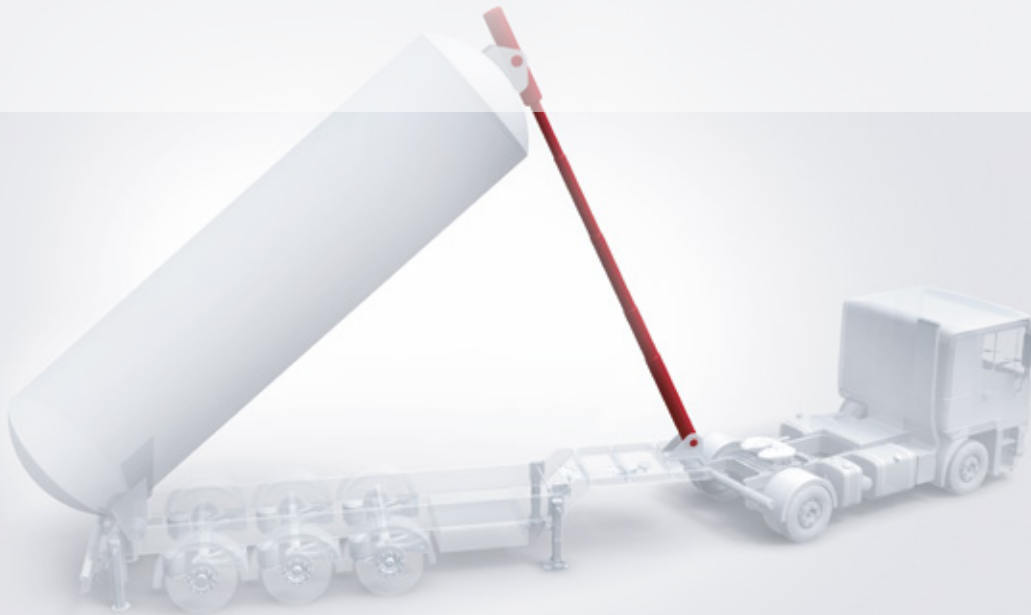


**Edbro**



# C series cylinder

EN Installation and operating instructions



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## 1 Explanation of symbols



### WARNING!

Means that death, serious physical injury or significant material damage can occur if the relevant safety instructions are not followed.



Advice!  
Contains additional important information



### ATTENTION!

Means that slight physical injury or material damage can occur if the relevant safety instructions are not followed.

## 2 Introduction

### Document Overview

This manual has been written to assist with the installation design and installation process of C series cylinder. Cylinders and their associated equipment. The Edbro C series cylinder includes cylinders with outer Cover (OO), eye ends (OE) and with spheric ends (OS).

### General remarks

Where a tipper is to be built-up with no sub-frame on the chassis, we strongly advise that an Edbro cradle is used to mount the cylinder. Recommendations for cradle mounting of the Edbro cylinder are also given in this manual. If the cylinder is to be fitted above a gearbox, splitter box or any part that needs periodic service, clearance must be provided between this area and the bottom of the cylinder.

Specification sheets are available for all Edbro cylinders; these sheets contain all relevant dimensional and application information about the cylinder.



Advice!  
The specification sheets are available on the Edbro Website and the technical centre

The Edbro cylinder has been developed for lifting purposes only and its use for any other purpose is not advised. The cylinder is not to be used as a stabiliser and any kind of side-load must be avoided whenever possible.



### WARNING!

Applying side-load to any cylinder is hazardous and should not be attempted. The cylinder should be mounted with a maximum pull out of 50 mm.

For information and recommendations on hydraulic oils please see Chapter 8 OIL specification (page 22–23).

### Contact Edbro

If you have any questions concerning the application, installation, operation or repair of any Edbro product, please contact your nearest Edbro Service Agent which you can identify on our website. Other documentation is available via the Technical Centre or via our Applications team.

**Phone** + 44 (0)1204 902 380

**E-mail** [applications-uk@jost-world.com](mailto:applications-uk@jost-world.com)

**Web** [www.edbro.com](http://www.edbro.com)

**Service Agent** [www.edbro.com](http://www.edbro.com) > Contact > Dealers & Parts Centres

**Technical Centre** [www.edbro.com](http://www.edbro.com) > Technical Centre

## 2 Introduction

### Precautions

Ensure there is enough free working space for mounting the cylinder. (For more information on fitting locations and mounting positions, *please see advice on page 5*). If the tipper body is already fitted to the truck chassis, lift the body using an overhead crane so that the cab protector is well clear of the cylinder. If the tipper body is raised to create working space, support the body using body props before mounting the cylinder.



#### WARNING!

Working under an unsupported tipper body can cause serious injury or death.

To avoid damage to the truck cabin, cover the rear of the cab with a tarpaulin. If necessary tilt the cabin (see the truck manual for details). Disconnect the vehicle's battery leads and ensure the vehicle is well earthed before undertaking any welding. While lifting any cylinder, the moving stages may extend.

To avoid this, wrap a sling around the outer cover and base tube (between the trunnion and oil inlet). Extend the cylinder until the sling is locked then transport the cylinder using a suitable lifting device (*see chapter 3.5*)



#### WARNING!

Not using the appropriate equipment when lifting parts (such as the correct sling for a cylinder body) can cause serious injury and death.



#### Advice!

Ensure any oil that is spilled during installation and testing is disposed of in an environmentally friendly way.

### First Fitment

On first fitment of the cylinder and only after finish painting please be sure to grease lubrication point 8 not exceeding the volumes of grease as per the table below. A grease of ISO grade 220 which is 220cST at 40°C or an even higher viscosity should be used.

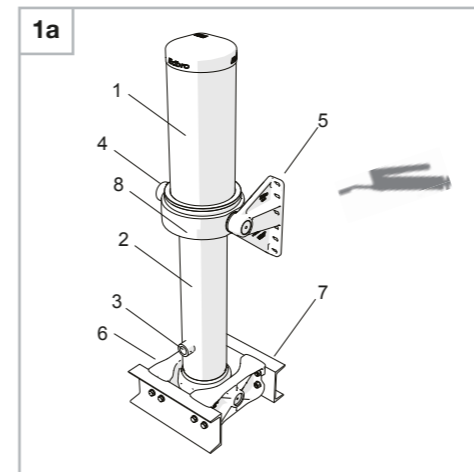
Cylinder Model	Volume of Grease (cm3)
CS11	160
CS13	215
CS15	430
CS17/18	430
CS17/ Ultra	290
CS19	500

## 3 Mounting Instructions

### 3.1 Components

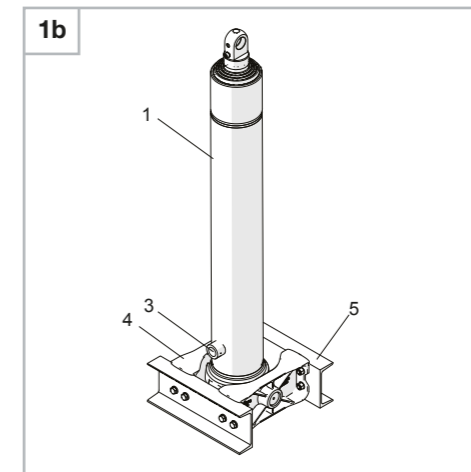
#### 00 Type (front-end cover)

1. Cylinder (cover)
2. Cylinder (base tube)
3. Oil inlet port
4. Body lifting bracket
5. Body lifting bracket
6. Chassis bracket
7. Mounting crossmember
8. Trunnion lubrication point



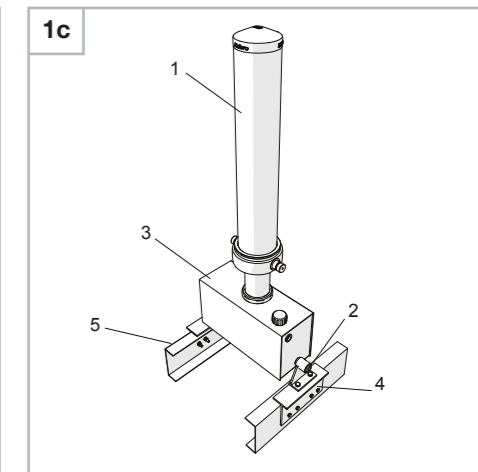
#### 0E/0S (front-end eye)

1. Cylinder (base tube)
2. Top eye
3. Oil inlet port
4. Chassis brackets
5. Mounting crossmember



#### CX (ram & tank assembly)

1. Cylinder (cover)
2. Pedestal brackets
3. Tank (base tube)
4. Cradle brackets  
(Chassis mounted brackets)
5. Chassis frame/sub frame



### 3 Mounting Instructions

#### 3.2 Mounting position and clearances

Select the correct tipping gear for your application with help the of the Edbro Cylinder Wizard. (*please see page 5 for advice*)

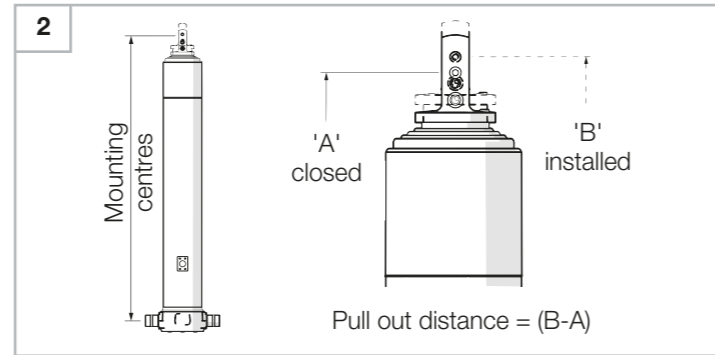
The application requirements (lifting capacity and tipping angle) of the cylinder are governed by the load capacity of the vehicle, and the physical shape of the body (overhang, body-length, hinge length, etc). The axle loading for the vehicle is governed by legal requirements in the country of use and the specification of the vehicle manufacturer.

If you are unsure of any of these details - (*please see contact details on page 5*)

The cylinder must be mounted at the exact centre line of the body.

1. Cab clearance – ensure enough clearance is left between the body and cab to allow tilting of the cab, movement of the body during tipping and access to other equipment in the mounting area.
2. Rotation clearance – during tipping the cylinder rotates about it's lower bracket. Ensure there is enough clearance around the lower part of the cylinder body, cab and gearbox.

3. End of stroke clearance – check there is at least 50 mm clearance between the front of the body and the stages of the cylinder at the end of it's stroke.
4. Maintenance access – remember to allow space for the use of tools, connection of hoses and other equipment during fitting and servicing.



**ADVICE!**  
The cylinder should be mounted with a minimum pull out of 10 mm and a maximum pull out of 50 mm. For front end cylinders, where a 'knock-off' or other end stroke device is to be used, allow a minimum of 150 mm of stroke to activate device (*see figure 2*).

### 3 Mounting Instructions

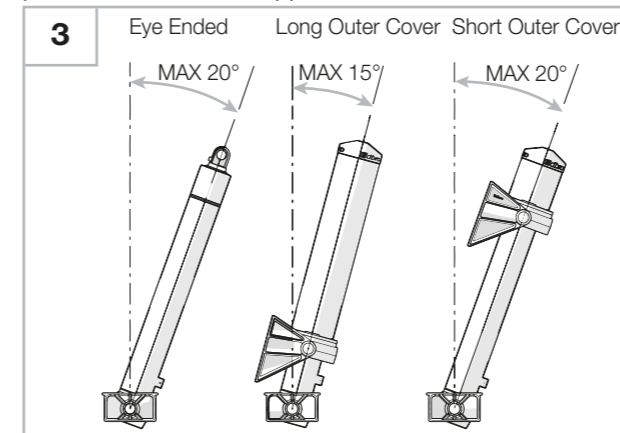
#### 3.3 Cross member mounting of the cylinder

##### Cross members

See brackets specification sheets, for the minimum distances between the support cross members. Allow ample distance for rotation of the cylinder during tipping (cylinder rotation is approximately half the tipping angle). Edbro cylinder cross-members should be used. Ensure the brackets are mounted in the correct orientation, minimum gap. Use packing shims as necessary to minimise this gap.

##### Cylinder mounting angle

Cylinder mounting angles stated below override the angles mentioned on individual cylinder outline drawings (*See figure 4*). Greater angles may be possible depending on application details, please send details to [applications@edbro.co.uk](mailto:applications@edbro.co.uk)

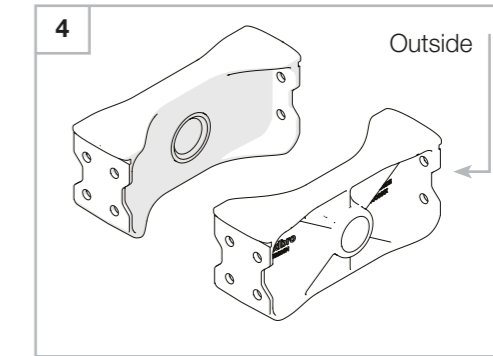


#### Chassis bracket mounting

The holes in the Edbro chassis brackets will align with the pre-drilled holes in the Edbro cross-member. Position the first of the chassis brackets hand-tighten the required bolts, self-locking nuts and washers (*see Table 1 / Pg: 19*).

(*See figure 4*) for position and orientation of chassis brackets. Ensure there is enough clearance between the top of the cross-member and the bottom of the cylinder at full extension. See cylinder specification sheet for details.

Bracket lips are mounting guides only and are not designed as structural members. The load is transmitted through the clamping force so the mounting faces must be firmly clamped together and the bolts must be correctly torqued.



### 3 Mounting Instructions

#### 3.4 Cradle mounting of the cylinder

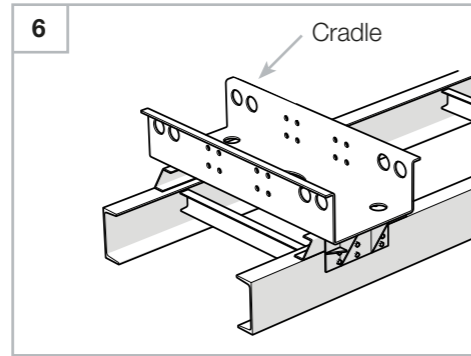
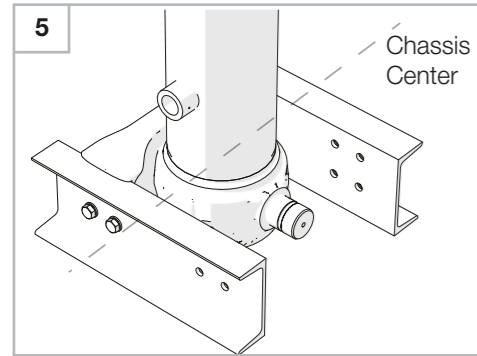
##### Mounting the cradle to sub frame

Fabricate and mount the sub frame according to the truck manufacturer's body builder guidelines. Weld or bolt the cradle securely to the sub frame (see figure 5) Use welds with a minimum standard of A6.

##### Mounting the cradle when no sub frame is used

Set the height of the cradle (see figure 6) to allow clearance for the gearbox or any other interfering parts, using standard rectangular or U-profile channels. Use any manufacturer's recommended sub-frame profiles for channel dimensions. Channels must be angled with rounded edges to minimise stress on the chassis. Align the attachment plates to run down to the chassis from the underside of the cradle.

Where the attachment plate would overlap with existing fixtures parts on the chassis (such as a suspension or steering bracket), the plate may be cut to fit. Follow the shape of the bracket as closely as possible using rounded corners. Refer to the truck manufacturer's guide before moving any existing vehicle components. It may be possible to reposition the parts on the chassis or fit the plate behind these components. If the chassis is not parallel at the fixing points, the attachment plates may be folded to suit. If necessary the plates can be cut and welded at the required angle with a stiffener rib over the weld.



### 3 Mounting Instructions

Bolt the attachment plates to the chassis (see figure 7) . Use a minimum of 4 x M16x1.25 quality 8.8 bolts per plate in existing holes wherever possible. Weld the cradle to the attachment plates (see Figure 6). Fully assemble and weld the cradle and attachment plates. Ensure the attachment plate is welded the full width of the underside of the cradle.



##### WARNING!

Disconnect the battery leads before welding and earth the chassis.

##### Mounting the chassis brackets

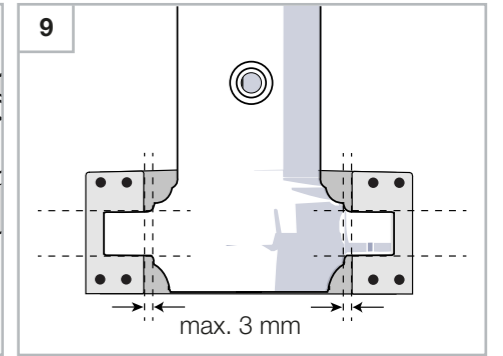
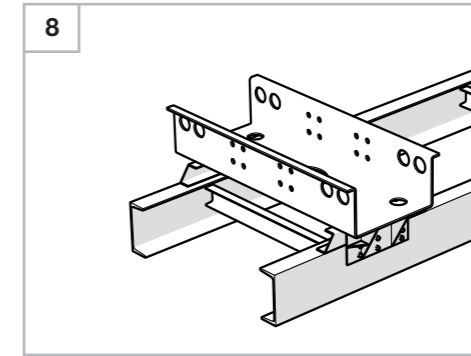
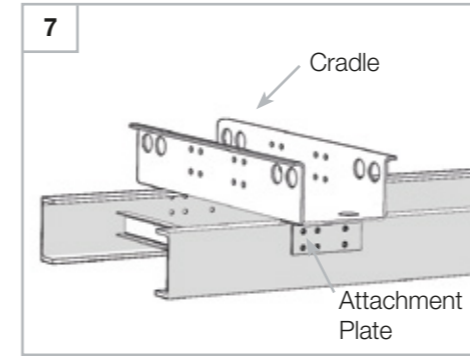
Use the pre-drilled holes in the cradle when mounting the chassis brackets. Position one of the chassis brackets, hand-tighten the required bolts. Self-locking nuts and washers should be used, (see figure 8) for position and orientation of chassis brackets.

For subsequent fitting steps (see chapter 3 section 2)



##### Advice!

Bracket lips are mounting guides only and not designed as a structural member.



### 3 Mounting Instructions

#### 3.5 Fixing the cylinder into the chassis brackets

When lifting the cylinder, ensure this is done slowly and carefully as some stages of the cylinder may extend. Wrap a lifting sling around the outer cover and base (for OE types use the base), and transport it using an overhead crane, or other suitable lifting device. (see figure 10)



#### WARNING!

Not using the correct sling can cause serious injury and death. Please ensure you lift the cylinder with suitable equipment. Edbro are not responsible for any accidents which may occur.

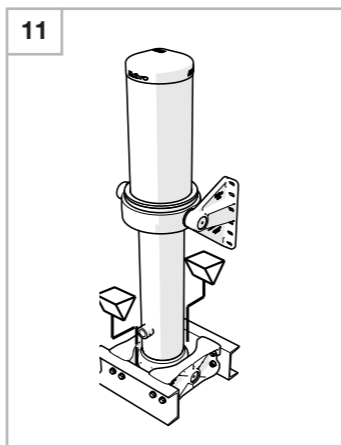
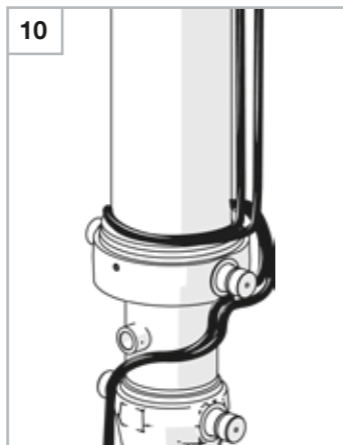
Remove the protective caps from the base trunion arms. Lightly grease the arms to protect against corrosion. Position one of the cylinder arms into the pre-positioned chassis bracket (see figure 5). Make sure the oil inlet is facing the correct direction for the connection of the hydraulic system. Fix the second chassis bracket and align the cylinder with the centre of the truck chassis (see figure 5). Ensure that a correct maximum clearance of 3 mm (see figure 9) is given between cylinder and bracket per side. Tighten all bolts securely ( see Table 1 / Pg: 19 for required torque).



#### WARNING!

After removing the sling, the cylinder may fall towards the cab. This can result in serious injuries to persons and / or damage of components.

To hold the cylinder in the correct position, place wooden wedges or blocks between the cylinder and the chassis (see figure 11). Remove the sling. If only the tipping gear is to be fitted (i.e. the body is to be fitted elsewhere) secure the cylinder and brackets to prevent damage during transport. Lean the cylinder away from the cab and secure to chassis with ropes.



### 3 Mounting Instructions

#### 3.6 Attaching the cylinder to the body

It is advised to design, build and fit an applicable body to have a pull-out matching the cylinders mounting centre + 40 mm maximum (50 mm total maximum).

#### Cylinder Mounting

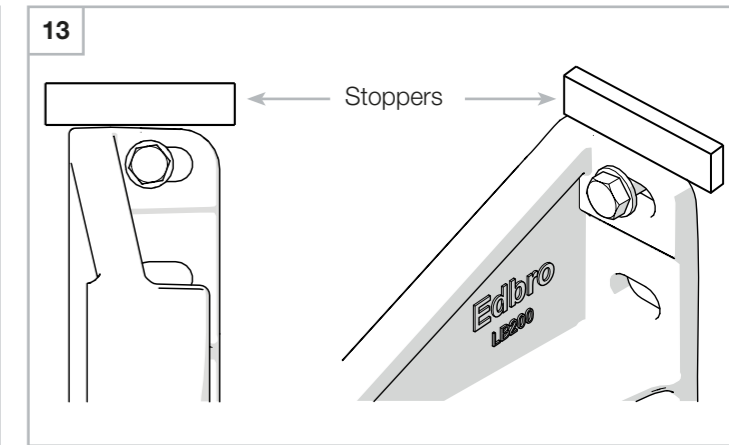
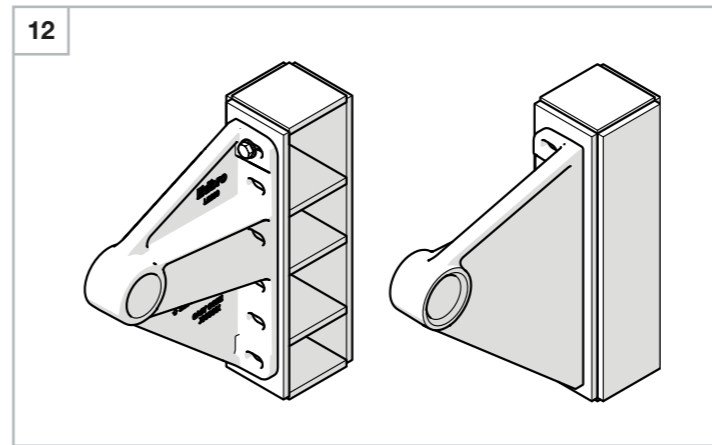
We recommend a rigid lifting plate or (reinforced) profile for mounting the lifting brackets. Too much flex in a plate or profile may result in the cylinder coming out of the lifting brackets.

Use all available bolt holes on the brackets for mounting (see figure 12). Do not modify the brackets and ensure they are mounted in the correct orientation (see Edbro bracket brochure). Use standard 8.8 bolts with self locking nuts and flat washers over the slotted hole in the bracket. If tipping weight is to exceed 50 tonnes. Stoppers should be positioned above the lifting bracket (see figure 13).



#### ADVICE

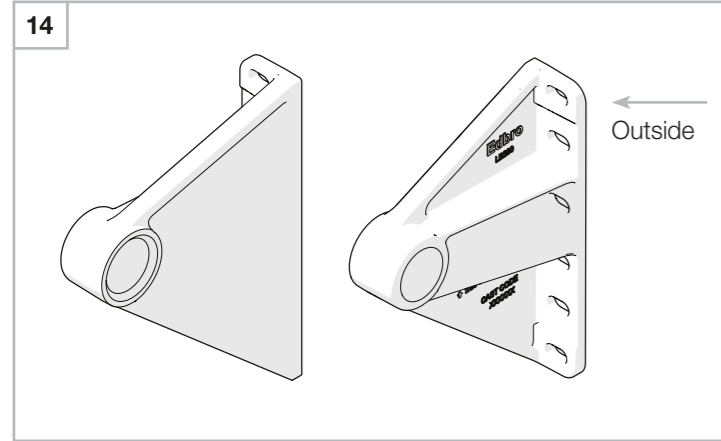
Mounting will vary depending on specific bracket and body design.



### 3 Mounting Instructions

Remove the protective caps from the cover trunnions. Lightly grease the pins to protect against corrosion. Place the lifting brackets on the cover pins and attach them to the tipping body. Make sure the brackets are not mounted inside out, (see figure 14) for correct position. Ensure the lifting brackets are in the correct position and orientation with a maximum of 3 mm clearance between the cover and brackets. The nuts and washers should be on the bracket flanges, if there is not enough space they may be inverted.

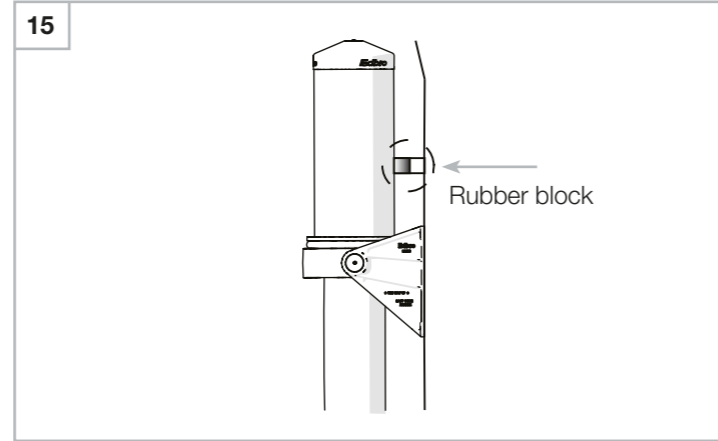
Tighten all bolts securely (see page 19 for required torque). Ensure brackets are mounted in the correct orientation.



#### Tip

The lifting bracket holes may not be vertically in-line with the tipping body holes. The cylinder can be carefully extended hydraulically or by physically pulling out the piston cover.

When a cylinder is mounted vertically, installing a rubber block to the body front can reduce unwanted movement. When a cylinder is mounted at an angle, a rubber block may not be required. (see figure 15),

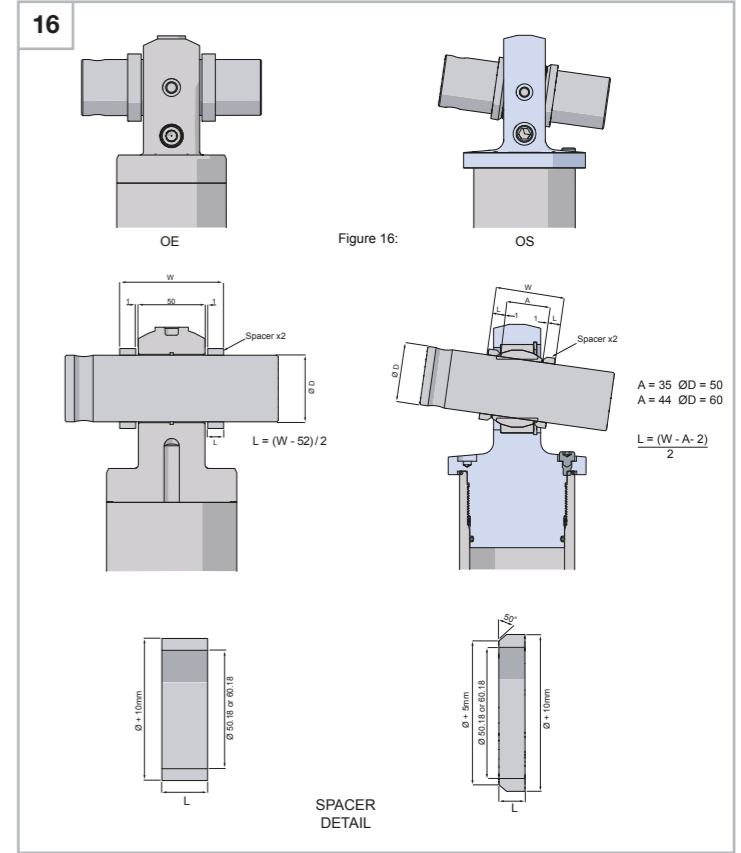


### 3 Mounting Instructions

#### 3.7 0E/0S

Attach the cylinder eye to the tipping body (see figure 16). Fit the pivot pin and secure it. 0S cylinders with spherical eye bearings must be mounted with tapered spacers on both sides of the eye to allow 6° of rotation to both sides. Make sure that the eye rotates freely within the bracket. Minimum spacer width is 10 mm. Internal bracket width (W) should be a minimum of 58 mm for Ø50 pin, 67 mm for Ø60 pin. 0E cylinders can be installed with plain spacers to match the bracket width.

A range of Edbro top brackets are available, see OMK bracket specification sheets in Technical Center. The top bracket must be mounted under the canopy in a horizontal condition.



16

Figure 16:

$$A = 35 \text{ } \varnothing D = 50$$

$$A = 44 \text{ } \varnothing D = 60$$

$$L = \frac{W - A - 2}{2}$$

SPACER  
DETAIL

### 3 Mounting Instructions

#### 3.8 Connecting and testing the cylinder

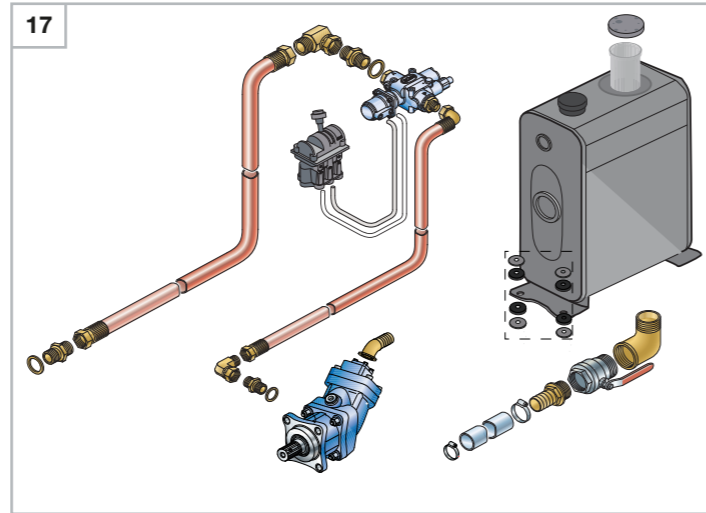
##### Connection of the hydraulic system

Connect the hydraulic kit ensuring the specification is appropriate for the cylinder (pressure, flow of pump, size of oil tank etc). For assistance please contact Edbro Application engineering. Remove the plug from the oil inlet port and connect the cylinder to the hydraulic system (see figure 17). Ensure that hose lengths are long enough to not restrict the movement of the cylinder during tipping and to allow full articulation of the tractor unit.



##### ADVICE

Assembly oil /grease may leak from the cylinder in the first few operations



#### 3.9 Body Clamp

It is strongly recommended that body clamps are used on all tippers to prevent body bounce when empty. Body bounce can cause wear, fatigue and stresses throughout the tipping structure and in extreme circumstances frequent body bounce can lead to premature cylinder tube wear local to the hydraulic seals which can result in leakage. Such wear as a result of body bounce is not considered under warranty. Edbro offer body clamps to suit both steel and Aluminium bodies please see the data sheet "BCA01 BODY CLAMP "(see figure 18).



### 4 Bleeding the System

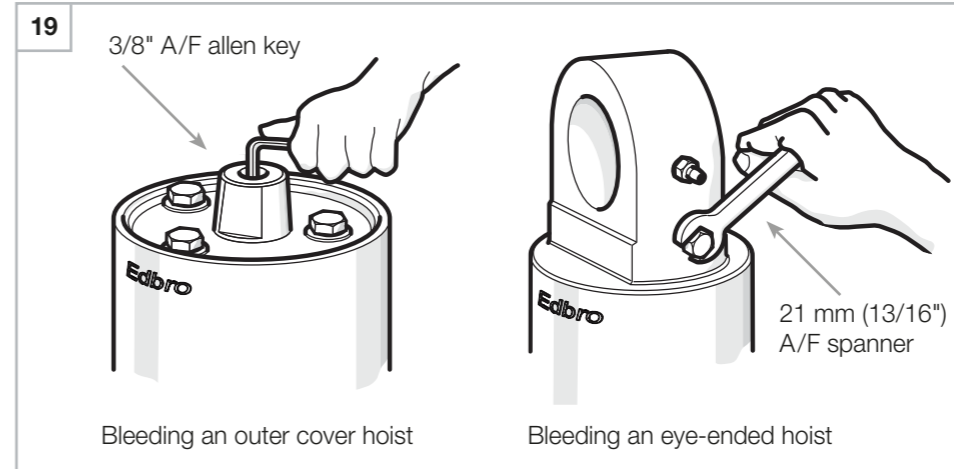
If the hoist judders in "LOWER", or the tubes operate out of sequence when lowering, there may be air in the system.



Advice!  
On first installation and periodically as required

##### Bleed the system as follows:

Lift the body to about 300 mm (12") above the chassis frame. Put the tipper lever in "HOLD". Locate the bleed screw and slacken about one turn (see figure 19). The body will come down slowly and force the air out of the system when oil flows freely, tighten the bleed screw. If the hoist is still jerky or sluggish, tip the body to full tip and then lower and repeat the whole process. Lower the body and top up the oil tank with clean oil and replace the plastic cap on top of the outer cover.



## 4 Bleeding the System



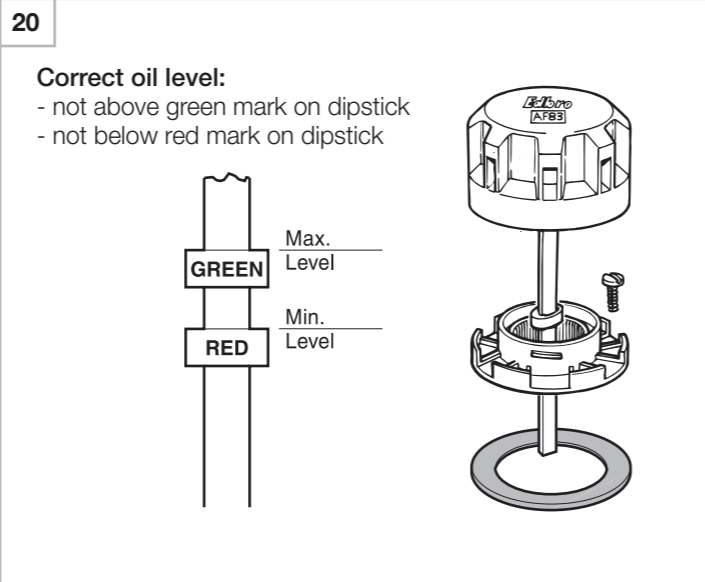
### WARNING!

Be aware of potential danger when releasing the air from the system and lowering the body.

Dirty oil may cause damage to your hydraulic system and reduce its lifespan considerably. The cleaner the oil, the more efficient the hoist's operation and the longer its life. So always use clean hydraulic oil for topping up or changing the oil in the tank.

For most climates we recommend an oil to specification ISO6734/4 HM32 -20°C to +30°C. For other climates (see table on page 22) her - ALWAYS use a cloth when cleaning.

To determine the oil level, use the oil tank sight gauge or alternatively remove the filler cap and check that the level is within the max./min. mark as shown (see figure 20).



## 5 Bolt and nut specifications



### ATTENTION!

1. Torques are advisory only and will depend on plating and lubrication.
2. The figures to the right are for plain (unplated) bolts in the as received condition. ( $\mu=0.2$ ) torqued to 75% of yield stress.
3. For Zinc plated bolts, increase torques by 10% ( $\mu=0.22$ ).
4. For lubricated bolts (any finish), reduce torques by 25% ( $\mu=0.15$ ).
5. Compatible nut and washer grades must be used.
6. Check final torque levels with your bolt supplier.

All strength calculations are based on St.37.2 and crossmember length of 1m.

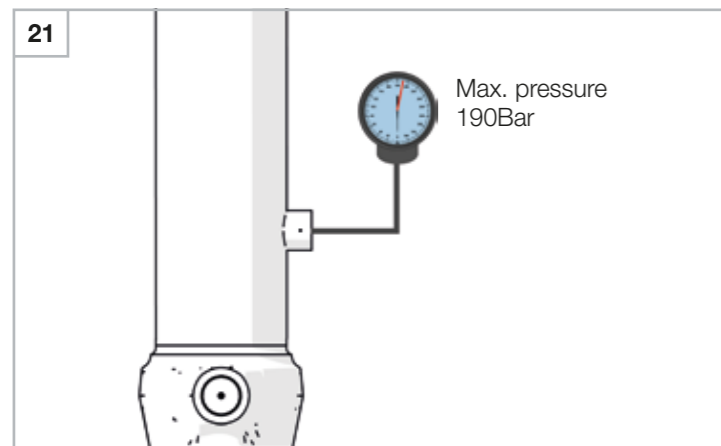
Size	BS		Minimum Quality	Torque
	Bolt	Nut		
<b>M12</b>	3612	3692	8.8	150 Nm
<b>M16</b>	3612	3692	8.8	240 Nm

## 6 Operating Pressure

The hoist must be installed into a pressure protected hydraulic system (a relief valve must be fitted). The maximum system pressure must be no greater than 190 Bar, but may be lower if there is a technical limitation applied (see figure 21)

Alternatively it may be possible to use the cylinder at a higher pressure if this is specifically agreed with the bodybuilder. In such cases, the bodybuilder will be responsible for displaying the maximum pressure.

The hoist works optimally if the vehicle is fitted with matching Edbro hydraulics (PTO, pump, valves, oil tank, pipes and controls).



During final installation checks it is recommended to check the system pressure by extending the cylinder to full stroke with the pump running.



### WARNING!

If the vehicle has Edbro hydraulics, NEVER TRY TO ALTER THE PRESSURE SETTING OF THE RELIEF (OVERLOAD) VALVE. This valve is preset at the factory.

If the tractor has non-Edbro hydraulics make sure they include a pressure relief (overload) valve which is:  
\* capable of accepting the maximum flow from the pump  
\* set correctly according to the hoist identification plate. This is very important.

The lack of a correct pressure relief (overload) valve can be VERY DANGEROUS and would invalidate the product warranty.

## 7 Final Checks

We recommend you bleed air from the system (see section 4). The first testing tip should be slow and all movements should be closely observed and verified.

- \* hoses do not interfere with any parts.
- \* cylinder extends in a straight line (no bending or side load)
- \* while tipping, ensure there is no contact between the rear end of The body and other parts of the truck (such as towing-hooks, tail lamps etc.).

Tip the body 4 or 5 times and check there is no side-load on the cylinder and the clearances are correct. If you find the cylinder's movement is stiff, loosen the bolts and realign the cylinder. Protect hoses at any point where they move against metal parts (if they can not be repositioned).

### Tip

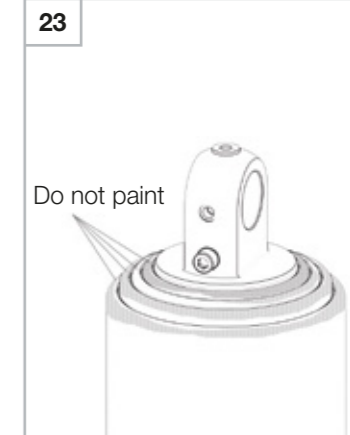
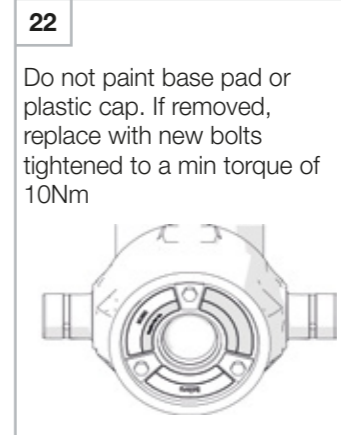
During the first few tips some assembly grease or oil may appear on the stages of the cylinder, this is normal and does not mean the cylinder is leaking.

Cylinder stages should extend in the correct sequence as follows: largest (first moving stage) extends first, then second stage and so on. However, with a new cylinder, an empty body and high pump flow rate, stages may extend in the wrong sequence (mis-staging). This is rare and should disappear during normal operation (loaded body).



### WARNING! Painting the cylinder

When painting the body, do not paint the interacting faces of the cylinder e.g. trunnion pins, piston, stages, wipers, bearings ( see figure 22 , see figure 23)



## 8 Oil Specification Guide

Oils should be specified to suit environmental temperature conditions. Use the colour coding below to identify the ideal oil grade for the operating temperature and to select specific manufacturers specifications.

	A	B	C	D	E
<b>Environmental conditons</b>	Extreme Cold To -40°C	Cold -5 to 25°C	Winter to Summer -5 to 30°C	Hot 30 to 50°C	Very Hot Over 50°C
<b>ISO Grade</b>	N/A	15	32	46	68

**Note:** Use of oils outside of the temperature ranges stated above is acceptable, however hydraulic efficiency will be reduced.

### Mineral Oil

This will be specified according to ISO 6743/4 HLP-HM or DIN 51524 (part 2) with ISO viscosity grade according to the chart above.

## 8 Oil Specification Guide

### Mineral Oil

		Oil Specification					Grease Specification
		A	B	C	D	E	
Manufacturer	<b>Mobil</b>	Aero HFA	DTE11M	DTE24	DTE25	DTE26	XHP222
	<b>Shell</b>	AeroShell 4	Tellus T15	Tellus 32	Tellus 46	Tellus 68	Retinax EP
	<b>BP</b>	Not available	Bartran HV15	Bartran HV32	Bartran HV46	Bartran HV68	Energrease LS EP2
	<b>Gulf</b>	Not available	Hydrasil 10	Hydrasil 32	Hydrasil 46	Hydrasil 68	Gulfcrown EP no2

### Environmentally Friendly Oil

These should be specified according to ISO 15380 type HEES with equivalent specification to the mineral oils above.

### Environmentally Friendly Oil

		Oil Specification					Grease Specification
		A	B	C	D	E	
Manufacturer	<b>Mobil</b>	Not available	Not available	EAL 32	EAL 46	Not available	EAL 102
	<b>Shell</b>	Not available	HF – E 15	HF – E 32	HF – E 46	HF – E 68	Naturelle EP2
	<b>BP</b>	Not available	Not available	Biohyd SE-S32	Biohyd SE-S-46	Biohyd SE-S 68	Biotac EP 2
	<b>Gulf</b>	Not available	Not available	Biosynth VG32	Biosynth VG 46	Not available	Biocal 2

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