motorized profile spotlight with 3 – phase steppers on all functions.
- The user interface is accessible by the display and the buttons
- The control is by DMX512 and Ethernet (ArtDMX).

6.3.1 Motherboard (Topbox board)

6.3.1.1 Block scheme



CPU is a Motorola 32 bit (ColdFire range) with on-chip peripherals including 2 UARTs and Ethernet. TCPIP stacks and web-page browser is running on LINUX.

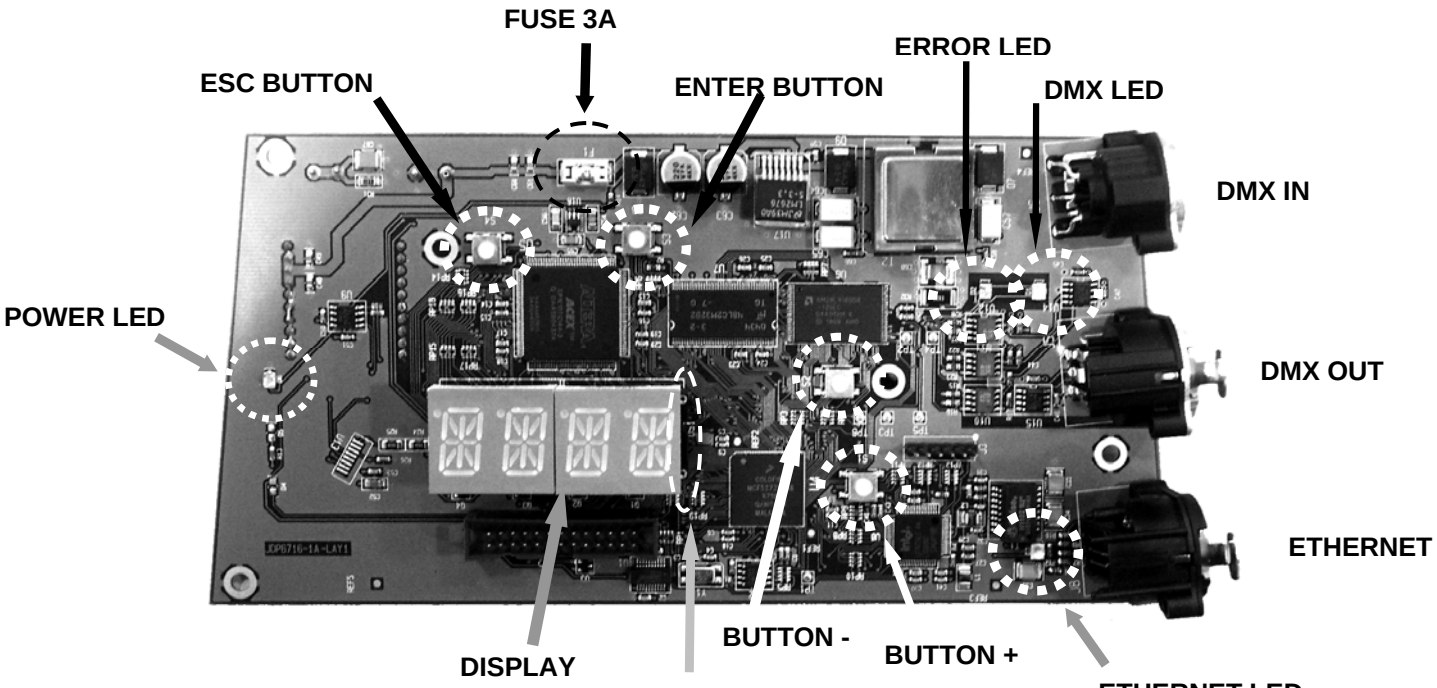
CPLD (Complex Programmable Logic Device).

6.3.1.2 Description

SPARE PART CODE	1001.65.290
LOCATION	TOP BOX
LINK	24 V Power Supply WARP Link 1 Ground

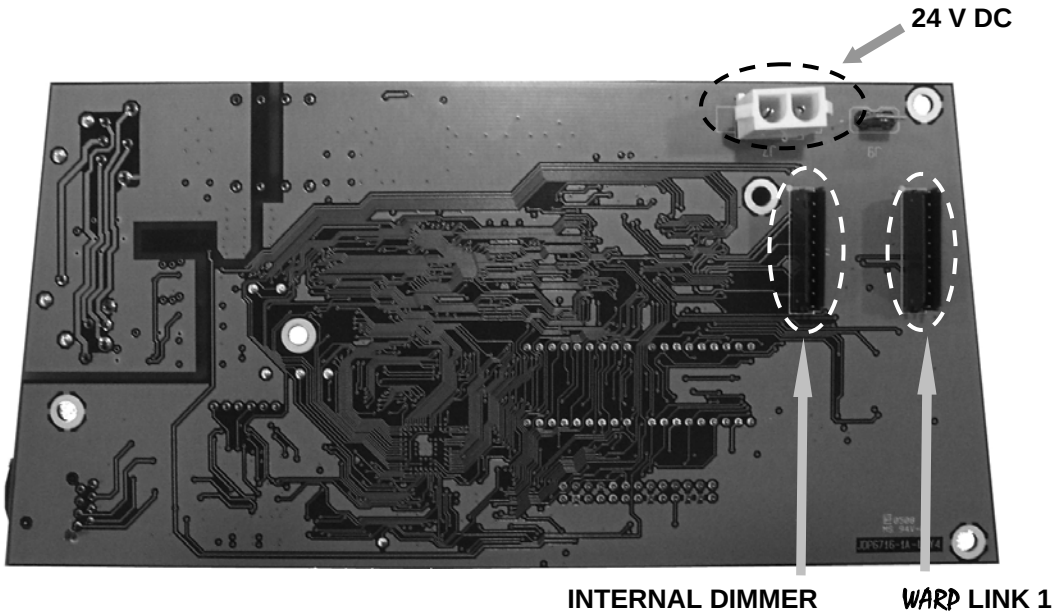
6.3.1.3 PCB 1494

Front:



Important:
2 Last slots must be free

Back:



6.3.1.4 Functions:

This board PCB 1496 is designed to:

- Receive / Send DMX 512
- Translate DMX in WARP Protocol
- Ethernet communication
- Control and Supply of the Motor Boards
- Technician Interface (Display Menu)
- Control of built-in dimmer and ballast (for WARP/M/DIM and WARP/H/HMI)
- Update of software in other boards

6.3.1.5 Components:

Components you can change on this board are:

- Fuse 3A (spare part code 1001.65.300)
- Display (see front photo: 2 last slots are free)

6.3.1.6 Power-up procedure:

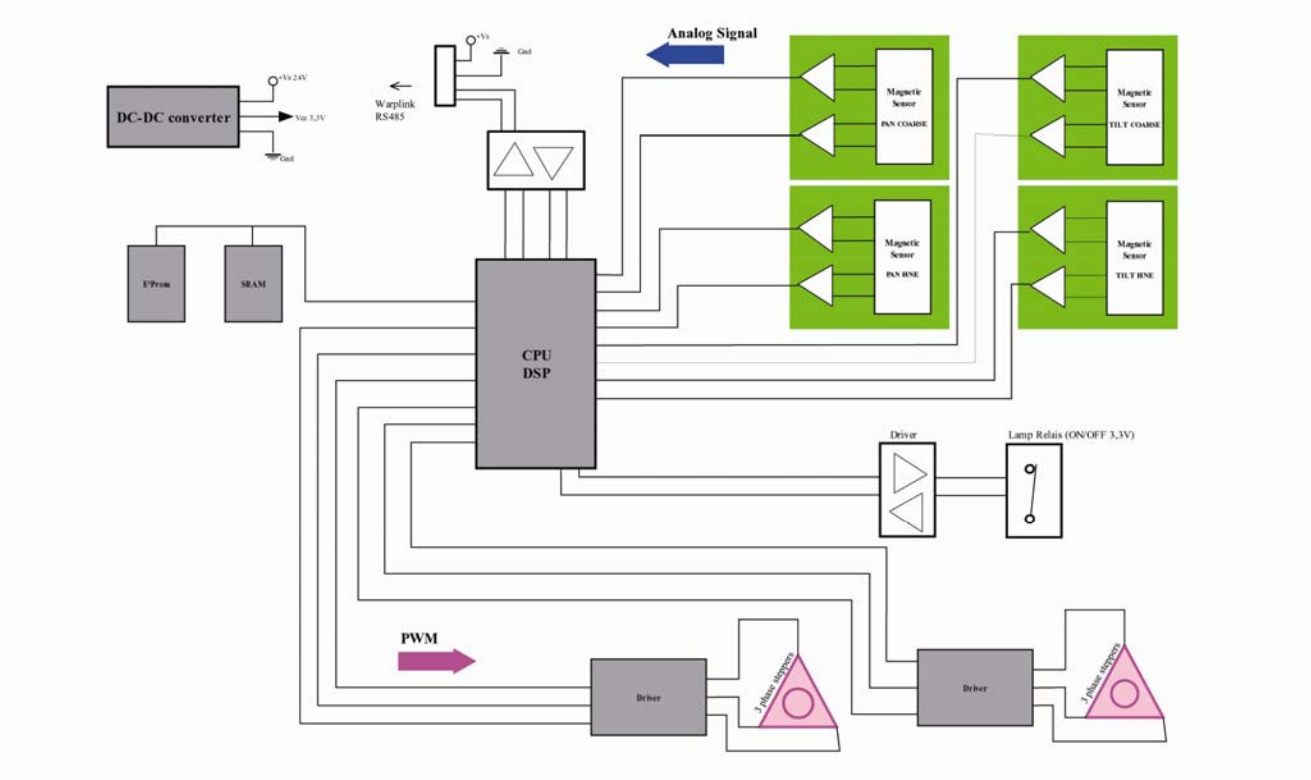
When you switch on the WARP/M

1. Only LED Power on
2. Wait approximately 30 s until all LED is on and Display write WARP or DMX- before motors resetting

6.3.2 Pan & Tilt driver board PCB 1525

The Pan and Tilt drive are driven by 3 phase steppers. The steppers are PWM (Pulse with modulated) controlled. We use a 1:10 belt drive reduction ratio to ensure a smooth Pan / tilt.

The DSP is 8 bit processor dedicated to motor control. The DSP has a 10 channel A/D converter input and a 6 channel PWM generator.



6.3.3 Magneto-resistance sensors

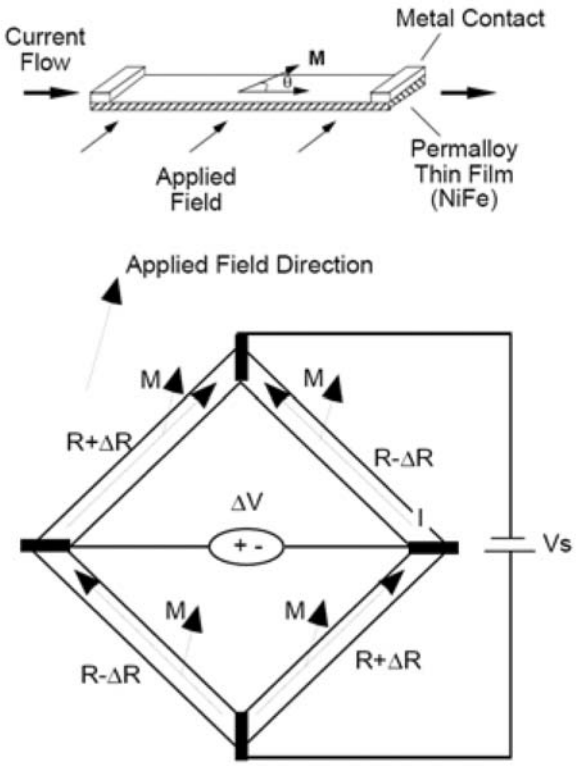
A high resolution, low power magneto-resistance sensor is used. The MR sensor is capable of measuring the angle direction of a magnetic field from a magnet.
The MR sensor operates on 3 V with bandwidth response of 0 – 5 MHz.

6.3.4 Principe of operation (1)

Anisotropic magneto-resistance (AMR) occurs in ferrous materials. It is a change in resistance when a magnetic field is applied in a thin strip of ferrous material. The magneto-resistance is a function of cos 2θ where θ is the angle between magnetization M and current flow in the thin strip. When an applied magnetic field is larger than 80 Oe, the magnetization aligns in the same direction of the applied field; this is called saturation mode. In this mode, θ is the angle between the direction of applied field and the current flow; the MR sensor is only sensitive to the direction of applied field.

The sensor is in the form of a Wheatstone bridge (Figure). The resistance R of all four resistors is the same. The bridge power supply VS causes current to flow through the resistors, the direction as indicated in the figure for each resistor. HMC1512 is designed to be used in saturation mode.HMC1512 has two identical MR bridges, coexisting on a single die. Bridge B physically rotates 45° from bridge A. The HMC1512 has sensor output ΔV=VSS sin (2θ) for sensor A and sensor B output ΔVS=-VSS cos (2θ), where VS is supply voltage, S is a constant, determined by materials.

(1) Honeywell Sensor products



6.3.5 Principe of operation by WARP/M

The importance by WARP/M is accuracy and good repeatability on Pan / Tilt.

WARP/M uses 2 magneto-resistance sensors for each motor. The gear box ratio between the 2 magneto resistance sensors gives an accurate measurement.

The magneto-resistance sensors generate two 90° phase-shifted sinusoidal signals:
A = VS (Oa+S sin (2θ))
B = VS (Ob+S cos (2θ))

Oa	Offset voltage of the A bridge
Ob	Offset voltage of the B bridge
S	Conversion ratio of the sensor
VS	Bridge voltage supply and gain
θ	Angle of magnetic field

6.3.6 Explanation of Pan by WARP/M

The gear box ratio used by WARP/M is 1/10 for the pan motor, 5 motor turns are required to cover the entire span. This means 10 electrical revolutions for the first magneto-resistance sensors, and 1 electrical revolution (1/2 mechanical turn) for the second magneto-resistance sensor.

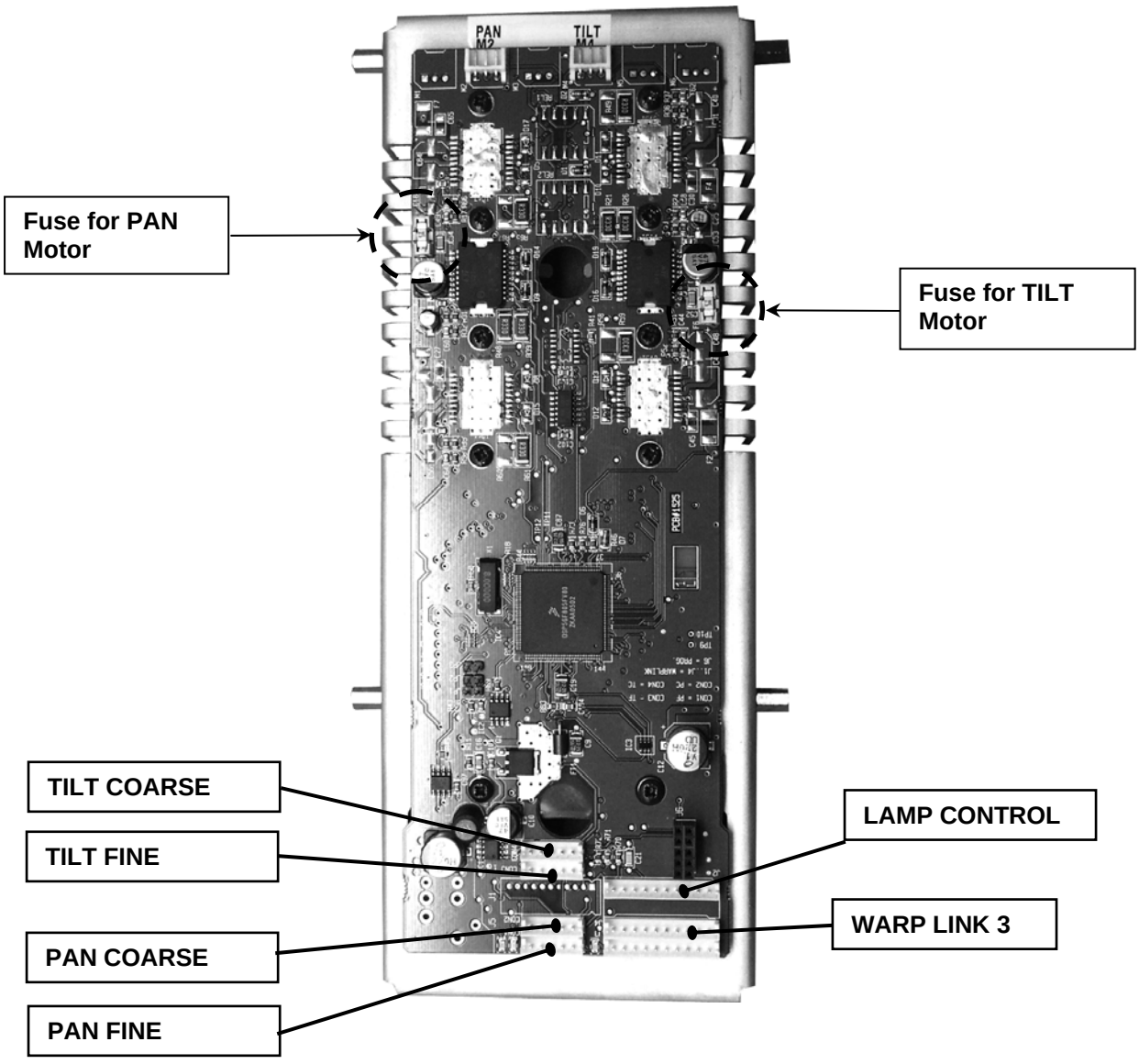
6.3.7 Magnetic sensors connector

The sensor connector is a MOLEX mini-KK series 1 x 5 male connector, with the following wiring:

1	2	3	4	5
+V analog (3.3V)	Sense1	Sense2	GND	GND

6.3.8 Description

SPARE PART CODE	1001.65.200
LOCATION	Left Arm
LINK	Pan & Tilt Motor Boards WARP Link 3 4 AMR Sensor Lamp Relay



Functions:

This board PCB 1525 is designed to:

- Control Pan and Tilt (magnet encoding)
- Control the lamp relay

Components:

Components you can change on this board are:

- Fuse 2A (spare part code 1001.65.300)

Reset procedure:

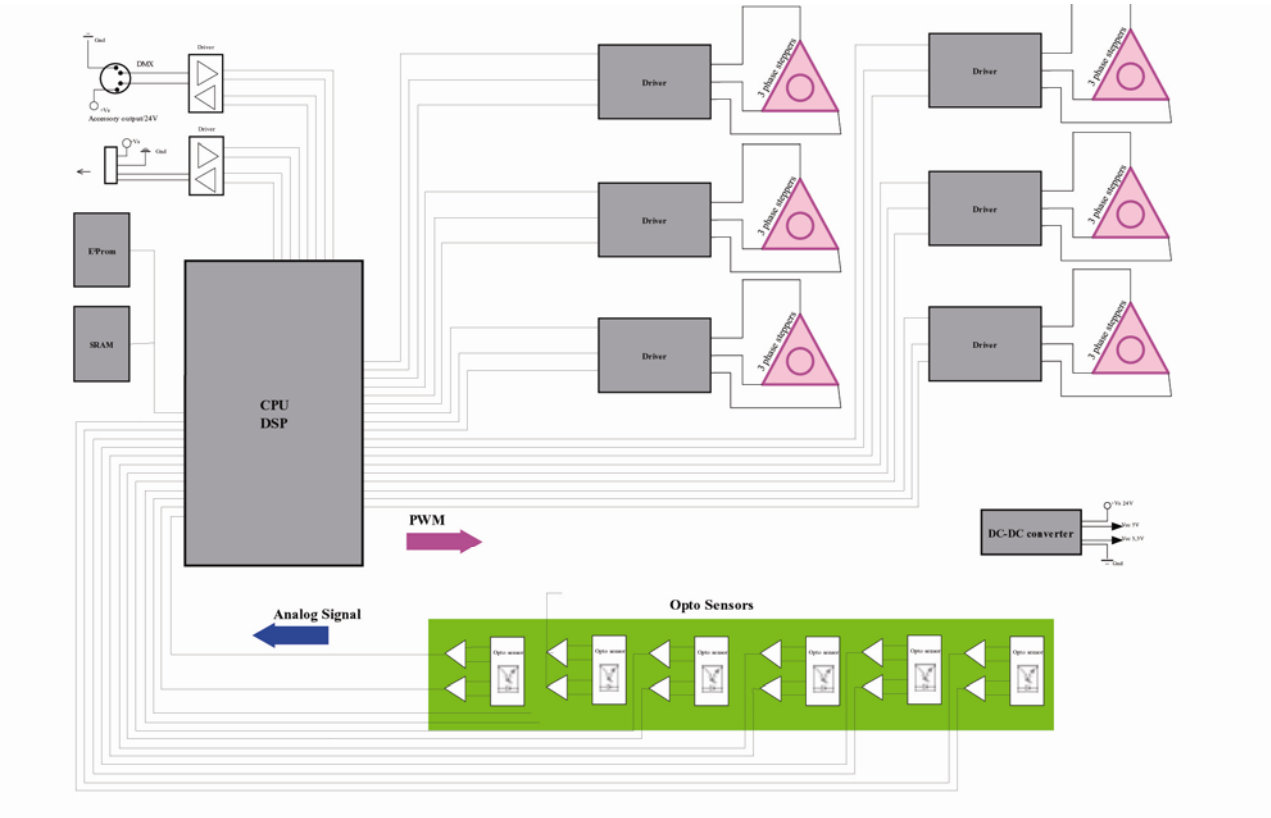
Absolute Positioning Mode

In this mode, there is no resetting procedure. When you switch on the WARP/M, the board knows the exact Pan & Tilt position via the AMR sensors.

Reset Mode

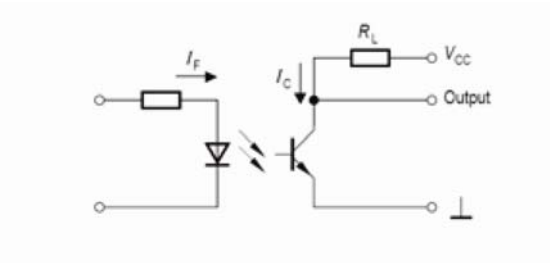
This mode could be used if you have a problem with one AMR sensor. (See User Manual to change mode).
In Reset mode, when you switch on the WARP/M, Pan and Tilt go to mechanical 0 position, then go to DMX Value.

6.4 Wheels driver board PCB 1525



DSP (Digital signal processors)

Opto sensor SFH 9210 – Reflective Interrupter with VCSEL-Emitter

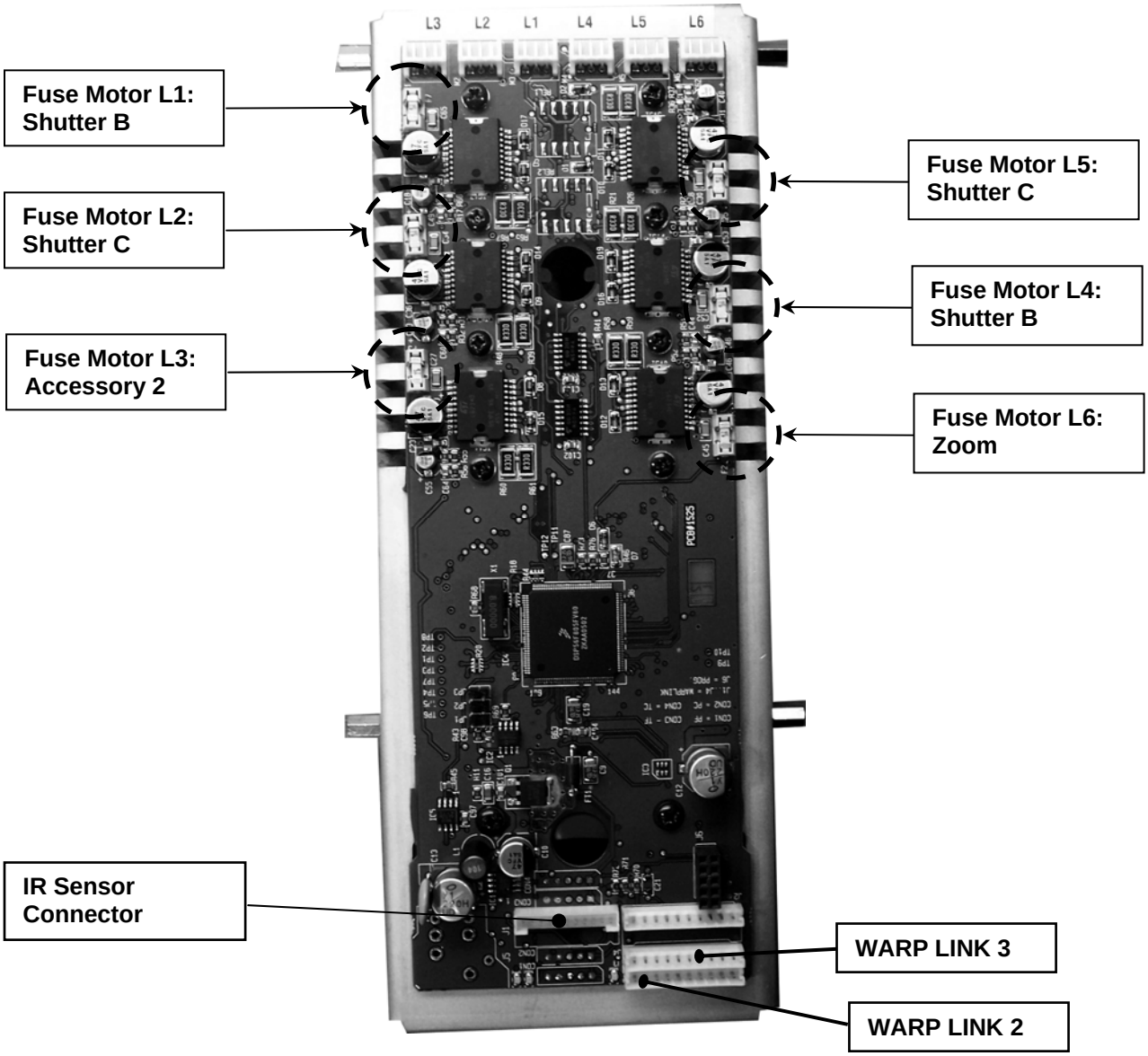


6.4.1 Opto sensors connector

1	2	3	4	5	6	7	8	9	10	11
GND	3V3			Sens1	Sens2	Sens3	Sens4	Sens5	Sens6	GND

6.4.2 Left 6 drivers Board PCB 1525

SPARE PART CODE	1001.65.210
LOCATION	Left Arm
LINK	Shutters B & C WARP Link 2 & 3 IR Sensor Left



Functions:

This board PCB 1525 is designed to:

- Control all Motors in the Left Motor Wing: Shutter B, Shutter C, Front Acc. And Zoom

Components:

Components you can change on this board are:

- Fuse 2A (spare part code 1001.65.300)

Reset procedure:

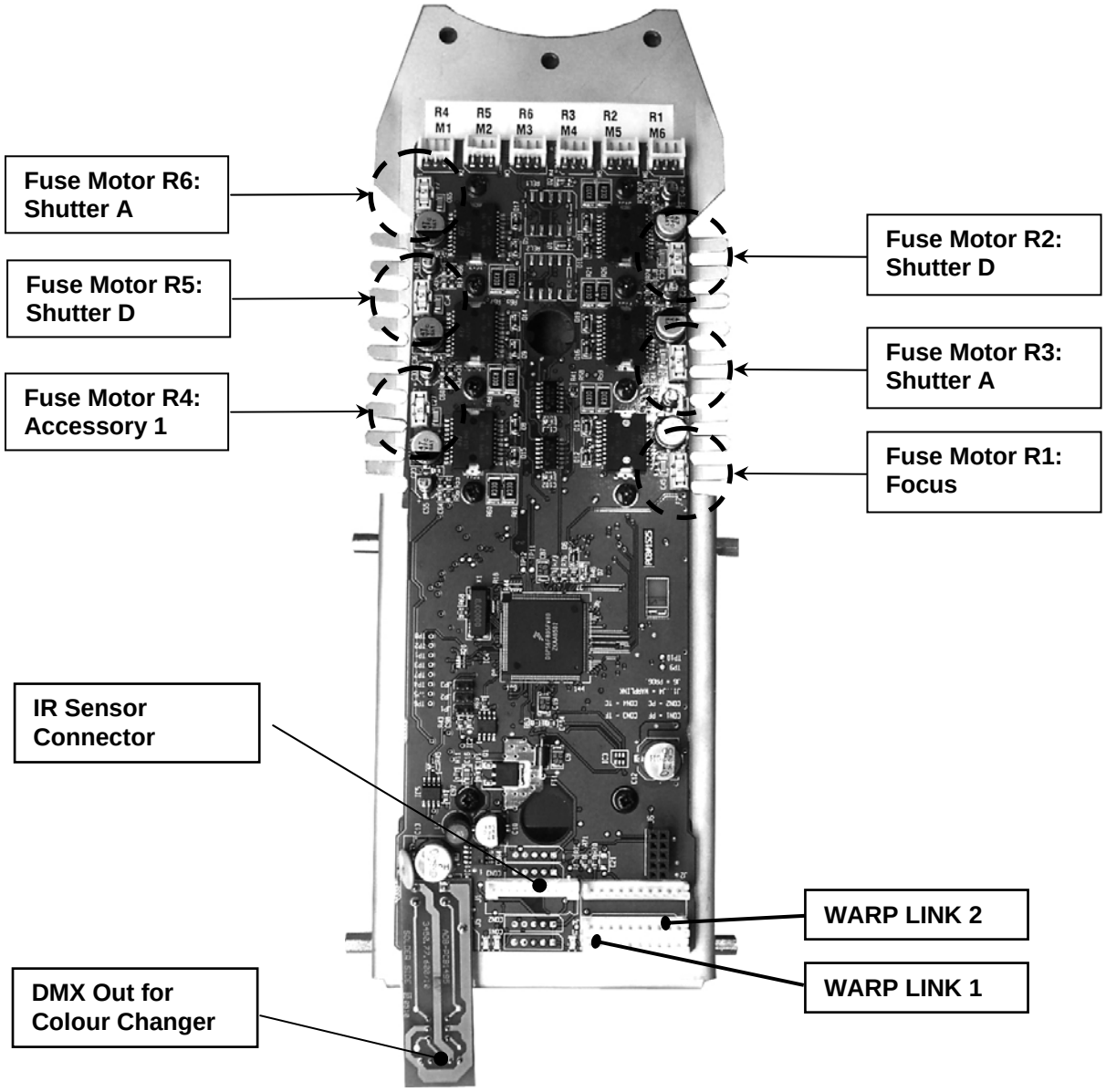
When you switch On the WARP/M, all shutter rings will turn automatically to the IR Sensor.
When the Silvered index of the ring passes in front of the IR Sensor, the ring stops and goes back to the 0 position.

If the ring doesn't stop in front of the IR sensor, the reset has failed.

In this case, send a calibration as explain in the user manual.

6.4.3 Right 6 Drivers Board

SPARE PART CODE	1001.65.220
LOCATION	Right Arm
LINK	Shutters A & D WARP Link 1 & 2 IR Sensor Right DMX for CC changer



Functions:

This board PCB 1525 is designed to:

- Control all Motors in the Right Motor Wing: Shutter A, Shutter D, Rear Acc. And Focus

Components:

Components you can change on this board are:

- Fuse 2A (spare part code 1001.65.300)

Reset procedure:

When you switch On the WARP/M, all shutter rings will turn automatically to their IR Sensor.
When the Silvered index of the ring pass in front of the IR Sensor, the ring stop and go back to the 0 position.

If the Ring doesn't stop in front of the IR sensor, the reset has failed.

In this case, send a calibration as explain in the user manual.

6.4.4 DMX Auxiliary connector (J1)

This connector is only mounted on Shield board with the DMX option. The connector is a NEUTRIK NC4FAH (with lock) or NC4FAH-0 (without lock), with the following wiring:

1	2	3	
GND	DMX 512 Data –	DMX 512 Data+	+24 VDC

The +24 VDC power supply is issued from the internal motor power supply. It is protected through a 1A fuse (RAYCHEM Polyswitch) and filtered by a bypass capacitor.

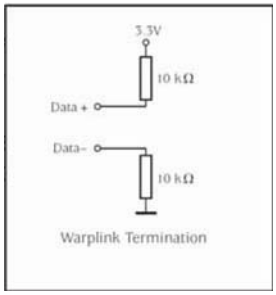
The DMX is not terminated nor polarized in the PCB. The board provides standard protection against electrostatic discharge (ESD) transients (up to 15kV for 100pF / 1,5kΩ model).

6.5 Warplink - Inter Board Communications Protocol

The link consists of a single RS485 multi-drop bus. Each transceiver on the link is called a "station".

6.5.1 Transceivers and Termination

The link is not terminated since runs are short and configuration is a star, but it is biased at each station so that with transmitters switched off or with the link disconnected, a logical 1 is read. An effective circuit is shown in figure. In the closed system of the Warp there is no need for isolated transceivers. Slew rate limited transceivers should be used.



6.5.2 Medium

A controlled impedance line is not necessary. However the data pair should be twisted if possible and steps must be taken to ensure that the two wires of the pair are kept close together throughout the run.

6.5.3 Byte Format

The protocol uses the 9 bit communications scheme common in microcontrollers, bit 8 is a start of message flag. It is 1 for the first character of a frame and is otherwise 0. This first character is sufficient to indicate to receivers whether they have any interest in the ensuing message. If not, a receiver can revert to an idle mode pending the next start of frame character. Data format is 1 start bit, 8 data bits (LSB first), 1 Start of message flag, 1 Stop bit.
Link data rate is 125kBaud.

6.5.4 WarpLink connectors

The internal **WarpLink** connector is a HE14 1x10 connector, with the following wiring:

1	2	3	4	5	6	7	8	9	10
GND	+24V	+24V	+24V	GND	data B	data A	GND	Spare 1	spare 2

7 Motorised Yoke - Maintenance Sheet

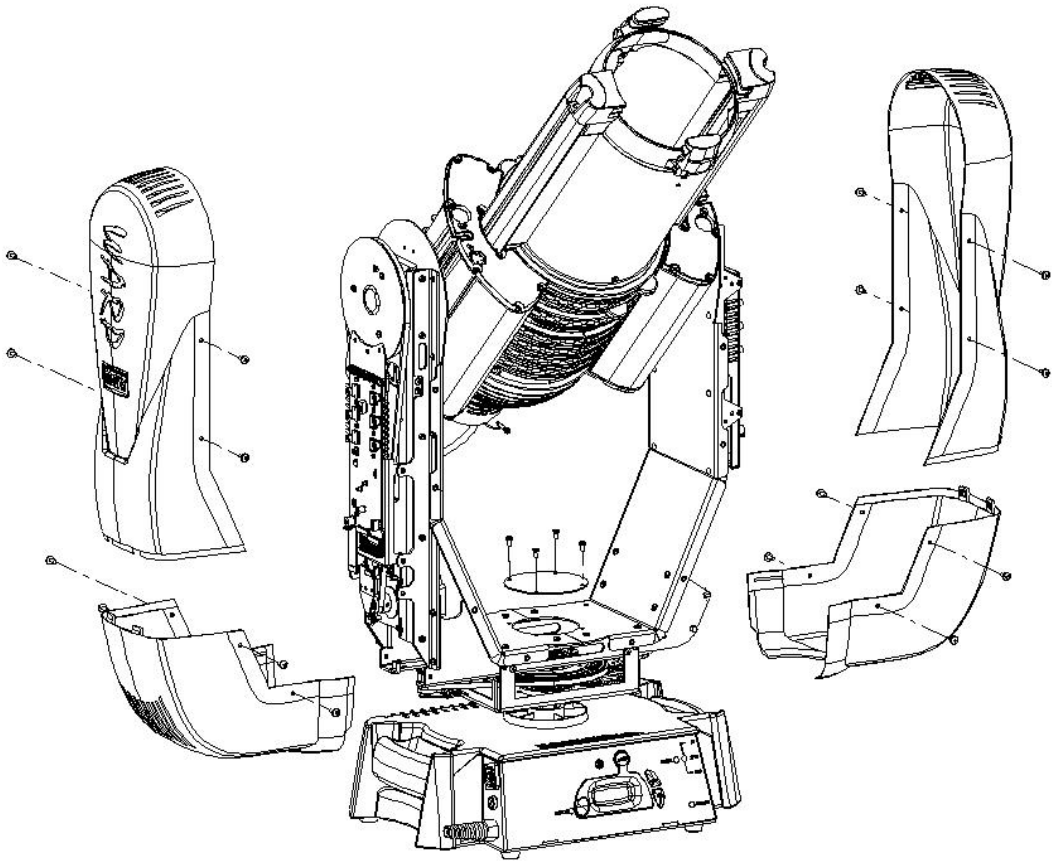
7.1 Disassembling arm cover and LID for PAN Axis

Required Tool(s)	Spare Part Code	Preliminary reading
Screwdriver PZ2	1001.65.850	None

1. Switch OFF and Unplug the WARP
2. Remove the 16 screws of ARM COVER
3. Remove the 4 screws of the LID PAN Axis

Notice :
- To close Arm Covers, start with shoulder covers
- To Close PAN Shaft Cover, please use new metric screws PZ M4*12

1001.65.850 includes:
- **2 Yoke cover shoulder**
- **2 Yoke cover arm**
- **1 Cover pan shaft**
- **20 Screws M4*12**



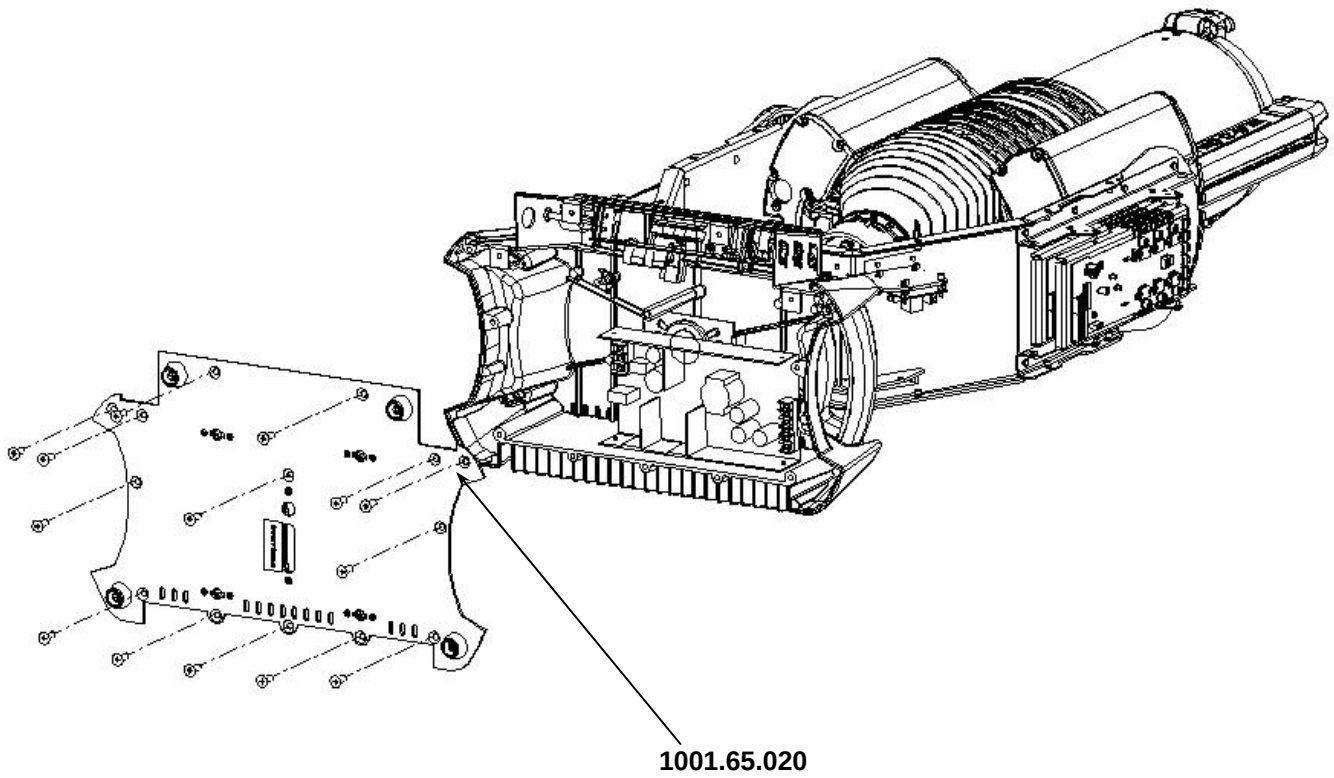
7.2 Open / Replace TOP BOX Plate

Required Tool(s)	Spare Part Code	Preliminary reading
Torx T30	1001.65.020	None

1. Switch OFF and Unplug the WARP
2. Lay the Motorised WARP on its side
3. Remove 14 screws of Top BoxPlate
4. Remove the Top Box Plate

1001.65.020 includes:
- **1 Top box plate feet assembly**
- **14 Screws M6*16**

Notice:
You can re-use same screws to close top box



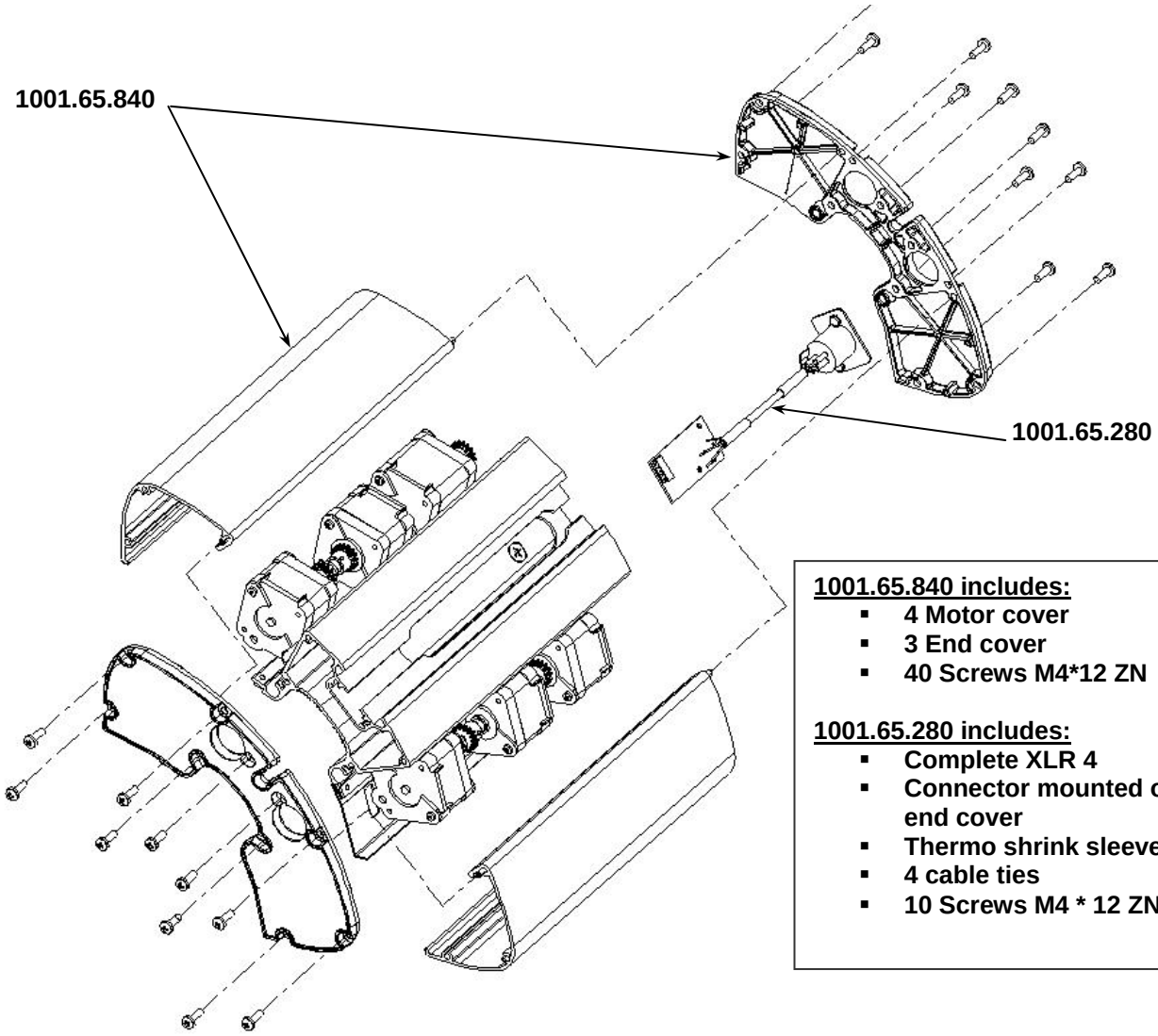
7.3 Open Motor Wing

Required Tool(s)	Spare Part Code	Preliminary reading
Screwdriver PZ2 Rivet Tool	1001.65.840 1001.65.280	None

1. Switch OFF and Unplug the WARP
2. Remove the 20 screws

Important:

- The first time your open Motor Wing; you have to replace all taptite screws by screws TCBC M4 x 12 Z.N DIN 7985-Z.
- For the right side, use drilled cover for XLR 4.



1001.65.840 includes:

- **4 Motor cover**
- **3 End cover**
- **40 Screws M4*12 ZN**

1001.65.280 includes:

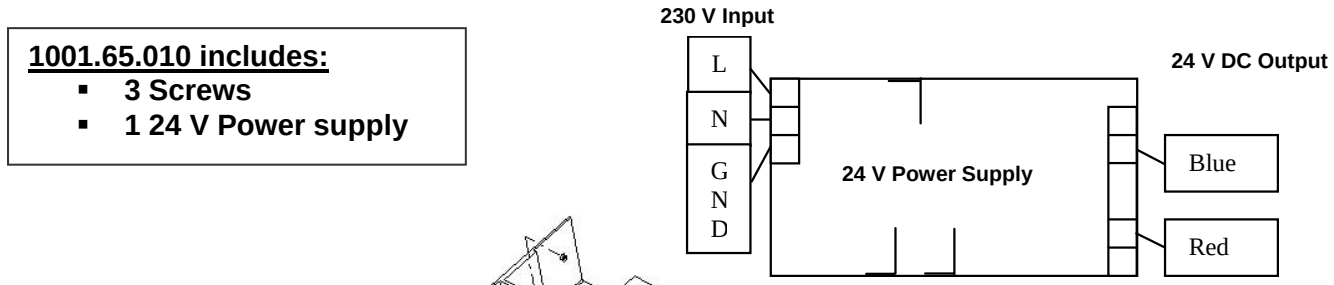
- **Complete XLR 4**
- **Connector mounted on an end cover**
- **Thermo shrink sleeve**
- **4 cable ties**
- **10 Screws M4 * 12 ZN**

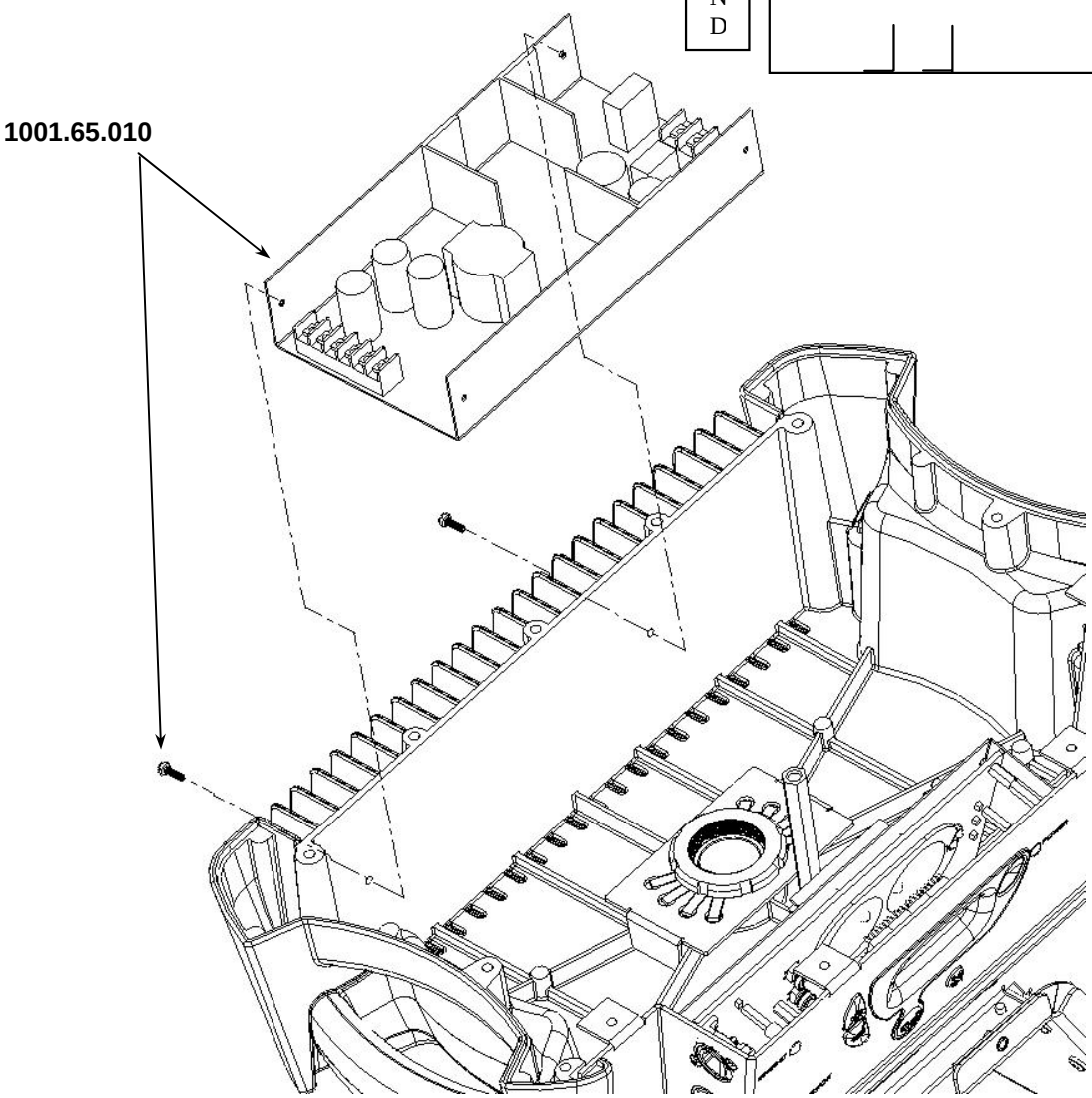
7.4 Replace 24 V DC Power Supply

Required Tool(s)	Spare Part Code	Preliminary reading
Flat Screwdriver Screw driver PZ2	1001.65.010	Chapter 7.2

1. Switch OFF and Unplug the WARP
2. Disconnect 230 V INPUT + 24 V OUTPUT on the power supply (use PZ 2).
3. Remove the 2 screws (TCF UNC 6-32 length 10 mm) and replace Power Supply.
4. Before replacing 24 V Power Supply, put LOCTITE 243 on the screw

1001.65.010 includes:
- **3 Screws**
- **1 24 V Power supply**





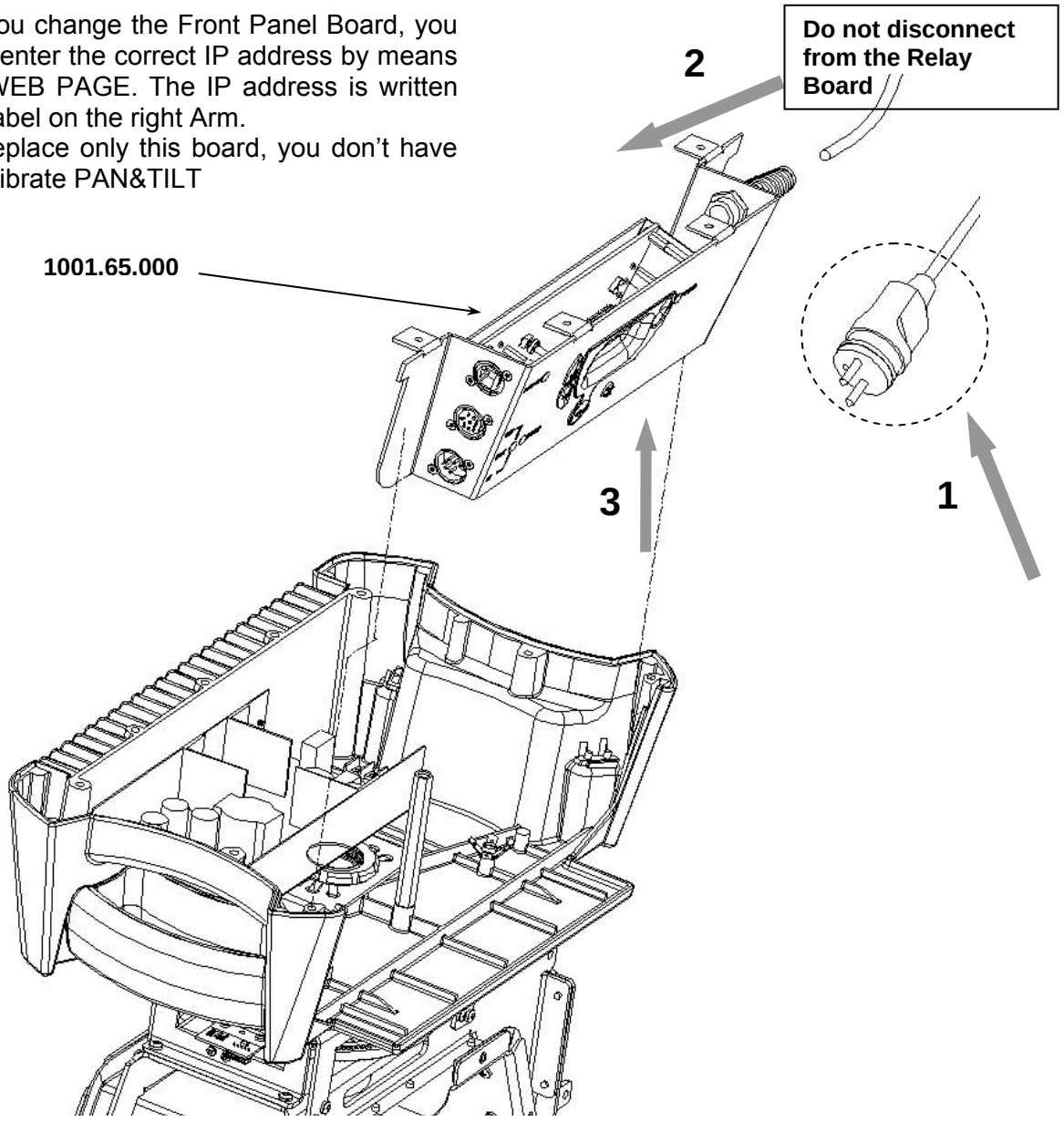
7.5 Replace Front Panel

Required Tool(s)	Spare Part Code	Preliminary reading
Flat Screwdriver Screwdriver PZ2 Wire Cutter	1001.65.000	Chapter 7.2 Chapter 6.1

1. Remove External connector and Slide Lamp Wire through the Cable Gland
2. Disconnect 24 V Power in + WARP Link 1 + GND (from the Board)
3. Cut cable tie behind Top Board (which fixes WARP Link 1)
4. Disconnect 230 V Power IN from 24 V Power Supply
5. Replace the Front Panel

1001.65.000 includes:
- **1 Front panel assembly**
- **3 cable ties**

Important:
- When you change the Front Panel Board, you have to enter the correct IP address by means of the WEB PAGE. The IP address is written on the label on the right Arm.
- If you replace only this board, you don't have to re-calibrate PAN&TILT



7.6 Replace Top Board PCB

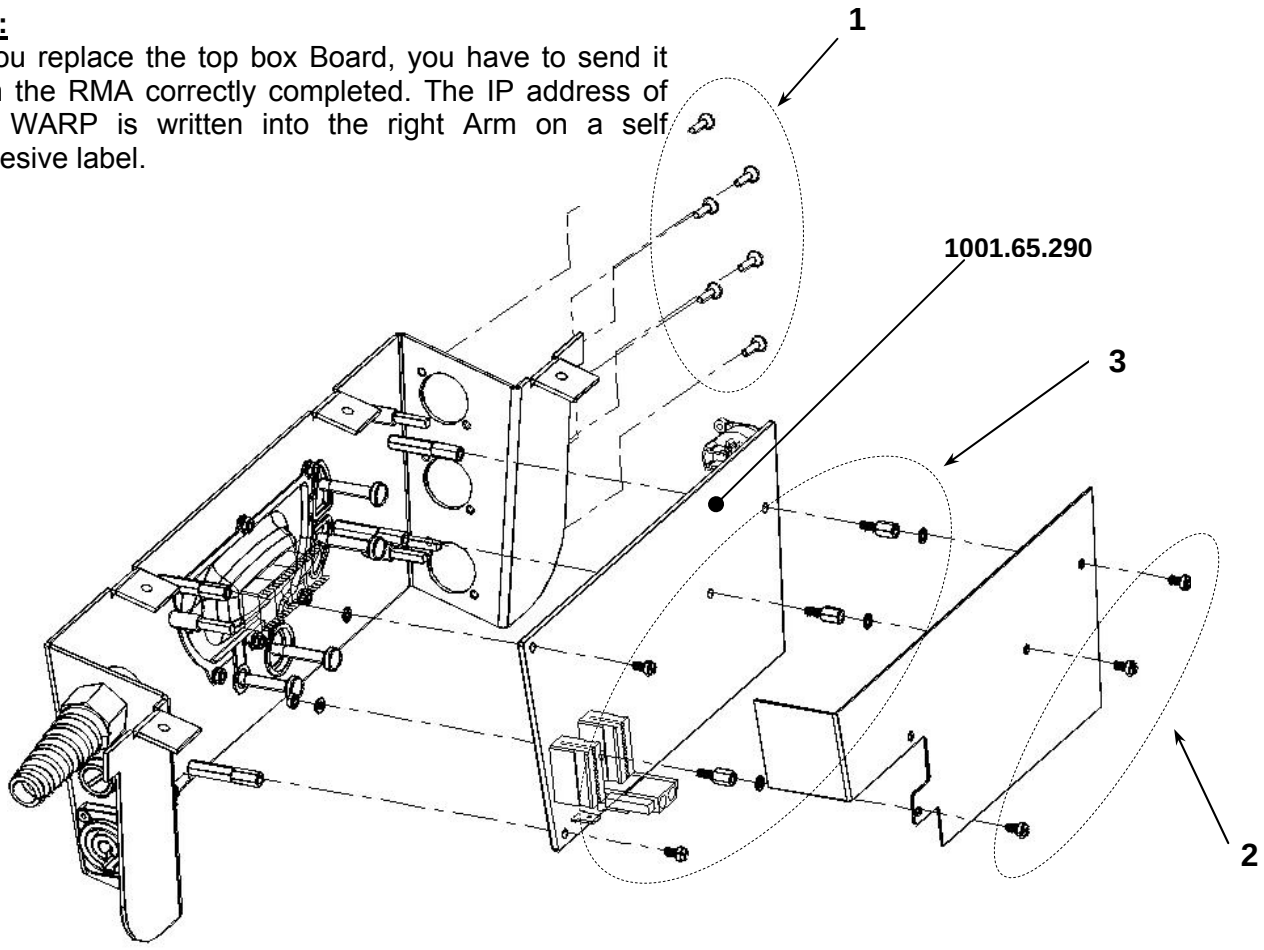
Required Tool(s)	Spare Part Code	Preliminary reading
Screwdriver PZ 0.75 Flat Screwdriver Open ended spanner 5.5	1001.65.290	Chapter 7.5 Chapter 6.1

1. Remove 6 screws from XLR connectors (PZ 0.75)
2. Remove 3 screws (Flat)
3. Remove 3 spacers and 2 screws
   (Open ended spanner + Flat)
4. Change the board

1001.65.290 includes:
- **7 Screws M3*12**
- **6 Screws M3*8**
- **4 Spacers M3*8**
- **6 Washers**
- **2 Nut M3**
- **1 Top Box Board**

Important:
- When you change the Top Board, you have to enter the correct IP address by means of the WEB PAGE. The IP address is written on the label on the right Arm.
- If you replace only this board, you don't have to re-calibrate PAN&TILT

WARNING:
- If you replace the top box Board, you have to send it with the RMA correctly completed. The IP address of the WARP is written into the right Arm on a self adhesive label.



7.7 Change Motor Board Right

Required Tool(s)	Spare Part Code	Preliminary reading
Flat Screwdriver Wire Cutter	1001.65.220	Chapter 7.1 Chapter 6.1

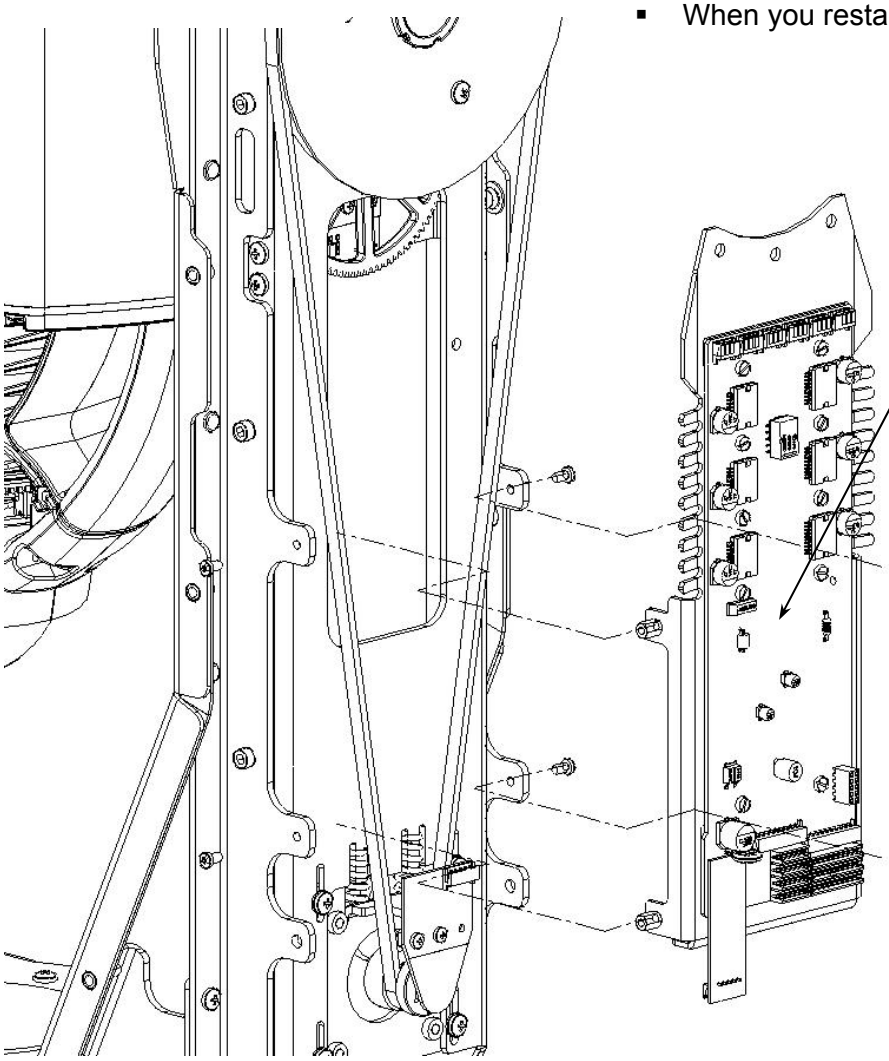
1. Switch OFF and Unplug the WARP
2. Disconnect from the Board: WARP Link 1 - WARP Link 2 - Magnetic Sensor – XLR 4
3. Disconnect all motors and cut cable tie on the heat sink
4. Remove the 4 screws
5. Replace Right 6 Drivers Board (use new cable tie)

MOTOR LABELS

R4 R5 R6 R3 R2 R1
M1 M2 M3 M4 M5 M6

Important:

- Before switch on, remove accessories (iris, gobo, …)
- When you restart; all rings will calibrate



1001.65.220 includes:

- **1 Complete right Board**
- **5 Screws M3*8**
- **5 Washers**
- **3 cable ties**

7.8 Replace PCB Pan & Tilt

Required Tool(s)	Spare Part Code	Preliminary reading
Flat Screwdriver	1001.65.200	Chapter 7.1 Chapter 6.1

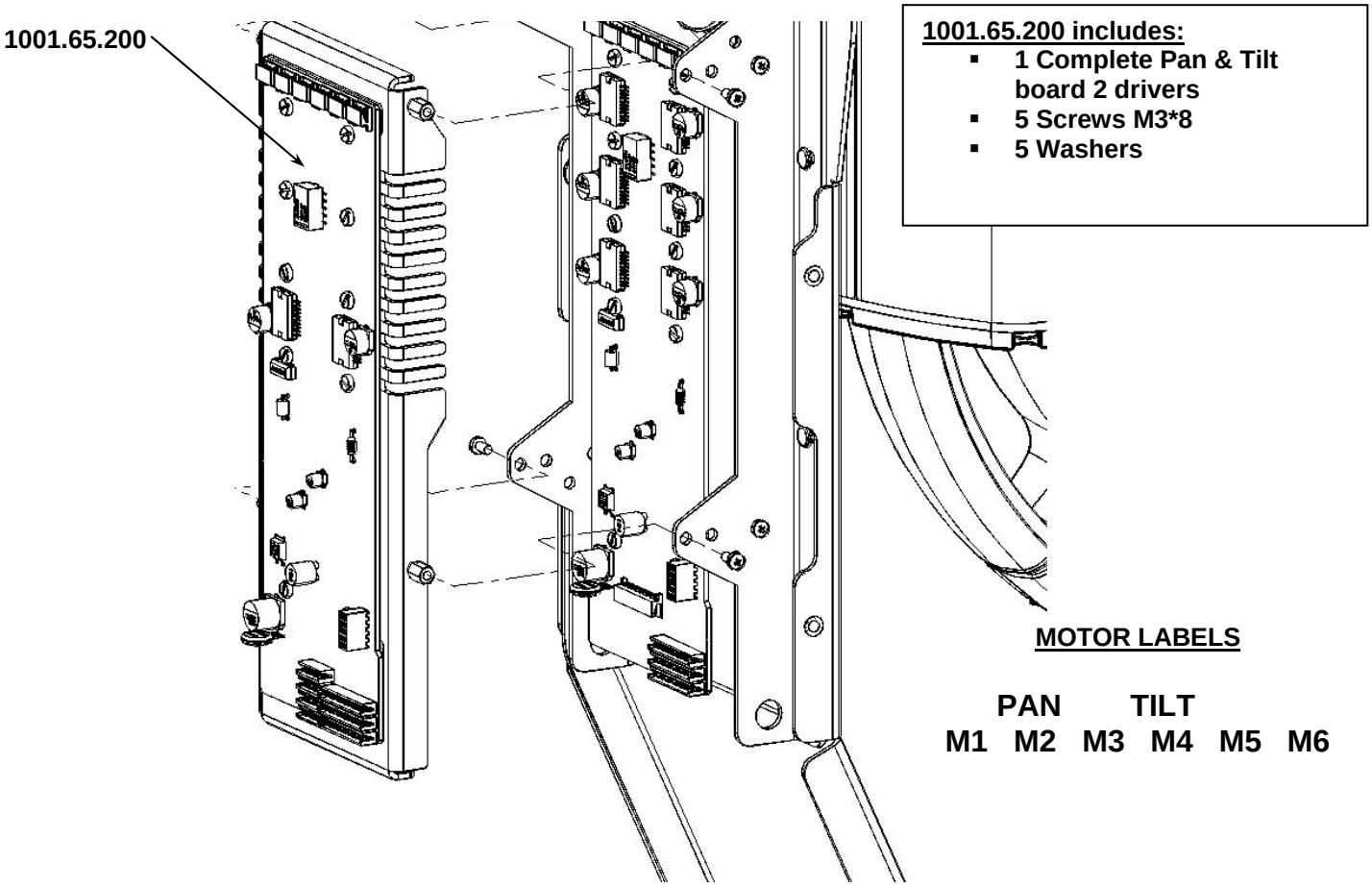
1. Switch OFF and Unplug the WARP
2. Disconnect from the Board: All Magnet Sensor - Pan & Tilt Motors - WARP LINK 3
3. Remove the 4 screws
4. Replace the Board

Important:

- **When you restart the WARP, and after replacing this board, it is necessary to re-calibrate Pan & Tilt. This can be started from Web Page, Desk or local Display with the latest WARP SOFTWARE**
- **PAN & TILT CALIBRATION takes around 20 minutes**

WARNING

- **Don't touch the YOKE during calibration If you touch YOKE, you have to restart a new calibration**



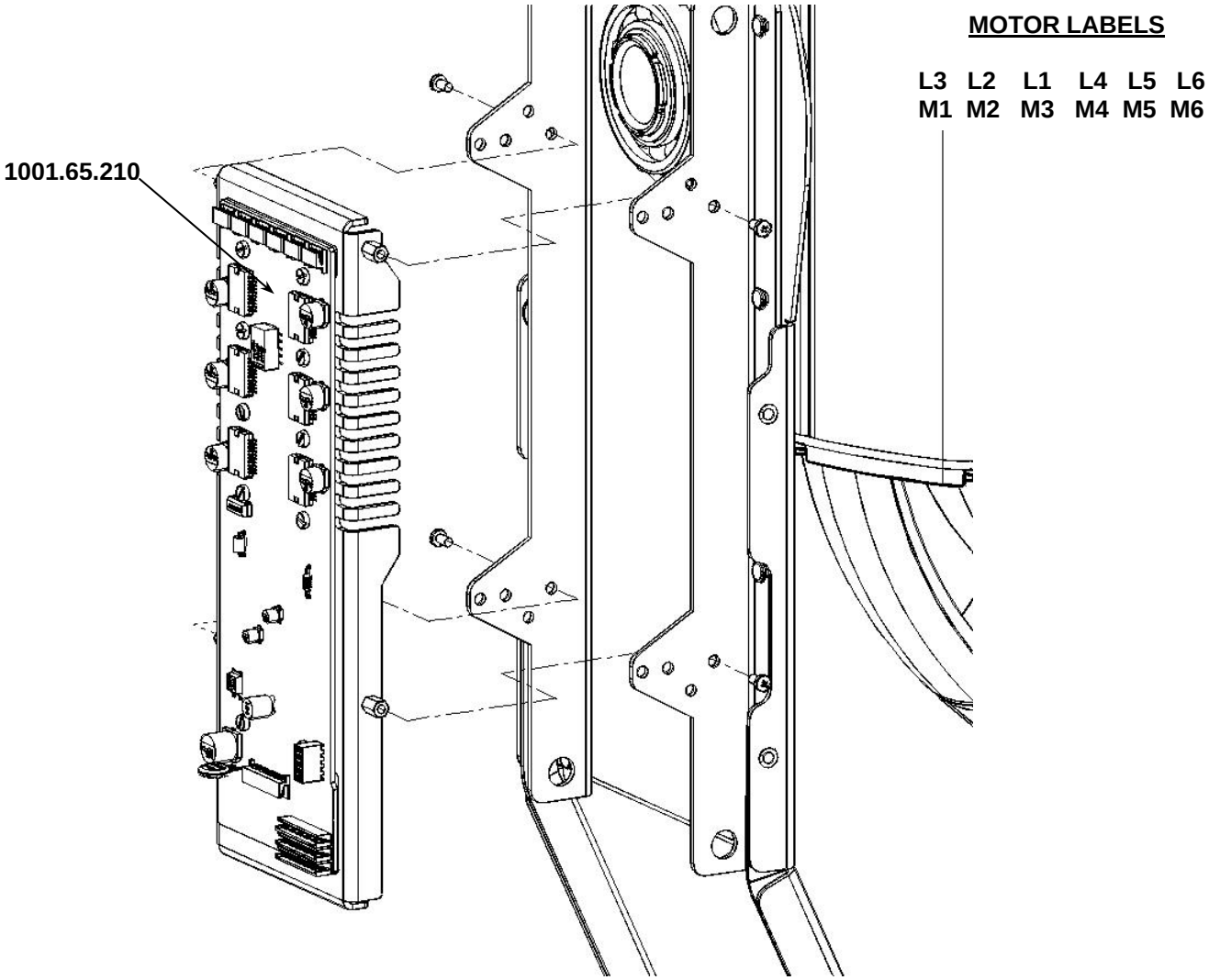
7.9 Replace PCB Shutter left

Required Tool(s)	Spare Part Code	Preliminary reading
Flat Screwdriver	1001.65.210	Chapter 7.1 Chapter 7.8

1. Switch OFF and Unplug the WARP
2. Remove PAN & TILT Board (see MS W/M008)
3. Disconnect WARP Link 3,IR Sensor Cable
4. Disconnect all Motors
5. Remove the 4 screws
6. Replace the Board 6 Drivers

1001.65.230 includes:
- **Complete left board 6 drivers**
- **5 Screws M3*8**
- **5 Washers**

Important:
- Before switch on, remove accessories (iris, gobo, …)
- When you restart ; all rings will calibrate



7.10 Replace Lamp Relay Board

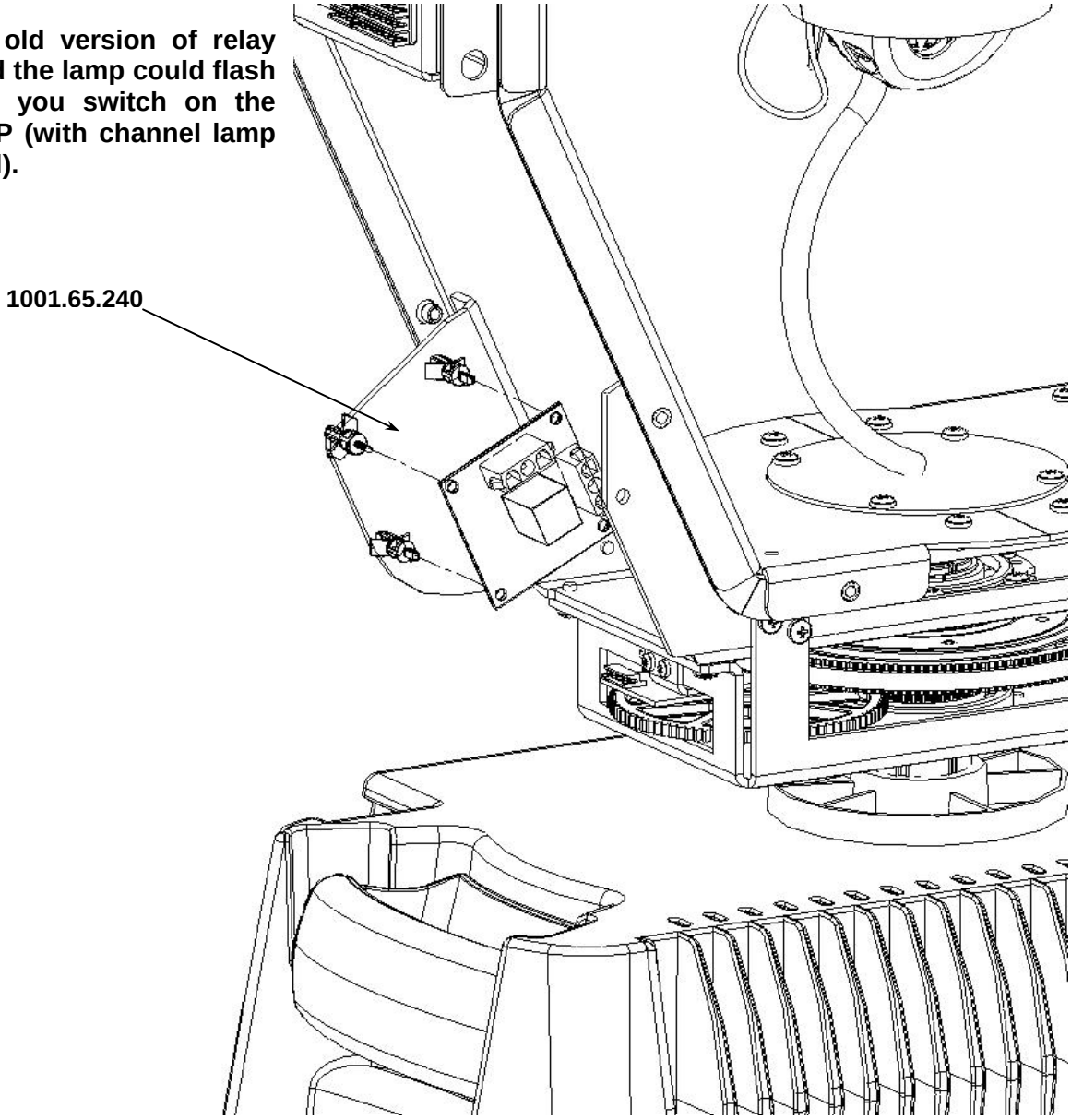
Required Tool(s)	Spare Part Code	Preliminary reading
Collet	1001.65.240	Chapter 7.1 Chapter 6.1

1. Switch OFF and Unplug the WARP
2. Disconnect the 2 lamp cables
3. Remove Plastic Clip and Replace the Board

1001.65.240 includes:
- **1 PCB 1525 Board relay**
- **5 Clips**

Note:

With old version of relay board the lamp could flash when you switch on the WARP (with channel lamp at full).

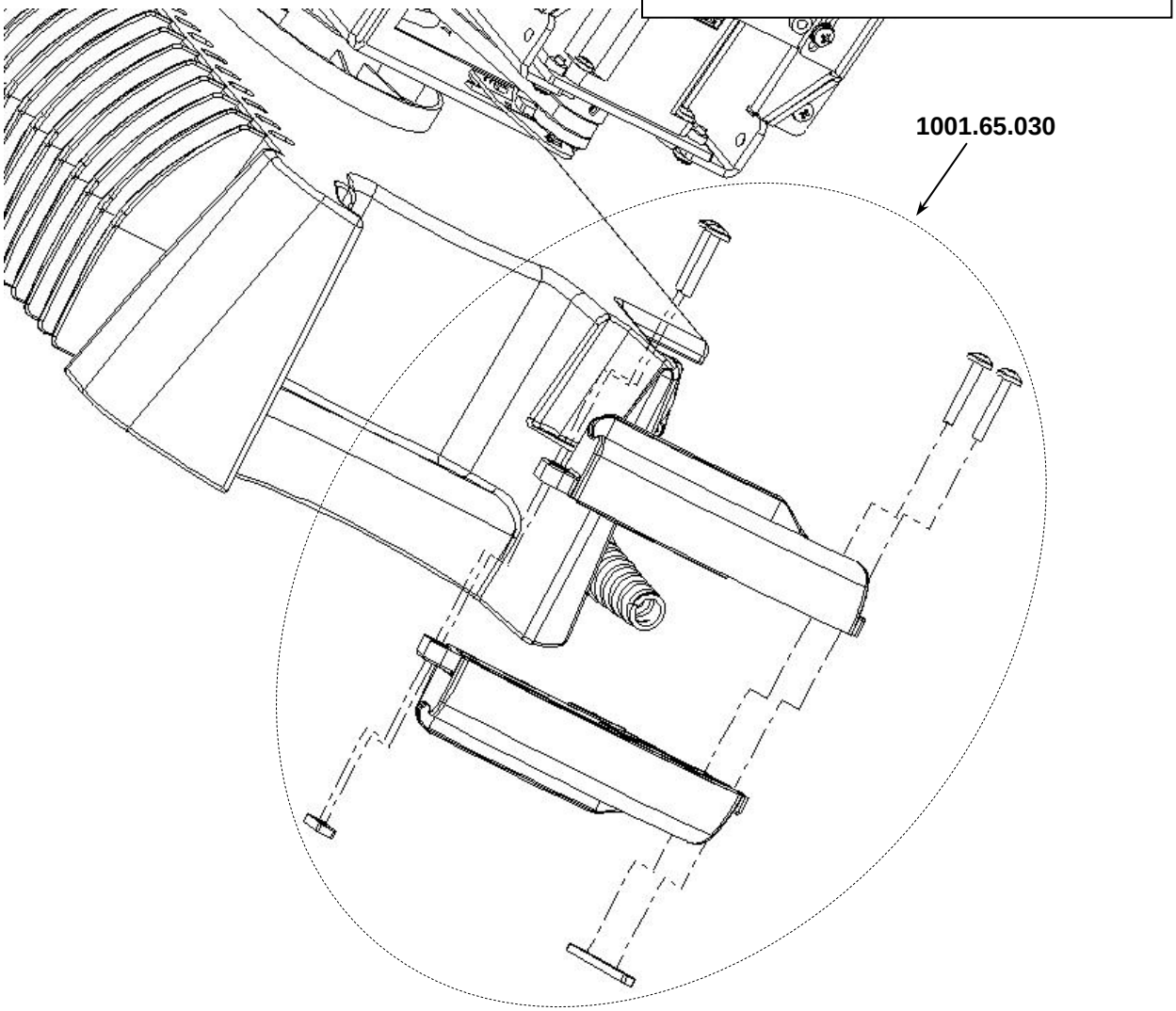


7.11 Replace Top Box Handle

Required Tool(s)	Spare Part Code	Preliminary reading
Screwdriver PZ2	1001.65.030	Chapter 7.2

1. Switch OFF and Unplug the WARP
2. Remove the 4 screws M5x25
3. Replace HANDLE

1001.65.030 includes:
- **4 Handle Top Box**
- **5 Screws M5*25**
- **2 Top box handle fastening**



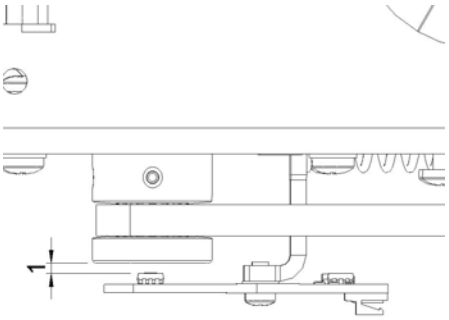
7.12 Replace fine Pan AMR Sensor

Required Tool(s)	Spare Part Code	Preliminary reading
Screwdriver PZ2	1001.65.230	Chapter 7.1 Chapter 6.1

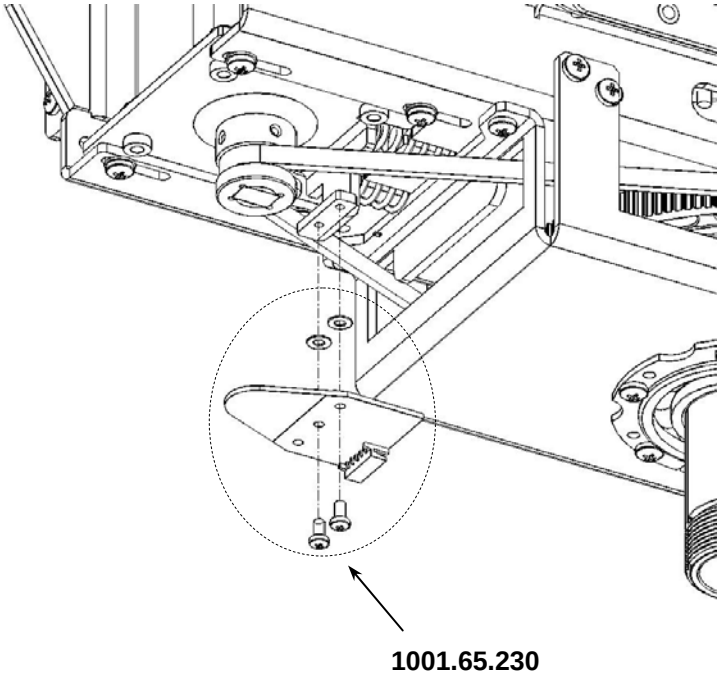
1. Switch OFF and Unplug the WARP
2. Disconnect Sensor Wire
3. Remove the 2 Taptite Screws from the Pan Suspension plate
4. Replace the Sensor Magnetic. Use new screws

1001.65.230 includes:
- **1 Sensor cable**
- **3 Screws M3*10**
- **3 Washers + 3 nuts**
- **2 cable ties**

Important:
- The first time you replace AMR SENSOR, you have to replace all taptite screws by **TCBC M4x8 ZN DIN 7985-Z**
- When you re-start the WARP you have to re-calibrate PAN AXIS. This can be started from web page, desk or local display.



Note:
Distance between sensor and magnet should be around 1 mm.



1001.65.230

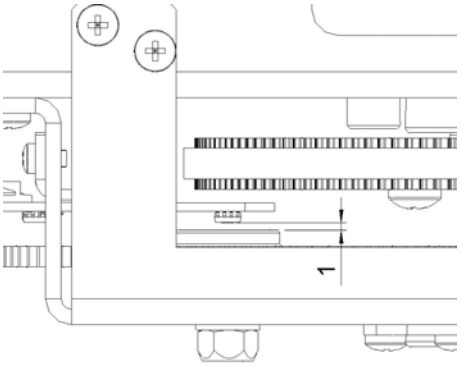
7.13 Replace Coarse PAN AMR Sensor

Required Tool(s)	Spare Part Code	Preliminary reading
Screwdriver PZ2	1001.65.230	Chapter 7.1 Chapter 6.1

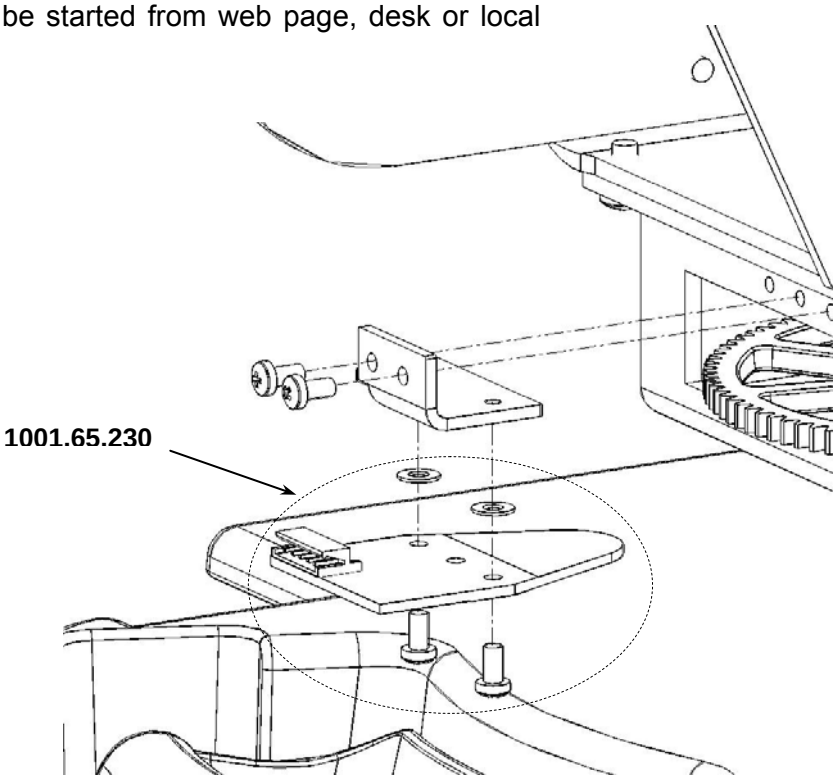
1. Switch OFF and Unplug the WARP
2. Disconnect sensor wire
3. Remove the 2 Taptite screws
4. Replace the Sensor Magnetic using new screws

1001.65.230 includes:
- **1 Sensor cable**
- **3 Screws M3*10**
- **3 Washers + 3 nuts**
- **2 cable ties**

Important:
- The first time you replace AMR SENSOR, you have to replace all taptite screws By TCBC M4x8 ZN DIN 7985-Z.
- When you re-start the WARP you have to re-calibrate PAN AXIS.
- This can be started from web page, desk or local display.



Note:
Distance between sensor and magnet should be around 1 mm.



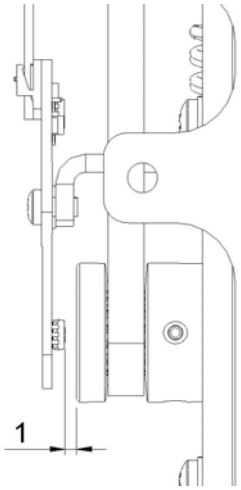
7.14 Replace fine TILT AMR Sensor

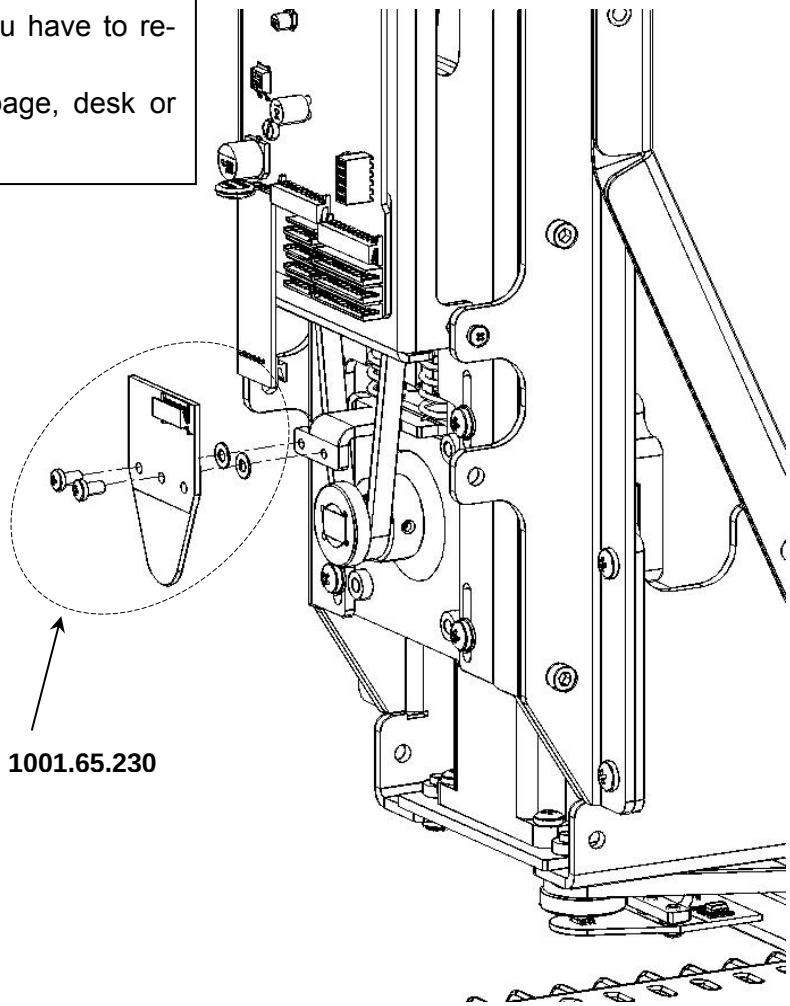
Required Tool(s)	Spare Part Code	Preliminary reading
Screwdriver PZ2	1001.65.230	Chapter 7.1 Chapter 6.1

1. Switch OFF and Unplug the WARP
2. Disconnect sensor wire from Fine Tilt Sensor
3. Remove the 2 taptite screws
4. Replace the Sensor Magnetic using new screws

1001.65.230 includes:
- **1 Sensor cable**
- **3 Screws M3*10**
- **3 Washers + 3 nuts**
- **2 cable ties**

Important:
- The first time you replace Fine Tilt AMR SENSOR, you have to replace all taptite screws by TCBC M4x8 ZN DIN 7985-Z.
- When you re-start the WARP you have to re-calibrate Tilt Axis.
- This can be started from web page, desk or local display.





Note:
Distance between sensor and magnet should be around 1 mm.

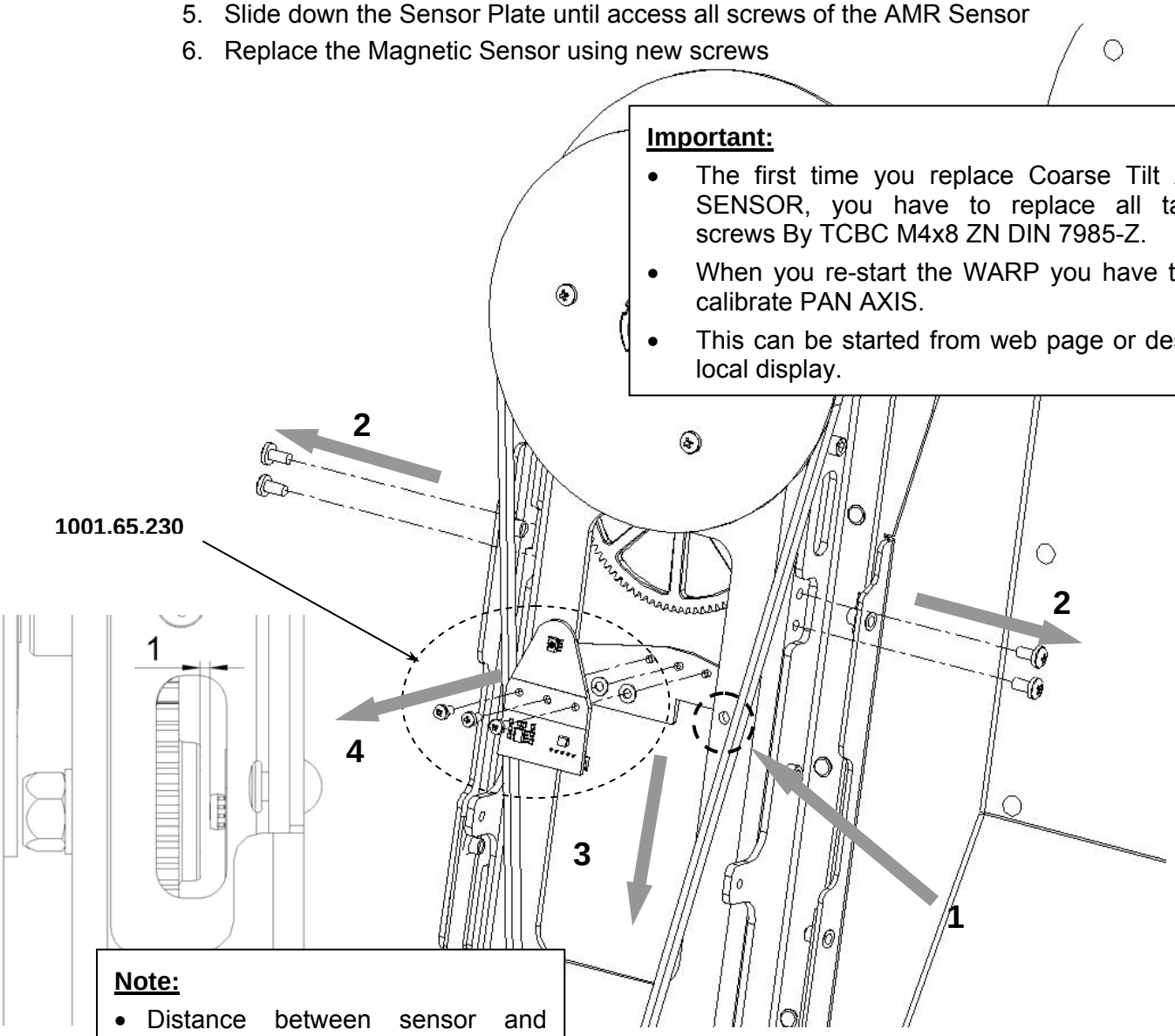
7.15 Replace Coarse TILT AMR Sensor

Required Tool(s)	Spare Part Code	Preliminary reading
Screwdriver PZ2 Wire Cutter	1001.65.230	Chapter 7.1 Chapter 7.7 Chapter 6.1

1001.65.230 includes:
- **1 Sensor cable**
- **3 Screws M3*10**
- **3 Washers + 3 nuts**
- **2 cable ties**

1. Switch OFF and Unplug the WARP
2. Remove Right Board (see chapter 7.7)
3. Cut The cable tie and Disconnect Coarse Tilt sensor wire
4. Remove the 4 taptite screws on the two sides of the arm.
5. Slide down the Sensor Plate until access all screws of the AMR Sensor
6. Replace the Magnetic Sensor using new screws

Important:
- The first time you replace Coarse Tilt AMR SENSOR, you have to replace all taptite screws By TCBC M4x8 ZN DIN 7985-Z.
- When you re-start the WARP you have to re-calibrate PAN AXIS.
- This can be started from web page or desk or local display.



Note:
- Distance between sensor and magnet should be around 1 mm
- You have small windows on the arm side to inspect the sensor position

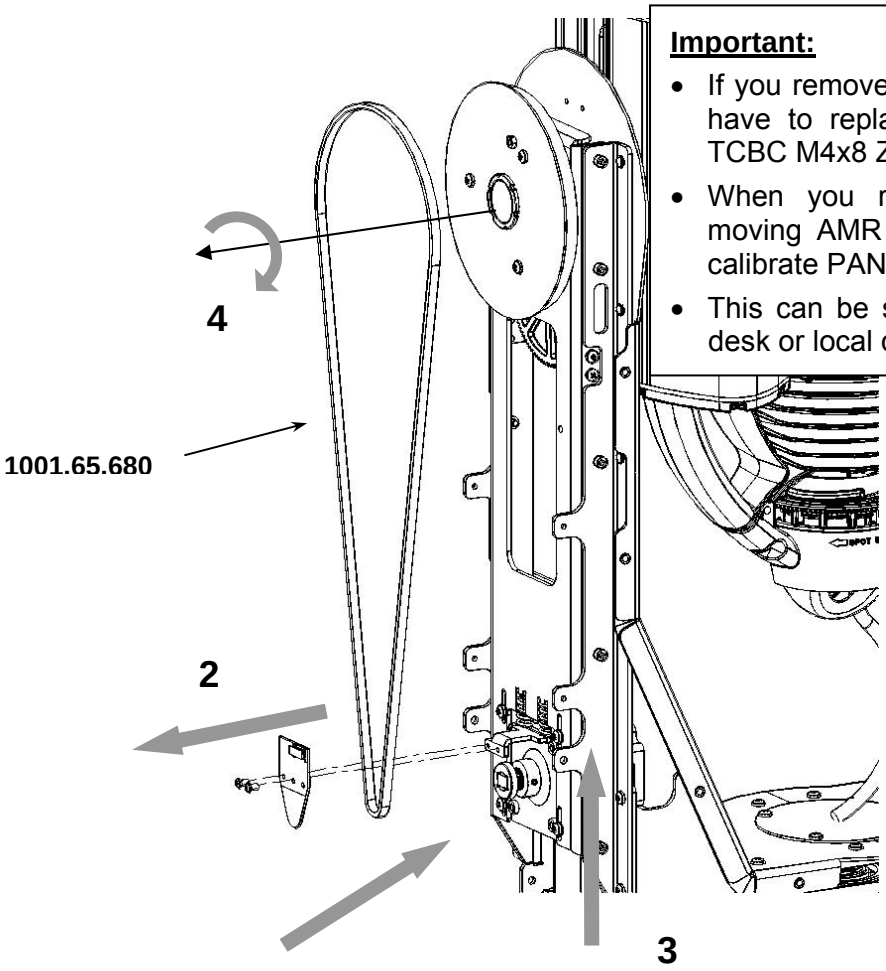
7.16 Replace TILT Belt

Required Tool(s)	Spare Part Code	Preliminary reading
Screwdriver PZ2 H 5	1001.65.680	Chapter 7.1 Chapter 7.7 Chapter 7.14

1. Switch OFF and Unplug the WARP
2. Remove Right Board (see chapter 7.7) and the Fine AMR Sensor (see chapter 7.14)
3. Loose 4 screws on the Tilt Motor Suspension Plate
4. Slide up the Motor to get free the Belt
5. Remove the belt turning the Tilt axis

1001.65.680 includes:
- **1 Belt**
- **2 Screws M3*108**
- **2 Washers + 2 nuts**

Important:
- If you remove the Fine Tilt Sensor, you have to replace all taptite screws By TCBC M4x8 ZN DIN 7985-Z.
- When you re-start the WARP after moving AMR Sensor, you have to re-calibrate PAN AXIS.
- This can be started from web page or desk or local display.



1: Loosen the 4 Screws

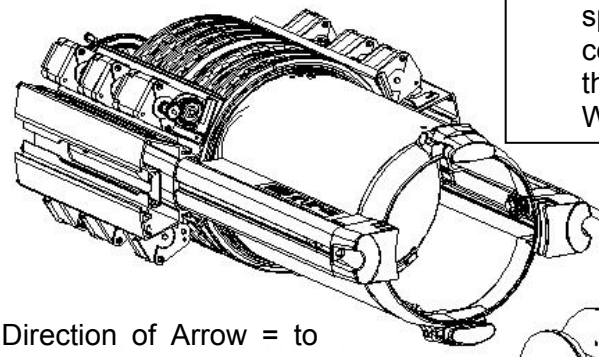
7.17 Remove WARP from the YOKE

Required Tool(s)	Spare Part Code	Preliminary reading
WARP Key Screwdriver PZ2 AMP Pin Crimp AMP Pin Extract Tool	1001.65.880	Chapter 7.1 Chapter 7.2 Chapter 6.1

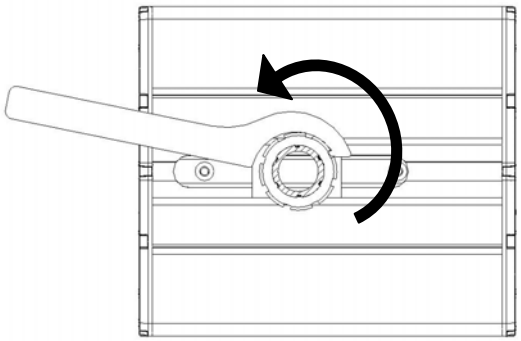
1. Switch OFF and Unplug the WARP
2. Open Arms cover and Disconnect lamp cable into the left arm.
3. Use the special tool to extract pin from the AMP Connector, if not cut the cable
4. Remove Motor Wing Cover (see chapter 7.2)
5. Unplug and remove all Cables from Motor Wing through Tilt shaft (Motors, IR Sensor and XLR 4)
6. Loosen Nut Right and Left between Arms and Motor Wing
7. Slide the WARP through the Motor Wing Profile and pass lamp cable through the Tilt Shaft.

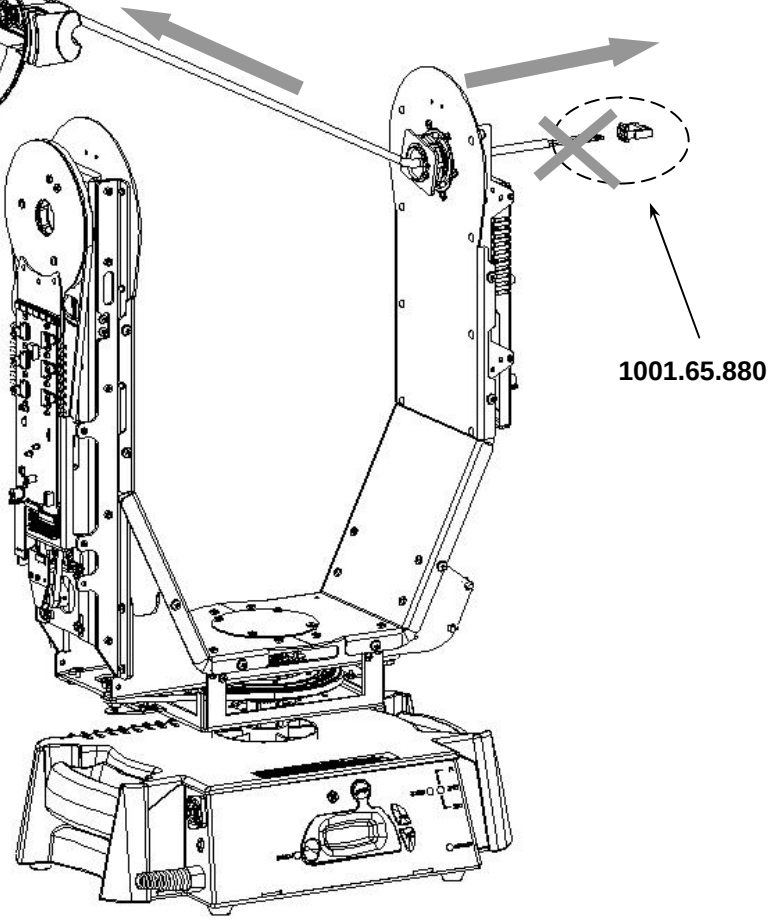
Notice:

- If you haven't got a Pin Extract Tool, you can order spare part **1001.65.880**, which provides you new connector and crimp pin. So you can cut wire near the existing one and replace it to re-assemble the WARP.



Direction of Arrow = to untighten





1001.65.880

1001.65.880 includes:

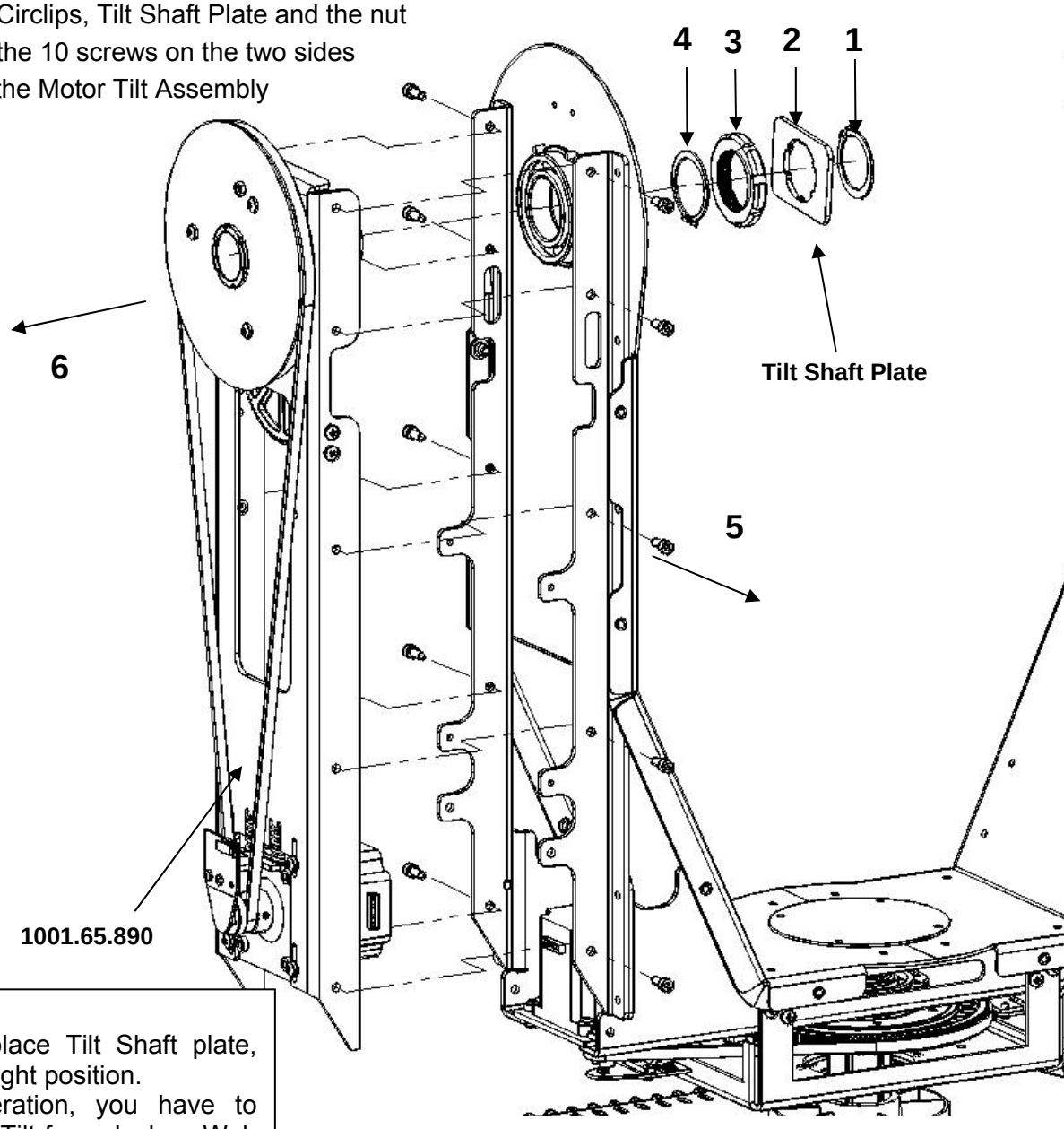
- **4 Pins**
- **1 Connector**
- **5 cable ties**
- **40 Screws M4*12 ZN**
- **Thermo shrink sleeve**
- **4 cable ties**

7.18 Remove Right Arm

Required Tool(s)	Spare Part Code	Preliminary reading
Hexagon Key4 Circlips Pliers 177 G 18 Wire Cutter	1001.65.890	Chapter 7.1 Chapter 7.7 Chapter 7.17

1001.65.890 includes:
- **1 Motor system housing tilt**
- **11 Screws M6*10**
- **10 Tie Rape**

1. Switch OFF and Unplug the WARP
2. Remove Right Board (see chapter 7.7)
3. Remove all cable fixed by tie-rape on the right arm structure
4. Disconnect: Tilt Motor – AMR Fine Tilt Sensor – AMR Coarse Tilt Sensor
5. Remove Circlips, Tilt Shaft Plate and the nut
6. Remove the 10 screws on the two sides
7. Replace the Motor Tilt Assembly



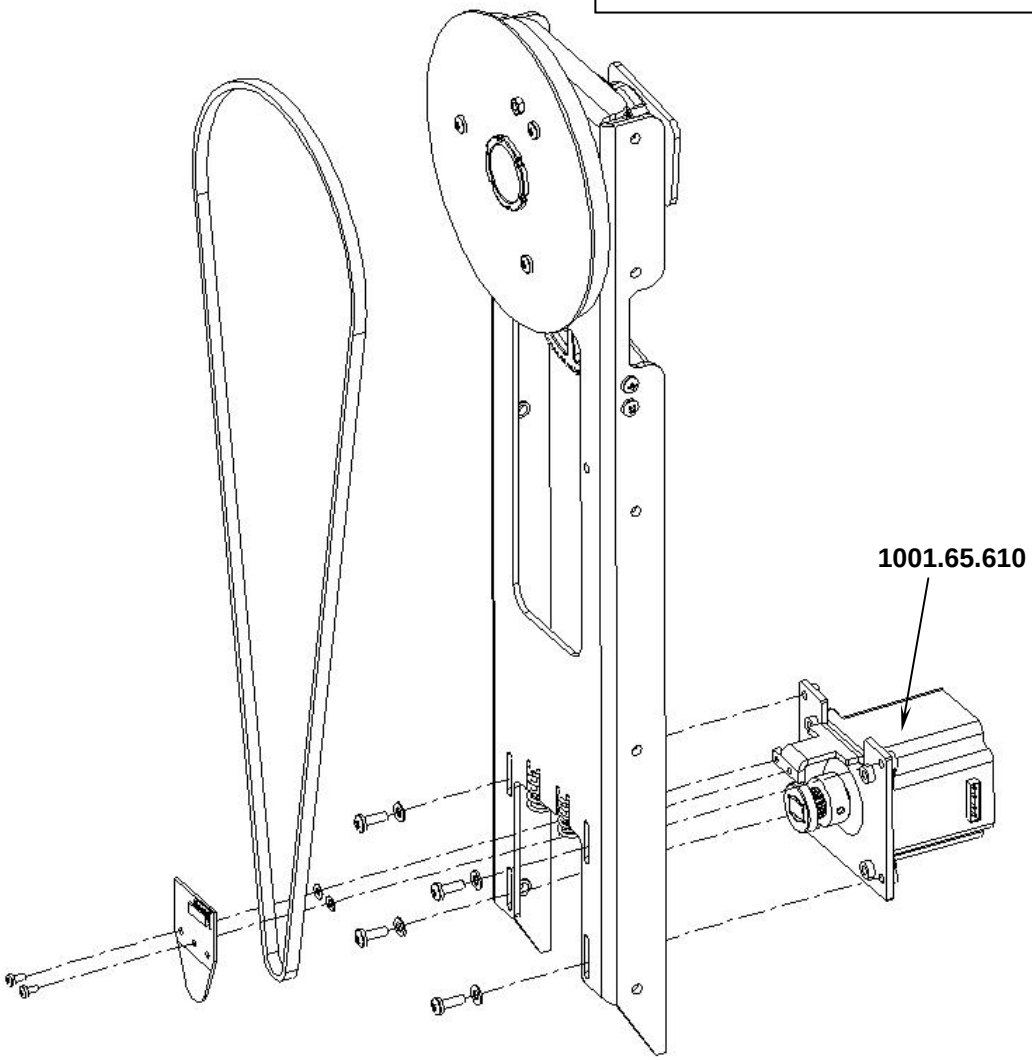
Important:
- When you replace Tilt Shaft plate, place it in the right position.
- After this operation, you have to recalibrate the Tilt from desk or Web page with the last ADB software

7.19 Replace Tilt MOTOR

Required Tool(s)	Spare Part Code	Preliminary reading
Screwdriver PZ2 Hexagon Key 3	1001.65.610	Chapter 7.18

1. Switch OFF and Unplug the WARP
2. Remove the 2 Taptite screws
3. Remove the 4 hexagon screws

1001.65.610 includes:
- **1 Tilt Motor assy**
- **4 screws 4*12**
- **4 Washers**
- **3 Screws M3*10 + Nuts**

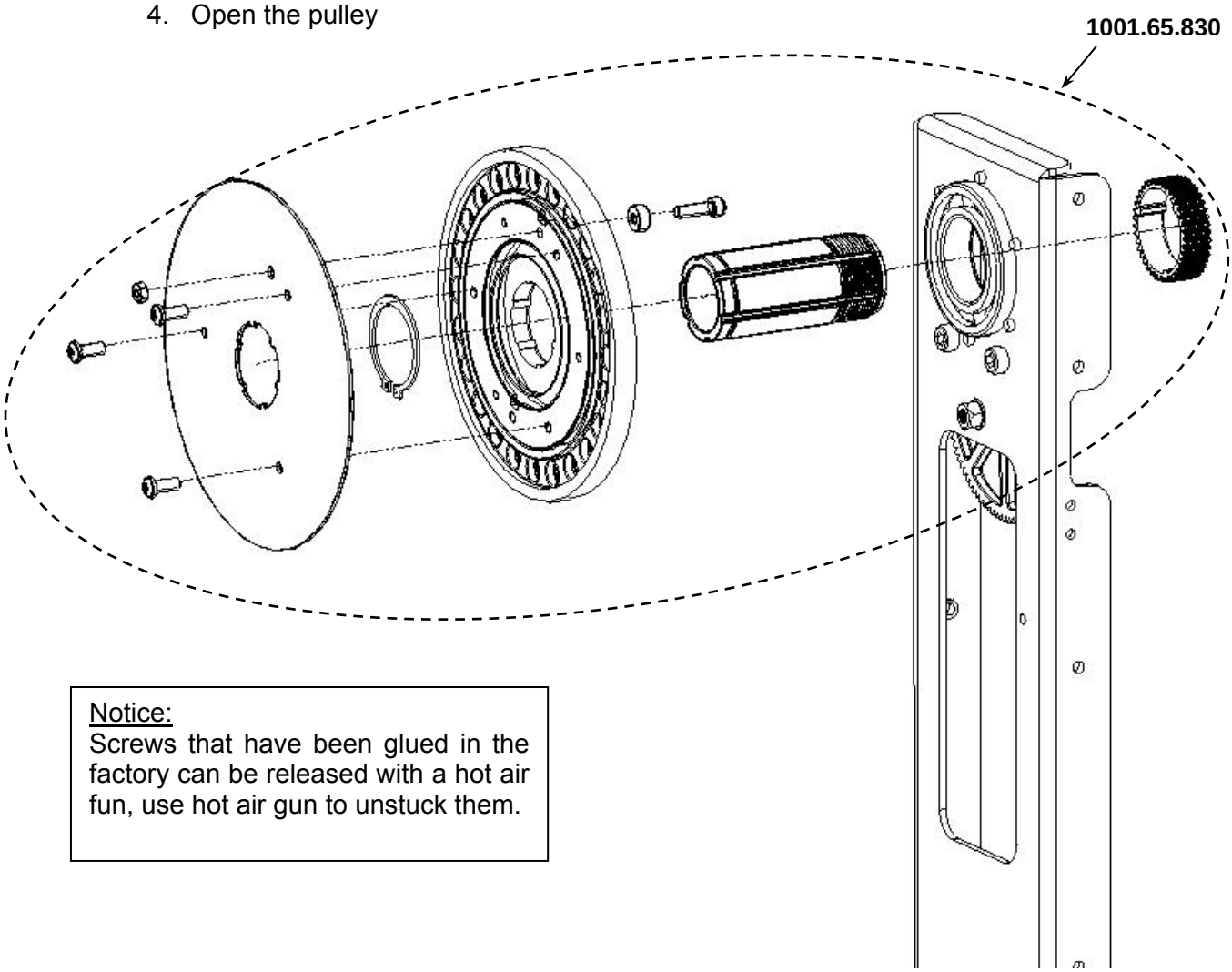


7.20 REPLACE TILT SHAFT & Pulley

Required Tool(s)	Spare Part Code	Preliminary reading
Screw driver PZ2 Hexagon Key 3 Circlips Pliers	1001.65.830	Chapter 7.18

1001.65.830 includes:
- **1 Tilt Axis Assembly**
- **1 large Pulley**

1. Remove the Tilt Belt (see 7.16)
2. Remove the intermediate gear and slide out the Tilt Shaft
3. Remove Mechanical endless and the 3 screws
4. Open the pulley



Notice:
Screws that have been glued in the factory can be released with a hot air fun, use hot air gun to unstuck them.

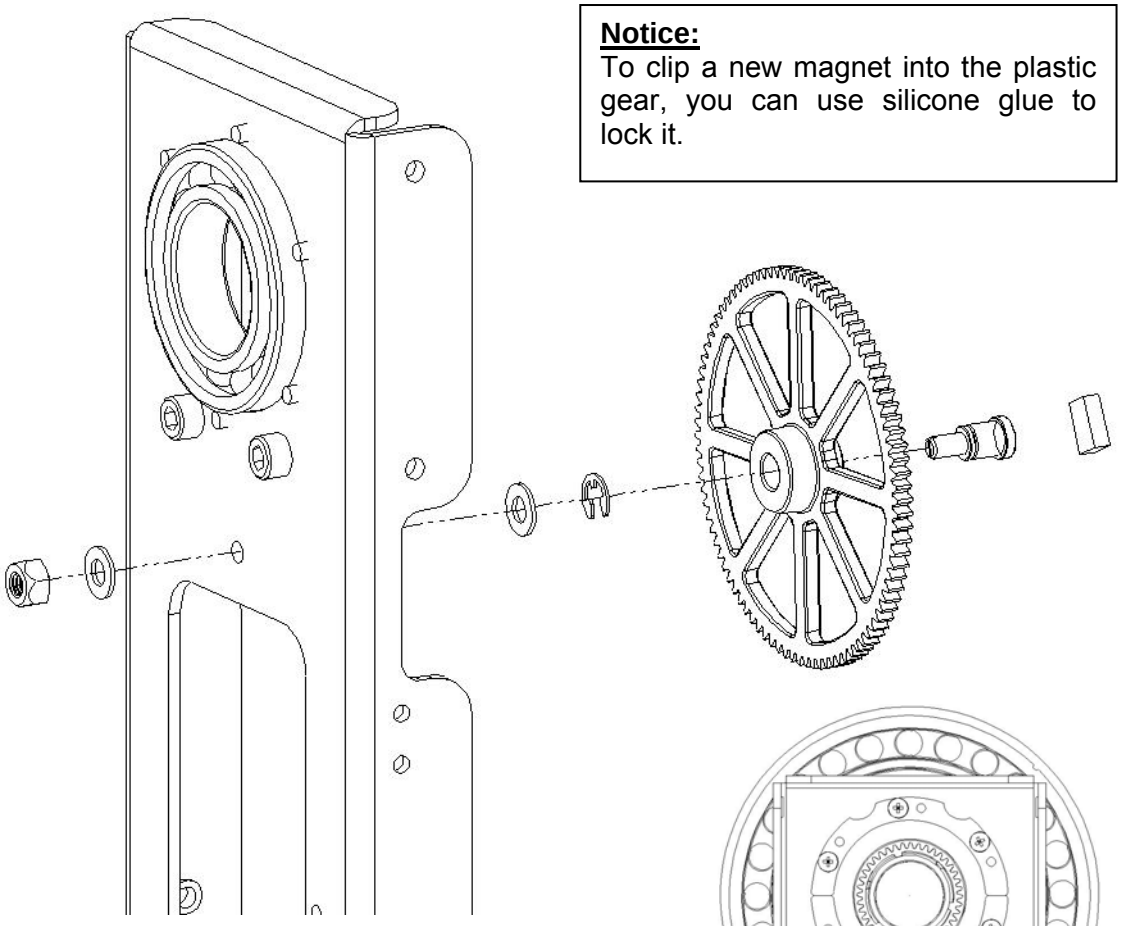
7.21 Remove Coarse TILT Ring

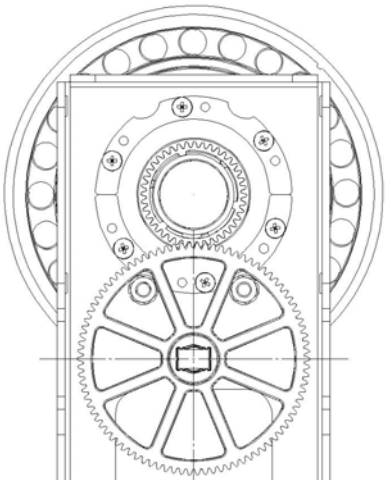
Required Tool(s)	Spare Part Code	Preliminary reading
Flat Screwdriver Metric Open ended spanner 8	1001.65.810	Chapter 7.18

1. Put the screw driver into the axis to lock the position
2. Use the Open ended spanner to tighten the nut.
3. Remove the axis from the arm
4. Unclip the magnet from the Plastic Gear.

1001.65.810 includes :
- **1 Magnet**
- **1 ring**
- **2 Washers**
- **1 Screw**
- **1 Nut**
- **1 Circlip**

Notice:
To clip a new magnet into the plastic gear, you can use silicone glue to lock it.





Magnet Position for the New Magnet

7.22 Replace Motor Wing

7.22.1 How to remove the Motor Wing

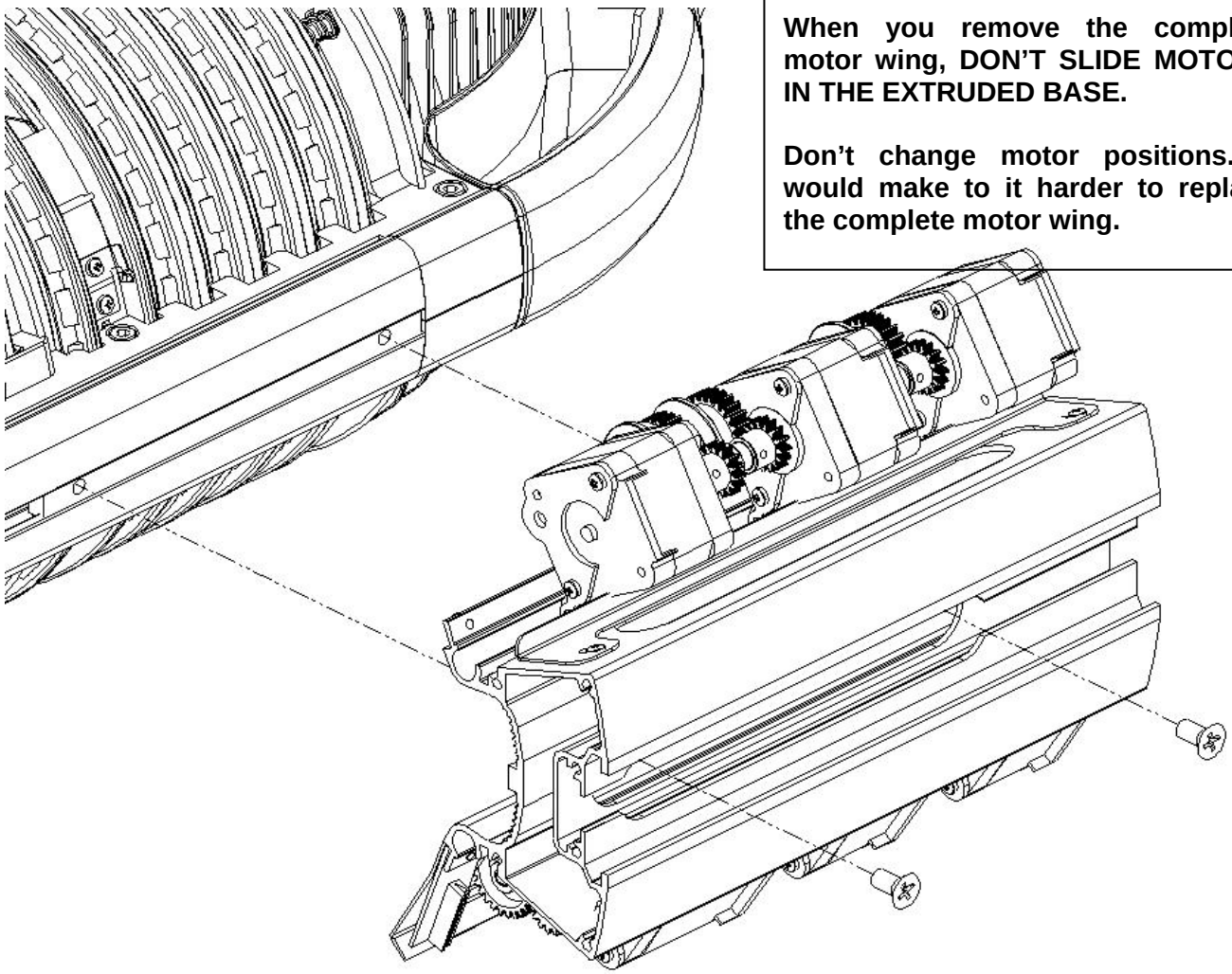
Required Tool(s)	Spare Part Code	Preliminary reading
Torx T30	None	Chapter 7.17

1. Remove the WARP from the Yoke (see chapter 7.17)
2. Remove the two Screws into the Motor Wing extrusion
3. Remove the motor wing (without change motor position)

WARNING :

When you remove the complete motor wing, DON'T SLIDE MOTORS IN THE EXTRUDED BASE.

Don't change motor positions. It would make to it harder to replace the complete motor wing.

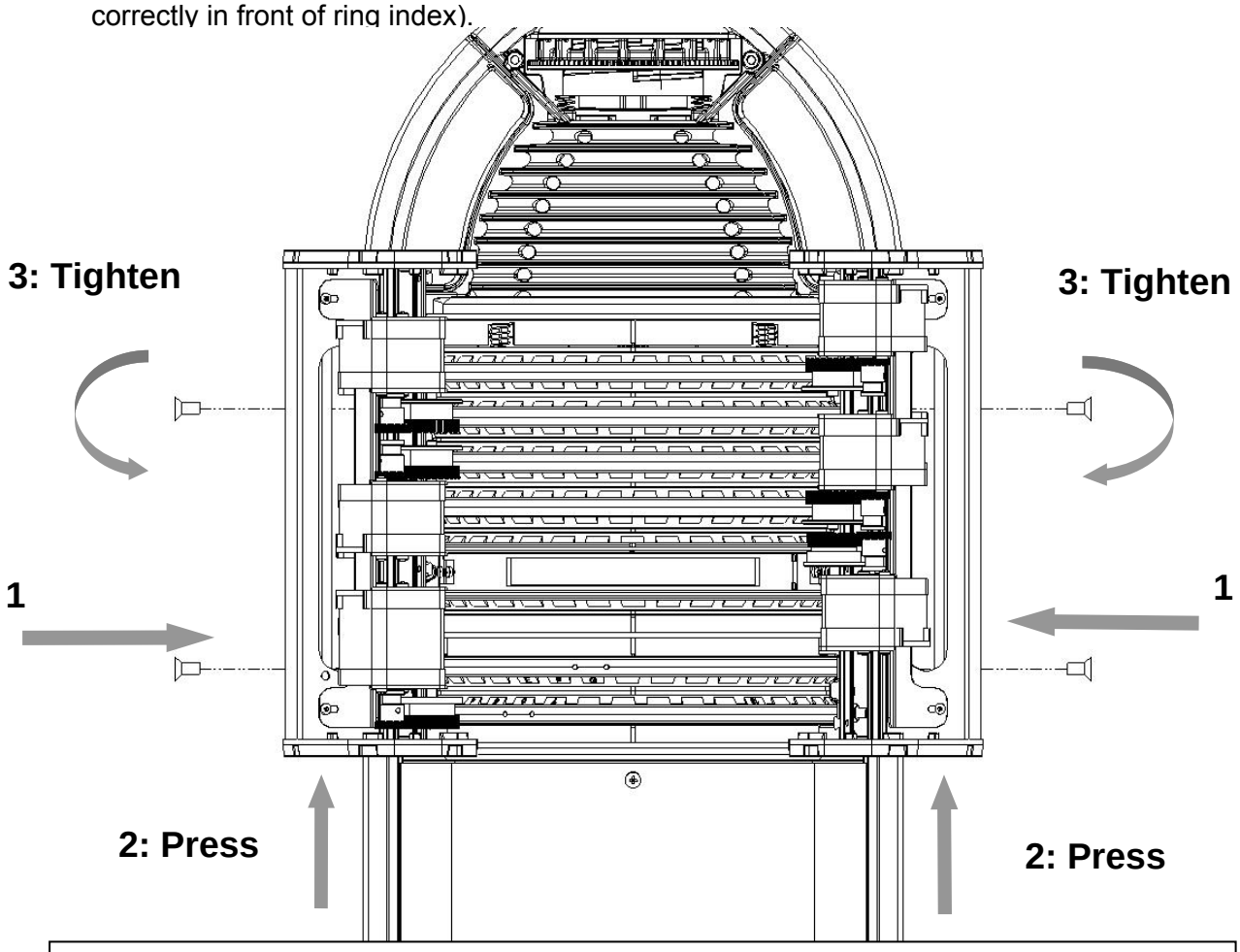


7.22.2 How to install the new Motor Wing

Required Tool(s)	Spare Part Code	Preliminary reading
Torx T30	None	Chapter 7.17

<u>WARNING:</u> BEFORE REPLACE MOTOR WINGS, CHECK SIDE POSITION AS EXPLAINED IN CHAPTERS 7.22.2.1 and 7.22.2.2

1. Place the Motor Wing in the good side, with motors in correct position
2. Put the two screws through the motor wing, and screw them on the fastener inside arm profile (not tight, loosen screw)
3. Press as shown below and tighten screws (this procedure is needed to place IR sensor correctly in front of ring index).



<u>IMPORTANT:</u>
When you restart the motorised WARP, you have to calibrate all wheels.

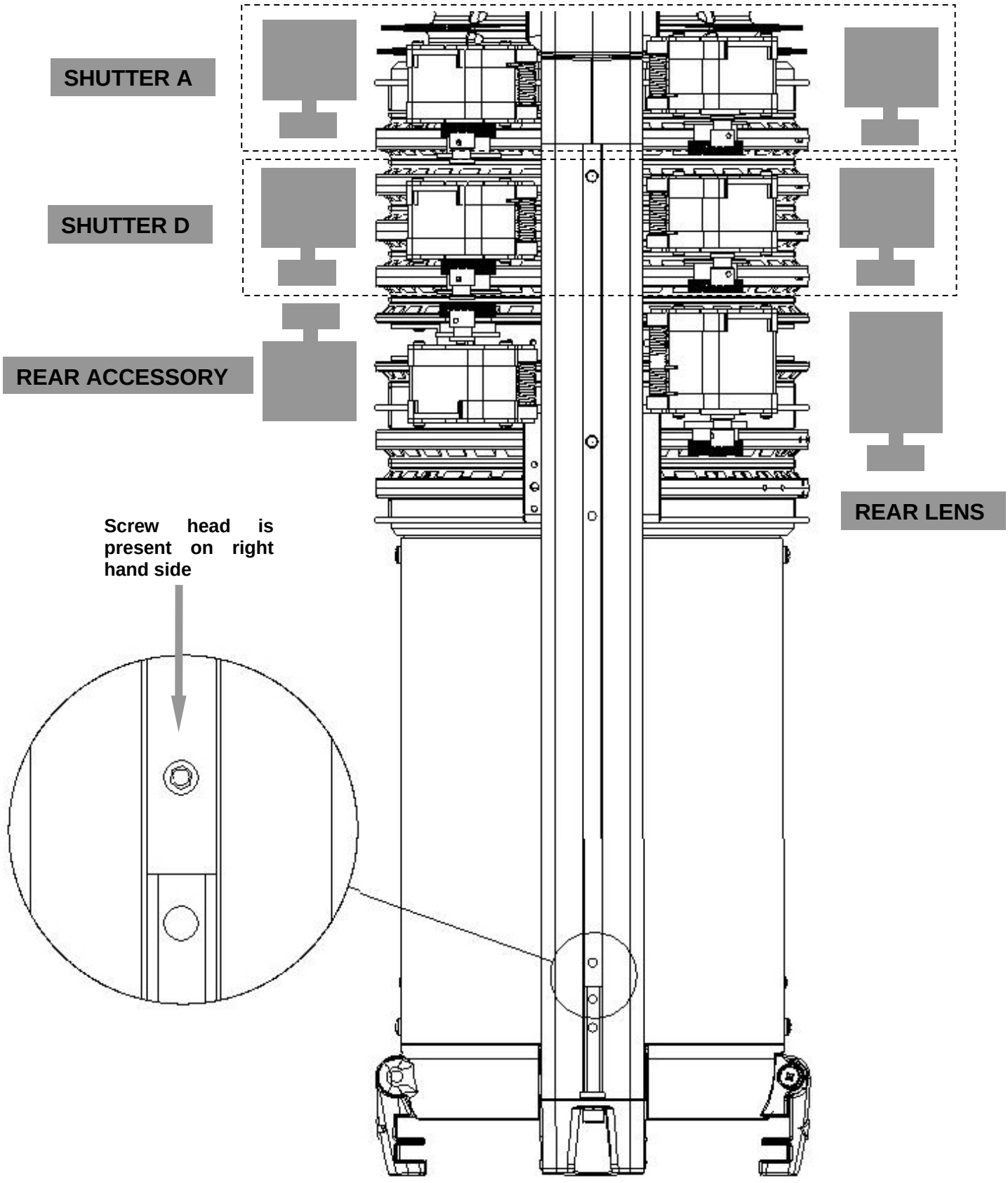
If calibration and reset failed, you have problem with IR sensor Position.
In this case, it is not necessary to remove the WARP from the Motorised Yoke

1. **Loosen Tilt Shaft nuts on the both side**
2. **Slide the WARP in the Yoke to access each motor Wing Screws**
3. **Loosen the 2 screws of the failed motor wing (Torx 30)**
4. **Use a plastic hammer and knock on the front end cover of the motor Wing**
5. **Re Tighten the 2 screws and nuts**

=If reset or calibration always failed, you have to change the IR Sensor

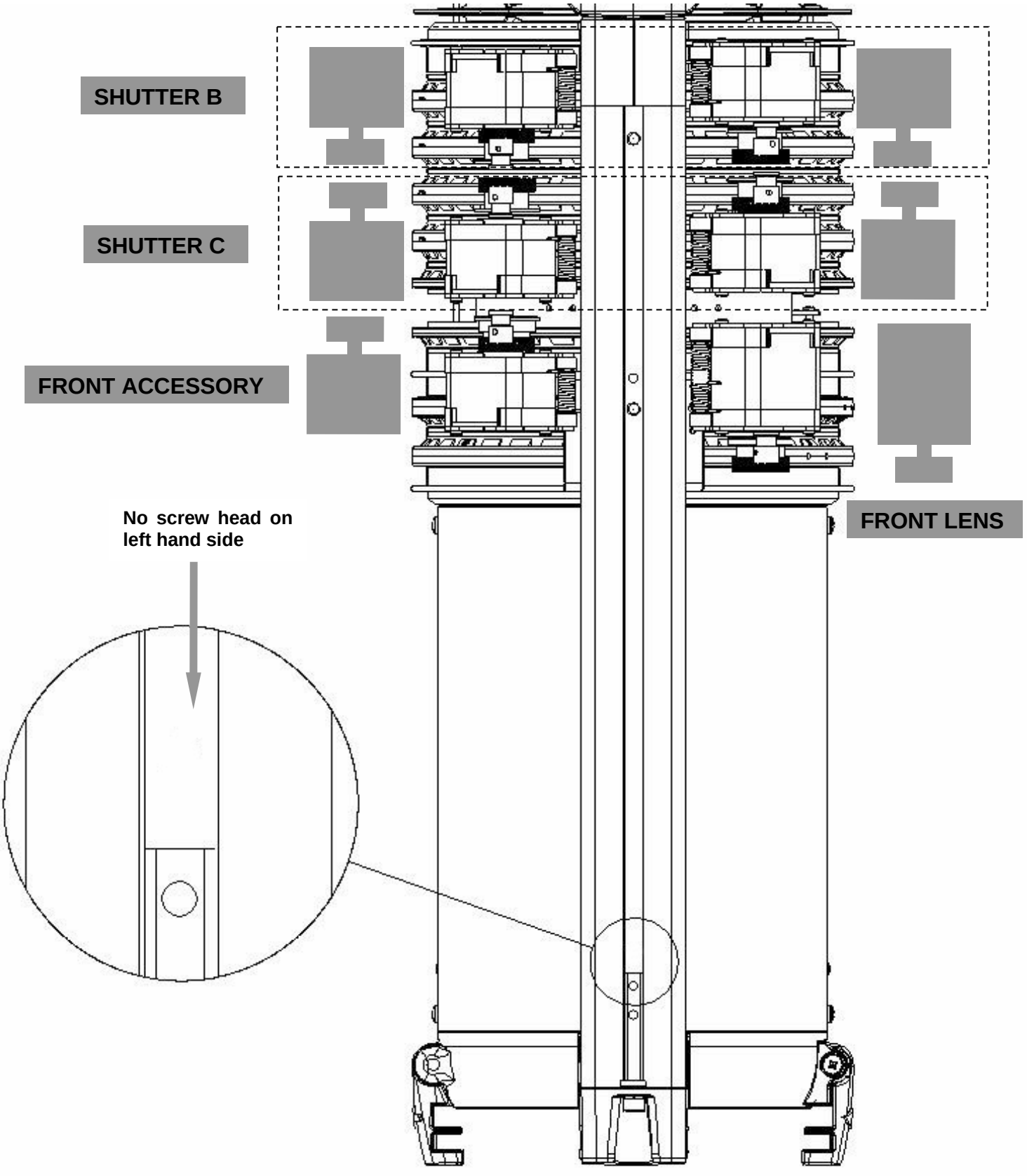
7.22.2.1 Right Motor Wing position

On the Right hand side of the WARP, you must see a screw head into to arm profile near the cassette filter, as shown below



7.22.2.2 Left Motor Wing position

On the left hand side of the WARP, there is no screw head into to arm profile near the cassette filter, as shown below

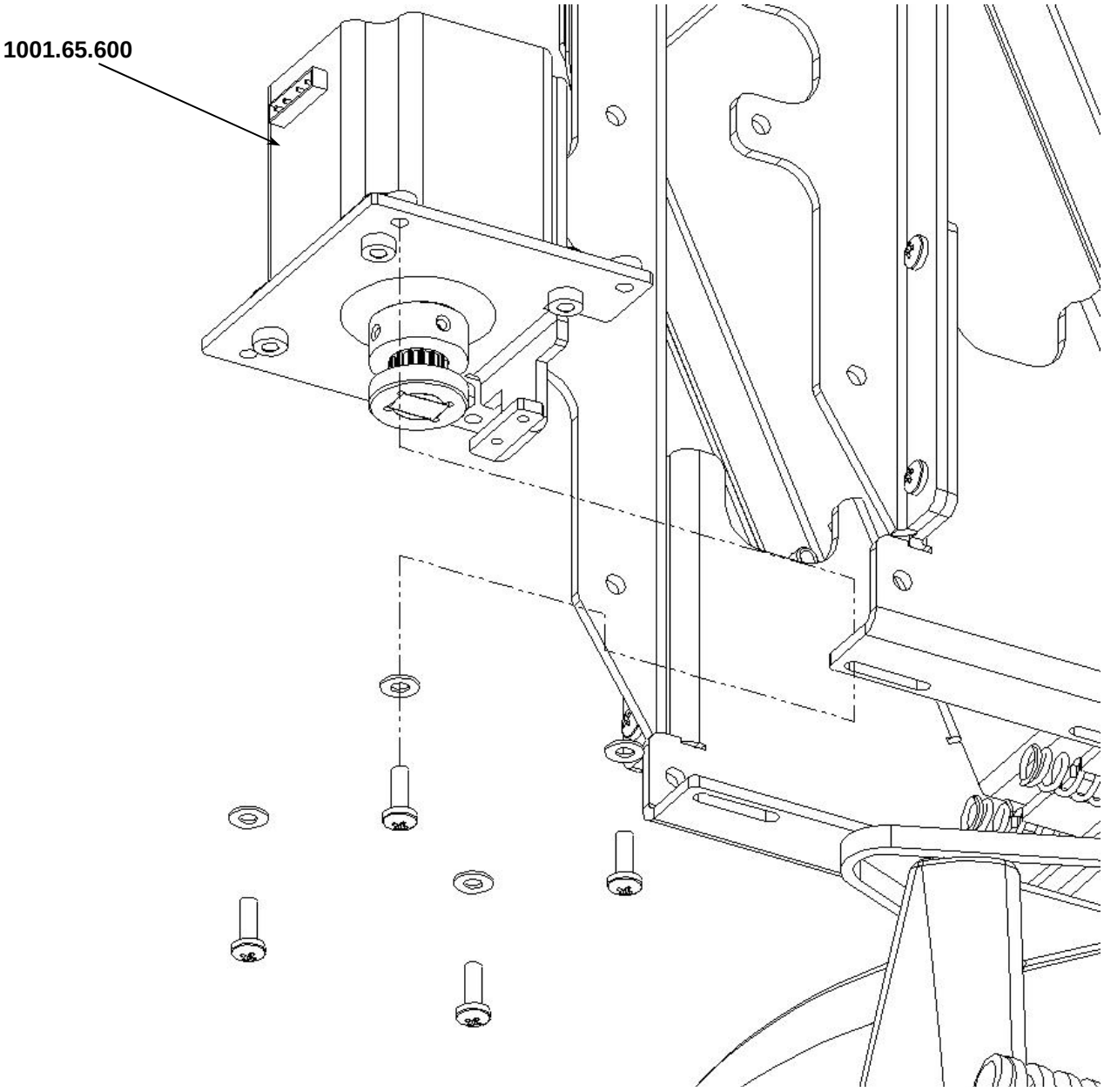


7.23 Remove Pan Motor

Required Tool(s)	Spare Part Code	Preliminary reading
Screwdriver PZ2	1001.65.600	Chapter 7.18

1. Remove Right Arm (see chapter 7.18)
2. Remove AMR Sensor “Pan Fine” (see chapter 7.12)
3. Loosen the 4 screws and Slide the motor to remove the belt
4. Remove the 4 screws and replace the Pan motor.

1001.65.600 includes:
- **1 Pan Motor Assembly**
- **4 Washers**
- **4 Screws M4*12**
- **3 Screws M3*10 + Nuts**

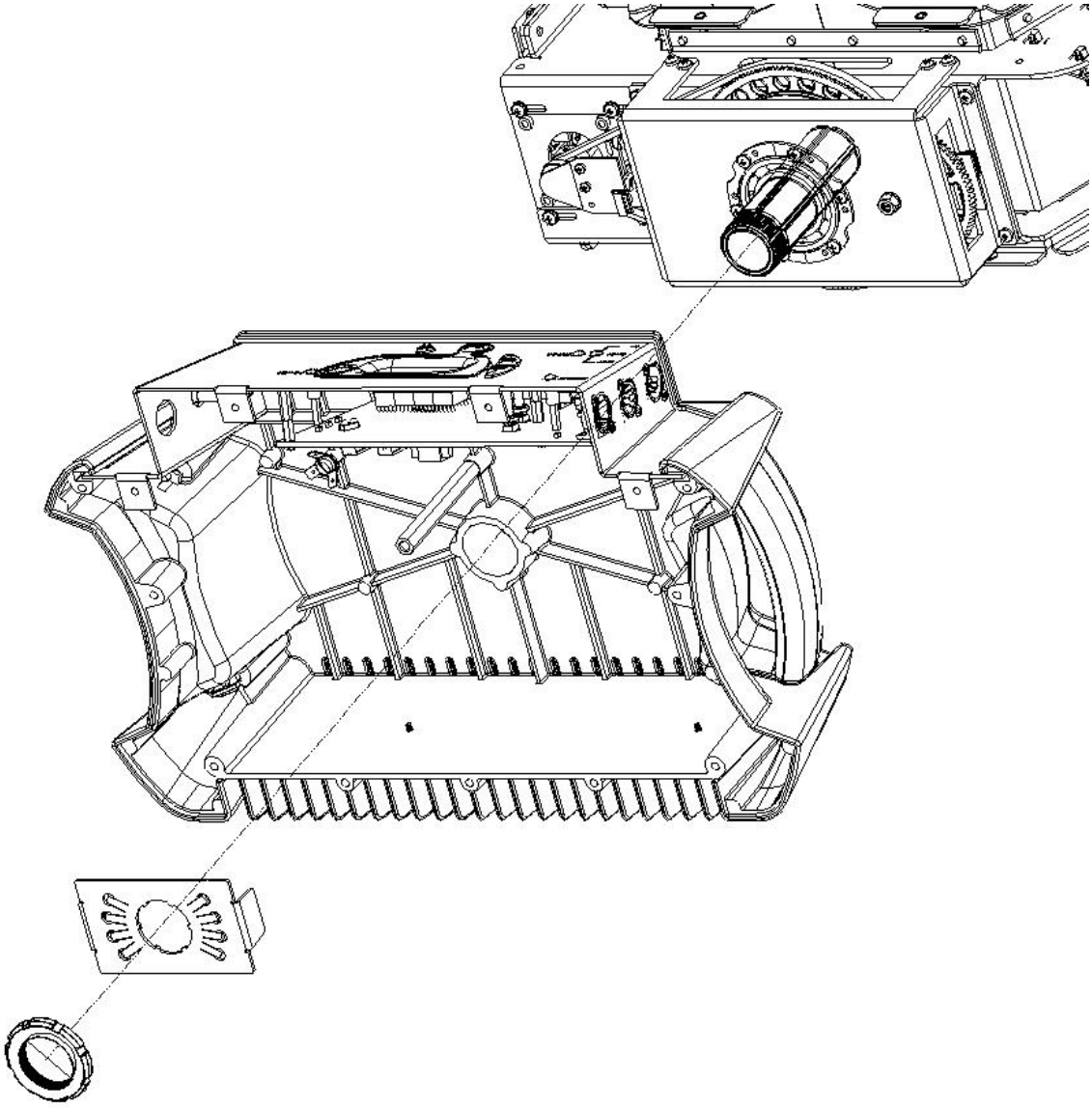


7.24 Remove Yoke from Top Box

Required Tool(s)	Spare Part Code	Preliminary reading
WARP Key Flat Screwdriver	None	Chapter 7.5

7.24.1 Remove Yoke from the Top Box

1. Remove top box Plate (see chapter 7.2)
2. Remove 24 V Power Supply (see chapter 7.4)
3. Remove Front Panel (see chapter 7.5)
4. Unplug ground cable from Pan shaft
5. Unlock the nut (bend the small plate) then remove the nut using WARP key.
6. Remove the Pan Shaft through the top box hole



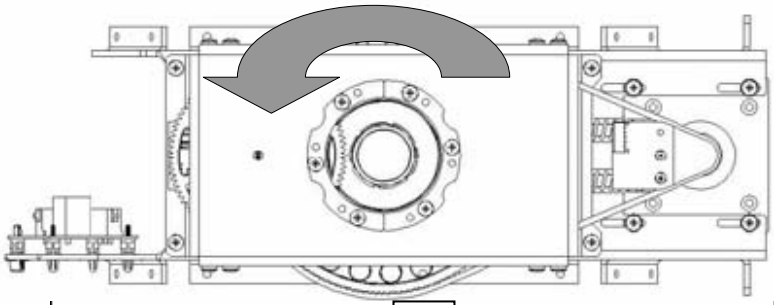
7.24.2 How to replace the motorised yoke on the Top Box

Required Tool(s)	Spare Part Code	Preliminary reading
WARP Key Flat Screwdriver	None	Chapter 7.5

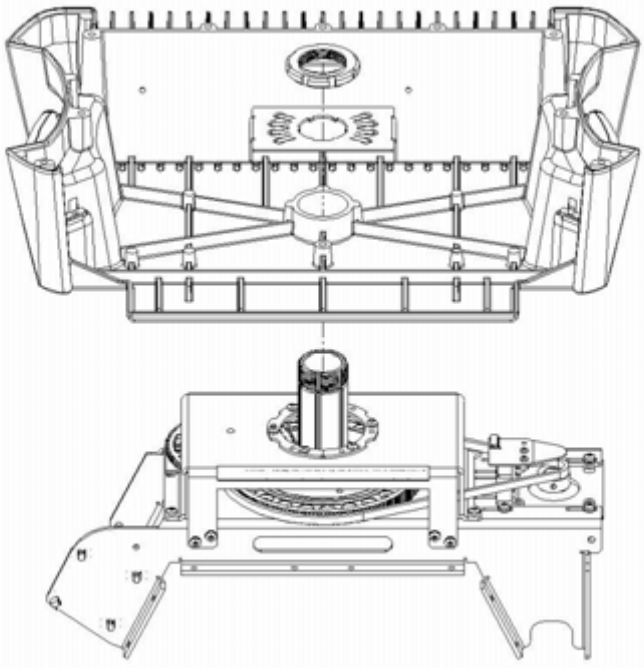
To replace the PAN Belt

1. Put the Pan Motor on the right side
2. Turn anticlockwise the Pan shaft to the mechanical end stop (you must have 2 shaft slot horizontal)
3. Slide the Top Box through the shaft with Opened Panel front of you
4. Slide the lock plate and clamp the 2 bended part into the topbox
5. Grip the shaft nut with the WARP key
6. Replace the Pan Belt
7. Bend one of the lock plate strip to fix the nut
8. Pass trough the shaft and connect correctly:
   - Security Cable
   - WARP Link 1
   - Ground Cable
   - Lamp Wire

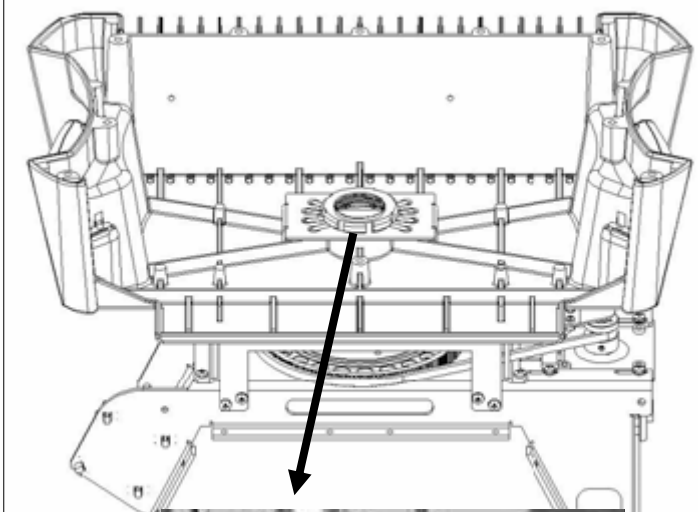
Left **1** **Righ**

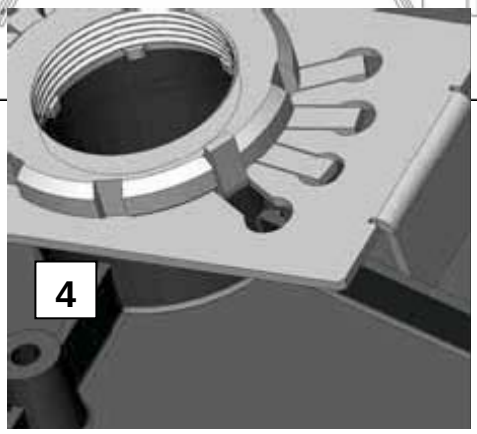


7.25 **2**



3





4

IMPORTANT:
You Must Calibrate Pan Axis after this operation

7.25 Replace Pan Belt and Coarse Gear

Required Tool(s)	Spare Part Code	Preliminary reading
Screw Driver PZ2 Circlips Pliers Flat Screwdriver Open Ended Spanner 8	 1001.65.670 1001.65.810	 Chapter 7.24 Chapter 7.13

To replace the PAN Belt

9. Remove the Pan Coarse Sensor
10. Remove the 10 Taptite Screws from the Pan Housing
11. Remove the Circlpis
12. Slide down the Pan Housing
13. Replace the Pan Belt
14. Before place the new one, put it in the Pan Housing

1001.65.670 includes :

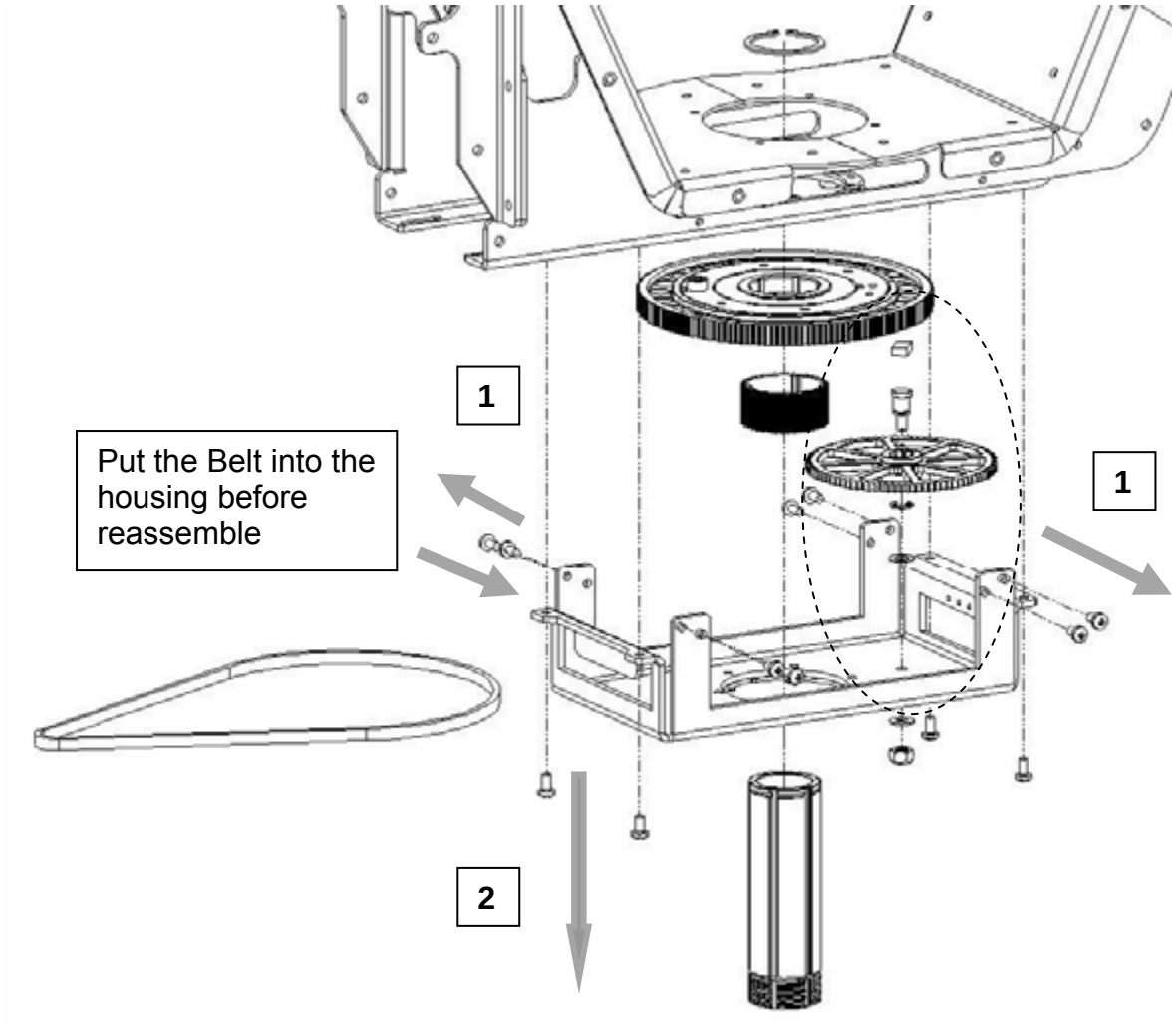
- **1 PAN Belt**
- **12 Screws M4*8 (not Taptite)**

1001.65.810 includes :

- **1 Complete Gear with Magnet**
- **1 Nut + 1 Washer**

To replace the Coarse Gear

1. Put the screw driver into the axis to lock the position
2. Use the Open ended spanner to tighten the nut.
3. Remove the axis from the Pan Housing
4. Unclip the magnet from the Plastic Gear.



7.26 IR Sensor

Required Tool(s)	Spare Part Code	Preliminary reading
Screwdriver PZ1	1001.65.270 Right 1001.65.260 Left	Chapter 7.22

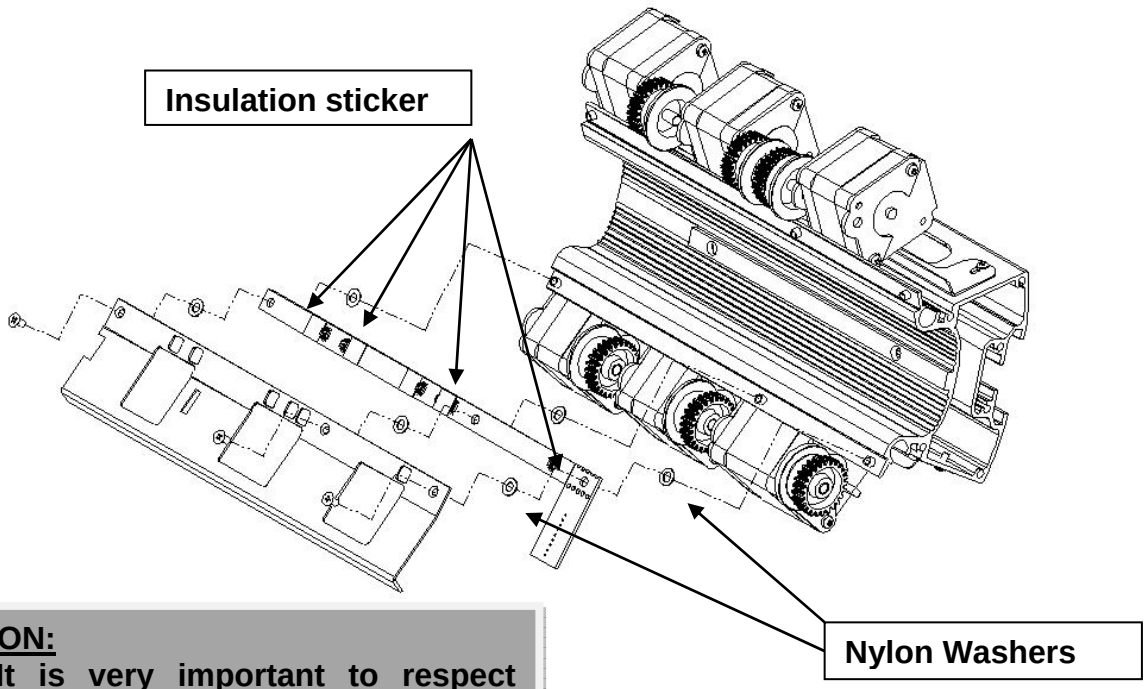
1. Remove the Motor Wing from the WARP (see chapter 7.22)
2. Remove the 3 Screws from the motor Wing
3. Remove the Plate protection and the IR board.
4. Replace the board using new screws and nylon washers (one beneath and one above the board on each M3 Insert, put blue Loctite 243 on screws)

Important:
- Don't forget Nylon Washer on each side of the board (can't work without)
- Take care of insulation above the board

Notice:
- In factory, M3 screws are stop with Loctite Glue 243; if difficult to remove, use a hot air gun to un-stick.

1001.65.270 includes:
- **1 IR Board Right with Insulation**
- **4 Screws M3*6 PZ1**
- **8 Nylon Washer**

1001.65.260 includes:
- **1 IR Board Left with Insulation**
- **4 Screws M3*6 PZ1**
- **8 Nylon Washer**

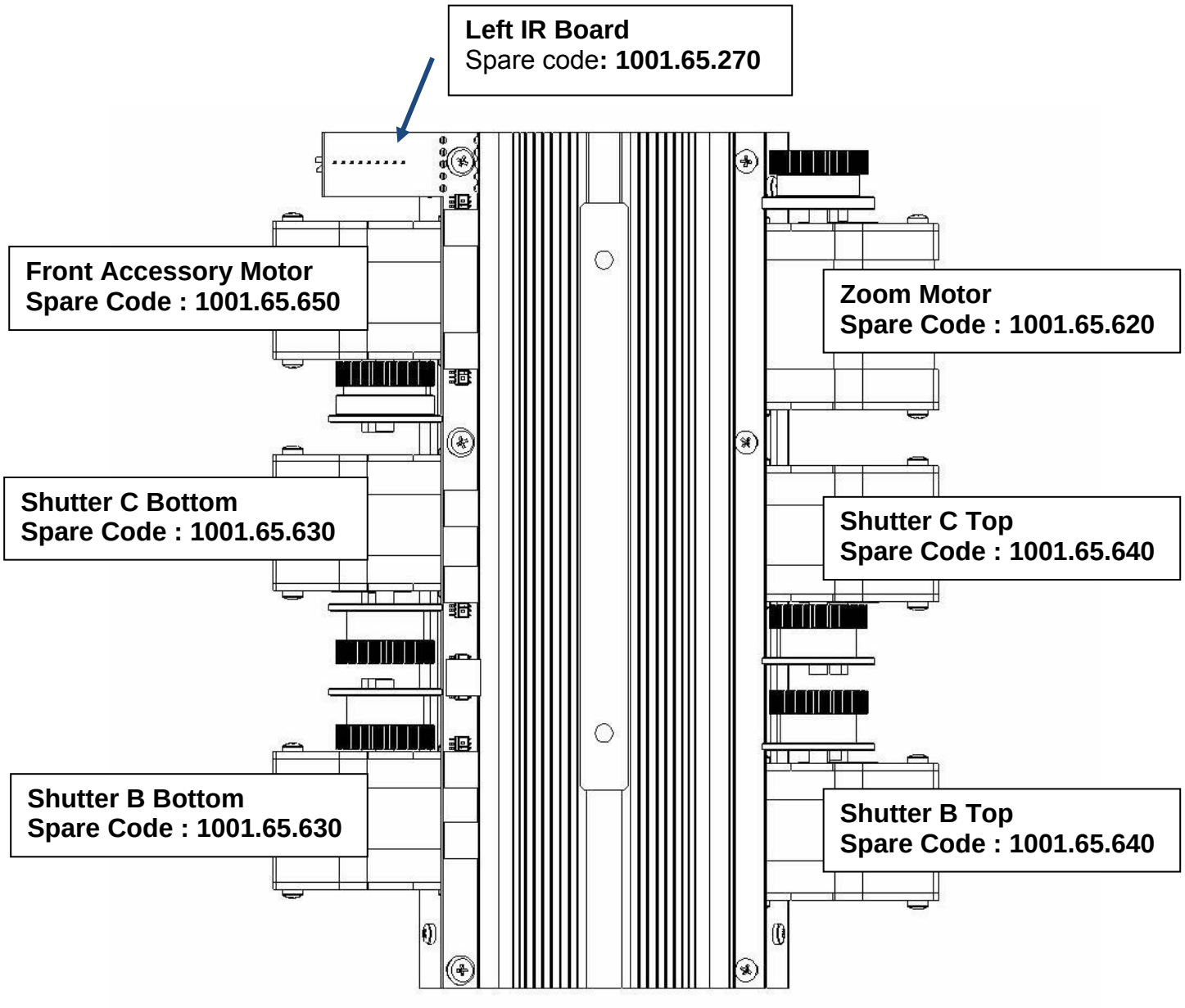


CAUTION:
- **It is very important to respect motors and IR board setting (see chapter 7.26.2)**
- **You must have a photoelectric cell in front of each gear**

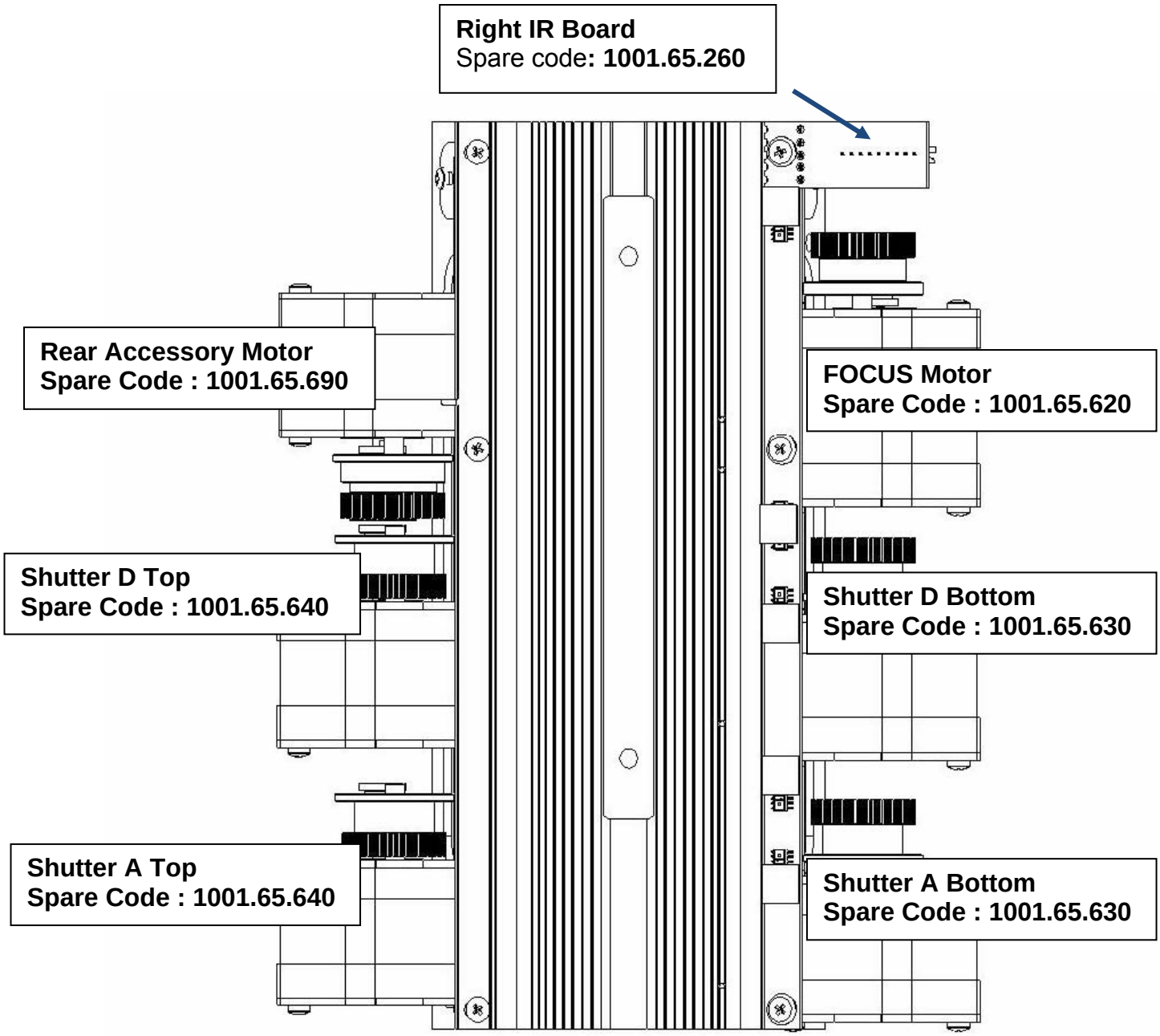
7.27 IR Sensor Setting

Following drawings show you motors and sensor setting.
On this drawing you can find Spare Part Code if you need to change Motor.

Left Motor Wing



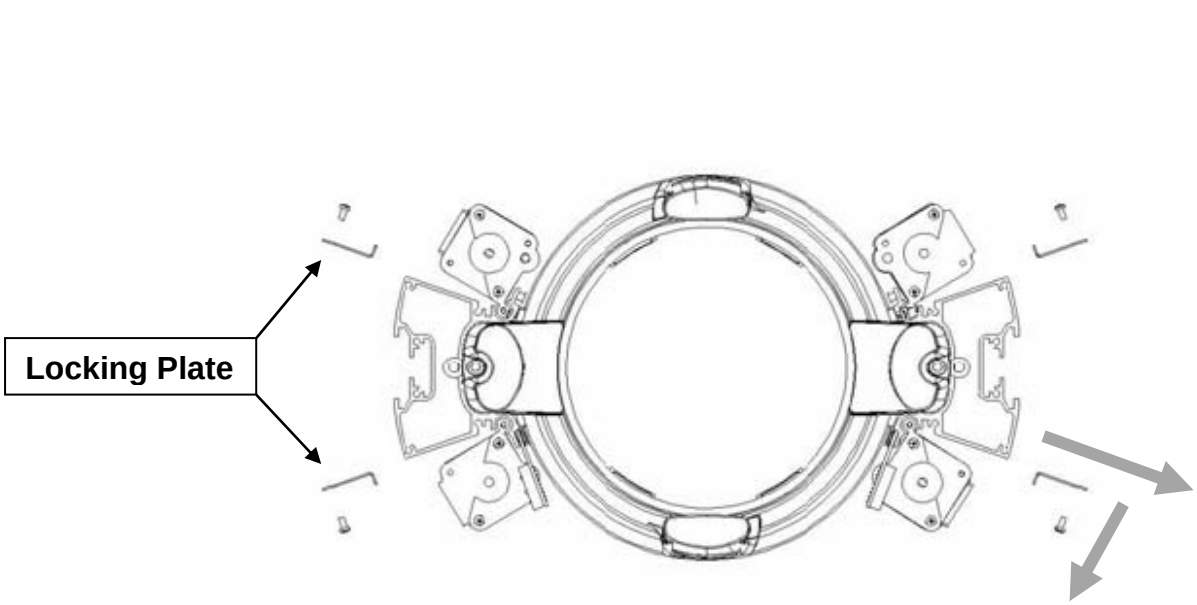
Right Motor Wing

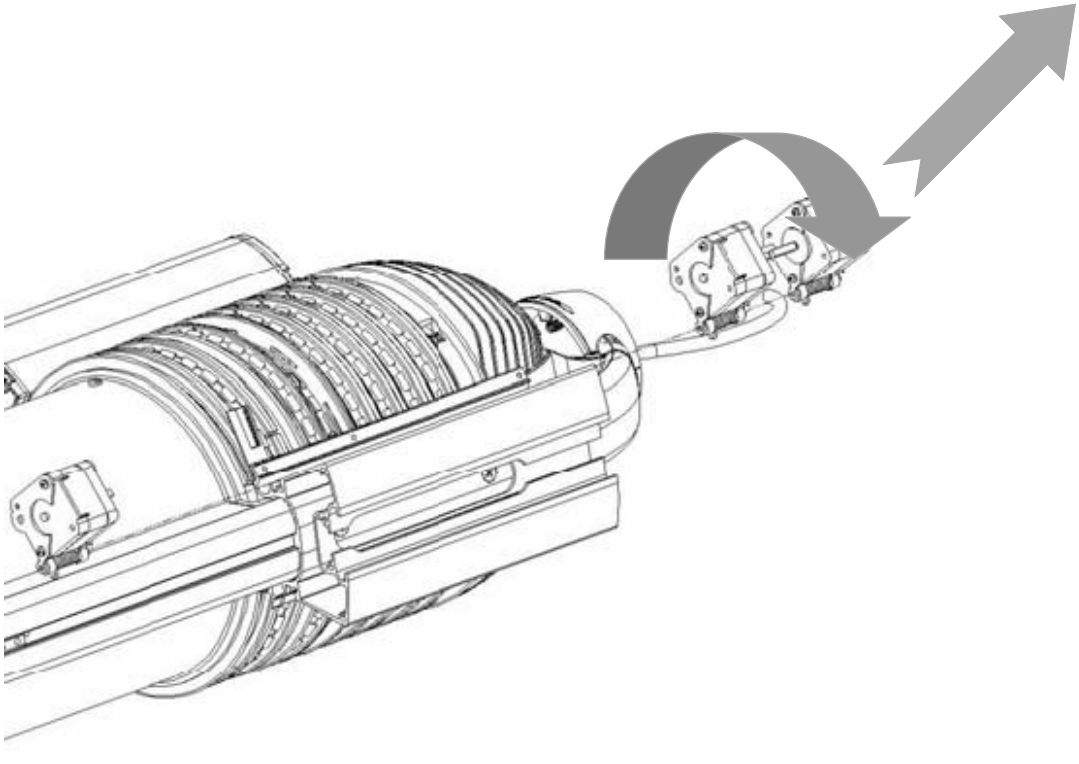


7.28 Motor Wing

Required Tool(s)	Spare Part Code	Preliminary reading
Open Ended Spanner 5.5 Flat Screw Driver Screw driver PZ2	None	Chapter 7.3 Chapter 7.26.2

1. Remove Wing Covers on each motor wing (see chapter 7.3)
2. Unplug motors you wish replace
3. Remove the locking plate on each side of the motor wing
4. To remove a motor, push it against the wing profile and slide it to the near end





7.29 Change motor Gears

Required Tool(s)	Spare Part Code	Preliminary reading
Hexagonal key 1.5	1001.65.660	Chapter 7.28.1

Change with motors outside

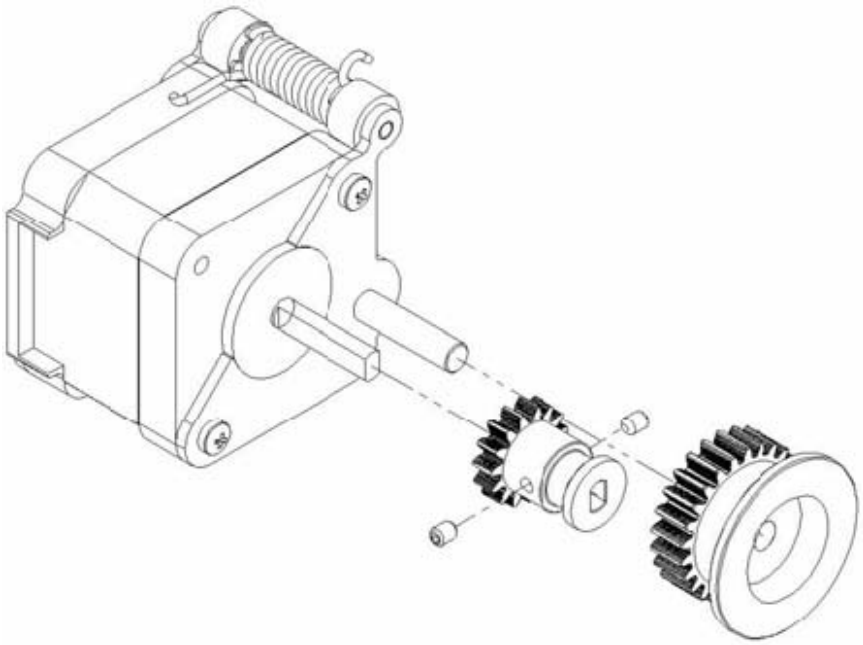
1. Remove 2 screws in the small gear
2. Slide out the 2 gears in same time
3. Replace gears (use Loctite 243 for the 2 screws)

You can change gears with motors on Motors Wing

1. Remove locking plate under the gears motor you want change
2. Remove the 2 screws from the small gear.
3. Push the Motor assembly against the motor Wing to disconnect from wheels.
4. Remove the 2 gears at same time

1001.65.660 includes :

- **8 Shutter gears**
- **2 Accessory gears**
- **2 Lens Gear**
- **12 small Gears**
- **26 Screws M3*4**



WARNING:

- **Gears Setting are different between shutters / accessory / lenses motor assembly.**
- **For shutters, you have a Top and a Bottom setting, please refer to chapter 7.26.2**

7.30 Adjust Motors in the motor Wing

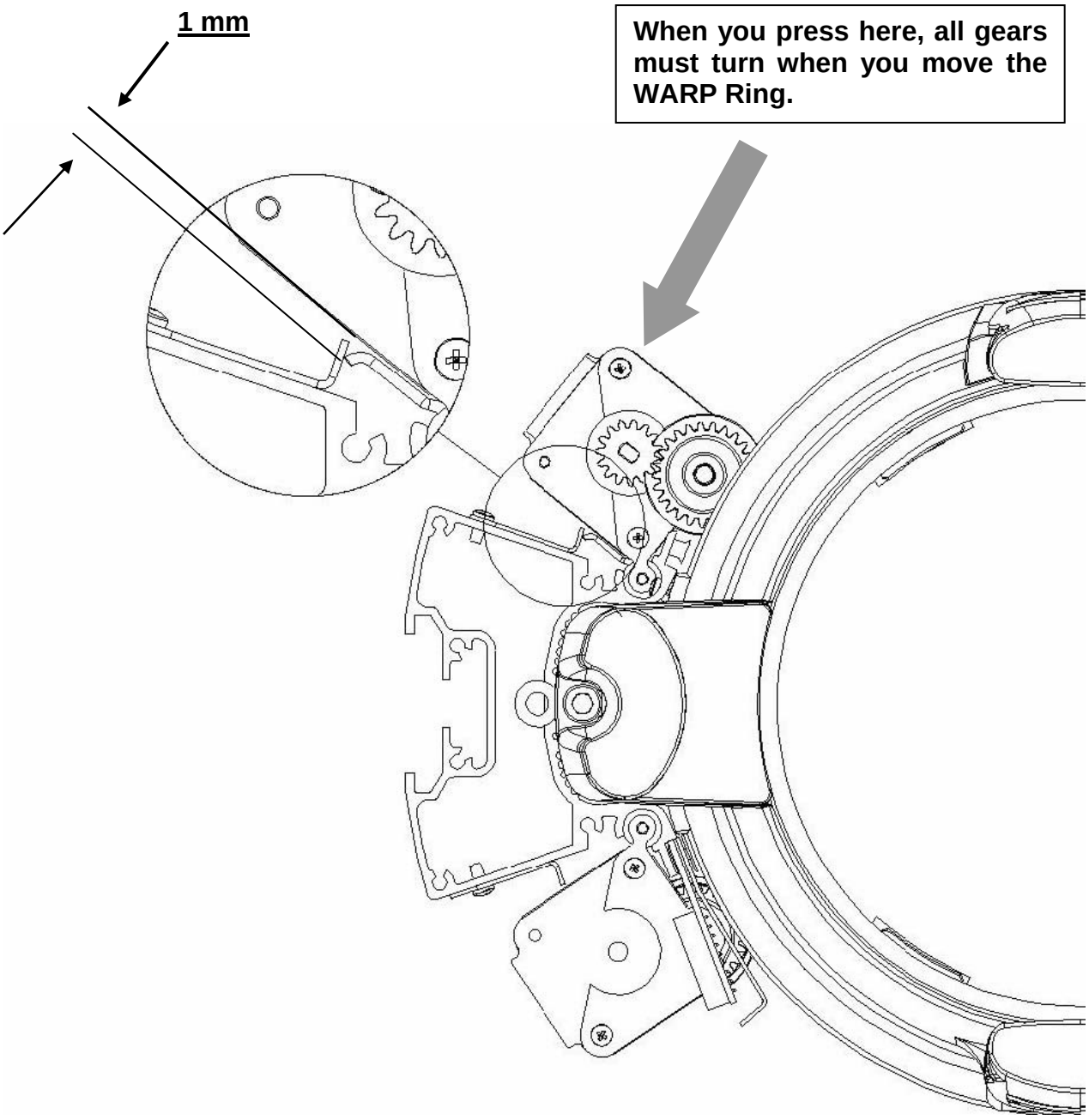
Required Tool(s)	Spare Part Code	Preliminary reading
Open Ended Spanner 5,5 Flat Screw Driver Screw driver PZ2	None	Chapter 7.28

IMPORTANT

When you remove the locking plate for maintenance, you have to adjust it before fixing and start the WARP.

It is very important to get free each motor to ensure a well working.

1. Loosen the 2 screws of the locking plate (you can move it through the 2 obround)
2. Adjust the locking plate position to leave 1 mm between it and all motors.
3. Tighten the 2 screws.
4. Control adjustment => Put the head up, Power on the WARP and control all reset



8 WARP HEAD - Maintenance Sheet

8.1 How to change the lamp assembly

8.1.1 How to remove the old lamp Assembly

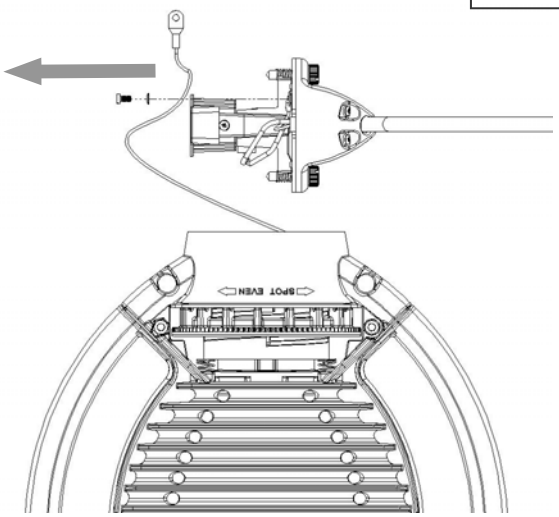
Required Tool(s)	Spare Part Code	Preliminary reading
Wire Cutter Flat Screw Driver Screw Driver PZ2	1001.61.000	Chapter 7.1 Chapter 7.3

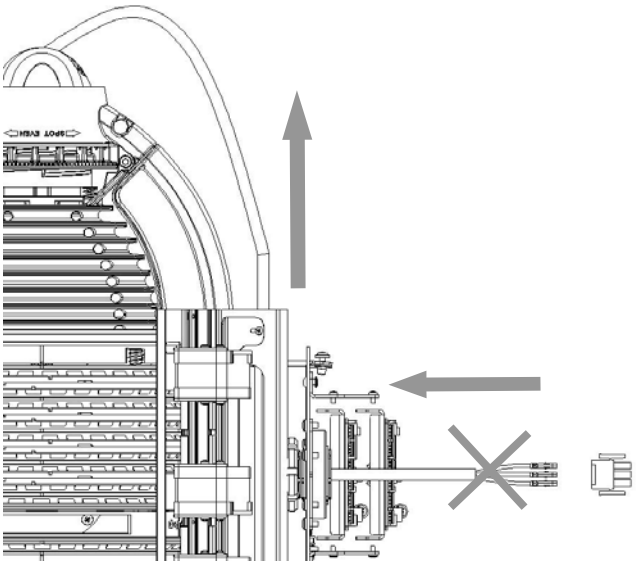
Before Change the lamp Assembly Unplug the WARP and remove the lamp:

1. Unplugged the Motorised WARP and remove the Lamp
2. Remove Left Arm Cover and Left Motor Wing Cover
3. Unplug Lamp Cable from the Relay Board (see chapter 6,1)
4. Cut All cable ties which fit the lamp wire from the PCB relay to the Tilt shaft
5. Cut the cable near the 3 pts connector.
6. Slide the old wire through the Tilt Shaft
7. Open the Lamp Holder
8. Keep the security cable on the peak and flat cylinder
9. Remove it from the old lamp assembly (screw which fix the earth wire).

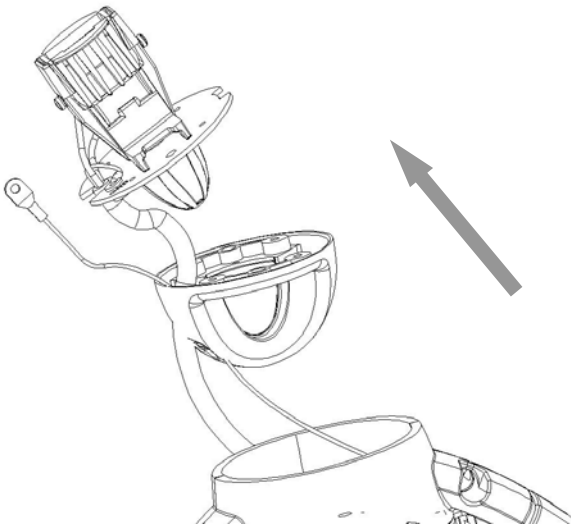
1001.61.000 includes:

- **1 complete lamp assembly (with grip on wire)**
- **4 M3 * 10 Taptite+ 1 M3*6**
- **2 Finger screws + springs**
- **10 cable ties**
- **1 x 3-pole connector**

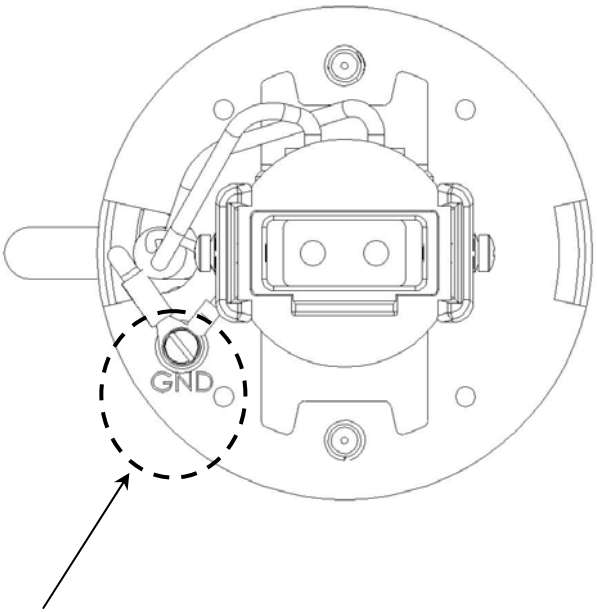




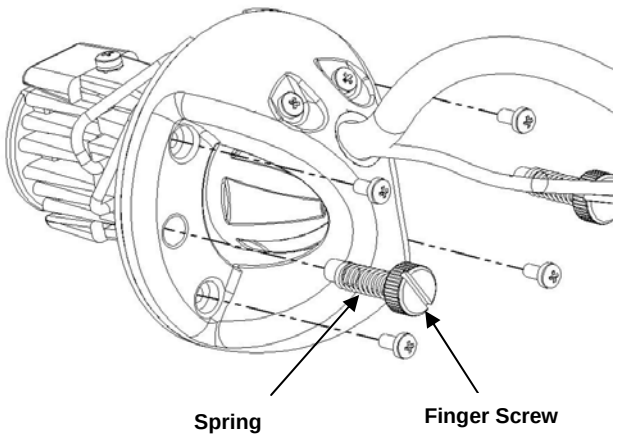
8.1.2 How to place the new lamp Assembly



4 - Pass the safety cable through the Lamp Cable hole of the new lamp handle.



5 - Fix the safety cable on the new lamp Assembly, using the Screw M3*6 (put the washer between lamp plate and earth wire).



6 - Unclose the new Lamp Assembly using the 4 black taptite screws.

7 - Screw the 2 Finger Screws with the 2 springs.

8.2 Remove / Change the light Box

Required Tool(s)	Spare Part Code	Preliminary reading
Hexagonal H4	1001.61.020	Chapter 7.17 Chapter 7.22.1

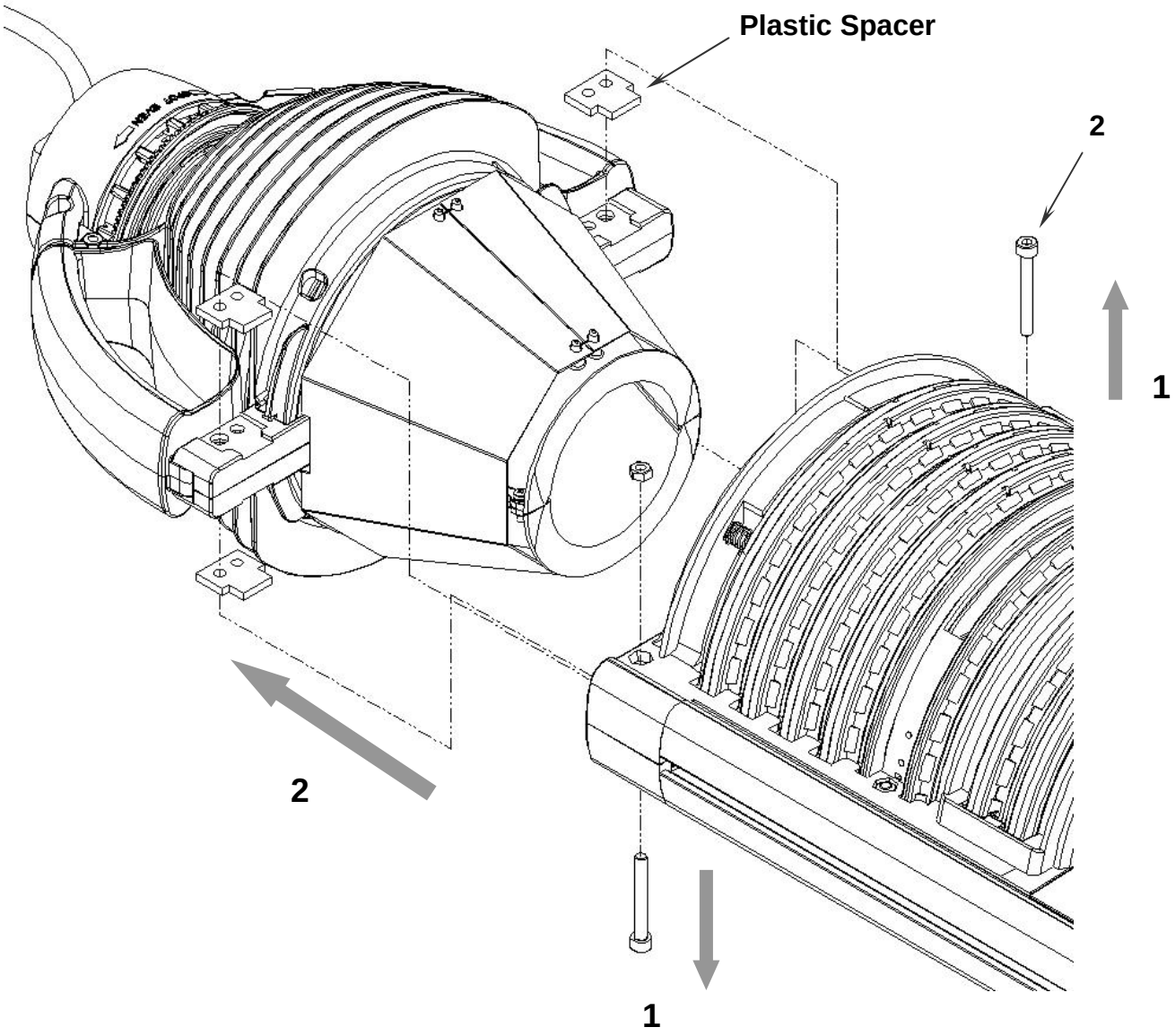
1. Unplug the WARP and remove the lamp:
2. Remove the WARP from the motorised Yoke (see chapter 7.17)
3. Remove the 2 screws into the rings compartment using H4
4. Remove / Replace the Light Box and the 4 Plastic spacers

WARNING:

Don't forget the 4 plastic spacers when you replace the light Box

1001.61.020 includes:

- **1 complete light box**
- **2 Screws M5 * 40 + 2nuts**
- **4 plastic Spacers**
- **10 cable tie**
- **1 x 3-pole connector**



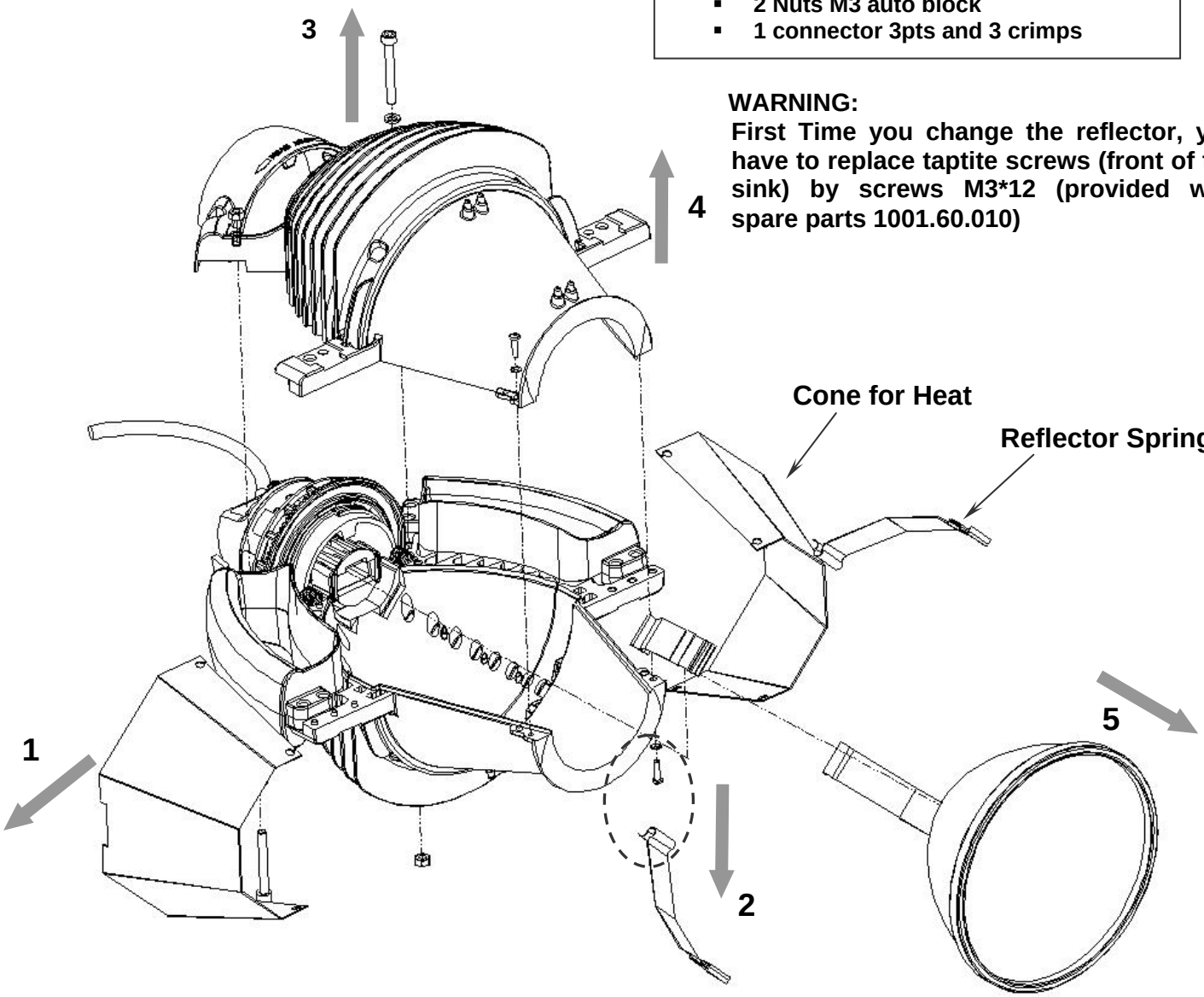
8.3 Replace the Reflector

Required Tool(s)	Spare Part Code	Preliminary reading
Hexagonal H4 Pozidrive PZ2	1001.61.010	Chapter 8.2

1. Unplug the WARP and remove the lamp:
2. Remove the Light Box from the WARP (see Chapter 8.2)
3. Remove the 2 Cones for heat
4. Remove screws M3 on the Front of the cone (PZ2)
5. Remove Screws H4 on the back (near the Peak and Flat)
6. Open the Light box
7. Replace the Reflector

1001.61.010 includes:
- **1 reflector**
- **4 reflector Springs**
- **2 Screws M 3 * 12 + 2 washers**
- **2 Nuts M3 auto block**
- **1 connector 3pts and 3 crimps**

WARNING:
First Time you change the reflector, you have to replace taptite screws (front of the sink) by screws M3*12 (provided with spare parts 1001.60.010)

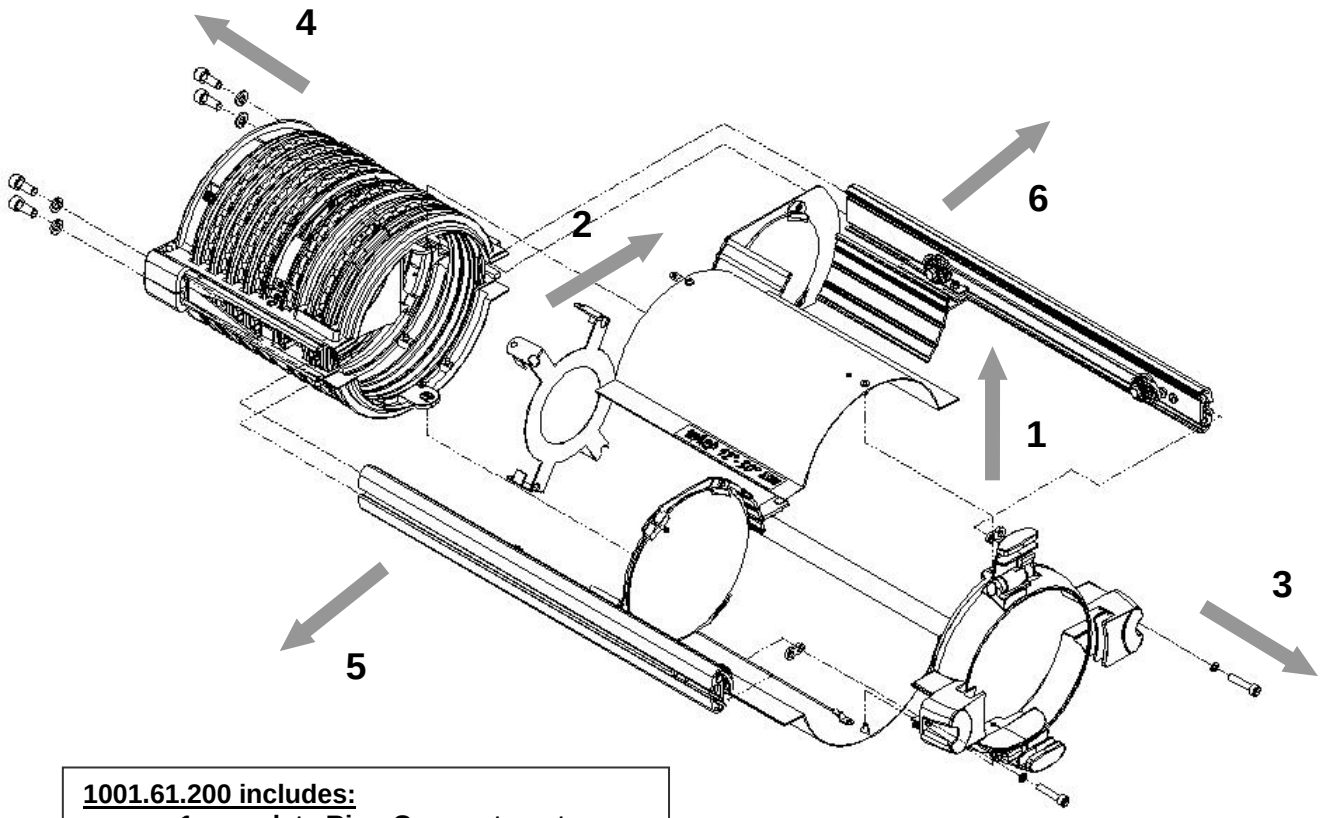


8.4 Change the Rings Compartment

Required Tool(s)	Spare Part Code	Preliminary reading
Metric Open ended spanner 13 Screw Driver PZ2 Hexagonal H 4 Hexagonal H5	1001.61.200	Chapter 7.17

8.4.1 How to Remove arms from the Ring Compartment

1. Unplug the WARP and remove the lamp:
2. Remove the WARP from the Motorised WARP (see chapter 7.17)
3. Remove Lenses Covers (see chapter 8.12)
4. Remove the light Box (see chapter 8.2)
5. Remove the Front Filter Cassette (see chapter 8.11)
6. Remove Diaphragm (see chapter 8.13)
7. Remove the 4 screws in the back of the Ring compartment
8. Remove the 2 arms



1001.61.200 includes:

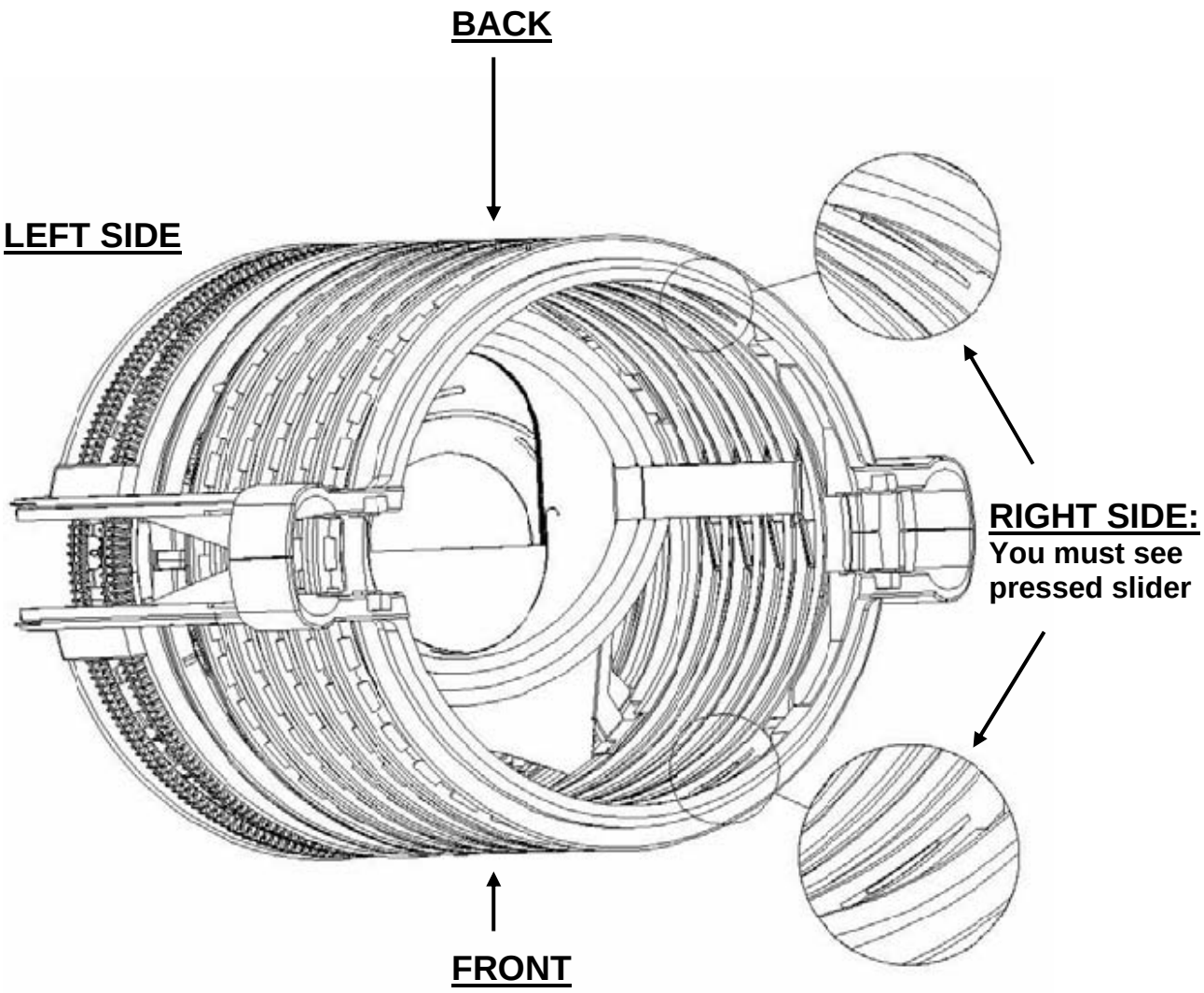
- **1 complete Ring Compartment**
- **2 screws M3*8 for Lenses Cover**
- **2 screws M6*30 + Washers for Front Cassette**
- **4 screws and washer to fix Arms on ring compartment**
- **2 screws and washers for Belt Clip.**

8.4.2 How replace the Ring Compartment on a Motorized WARP 12°-30°

8.4.2.1 Prepare Rings position for WARP/M 12°-30°

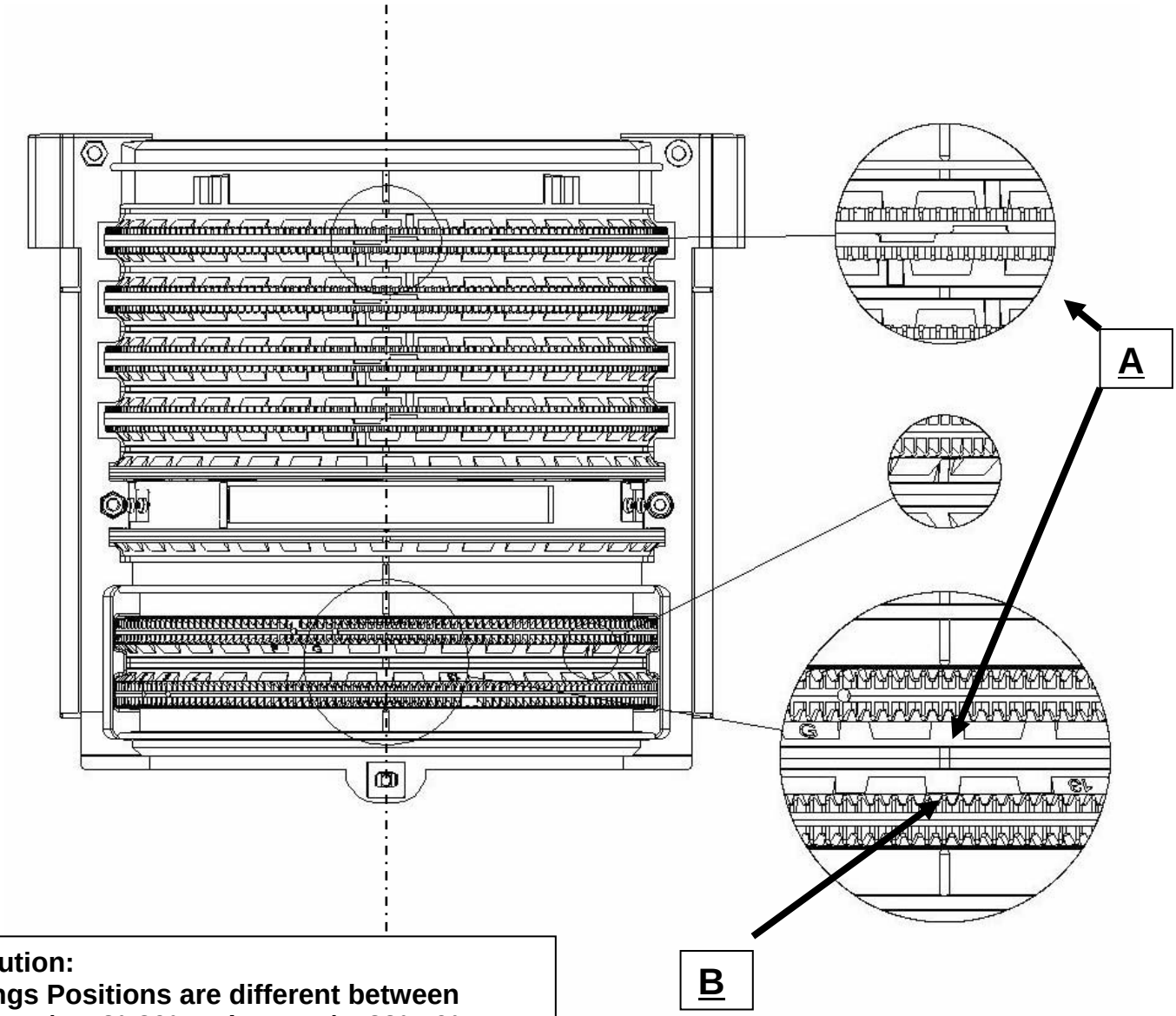
Before replace ring compartment, you have to prepare the ring position as describe:

Place the ring compartment to see pressed slider of the ring spacer on your right.



Place all graduated wheels as describe:

LEFT SIDE **FRONT** **RIGHT SIDE**

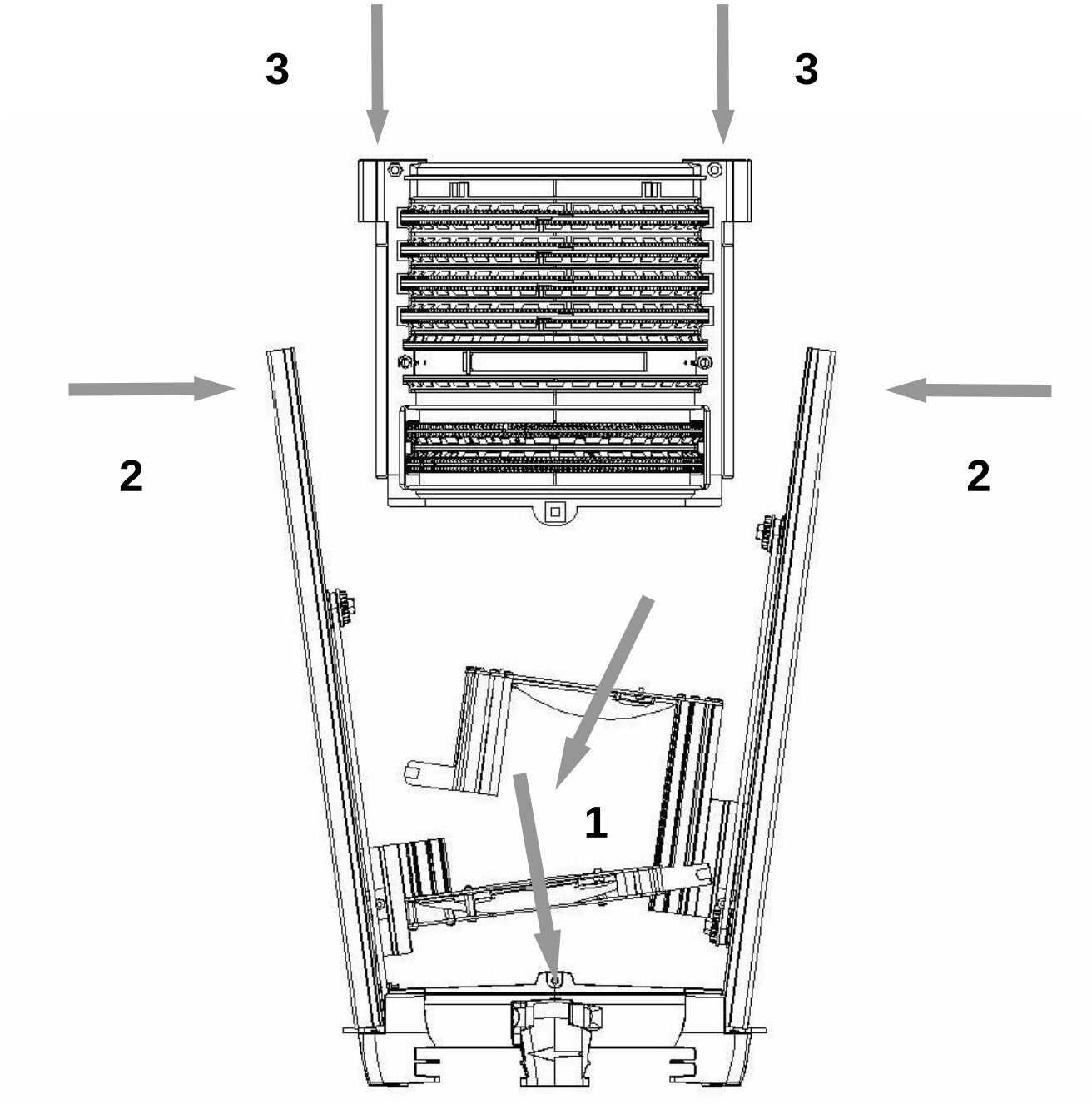


Caution:
Rings Positions are different between WARP/M 12°-30° and WARP/M 22°-50°

RING	POSITION
SHUTTERS	You must see all white index, **all shutters rings at ZERO**
ACCESSORIES	You must see all white index, **all accessories rings at ZERO**
FOCAL	You must place the ring at Position **G + 1.5** and you must **see the white index on your right front of you** (detail A)
ZOOM	You must place the ring **between 11 and 12** and you must **see the white on back side** (detail B)

8.4.2.2 Introduce Rings Compartment between lenses Arm on the WARP/M 12°-30°

1. Put the cassette filter down and lenses arm up
2. Slide down Zoom and Focal lenses
3. Check all rings position (as describe on chapter 8.4.2.2)
4. Introduce Arms into the Ring compartment (Take care that small gears are correctly connected to the lenses Ring)

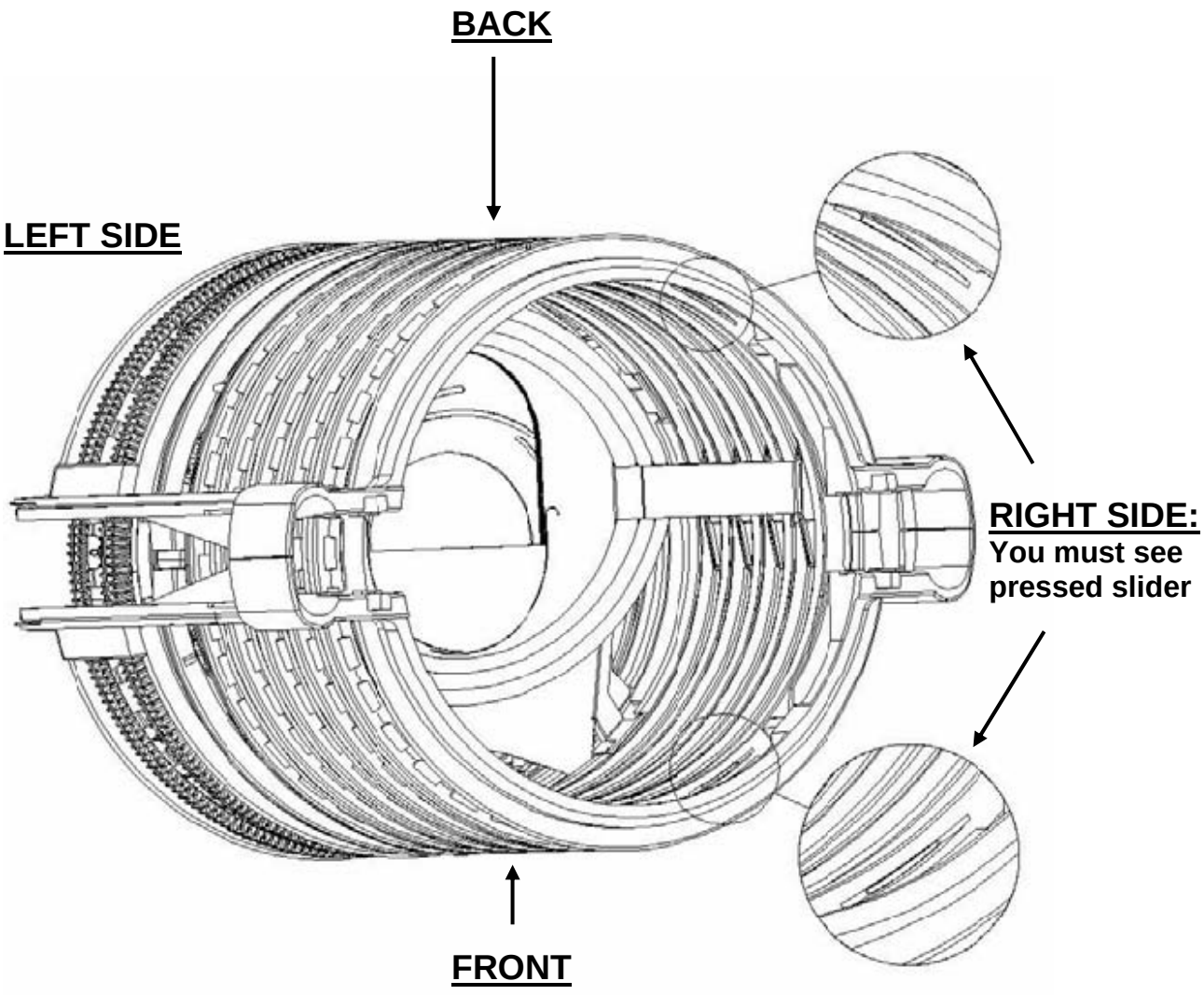


8.4.3 How replace the Ring Compartment on a Motorized WARP 22°-50°

8.4.3.1 Prepare Rings position for WARP/M 22°-50°

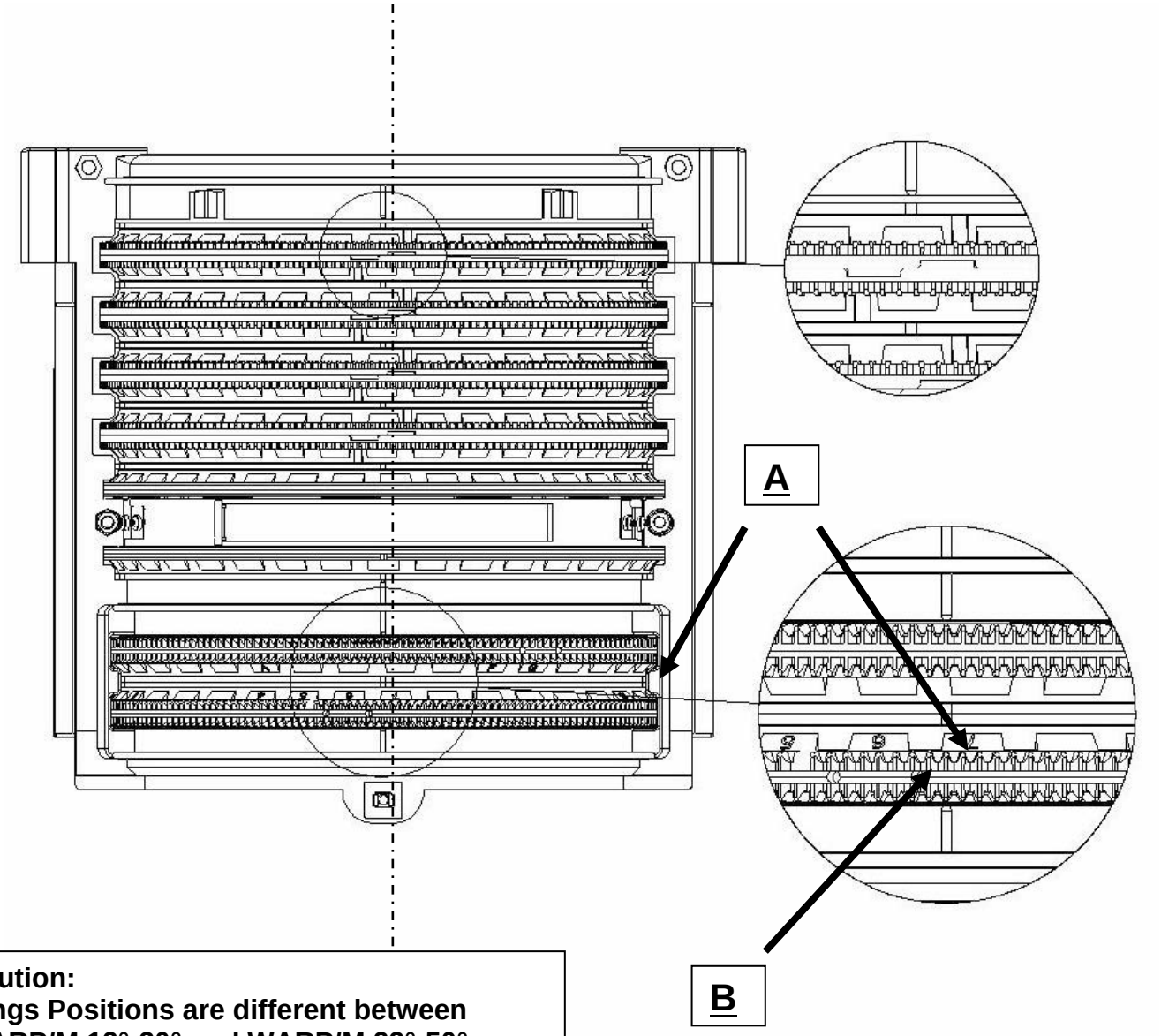
Before replace ring compartment, you have to prepare the ring position as describe:

Place the ring compartment to see pressed slider of the ring spacer on your right.



Place all graduated wheels as describe:

LEFT SIDE **FRONT** **RIGHT SIDE**

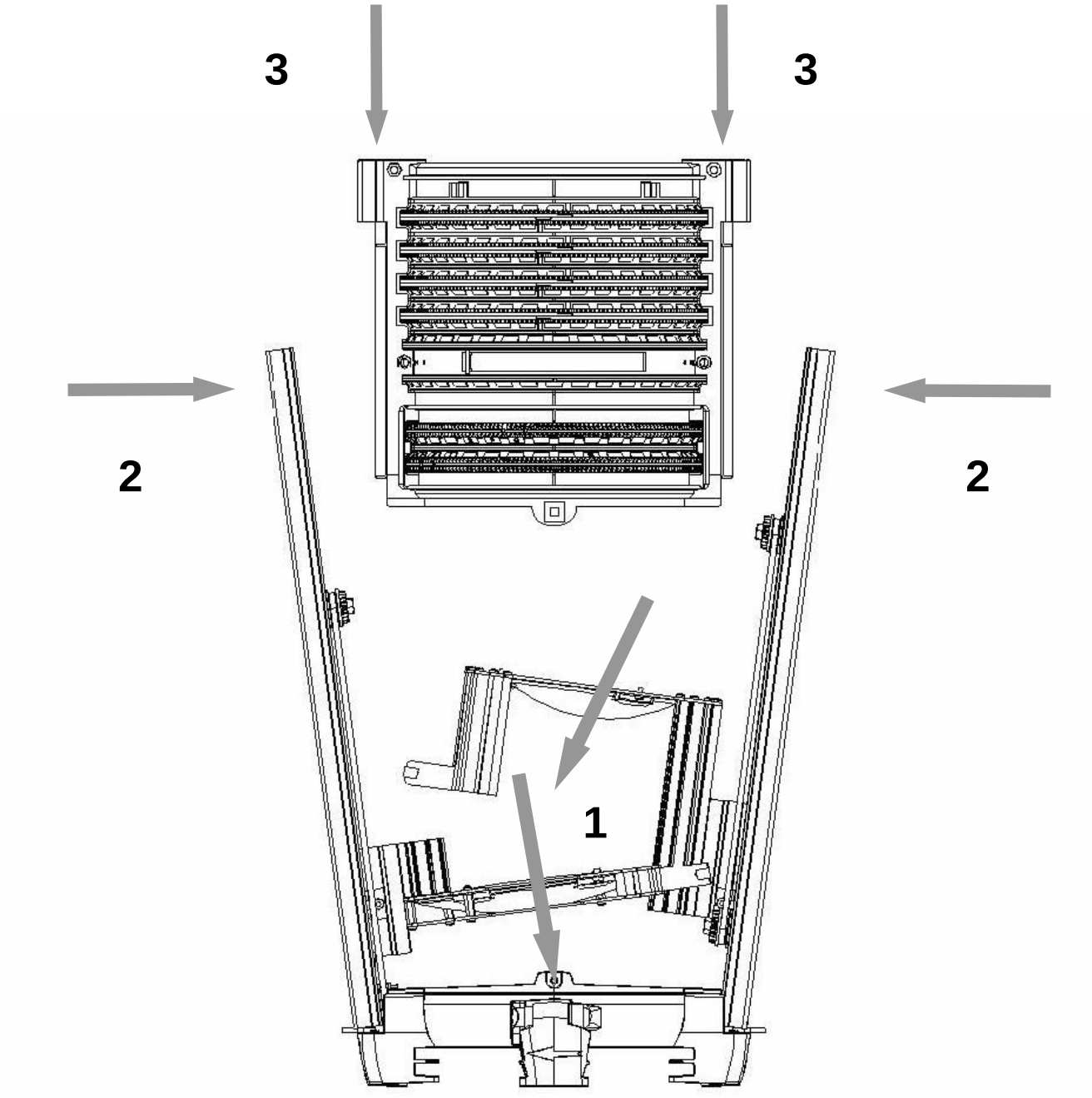


Caution:
Rings Positions are different between WARP/M 12°-30° and WARP/M 22°-50°

RING	POSITION
SHUTTERS	You must see all white index, **all shutters rings at ZERO**
ACCESSORIES	You must see all white index, **all accessories rings at ZERO**
FOCAL	You must place the ring **near the D Position** and **the white index must be on your right** (hide by aluminium part) (detail A)
ZOOM	You must place the ring **near the 7 Position** and you must **see the white on back side** (detail B)

8.4.3.2 Introduce Rings Compartment between lenses Arms on the WARP/M 22°-50°

1. Put the cassette filter down and lenses arm up
2. Slide down Zoom and Focal lenses
3. Check all rings position (as describe on chapter 8.4.3.2)
4. Introduce Arms into the Ring compartment (Take care that small gears are correctly connected to the lenses Ring)

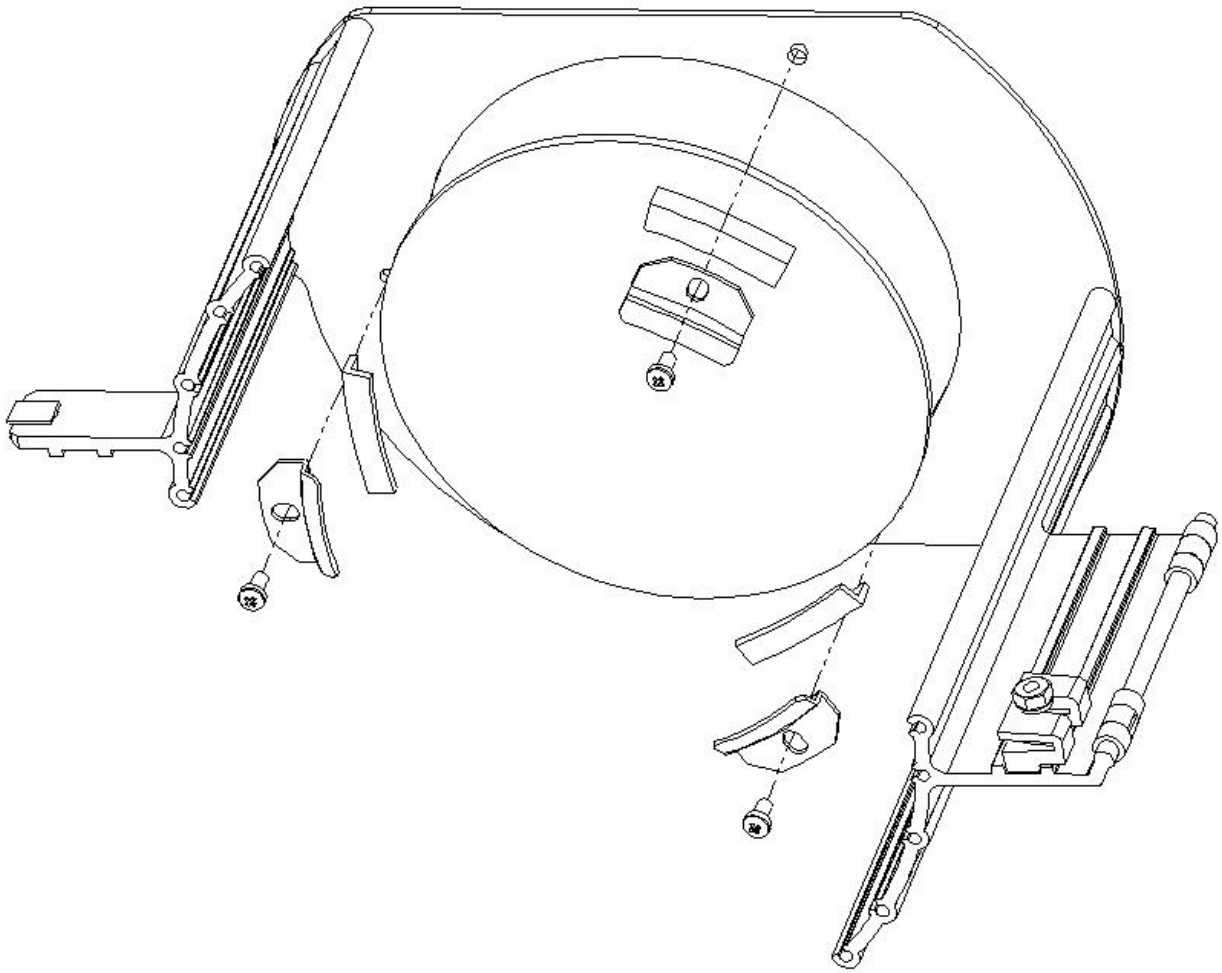


8.5 Replace the Back Lens on 12°-30° WARP

Required Tool(s)	Spare Part Code	Preliminary reading
Flat Screw Driver Screw Driver PZ2	1001.61.300	Chapter 8.12

1. Unplug the WARP
2. Open the two lenses cover
3. Remove the Diaphragm (see chapter 8.13)
4. Put Front and back lenses at Full
5. Remove the 3 taptite screws from the Lens plate
6. Remove the 3 Isolations and the ADB Clip
7. Change the Lens

1001.61.300 includes:
- **Back Lens 22°-50°**
- **3 New screws**
- **3 Isolations**
- **3 ADB Clip.**

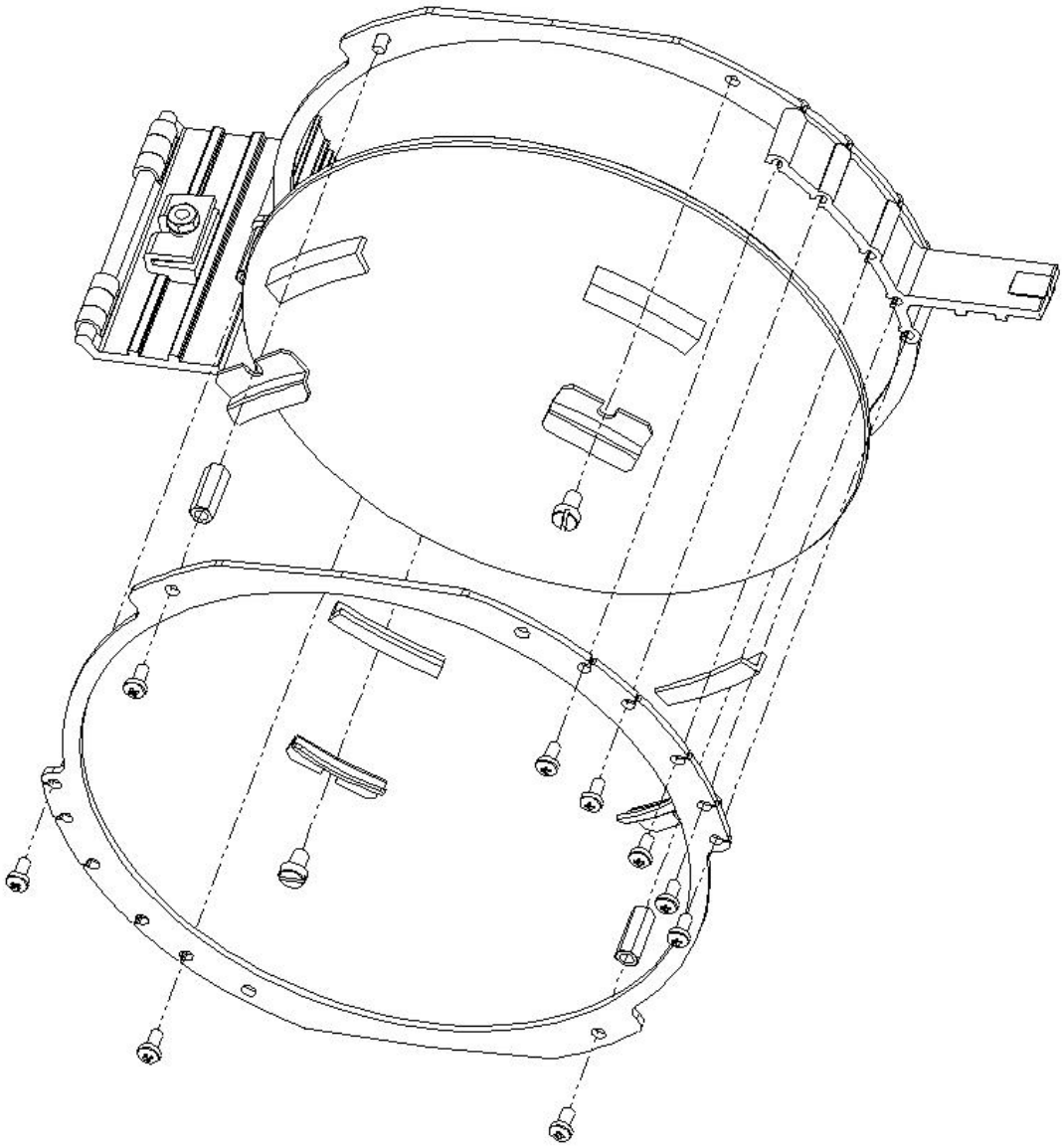


8.6 Replace the Front Lens on 12°-30° WARP

Required Tool(s)	Spare Part Code	Preliminary reading
Flat Screw Driver Screw Driver PZ2	1001.61.310	Chapter 8.12

1. Unplug the WARP
2. Open the two lenses cover and remove the diaphragm (see chapter 8.13)
3. Put Front and back lenses at 0
4. Remove the 9 Taptite Screws and the front lens plate
5. Remove the 2 screws and the 2 spacers
6. Remove the 4 isolations and Clips
7. Change the Lens

1001.61.310 includes:
- **Front Lens 12°-30°**
- **10 New screws for Lens plate**
- **4 Isolations**
- **4 ADB Clip**
- **2 Screws**

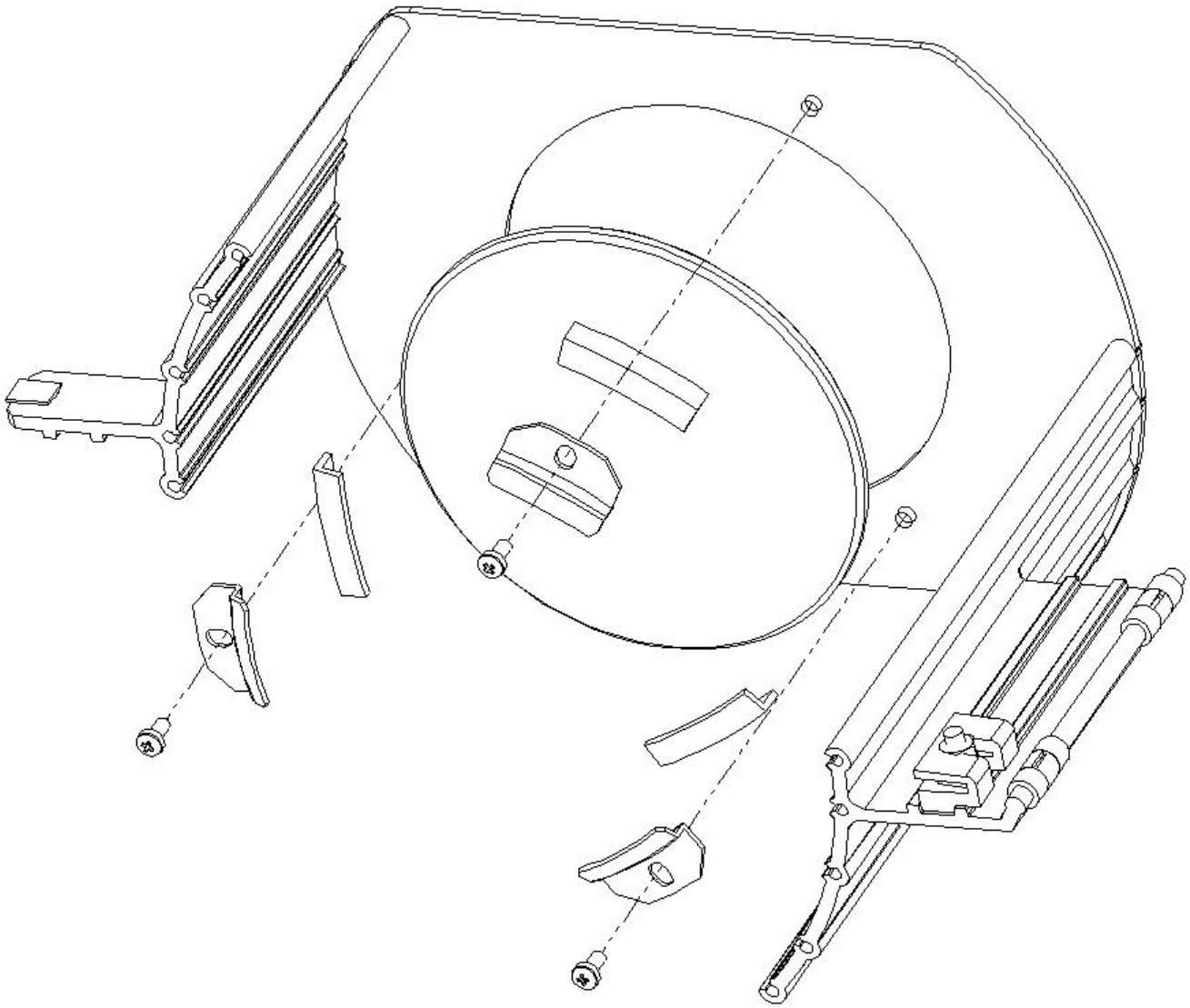


8.7 Replace the Back Lens on 22°-50° WARP

Required Tool(s)	Spare Part Code	Preliminary reading
Flat Screw Driver Screw Driver PZ2	1001.61.320	Chapter 8.12

1. Unplug the WARP
2. Open the two lenses cover
3. Remove the Diaphragm (see chapter 8.13)
4. Put Front and back lenses at Full
5. Remove the 3 taptite screws
6. Remove the 3 Isolations and the ADB Clip
7. Change the Lens

1001.61.320 includes:
- **Back Lens 22°-50°**
- **3 New screws**
- **3 Isolations**
- **3 ADB Clip**

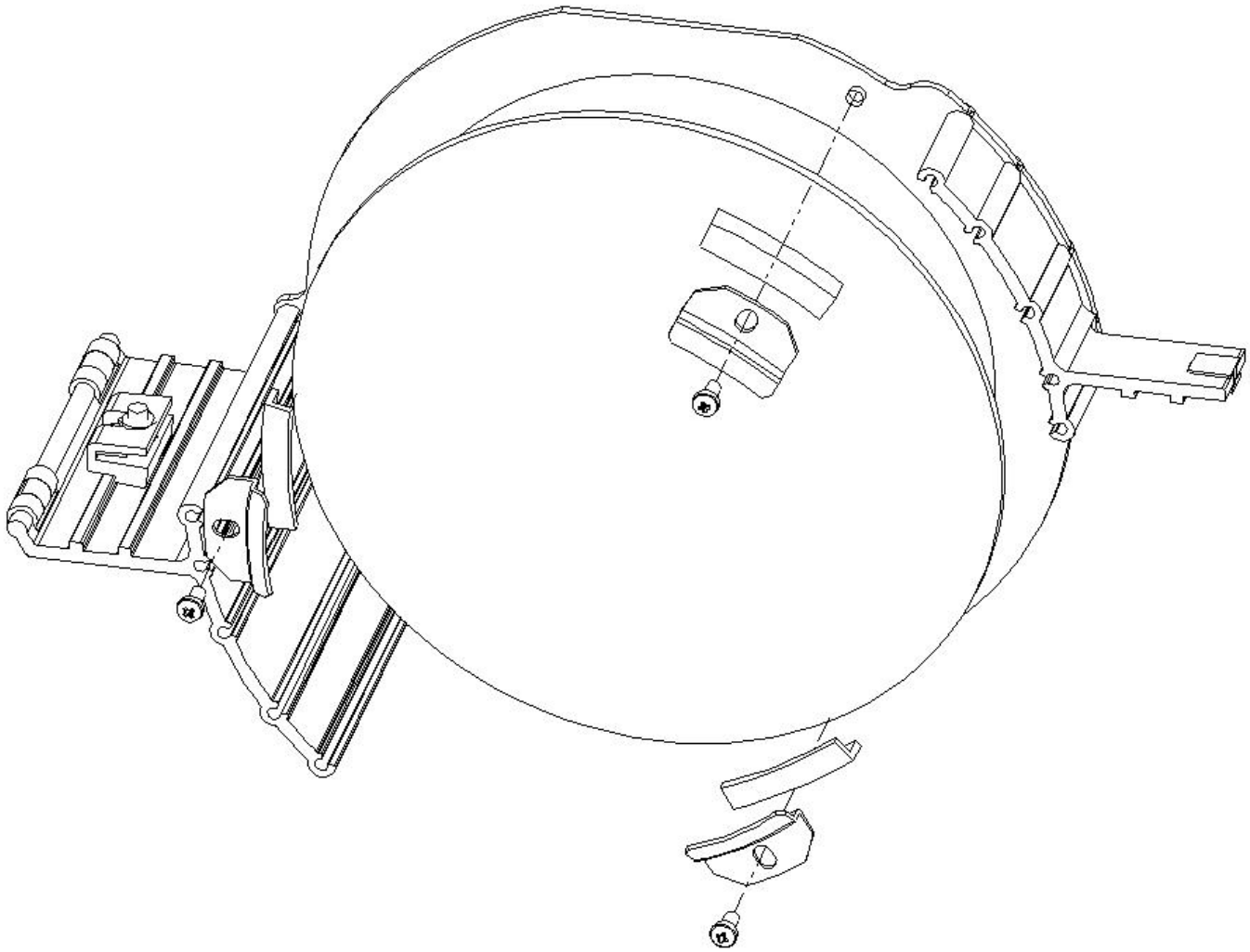


8.8 Replace the Front Lens on 22°-50° WARP

Required Tool(s)	Spare Part Code	Preliminary reading
Flat Screw Driver Screw Driver PZ2	1001.61.330	Chapter 8.12

1. Unplug the WARP
2. Open the two lenses cover
3. Put Front and back lenses at 0
4. Remove the 3 screws
5. Remove the 3 isolations and Clips
6. Change the Lens

1001.61.330 includes:
- **Front Lens 22°-50°**
- **3 New screws**
- **3 Isolations**
- **3 ADB Clip**



8.9 Change Gears & Belts on 12°-30°

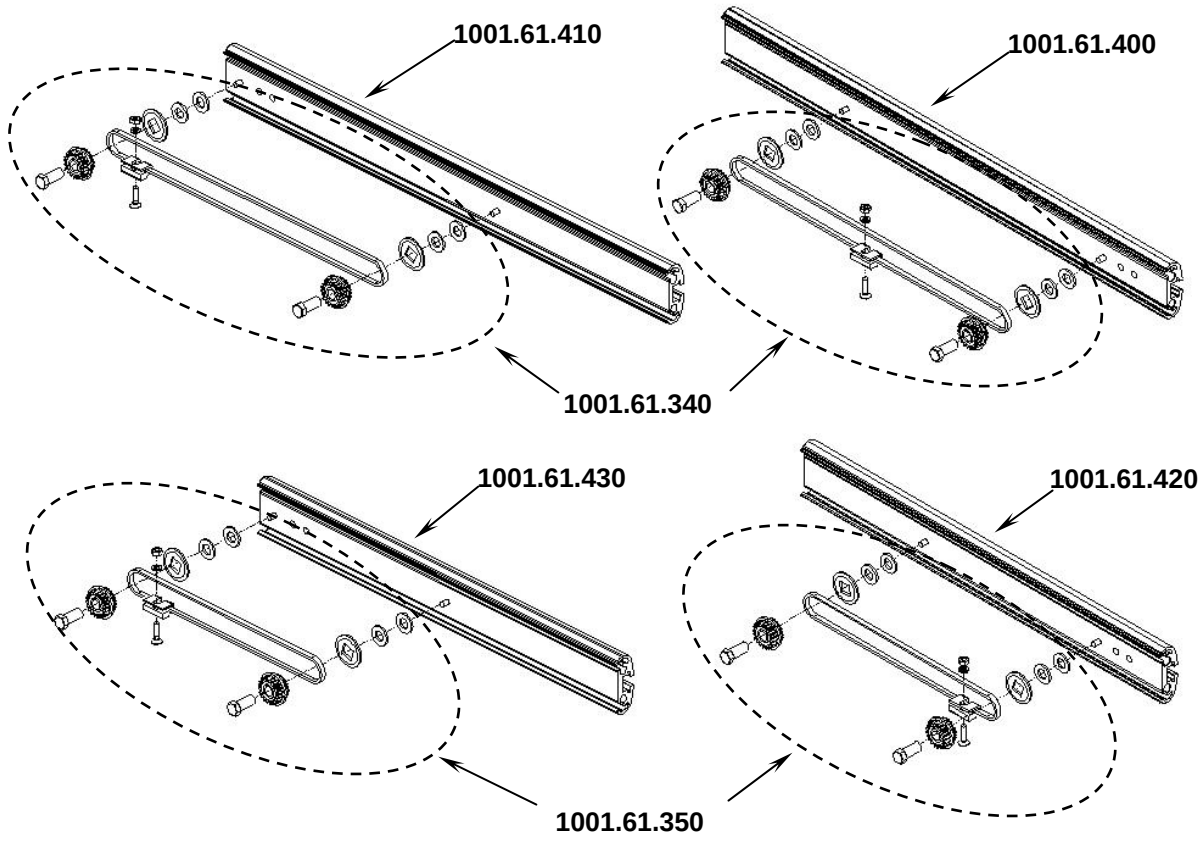
Required Tool(s)	Spare Part Code	Preliminary reading
Flat Screw Driver Screw Driver PZ2	1001.61.340 1001.61.350	Chapter 8.4.1

Important: On the WARP you have to remove Arms to change all gear and belt. To replace Arms correctly, please see chapter 8.4.2 for 12-30° and chapter 8.4.3 for 22-50°.

1. Unplug the WARP
2. Remove arms from WARP (see chapter 8.4.1)
3. Use Open ended spanner 10 to replace gear shafts

1001.61.340 & 1001.61.350 include:

- **2 Belts T3 * 420**
- **2 Belt Clip**
- **Screw washer and nut for Belt Clip**
- **4 Ball Bearing Gears and Washer**
- **2 gear Shaft**
- **8 Washers M8**



8.10 Replace Teflon Ring

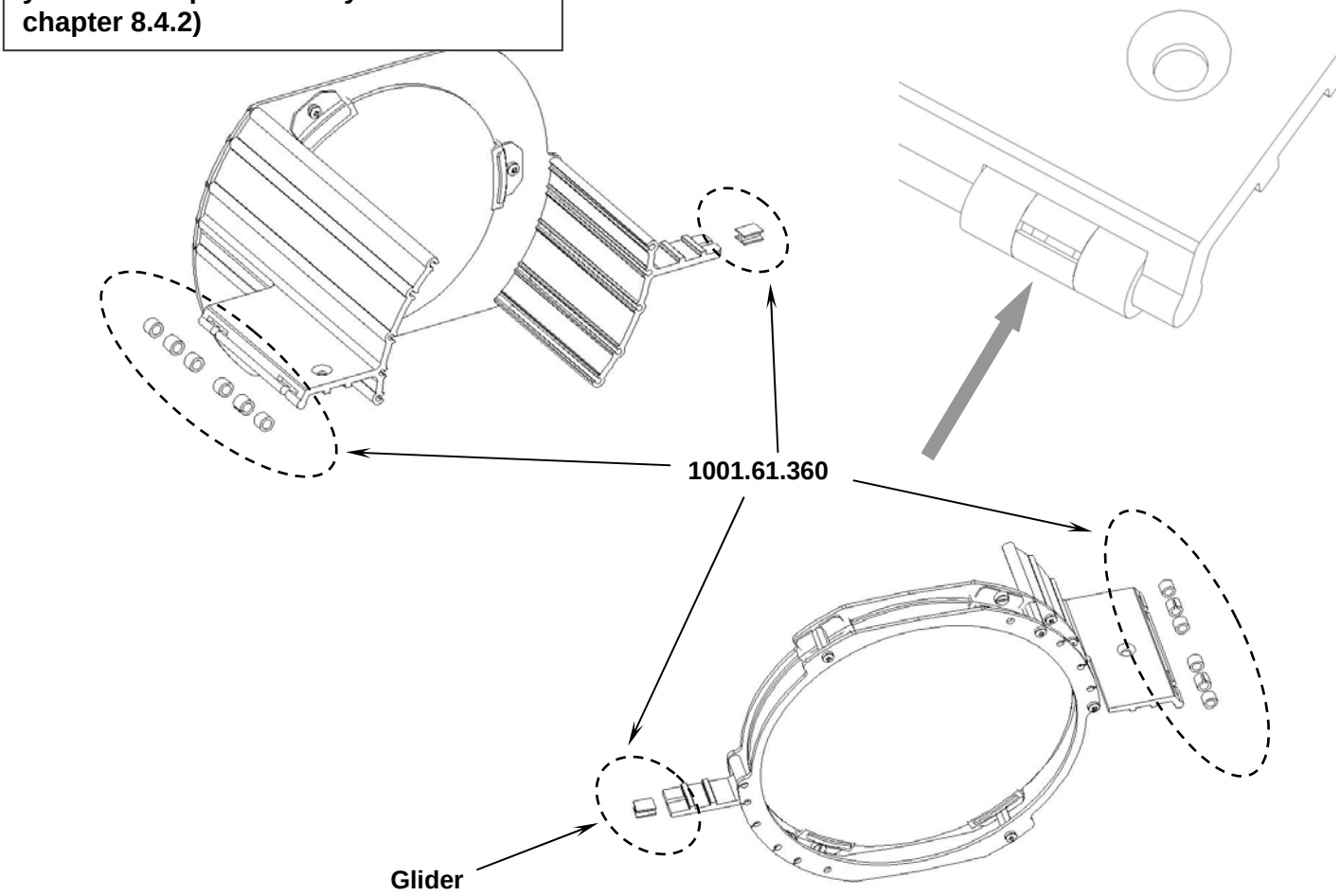
Required Tool(s)	Spare Part Code	Preliminary reading
Flat Screw Driver Screw Driver PZ2	1001.61.360	Chapter 8.11

Important: After a few years of operation, it could be necessary to change the Teflon ring to facilitate the sliding of the lenses.

1. Unplug the WARP
2. Open Covers and remove Filter Cassette (see chapter 5.12)
3. Remove Diaphragm (see chapter 5.14)
4. Unlink the 2 lenses from belts (remove screws and nuts from the belt clip)
5. Slide and remove completely lenses support from arms
6. Change all Teflon parts as initially assembled on each lens support
7. Replace lenses into arm profile
8. Replace Diaphragm Filter Cassette and covers

1001.61.360 includes:
- **10 Lens Stears**
- **5 Lens Opened Stears**
- **3 Lens Gliders**

WARNING:
DON'T Remove clip from belts if not you have to put correctly as written on chapter 8.4.2)

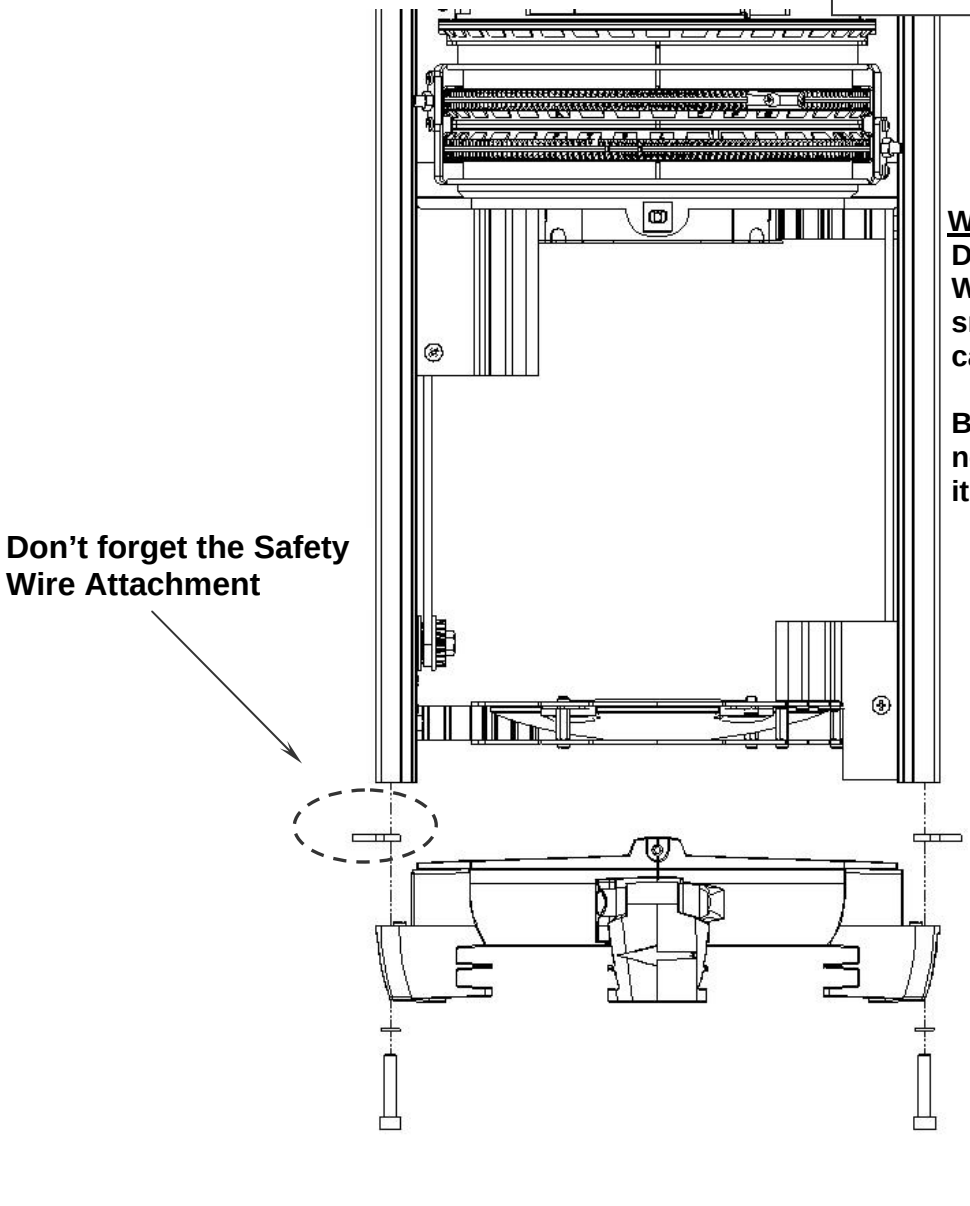


8.11 Remove / Change Front Filter cassette

Required Tool(s)	Spare Part Code	Preliminary reading
Screw Driver PZ2 Hexagonal H5	1001.61.500	None

1. Unplug the WARP
2. Open the two lenses cover
3. Remove the 2 screws M6 on the front
4. Remove the Filter Cassette

1001.61.500 includes:
- **1 Complete Filter Cassette**
- **2 screws M6 * 30**
- **2 Locking Washers**
- **2 Safety Wire Attachment**



WARNING:
Due to mechanical adjustment, some WARP were manufactured with a small sheet spacer between the filter cassette and arms.

Before you remove the cassette, make note of the spacer position, to replace it correctly.

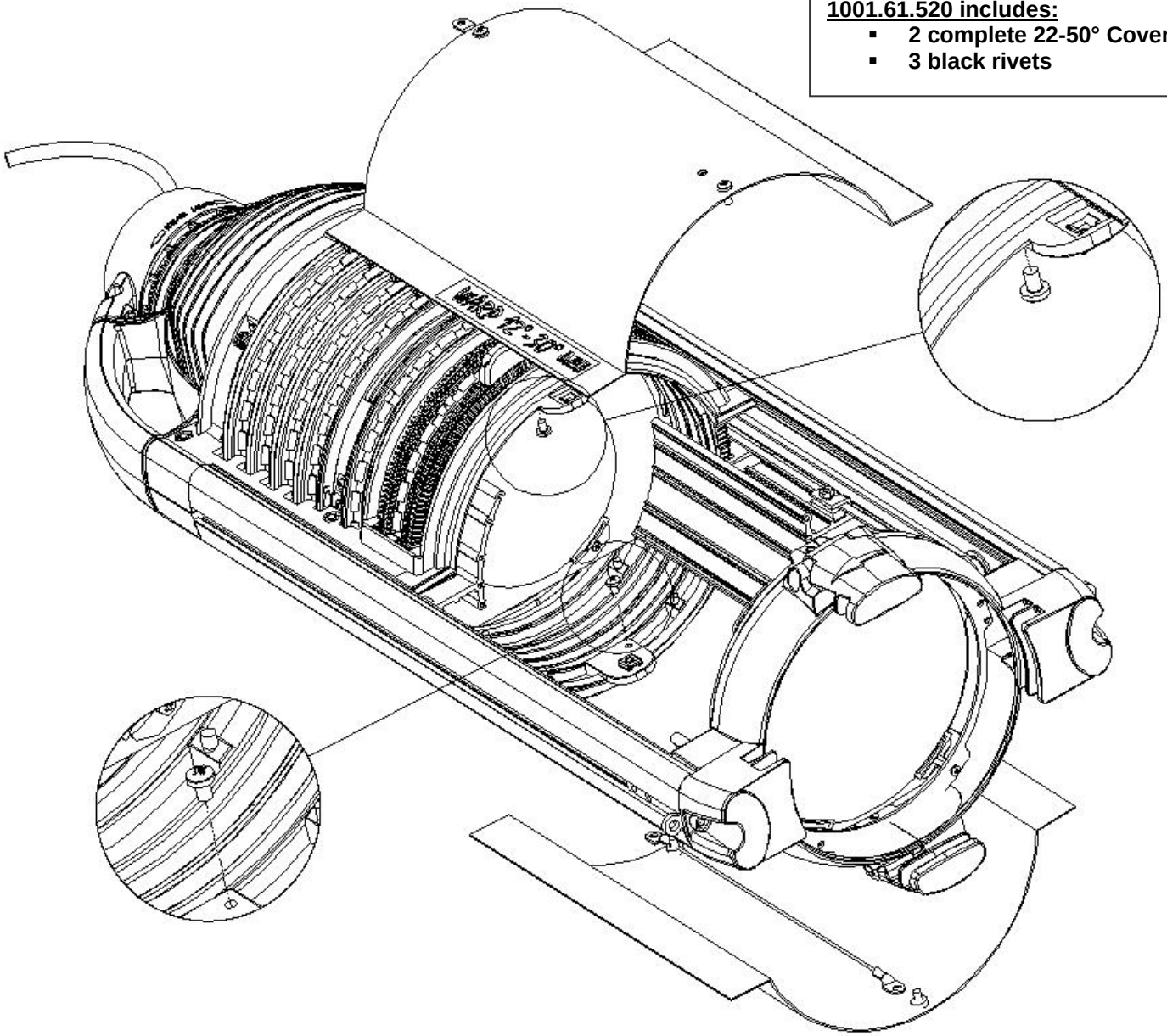
8.12 Replace Lenses Cover

Required Tool(s)	Spare Part Code	Before refer to:
Rivet Grip	1001.61.510 (12-30°) 1001.61.520 (22-50°)	None

1. Unplug the WARP
2. Drill the 2 rivets on Lenses cover with a drill diam. 3.2 mm
3. To install new covers, use new rivets (provided)

1001.61.510 includes:
- **2 complete 12-30° Covers**
- **3 black rivets**

1001.61.520 includes:
- **2 complete 22-50° Covers**
- **3 black rivets**



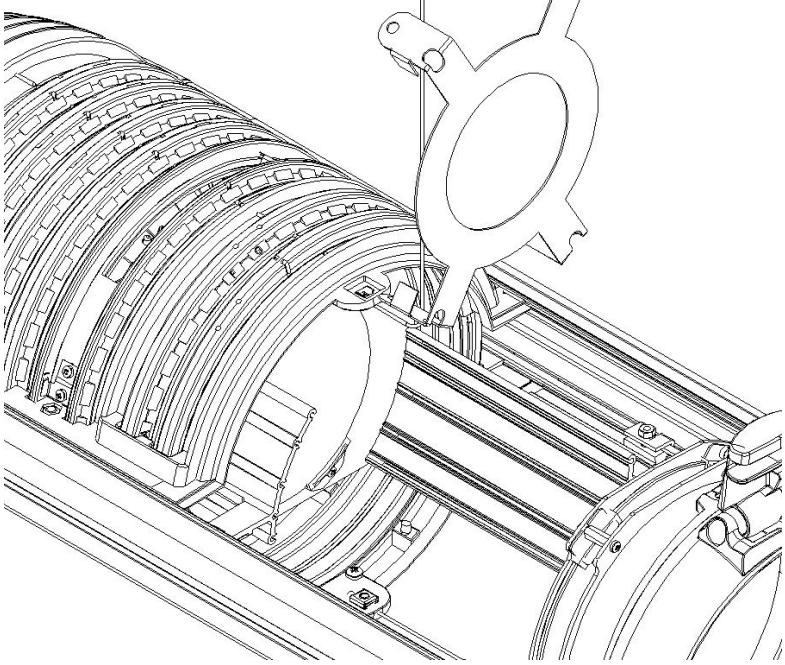
8.13 Replace Diaphragm

Required Tool(s)	Spare Part Code	Before refer to:
Screwdriver PZ2	1001.61.370 1001.61.380	None

1. Unplug the WARP
2. Open the two lens covers
3. Press on diaphragm arms and remove it from ring compartment.

Diaphragm 12°-30°
1001.61.370

Press here

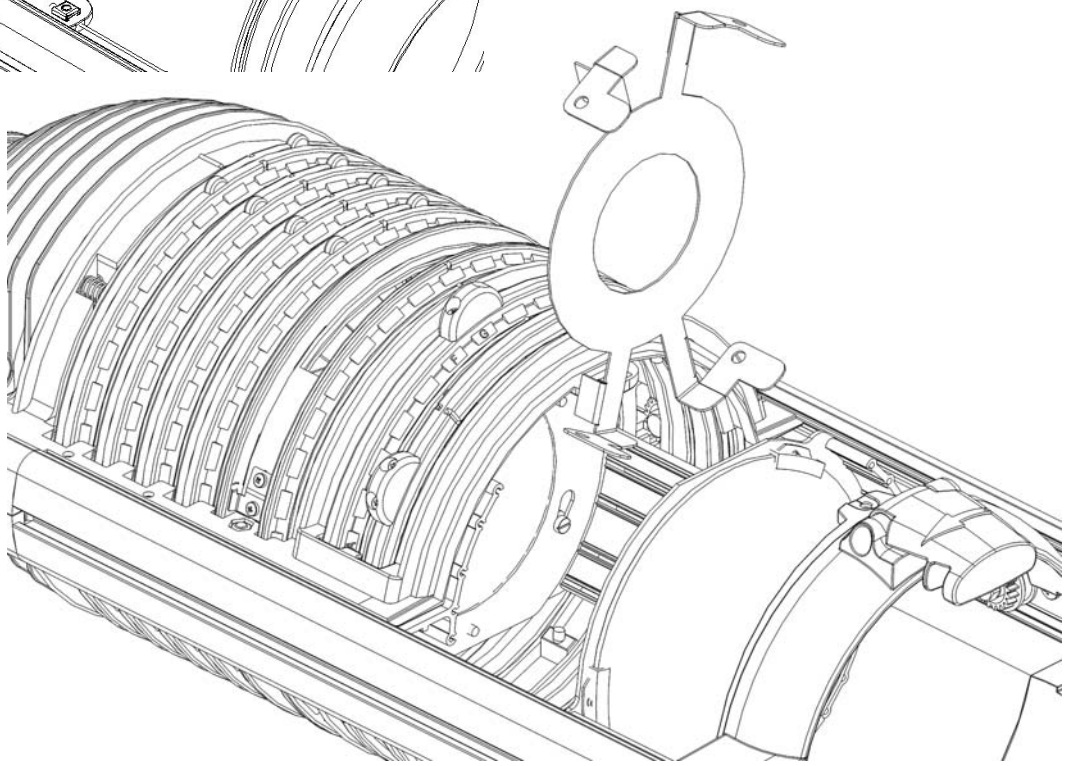


1001.61.370 includes:
- **1 Diaphragm 12°-30°**

1001.61.380 includes:
- **1 Diaphragm 22°-50°**

Press here

Diaphragm 22°-50°
1001.61.380



9 Personal notes

ADB - Your Partner for Light

Belgium **N.V. ADB-TTV Technologies S.A.**
(Group Headquarters) Leuvensesteenweg 585, B-1930 Zaventem
Tel : +32.2.709.32.11, Fax : +32.2.709.32.80, E-Mail : adb@adblighting.com

France **ADB S.A.S.** **Sales Office:** 92, Avenue Jean Jaurès F-92120 Montrouge
Tel : +33.1.41.17.48.50, Fax : +33.1.42.53.54.76, E-Mail : adb.fr@adblighting.com

Factory & Group Logistics Centre: Zone industrielle Rouvroy F-02100 Saint-Quentin
Tel : +33.3.23.06.35.70, Fax : +33.3.23.67.66.56, E-Mail : adb.fr@adblighting.com

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