

# excavator mounted vibrator | EMV 220



## excavator mounted vibrator

owners manual  
operators instructions  
spare parts list  
safety precautions  
maintenance  
Original Instructions  
EMV220 ver. 2024-02

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# preface

This manual is used to familiarise you with safety, assembly, operation, adjustment, troubleshooting, and maintenance. Read and follow the recommendations in this manual to ensure safe and efficient operation. Keep this manual with the attachment at all times for future reference.

We want you to be completely satisfied with your new product, feel free to contact your local authorized service dealer for help with service, replacement parts, or any other information you may require. If you need assistance in locating a dealer, visit our web site at [www.dcpuk.com](http://www.dcpuk.com) or call customer service at +44 (0) 1908 240300.

Whenever you contact your authorised service dealer, always have the model number and serial number of your product available. These numbers will help provide exact information about your specific product. You will find the model and serial numbers on an ID plate located on the product.

The descriptions and specifications in this manual are subject to change without notice. Dawson reserves the right to improve products. Some product improvements may have taken place after this manual was printed.

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# Certificate

# Declaration of Conformity

We declare that the machinery/equipment detailed below is in compliance with the applicable regulations and harmonised standards as listed. This declaration ceases to be valid if alterations are made the machinery/equipment without agreement with Dawson Construction Plant Ltd.

Category	Piling Equipment
Type	EMV
Serial Number	220-
Year of Manufacture	2018
Power kW	42
Suitable Excavator Range	7-18 tonnes

Measured sound power level on machines representative of this type Applied conformity assessment procedure according to Annex VIII Technical documentation archive location: MK6 1NE	107 dB (A)
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Relevant Regulations:

2006/42/EC	Machinery Directive
2000/14/EC	Noise emission in the environment -

Applied harmonised standards, in particular:

EN 12100-1:2010	Safety of machinery. Basic terminology and methodology
EN 16228-1:2014	Drilling & foundation equipment. Common requirements
EN 16228-4:2014	Drilling & foundation equipment. Foundation Equipment
EN 16228-7:2014	Drilling & foundation equipment. Interchangeable auxiliary equipment

Signed by on behalf of DCP

Name / Position

DAVID BROWN - MANAGING DIRECTOR

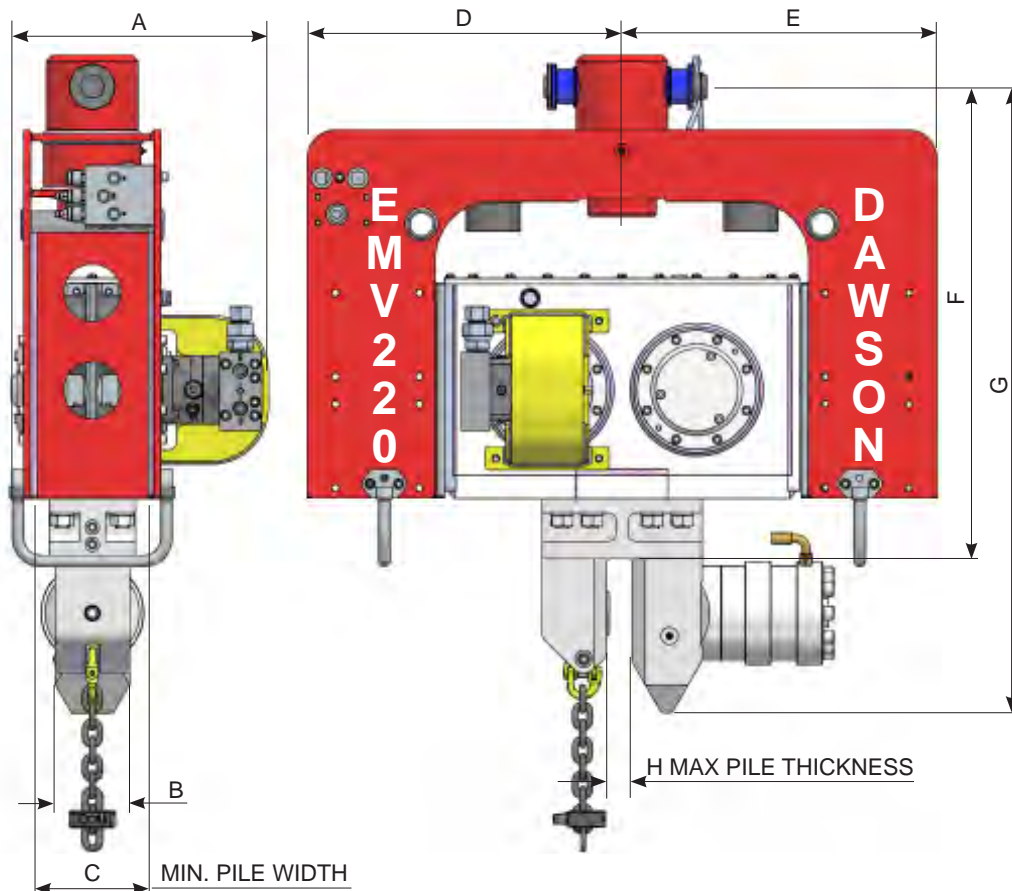
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# basic technical specifications

SPECIFICATIONS	EMV220	
	METRIC	US
UNITS	METRIC	US
STATIC MOMENT	2.3 kgm	200 in lbs
FREQUENCY	50 hz - 3,000 rpm	
CENTRIFUGAL FORCE	220 KN	50,236 lbs.F
AMPLITUDE	12 mm	0.45 in
REQUIRED HYDRAULIC FLOW RATE *	90 L/min	24 gpm
MIN. HYDRAULIC PRESSURE	280 bar	4,060 psi
MAX. HYDRAULIC PRESSURE	350 bar	5,076 psi
MIN. HYDRAULIC POWER	50 kW	80 hp
DYNAMIC MASS	370 kg	814 lbs
TOTAL MASS	580 kg	1,276 lbs
MAX. PILE MASS	800 kg	1,760 lbs
MAX. PUSH/PULL FORCE	7,500 kg	16,500 lbs
CLAMP FORCE	26.5 tonne	
TYPICAL EXCAVATOR WEIGHT	7 to 18 tonne	7.5 to 20 ton

\* REQUIRED FLOW = MAX. FREQUENCY  
MACHINE HAS INTEGRAL FLOW REGULATOR UPTO 250 L/min.



DIMENSIONS	A	B	C	D	E	F	G	H
mm	455	130	275	550	550	824	1094	40
in	17.9	5.1	10.8	21.6	21.6	32.5	43	1.5

# basic safety points

- The vibrator should only be operated by suitably qualified personnel.
- The vibrator/clamps not to be used for lifting operations.
- It is prohibited to leave an element suspended in the clamps of a vibrator, which is free hanging and out of operation.
- Don't leave the vibrator clamped on a pile without being attached to the excavator.
- Extraction pulling force not to be exceeded.
- Pile to be secured to the lifting chain of equal lifting or greater capacity to the load held in the clamp.
- It is prohibited to use vibrator as an impact hammer, by hammering with open clamp.
- There should be visual contact between operator and slinger (banksman) at all times.
- Monitor the piling operation constantly – stop the process immediately if any danger occurs.
- Do not operate the vibrator if any person is within the **High Risk Area** – see section 2.1.4.
- Consider machine stability at all times.
- The operator should inspect the equipment for defects every day and before being taken in to service. Any defects that affect operational safety should be corrected before the equipment is taken into service – see section 5.
- Pay attention to the Safe Working Load of all lifting accessories at all times. (See table in section 2.1.6).
- The working area should be properly illuminated.
- Work safely at all times and within the requirements of all local legislation.
- The vibrator can become very hot during operation – do not touch it unless wearing appropriate protective clothing.



## WHO IS RESPONSIBLE?

Those who are in charge of, or responsible for, the use and maintenance must ensure that the vibrator and all its auxiliary equipment are in good condition.

Piling should only be carried out under the supervision of an appropriately qualified and experienced person who can assess that the work is carried out safely.

The excavator operator must ensure that his communication signals are understood, by those on the ground, and followed. During piling operations he must watch out for any potential hazards.



## WORKING CONDITIONS / ADVERSE WEATHER CONDITIONS

Vibrators should only be operated and driven on firm ground with clear visibility of the working area and the process monitored constantly. Operators must have a clear understanding of the site assessment and method statement. This assessment will cover risks and site actions that have been implemented for the event of adverse weather conditions.

The vibrator stand must stay upright on level ground (at all times) to avoid personnel injury.



## WORKING NEAR UNDERGROUND / OVERHEAD OBSTACLES

Before the start of any piling work it is up to the contractor to identify if there are any underground cables, utilities and overhead obstacles within the working area which could be dangerous to personnel, including but not limited to live electrical cables. This should be fully covered in the site specific method statement. All personnel on site should have a full understanding of the risks. In the case of unforeseeable contact or damage of an underground / overhead obstacle, then work must stop immediately and the person in charge informed.



## THE HIGH RISK AREA

This is an area defined as that being within an approximate radius of the vibrator which is calculated by the following formula: Pile length (m) + ½(Pile Length)

This area can be either this or within the slewing radius of the excavator, whichever is greater. The High Risk Area is active while the vibrator is working or the excavator is in operation. (Please refer to operator's instruction for full details)

# continued - basic safety points

Personnel are at risk when within this area from:

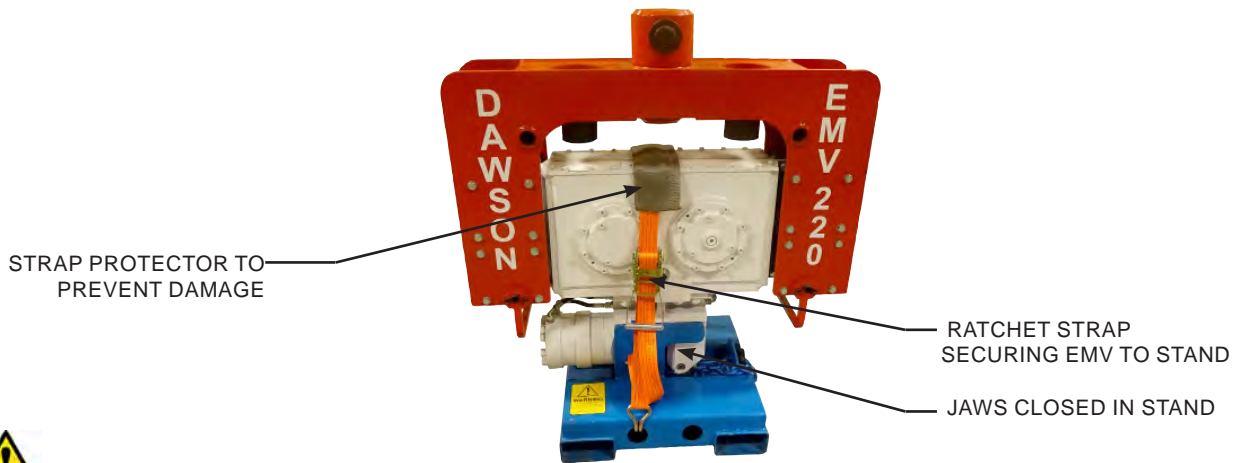
- Falling piles – should the pile be handled incorrectly
- Liquids under high pressure and associated components
- Mechanical failures of equipment components
- Noise – wear ear protection equipment when inside this area
- Unexpected movement of the excavator (slewing, overturning)



## TRANSPORTING THE VIBRATOR

When transporting the vibrator, ensure it is placed correctly in the stand.

Once in place on the stand the jaws must be closed. Release the hydraulic hoses from the excavator (the hard jaws will remain closed) and cap the hose ends to prevent contamination. A ratchet strap is secured over the gearbox of the EMV and fixed to the stand. (Please see below image). Disconnect the vibrator from the excavator.



## TRANSPORTING PILES ON SITE

Transporting a pile using the vibrator should only be done over a small distance, with the clamp fully engaged on the pile top and with the lifting chain fitted. The load should be carried as close to the ground as possible to minimise falling risk. Should the grip on the pile be reduced during this procedure, the excavator must stop, and a better grip effected. Should a pile slip then the lifting chain could snap and cause an accident.

When transporting a pile extreme care must be taken to ensure that no one is in the **High Risk Area** and that the pile is handled in such a way as to ensure no danger to site personnel at any time.

In order to avoid extensive transporting, have the piles laid out as close to the point of installation as possible.

Do not use the excavator with the EMV220 installed to handle bundles of piles around the job site. The maximum pile weight allowed to be transported by each EMV model is shown in the table below:

	MODEL				
	EMV70	EMV220	EMV300	EMV450	EMV550
MAX PILE MASS	800kg	800kg	800kg	1,000kg	1,400kg
LIFTING CHAIN SWL (t= 1000kg)	3.2t	3.2t	3.2t	1.6t STD CHAIN 3.2t ADAPTOR	1.6t STD CHAIN 3.2t ADAPTOR



## QUICK REFERENCE GUIDE

IMPORTANT:- READ FULL OPERATING INSTRUCTIONS @ WWW.DCPUK.COM

# SAFETY FIRST

### Basic Safety Points

The vibrator should only be operated by suitably competent personnel.

There should be visual contact between operator and banksman at all times.

Monitor the piling operation constantly - interrupt the process immediately if any danger occurs.

Do not operate the vibrator if any unauthorised personnel are within the HIGH RISK AREA. = ( Pile length +  $\frac{1}{2}$  Pile Length) or within the slewing radius of the excavator.

Consider machine stability at all times.

The operator should inspect the equipment for defects every day and before being taken into service.

Any defects that affect operational safety should be corrected before the equipment is taken into service

Pay attention to the Safe Working Load of all lifting accessories at all times.

The working area should be properly illuminated.

Work safely at all times and within the requirements of all local legislation.

The vibrator can become very hot during operation - do not touch it unless wearing appropriate protective clothing.

The maximum weight of pile that can be used with the;

EMV70, 220, 300 = 800kg

EMV450 = 1000kg

EMV550 = 1400kg

The most important hose on the machine is the drain line which must be fed either directly into the hydraulic tank in the excavator or connected to the breaker circuit return line. (Recommended  $\text{Ø}1/2$ " hose minimum).



#### **WARNING!**

**IT IS IMPERATIVE THAT THE DRAIN LINE IS NOT RESTRICTED AS THIS WILL CAUSE THE BUILD UP OF PRESSURE WHICH WILL DAMAGE THE MOTOR.**

### Responsibility

Those who are in charge of, or responsible for the use and maintenance must ensure that the vibrator and all its auxiliary equipment are in good condition.

Piling should only be carried out under the supervision of an appropriately qualified and experienced person who can assess that the work is carried out safely.

The excavator operator must ensure that his communication signals are understood, by those on the ground, and followed. During piling operations he must watch out for any potential hazards.

The equipment is hired under C.P.A. conditions and as such any theft or damage caused by misuse or abuse will be charged accordingly.

IN THE EVENT OF MALFUNCTION, DAMAGE OR LEAKAGE OF OIL, DAWSON CONSTRUCTION PLANT MUST BE NOTIFIED IMMEDIATELY.

## Operating Procedures Summary - Read Full Operating Instructions at [www.dcpuk.com](http://www.dcpuk.com)

Allow the excavator engine to warm up, particularly in temperatures below 10°C.

Pay daily attention to the general condition of the hard jaws (vibrator clamp). Ensure they are replaced once signs of wear are apparent. Check for loosened connections daily.

Check both the vibrator and auxiliary equipment for damage. Pay particular attention to the lifting chain assembly. Any defects should be immediately notified to the person in charge. **DO NOT OPERATE A DAMAGED UNIT.** The Ø40mm hole in the pile for the lifting chain must be spaced 250mm from the top of the pile to avoid clash with the EMV jaws.

**Refusal** - Under normal conditions, refusal is defined when the time taken to drive a pile 250mm exceeds 5 minutes. The penetration distance of 250mm is absolute, i.e. No conversion is allowed, for instance, 20 minutes for 1m penetration.

**Rebound** - This occurs when a large proportion of the hammers energy is reflected back up through the pile as a result of hitting an impenetrable layer or obstruction. The reflected forces will be transferred back into the hammer and the suppressor head, and as a result, the head will start "jumping" relative to the vibratory case. In this situation driving should be stopped immediately.

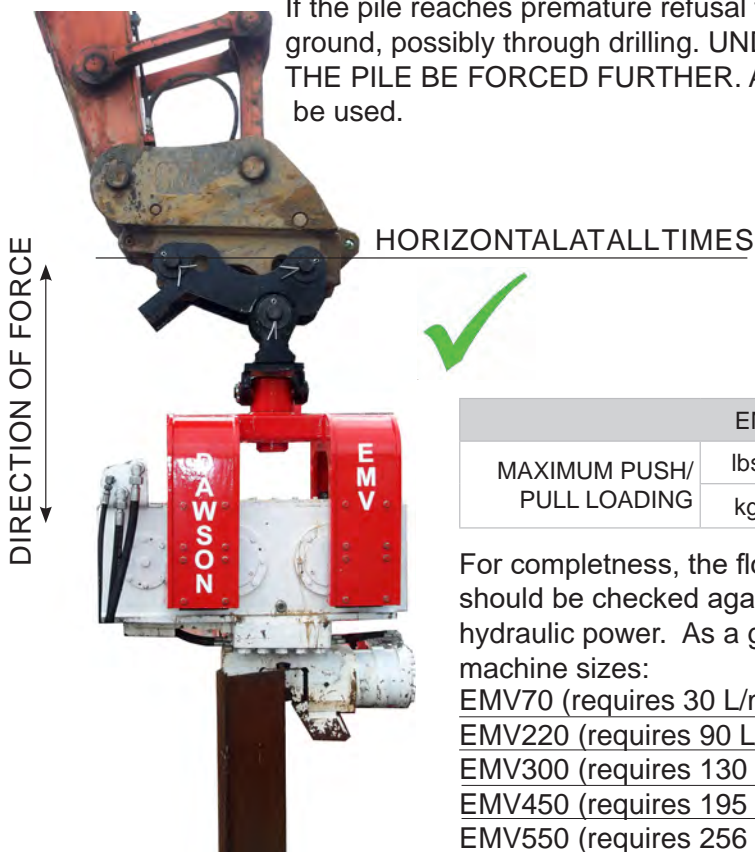
If the pile reaches premature refusal then it will be necessary to loosen up the ground, possibly through drilling. **UNDER NO CIRCUMSTANCES SHOULD THE PILE BE FORCED FURTHER.** Alternatively a larger piling device should be used.



### WARNING!

The position of the quick hitch to the dipper arm.

The quick hitch should always be horizontal, with the direction of force being vertical as shown. Incorrect alignment could result in serious part failure and risk to life!



	EMV	70	220	300	450	550
MAXIMUM PUSH/ PULL LOADING	lbs	6,171	16,500	33,600	33,600	49,500
	kg	2,800	7,500	15,000	15,000	22,500

For completeness, the flow and pressure from the excavator to the EMV should be checked against the specification sheets to confirm adequate hydraulic power. As a guide the EMVs typically suit the following base machine sizes:

EMV70 (requires 30 L/min, 240 bar)	~ 5.5 - 17 t excavator
EMV220 (requires 90 L/min, 280 bar)	~ 7 - 18 t excavator
EMV300 (requires 130 L/min, 280 bar)	~ 13 - 25t excavator
EMV450 (requires 195 L/min, 270 bar)	~ 25 - 45t excavator
EMV550 (requires 256 L/min, 280 bar)	~ 30 - 55t excavator

## Daily Maintenance

Grease all grease points - Clamp Cylinder, Saddle Swivel, Dipper Pins

Check the screws, bolts, fitting etc. for tightness

Check hydraulic hoses for leaks

Check oil level in the excavator hydraulic tank

Check the gear oil level in the vibrator. The level must be halfway up the sight glass (change oil ever 50hrs).

Check lifting chain coupler and chain clamp for damage, wear and tear

For full details read operators instructions & spare parts manuals, available to view or download at [www.dcpuk.com](http://www.dcpuk.com)



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# how does the emv work?

Modern pile vibrators basically work in the same way. Pairs of high-speed contra-rotating eccentric weights are geared together so as to produce net vertical vibratory forces.

The vibrations produced are transmitted to the pile through a powerful hydraulic grip. Consequently the pile is vibrated at the same speed and displacement (or movement) as the gearbox itself. This vibration effect is transmitted to the pile tip where the surrounding soils become almost fluid like.

The fluidising effect on the soil permits particles to shuffle themselves around creating some spaces for the pile to move into. This combined with the weight of the pile and vibrator is adequate to push the pile into the ground.

Not all soil types will however fluidise. Clays soils are very cohesive and extremely dense by comparison to sands and gravels where vibrators work best. The dense clay soil does not allow soil particles to shuffle themselves around so no fluidising effect can occur. Also the ground effectively sticks itself to the pile and much of the power generated is lost in shaking the ground.

The EMV is particularly effective for its size and weight because it is able to utilise the crowd force available from the excavator to add further push force to the pile.

The gearbox in the EMV unit is driven by a hydraulic drive motor that receives hydraulic power from the excavators bucket ram circuit. Typically this circuit will be able to supply adequate working pressure but excessive amount of oil flow rate. The EMV has a built-in flow regulator that limits the oil flow rate supplied to the drive motor so that the gearbox can not be run too fast. This is essential to prevent excessive bearing loads and correct performance of the unit.

In addition, the flow regulator has a sequence valve built-in that will not allow the vibrator to run until adequate clamping force has been applied to the pile – an essential safety feature. This simplified hydraulic system enables simple installation and reliable performance.

flow regulator & sequence valve

DAWSON

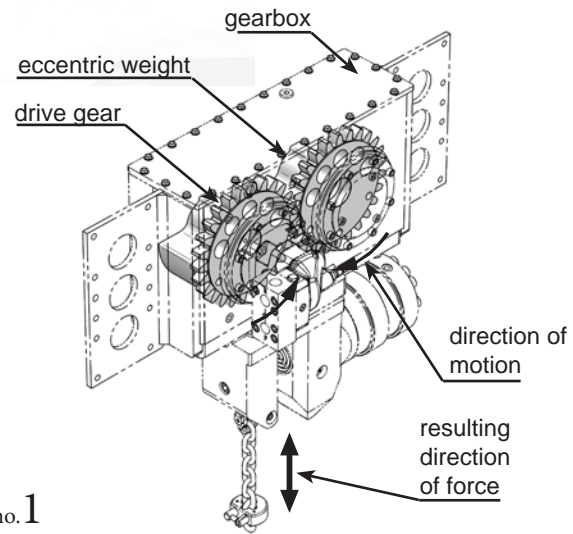
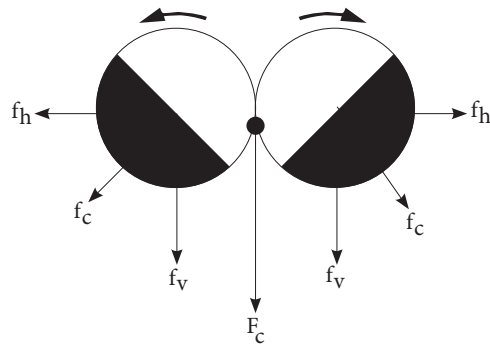
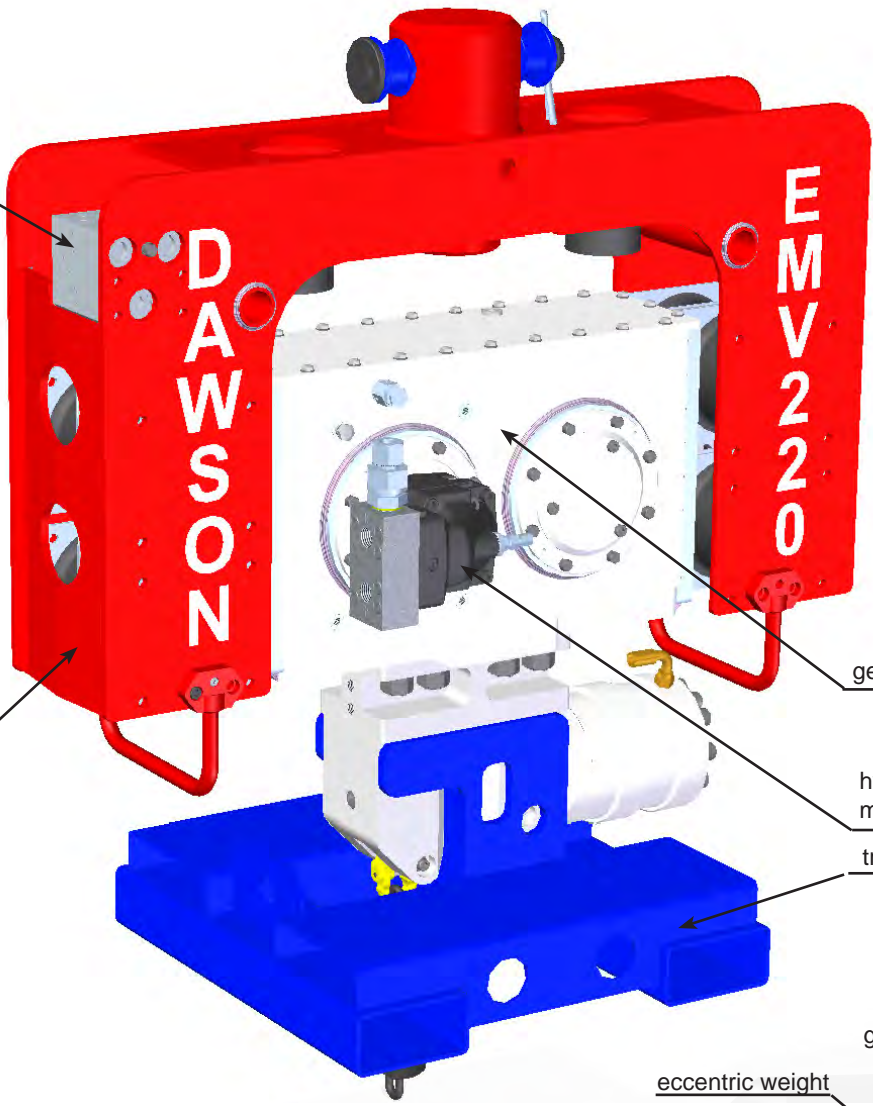
EMV 220

saddle assembly

gearbox

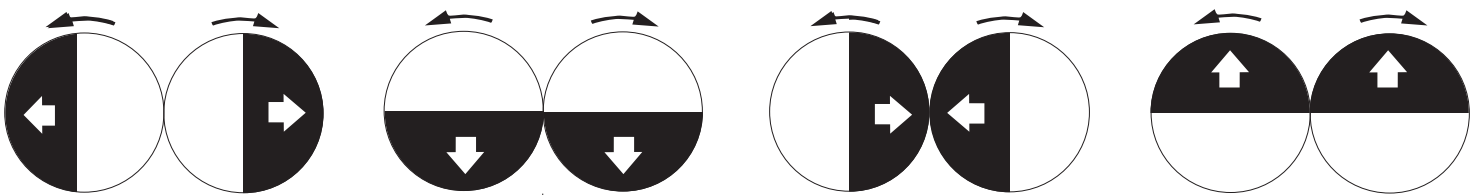
hydraulic drive motor

transport stands



no.1

Motion of a pair of eccentrics



Corresponding Sinusoid



# mounting instructions

The excavator hydraulic power output must be matched to the requirements of the vibrator before installation. A standard excavator enquiry sheet is available for the user to complete prior to considering the suitability of the excavator for use with the EMV220.

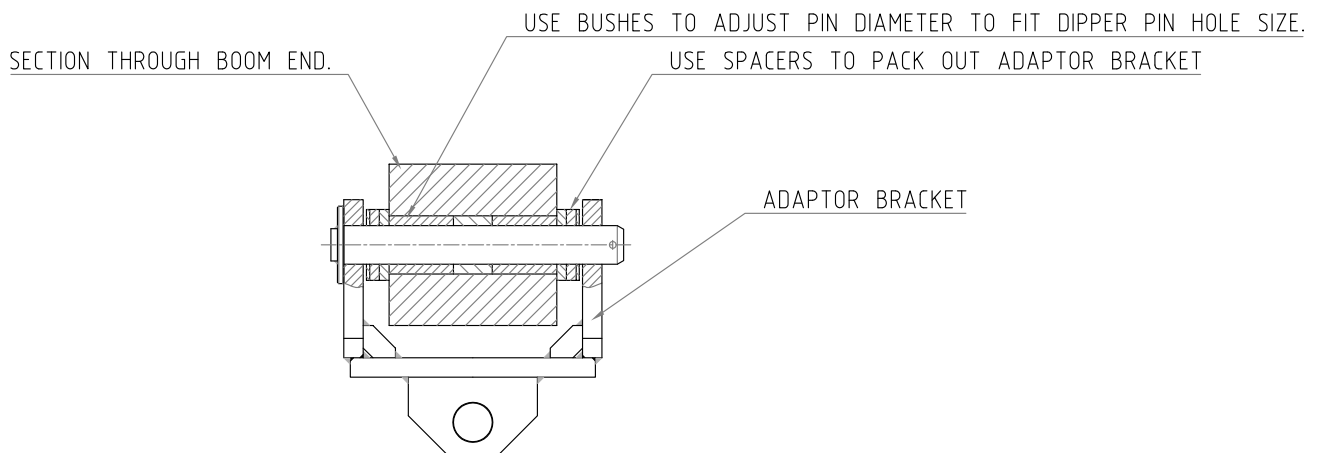


## MOUNTING THE VIBRATOR

The vibrator is mounted in place of the excavator's bucket, and should be allowed to hang freely once installed. Remove the bucket prior to installing the EMV.

A shear pin is used to fix the vibrator to the boom via an adaptor bracket. Different adaptor brackets may be required for different excavators. Check this prior to the start of installation. If the excavator is fitted with a quick hitch it will either be necessary to remove it or purchase half a quick hitch and modify to suit the Dawson adaptor bracket.

Standard brackets are available for different machine size ranges. Typically, one of these brackets can be adapted to fit a variety of different pin sizes and dipper end widths by using a kit of bushes and spacers.



## HYDRAULIC HOSES - LAYOUT & CONNECTIONS

The pressure line is usually connected to the bucket ram "extend" circuit and the return line to the bucket ram "retract" circuit. The third, and smaller, drain line is fed either directly back into the hydraulic tank on the excavator, or connected to the breaker circuit return line. Excavators will rarely have the same fittings as these on their bucket circuit so adaptor fittings must be used.

# continued - mounting instructions



Ensure all hydraulic connections are clean prior to fitting and that no contamination is introduced into the hydraulic circuit during installation – this may cause internal component damage to the hydraulic system or faulty operation of the vibrator or excavator.

If quick release couplings are installed on the excavator they should be replaced. It is strongly recommended that quick release couplings are not used for this application. For permanent installation ball valves can be added to the excavator boom to ensure rapid changing between bucket and EMV hydraulic function. As the bucket ram is no longer in use, it should be retracted and fastened down.



**WARNING: THE DRAIN LINE MUST FLOW DIRECTLY TO TANK WITHOUT RESTRICTION. FAILURE TO DO SO WILL RESULT IN THE HYDRAULIC DRIVE MOTOR BLOWING ITS CASING SEAL OR FRONT CASING CASTING – THIS DAMAGE IS VERY COSTLY TO REPAIR.**

The EMV is fitted with a motor case blow-off valve. This valve is effectively a check valve that vents some oil to atmosphere should the motor case drain line pressure exceed approximately 6 bar. It is not a pressure protection valve and is intended only as an early warning valve, giving a visual signal that something is wrong. Any sign of this and use of the EMV should be halted immediately and the cause investigated.

The blow-off valve does not guarantee the motor will be protected in all circumstances!

# operating instructions



## PREPARATIONS - BEFORE DRIVING / EXTRACTING PILES

It is the excavator operator's responsibility to ensure that the equipment is functioning and performing correctly and that the EMV method of piling is implemented efficiently.

In order to meet this responsibility please note the following points:

- a. Bundles of sheet piles should be set out on the job site so as to minimise the amount of handling and travelling required with the EMV.
- b. Ensure that all piles have  $\text{Ø}40\text{mm}(\text{Ø}1\frac{1}{2}\text{'})$  holes cut in them approximately 250mm(10") down from the top edge and central prior to commencement of the piling operation.
- c. Allow the excavator engine to warm up, particularly in temperatures below minus 10°C and warm the excavators hydraulic system by, for example, tracking backwards and forwards – this avoids the EMV's blow-off valve spitting oil on initial start-up.
- d. Before work commences slowly operate the bucket ram lever in both directions. It is particularly important that the vibrator is allowed to run freely for approximately 30 seconds, this allows the gearbox oil to reach all the necessary lubricating points.
- e. Review section "2.1 Basic Safety Points" in this manual before starting work.
- f. Review section "6.1 Daily Maintenance" before taking the equipment into service.
- g. It is particularly important that you make sure that during a piling operation the vibrator is kept directly above and in line with the pile, otherwise the piling energy is transferred to the excavator arm and causes unnecessary wear and may lead to pile damage.



## DRIVING PILES

- a. Ensure that all safety procedures and maintenance has been carried out before starting the excavator – see section 5.1.
- b. Ensure that it is safe to move the dipper arm. Release the stand from the jaws of the vibrator by operation of the retract bucket ram control function in the cab. Manoeuvre the vibrator above one end of the pile to be pitched, so that there is enough distance to allow safe insertion of the lifting chain through the hole at the top of the pile.
- c. Manoeuvre the vibrator above one end of the pile to be pitched, so that there is enough distance to allow safe insertion of the lifting chain through the hole at the top of the pile.
- d. Check which way around the pile has to be lifted before inserting the lifting chain – was the previous pile pitched left or right handed? Insert the lifting chain correctly (no twists, knots etc) through the lifting hole in the pile and finally with the chain clamp. Allow enough free chain length for the pile to rotate to vertical during the lifting process without jamming against the underside of the clamp body. If this happens the chain will be overloaded, may subsequently break and allow the pile to fall – this is a sever hazard to all site personnel and must be avoided at all times. Do not allow too much chain so that the top of the pile hangs too far away from the clamp when it is raised to the vertical – this will make it difficult to engage the pile in the clamp.
- e. Clear all personnel standing in the High Risk Area and lift up the pile until it just hangs freely off the ground.
- f. Lower the pile slowly so that the pile can be correctly inserted into the clamp. Once firmly inserted, close the jaws.
- g. Manoeuvre the pile to the insertion point and push the pile slowly into the ground. Plumb the pile and ensure all personnel are out of the High Risk Area.

# continued - operating instructions

- h. Start the vibrator and adjust (crowd) the hydraulic rams so that the vibrator is level and always sits directly on top of the pile as it goes into the ground. Do not over push the vibrator - stop pushing when the gearbox starts to vibrate against the rubber stops on the underside of the saddle. With the EMV220 the deflection is 146mm (5.75”).
- i. When the pile has reached the required depth turn the vibrator off by returning the control lever to the central position and allow all vibrations to stop. Release the hard jaws from the pile by slowly operating the control lever in the opposite direction. Do not operate the control lever from one extreme position to the other whilst the EMV is running – it will cause hydraulic system pressure spikes to occur.
- j. Remove the chain clamp and lifting chain from the pile lifting hole.
- k. Repeat steps c-j to continue.
- l. When piling progress is less than 100mm/min (4ins/min) release ground resistance by augering or by water jetting. Under no circumstances should the pile be forced any further.



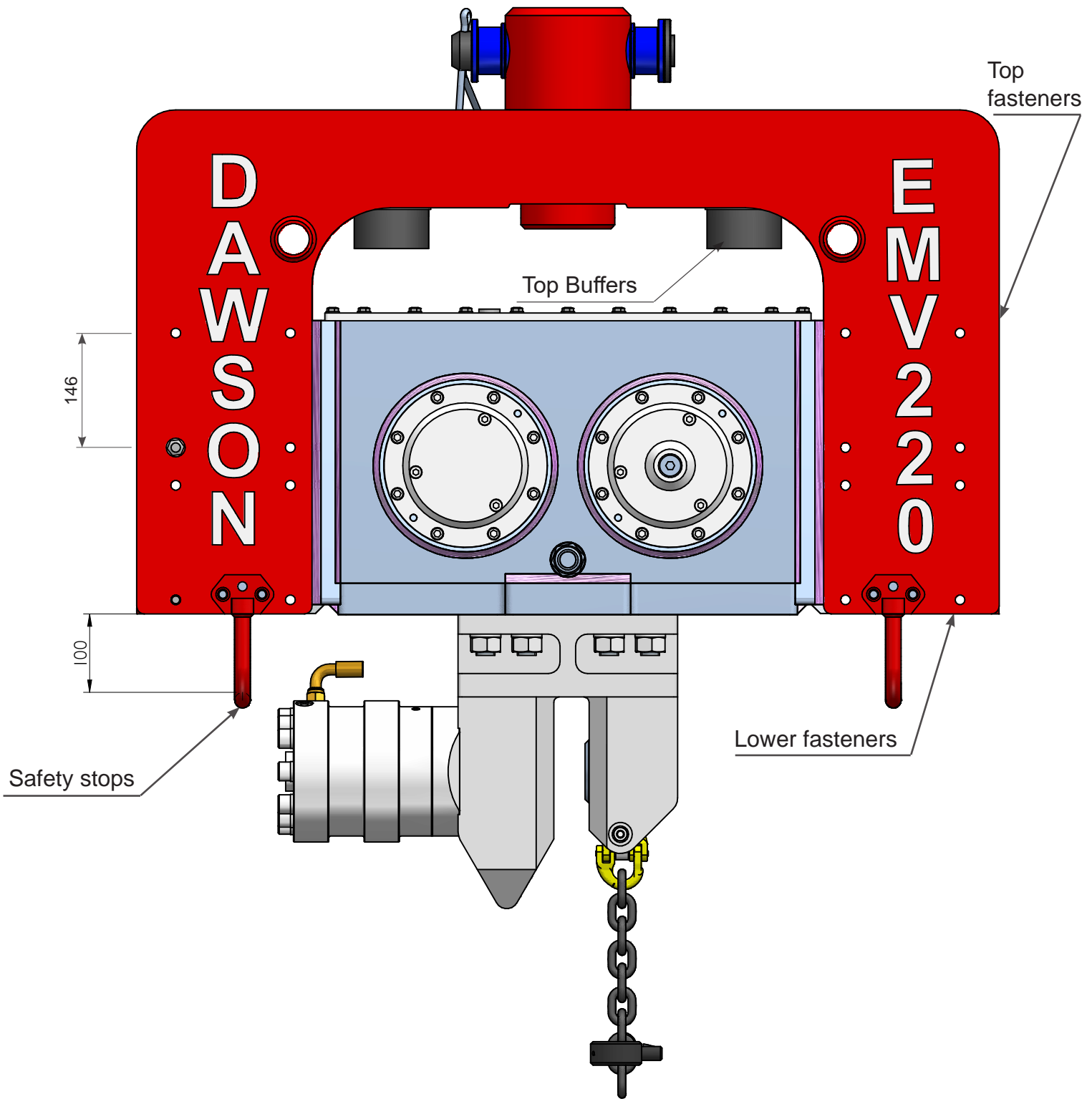
## EXTRACTING PILES

- a. Ensure that all safety procedures and maintenance has been carried out before starting the excavator – see section 5.1.
- b. Ensure that it is safe to move the dipper arm. Release the stand from the jaws of the vibrator by operation of the retract bucket ram control function in the cab. Manoeuvre the vibrator above one end of the pile to be extracted so that there is enough distance to allow safe insertion of the lifting chain through the hole at the top of the pile. Confirm suitable hole in pile.
- c. Insert the lifting chain correctly (no twists, knots etc) through the lifting hole in the pile and secure with the chain clamp. Allow enough free chain length for the pile to rotate to horizontal during the lowering process without jamming against the underside of the clamp body. If this happens the chain will be overloaded, may subsequently break and allow the pile to fall – this is a severe hazard to all site personnel and must be avoided at all times.

**Under no circumstances should a pile be pulled using the lifting chain only.**

- d. Clamp the vibrator onto the pile head ensuring that it is level. Ensure all personnel are out of the High Risk Area.
- e. Start the vibrator and allow the soil to loosen around the pile. Start to lift up the pile. Ensure the pile clutches are not rubbing together Pay attention to the distortion of the rubber sandwich mounts - under no circumstances should these mounts be allowed to deflect by more than the stipulated amount shown on Figure 1 in section 2.0. Reduce the extraction force to continue pulling. Continue extracting the pile until the pile foot is almost extracted. Stop vibration at this point and carefully pull the pile out the remaining short distance.
- f. Move the pile to a suitable area, and place the pile on the ground. Ensure that all personnel are out of the High Risk Area.
- g. Hold the pile on the ground and release the jaws. Raise the vibrator off the pile slowly ensuring that there is no snatch on the lifting chain. Slowly lower the pile towards the ground.
- h. Remove the chain clamp and lifting chain from the pile lifting hole.
- i. Repeat steps c-h to continue.



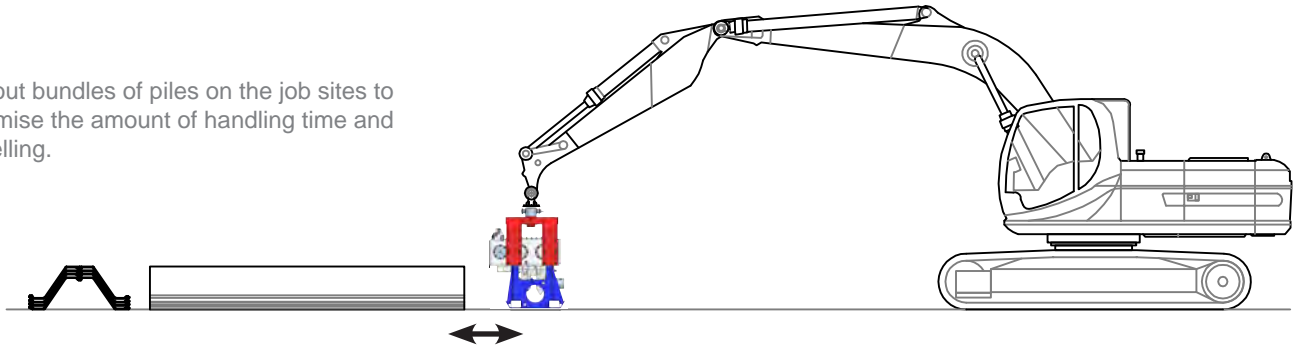


Maximum deflection of sandwich mounts is achieved during extracting when the gearbox casing hits the safety stops (100mm). When driving piles a maximum deflection of 146mm can be achieved. This is when the top fasteners are inline with the lower.

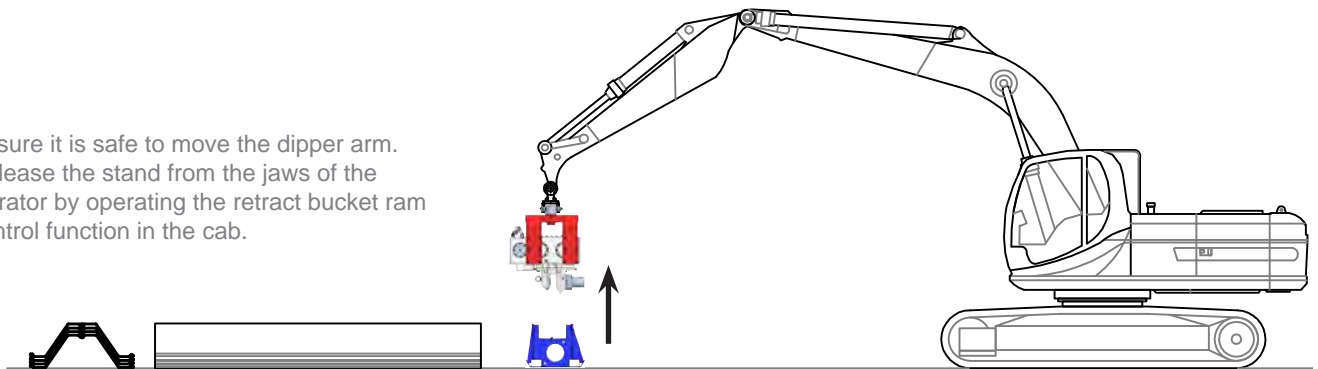
# operating instructions driving piles (quick reference illustrations)

The illustrations below are to show visually a simplified version of the operating instructions given in part 5.2/5.3, driving / extracting piles. 5.1 preparation before driving / extracting piles must be read before these illustrations.

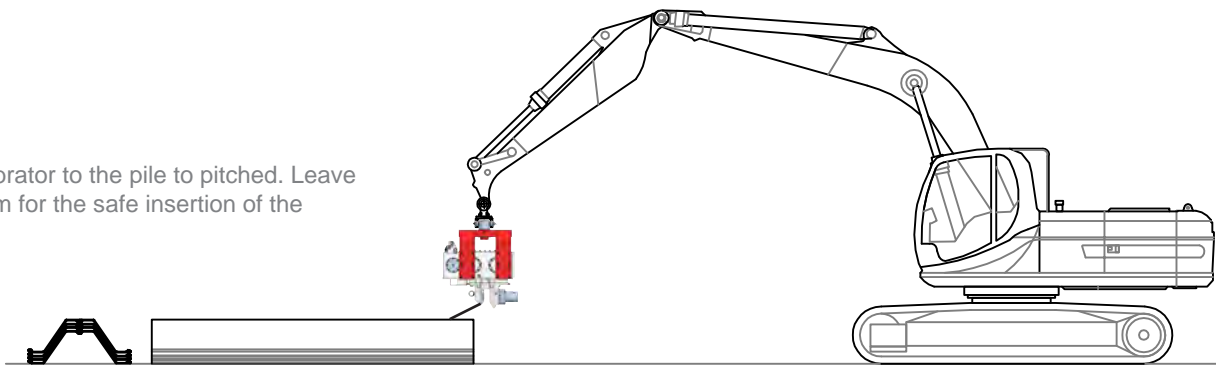
Set out bundles of piles on the job sites to minimise the amount of handling time and travelling.



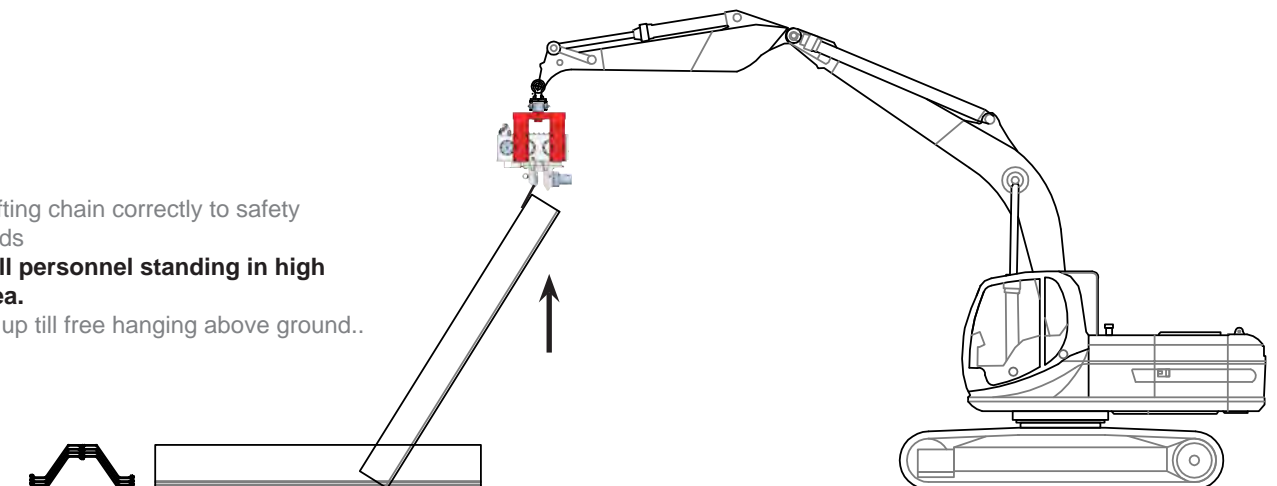
Ensure it is safe to move the dipper arm. Release the stand from the jaws of the vibrator by operating the retract bucket ram control function in the cab.



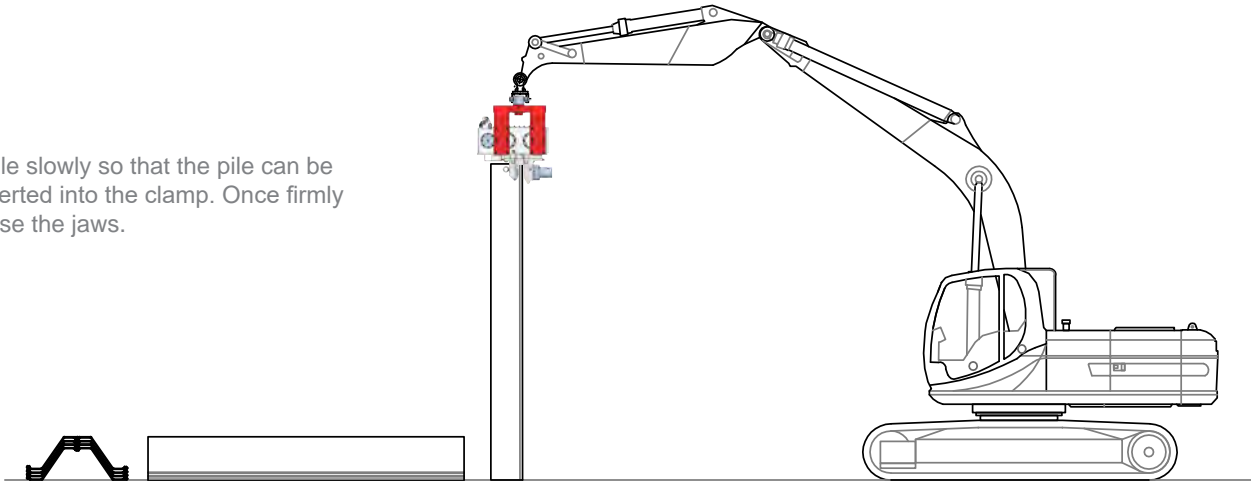
Move the vibrator to the pile to pitched. Leave enough room for the safe insertion of the lifting chain.



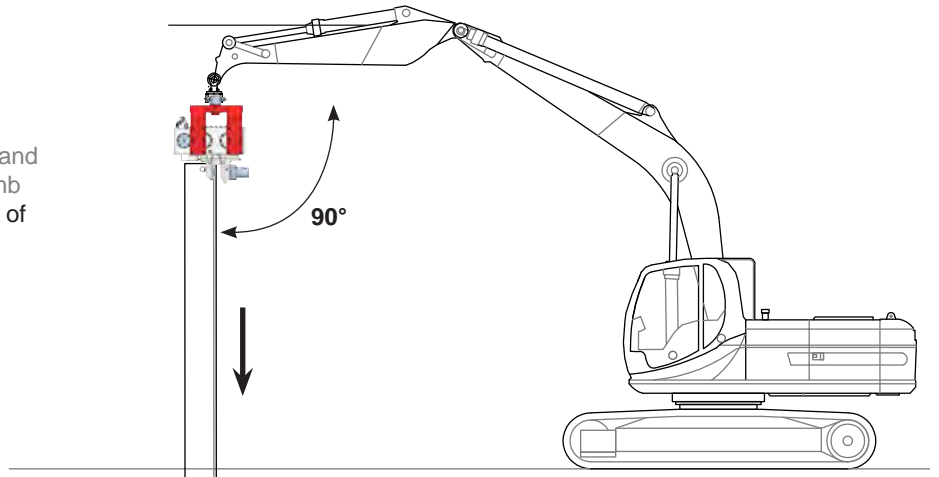
Insert lifting chain correctly to safety standards  
**Clear all personnel standing in high risk area.**  
Lift pile up till free hanging above ground..



Lower the pile slowly so that the pile can be correctly inserted into the clamp. Once firmly inserted, close the jaws.



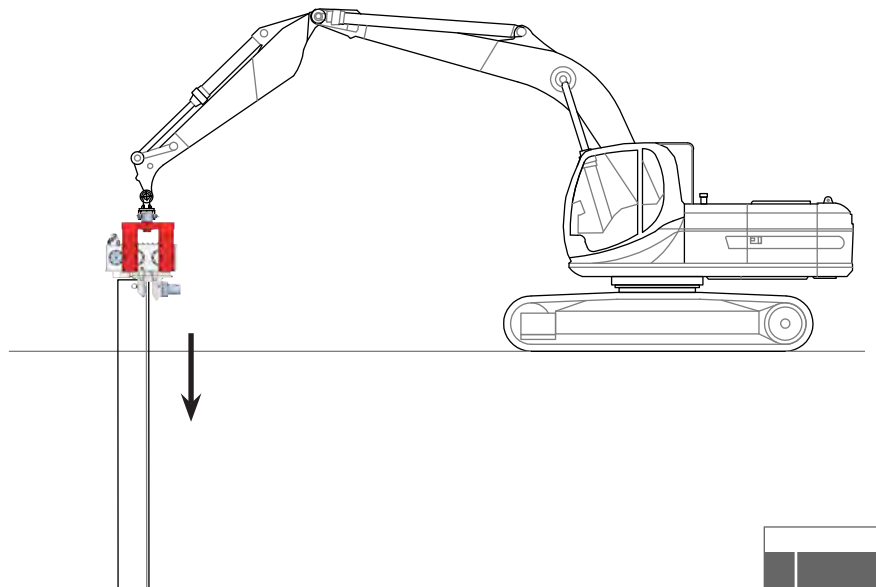
Manoeuvre the pile to the insertion point and push the pile slowly into the ground. Plumb the pile then ensure all personnel are out of the High Risk Area.



Start the vibrator and adjust (crowd) the hydraulic rams so that the vibrator is level and always sits directly on top of the pile as it goes into the ground.

When the pile has reached the required depth turn the vibrator off by returning the control lever to the central position and allow all vibrations to stop.

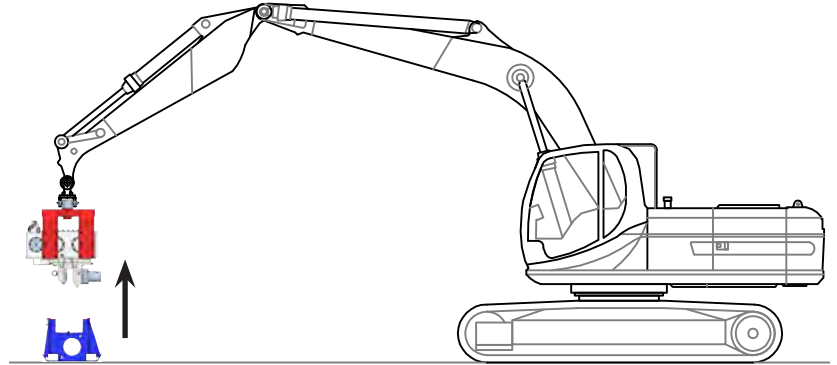
Remove the chain clamp and lifting chain from the pile lifting hole.




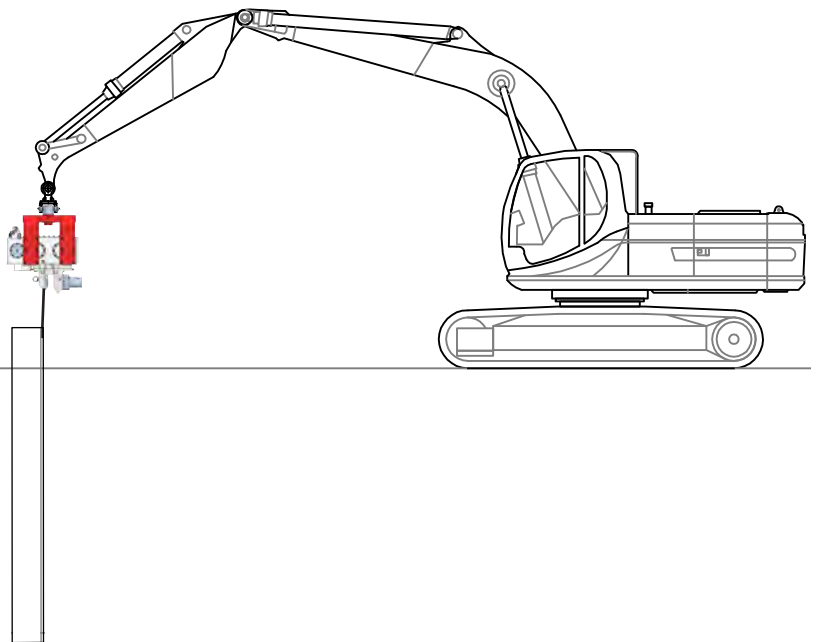
# operating instructions - extracting piles (quick reference illustrations)


The illustrations below are to show visually a simplified version of the operating instructions given in part 5.2/5.3, driving / extracting piles. 5.1 preparation before driving / extracting piles must be read before these illustrations.

Ensure it is safe to move the dipper arm.  
Release the stand from the jaws of the vibrator by operating the retract bucket ram control function in the cab.

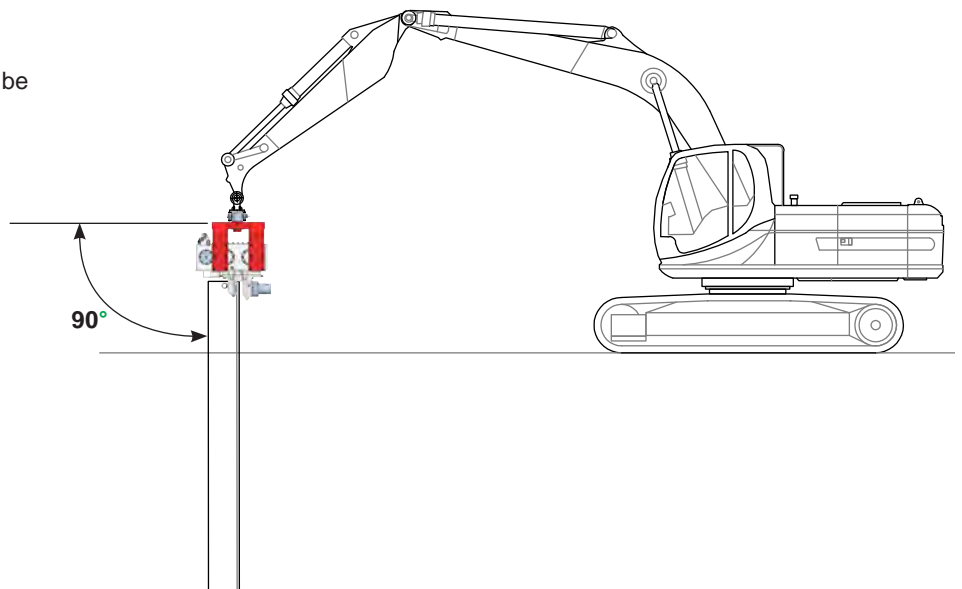


 Move the vibrator to the pile to be extracted.  
Leave enough room for the safe insertion of the lifting chain.  
**Clear all personnel standing in high risk area.**



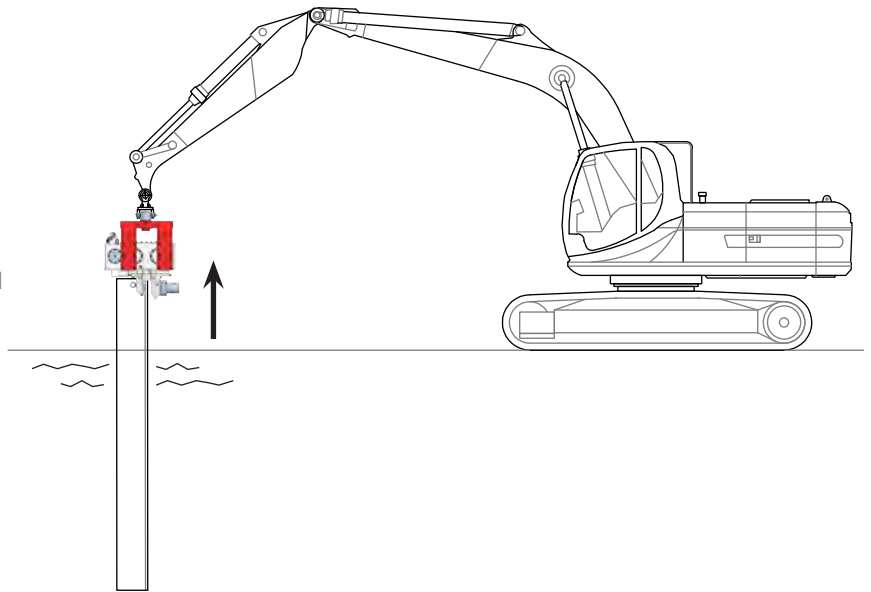
 Under no circumstances should a pile be pulled using the liftin chain.

Clamp the vibrator onto the pile head ensuring that it is level.

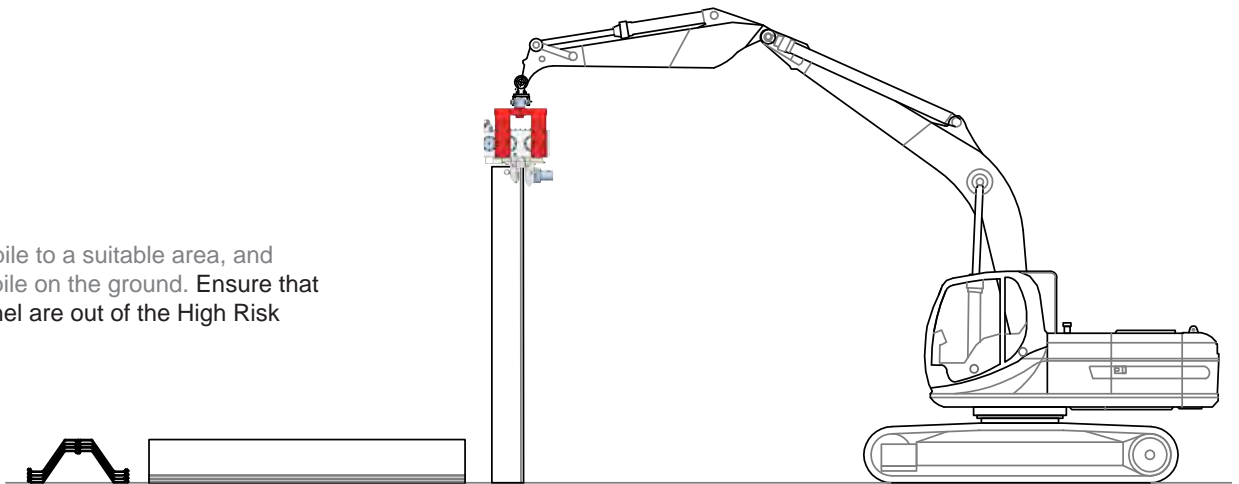




Start the vibrator and allow the soil to loosen around the pile. Start to lift up the pile. Ensure the pile clutches are not rubbing together. Pay attention to the distortion of the rubber sandwich mounts - under no circumstances should these mounts be allowed to deflect by more than the stipulated amount shown on Figure 1 in section 2.0. If these mounts are deflected by more than the specified amount on the EMV reduce the extraction force to continue pulling. Continue extracting the pile until the pile foot is almost extracted. Stop vibration at this point and carefully pull the pile out the remaining short distance.

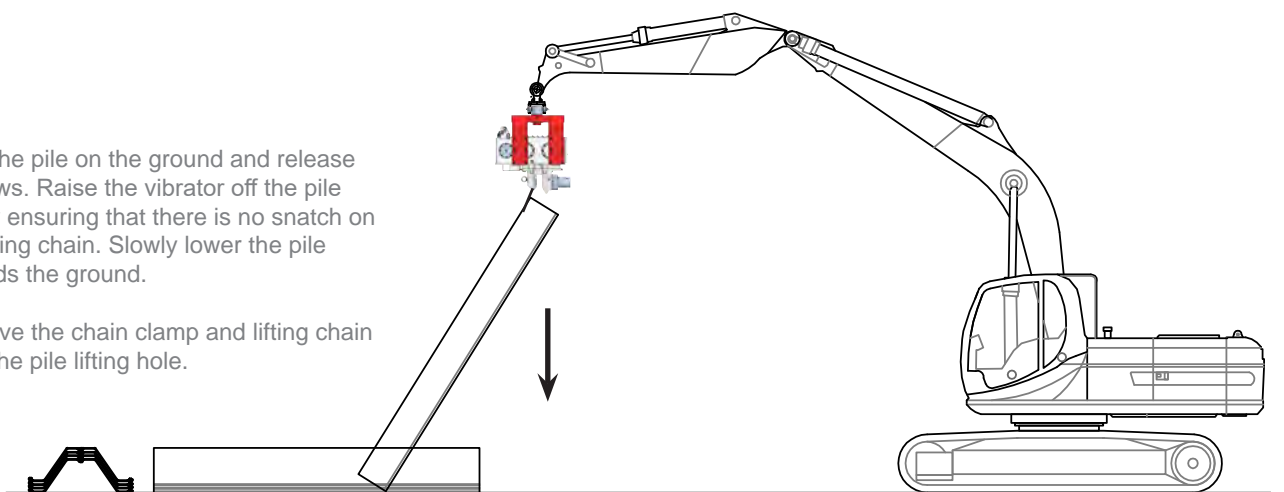


Move the pile to a suitable area, and place the pile on the ground. Ensure that all personnel are out of the High Risk Area.



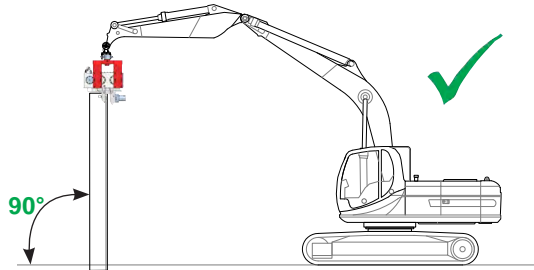
Hold the pile on the ground and release the jaws. Raise the vibrator off the pile slowly ensuring that there is no snatch on the lifting chain. Slowly lower the pile towards the ground.

Remove the chain clamp and lifting chain from the pile lifting hole.

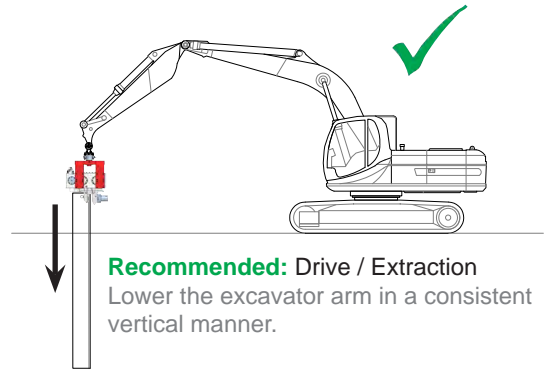


# recommended excavator positions (quick reference illustrations)

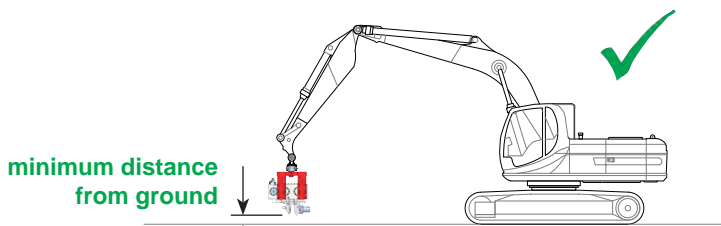
These illustrations represent the recommended working, transport and resting positions for your Dawson EMV attachment when used with an excavator.



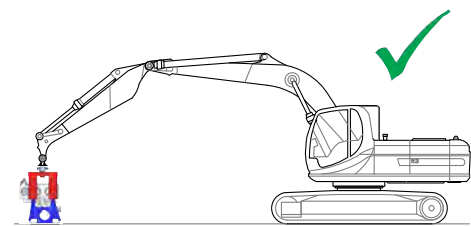
**Recommended: Starting Position**  
Position the pile vertically in desired location and begin drive / extracting.



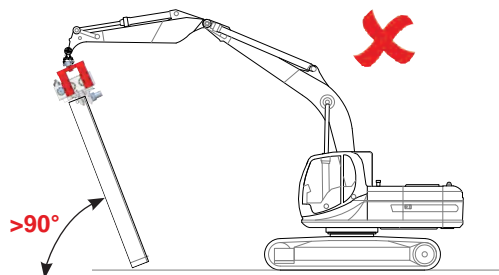
**Recommended: Drive / Extraction**  
Lower the excavator arm in a consistent vertical manner.



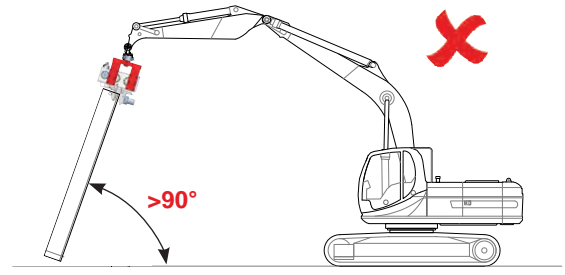
**Recommended: Transport Position**  
Lift the Vibro off the ground during transport on the job site. Keep Vibro as low as possible.



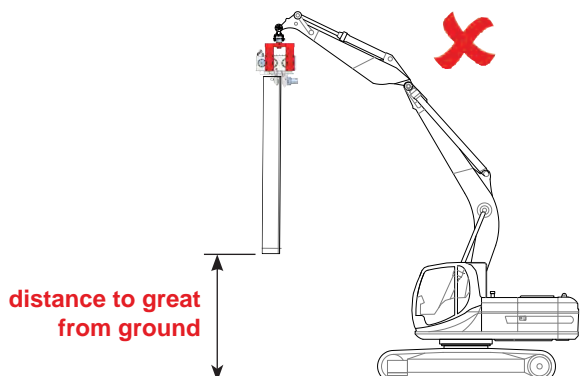
**Recommended: Resting/Parting Position**  
Park the excavator with the vibro in its stand.



**Avoid: Driving / Extraction Position**  
Avoid any driving / extrating position that is not vertical. Vibro will become unstable and not easily controlled



**Avoid: Driving / Extraction Position**  
Avoid any driving / extrating position that is not vertical. Vibro will become unstable and not easily controlled



**Avoid: Transport Position**  
When Transporting the pile on the job site do not allow the pile to swing in an uncontrolled manner. Damage can occur to the vibro and excavator.

**Avoid: Resting/Parting Position**  
Avoid parking the excavator with the Vibro in a suspended position.

The Excavator Mounted Vibrators have been designed to give years of trouble free service. Providing the equipment is treated with respect and the basic maintenance procedures are adhered to there will be little work additional work required.

The most important points are correct installation on good quality excavators, cleanliness when connecting to the excavator's hydraulic system and regular gearbox oil changes using appropriate oils - again cleanliness is paramount.

Visual inspection of the EMV by a competent person on a daily basis and before being taken into service can prevent many potential problems from occurring. Ensure that lifting accessory test certificates are correct and valid at all times.

- All service and maintenance work must be carried out by qualified personnel using original Dawson parts. The use of other parts will invalidate the whole warranty for the equipment.
- The equipment should be inspected at ground level only and should be positioned so as to be stable at all times.
- Secure the equipment against unexpected starting during the maintenance process.
- The equipment should be inspected by a Dawson technician or by one of their approved distributors once a year or every 1000 working hours.



## DAILY MAINTENANCE

- a. Grease the two grease points on the EMV220 – one on the Saddle Swivel and the other on the side of the Clamp Body. Two or three pumps with a molybdenum-based grease will be adequate.
- b. Check machine labelling. (Figure 6)
- c. Check visible screws, bolts, fittings etc for tightness.
- d. Visually inspect all hydraulic hoses and fittings for leaks or damage.
- e. Check the gear oil level in the vibrator. The level must be half way up the sight glass.
- f. Inspect the lifting chain and chain clamp for damage. The chain should be in good order, free from any structural damage or

permanent deformation of any kind. The chain clamp should also be free from any structural damage and its correct operation and safe function should be checked by depressing and releasing several times – any binding or hesitancy with its operation should result in it being changed for a new certified item. The chains Coupler and anchorage point should be in good order showing no signs of damage, wear or cracking.

**Remember if in doubt change it – lifting chains in the UK are required to have a thorough examination by a competent person at intervals not exceeding 6 months. Any local/national requirements must be adhered to!**

- g. Inspect the condition of the Hard Jaws. To be acceptable these should look to be in almost as new condition. The teeth on these pads have some flats on them when new (approximately 1mm). Over time they will round off, flatten out more and even become chipped. If not changed when require they will loose their grip on the pile during driving and certainly during extraction. Besides causing a reduction in performance this can become a safety hazard. We define the following wear limit:

**Hard Jaw Wear Limit - 90% of all teeth on any hard jaw should make contact with the pile and 80% of all teeth should have points with flats no greater than 3mm.**

### Changing the Hard Jaws – Static Side

Remove the Cap Screw that hold this jaw in place. Tap out the old jaw and clean/inspect the clamp body seating area to ensure the faces are in good order. Slide in the new jaw and check that it is a snug fit – the

# continued - maintenance

jaw should not move up and down. Fit the Cap Screw and tighten using a hexagonal wrench. Remember to install the washers on these screws.



## Changing the Hard Jaws – Moving (Cylinder) Side

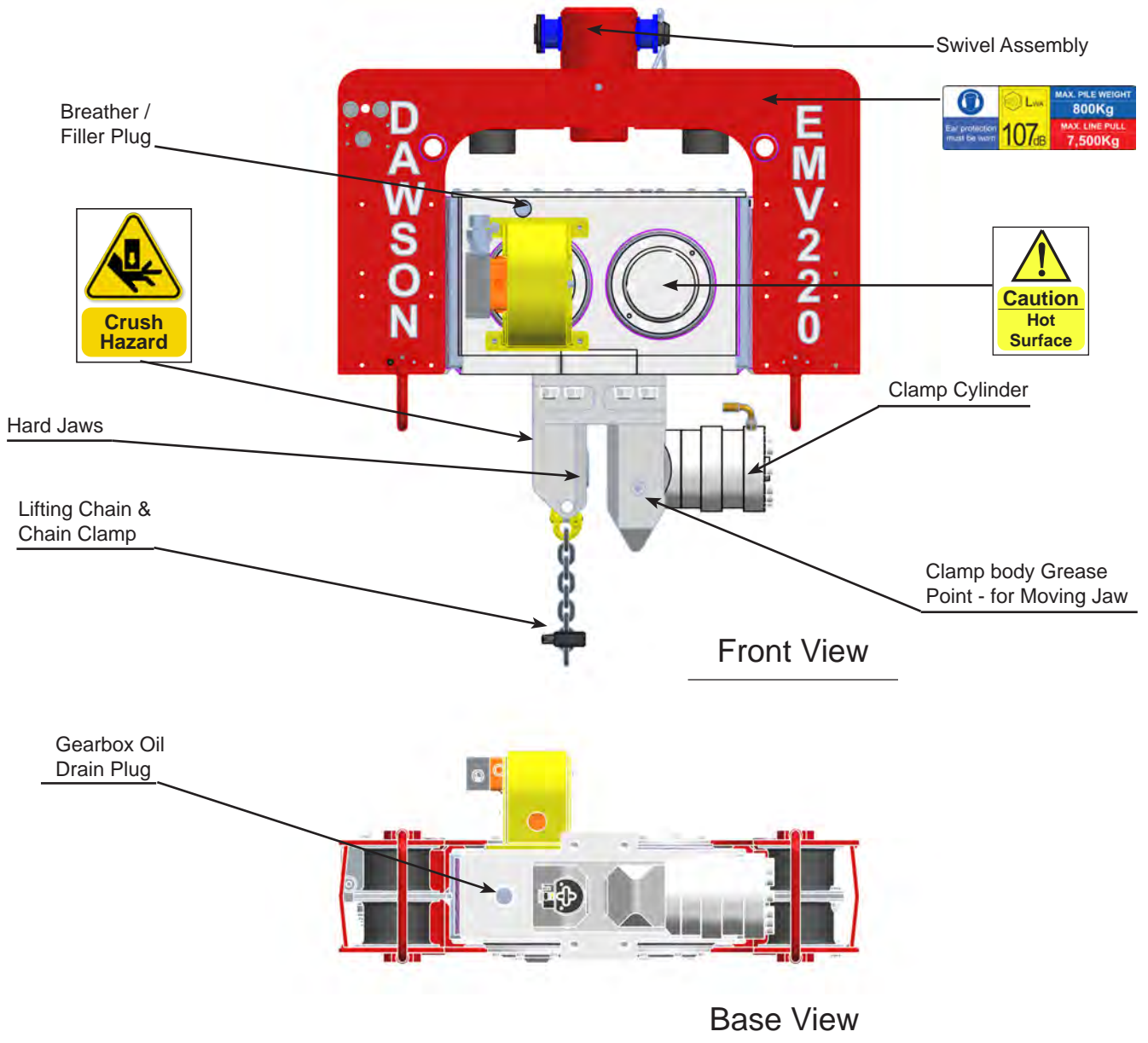
Release the 8 off Cap Screws that hold the Clamp Cylinder in place and remove the Clamp Cylinder. Undo the two clamp supply hoses, carefully marking them to ensure correct re-assembly. Once removed, unscrew the round Hard Jaw counter-clockwise and replace with a new one using a new O-ring. Ensure the Jaw is fully tightened on the Clamp Cylinder piston rod so that the O-ring is no longer visible. Inspect the bronze Guide Bush inside the Clamp Body whilst the cylinder is out – check the grooves in the front area of the bush and the condition of the bore. Replace the bush if badly worn.

Assemble the Clamp Cylinder back into the Clamp Body, fit the clamp hoses then fit and tighten the Cap Screws using the hexagonal wrench. Ensure the clamp functions correctly after completing the work.

- h. Inspect the rubber Sandwich Mounts (Elastomers) for wear or damage. Wear is typified by splitting/tares. This usually occurs in the rubber adjacent to the bonded steel plates and is usually a result of fatigue in the material over a long period of time. Cracking/softening may occur but this is usually associated with long term exposure to sunlight or exposure to petroleum based products. As a general rule change the Sandwich Mount if any single tare or split exceeds 40mm (1½”) or if the rubber has become contaminated.
- i. Check the overall condition of the Swivel Assembly. Check that the Lifting Bolt and Nut (that are the centre piece of this assembly) only allow rotational movement with minimal axial movement. Excessive axial movement will allow the assembly to rattle around, make more noise and cause in turn more wear. If the axial play exceeds 1mm it will be necessary to tighten the nut. To do this remove the coil/spring pin with a punch and hammer, tighten the nut further and drill and pin it in the new position.
- j. Check the condition of the boom Adaptor Bracket, Shear Pins, Spacers and Bushes. The whole assembly should be relatively tight with minimal play in the components. The bracket needs to be able to float a little from side to side – as much as 5/10 mm is acceptable. The pins and bushes should however be little more than a running fit – clearances of more than 0.5mm would be considered excessive.



FIGURE 6



# continued - maintenance



## EVERY 50 WORKING HOURS

Change the oil in the vibrator gearbox. Remove the Drain Plug from the bottom of the gearbox and the Breather/Filler Plug from the top. Allow the oil to drain out completely into a suitable container – this is best done at the end of a shift when the oil is relatively warm and thin. Replace the Drain plug and fill with new clean oil through the Breather/Filler hole until the oil level in the gearbox is approximately half way up the sight glass – this is approximately 2.5 litres (0.66 US gallons).

Re-fit the Breather/Filler Plug using a new seal and tighten.

The old oil must be taken to a certified waste disposal centre or handed over to a certified waste disposal contractor.

Generally any good quality mineral based gear oil in the class API GL-5 with viscosity class SAE 75W/90 will be suitable. Alternatively, in hotter climates fully synthetic oil of the same classification may be used. For example:

Manufacturer	Mineral Oil Reference	Synthetic Oil Reference
BP	ENEGEAR HT 75W/90	
MOBIL		MOBILUBE 1 SHC
CASTROL		SAF-EXB
ELF	TRANSELF B 75W/90	TRANSELF TR2 75W/80
TEXACO	GEARTEX EPC80W/90	GEARTEX 5S 75W/90

Note: Maximum ambient operating temperature for the unit +40°C  
Minimum ambient operating temperature for the unit –20°C



## EVERY 100 HOURS

It is recommended that the unit be inspected and serviced by the manufacturer. Apart from undertaking to do the relevant preventative maintenance work and checks as described above Dawson will inspect the structural integrity of the equipment and ensure there are no safety related matters that may go unchecked. Bearings and gears will also be inspected to check for signs of unusual wear or potential problems. In some countries it is a requirement by law that the unit be inspected by qualified personnel.

# troubleshooting

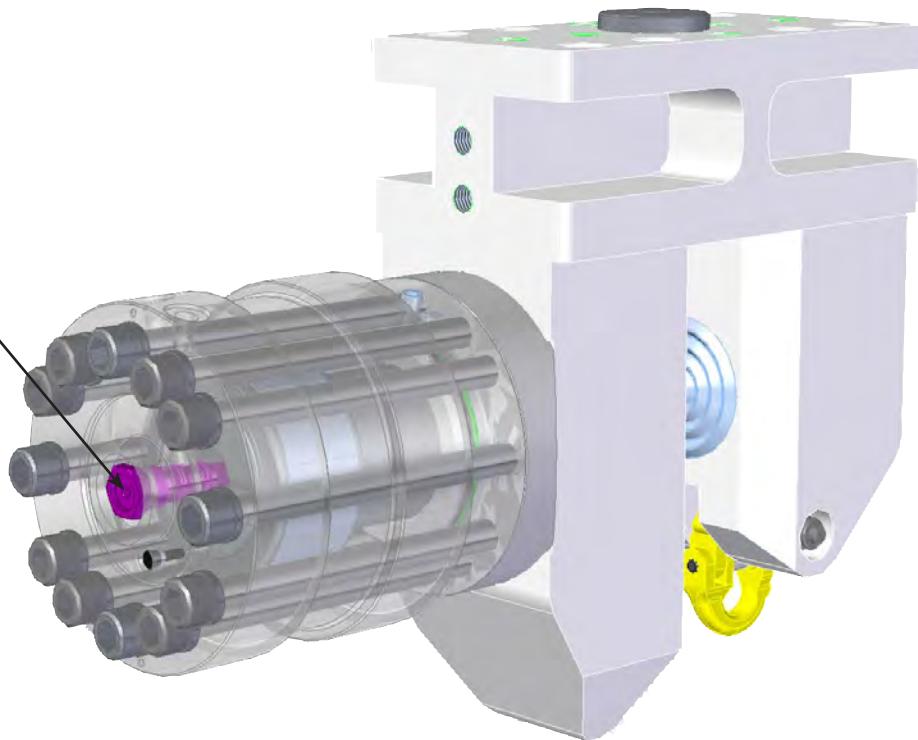
Please ensure that troubleshooting, inspection work and repairs are undertaken by suitably qualified personnel. Training can be carried out by the manufacturer or by your local approved Dawson distributor. The following guidelines are intended to assist with basic diagnostics and are not intended to be a definitive list – it assumes the inspector has a basic understanding of servicing techniques associated with this type of equipment. Work should not be undertaken by a novice without adequate supervision.



## EMV CLAMP DOES NOT CLOSE

- 7.1.1 Check that base machine hydraulics lines are correctly connected – see section 4.2. Operate control lever in both directions to check flow directions.
- 7.1.2 Remove the check valve cartridge from the rear of the clamp cylinder and inspect for contamination or damage. The poppet inside the cartridge should move freely. If in doubt replace and use new seals.
- 7.1.3 Independently check the operation of the clamp cylinder with it removed from the hydraulic circuit. This should only be carried out by a competent person.
- 7.1.4 Remove the cylinder and inspect for mechanical damage inside the clamp or inside the cylinder.

Pilot Operated  
Check Valve



# continued - troubleshooting



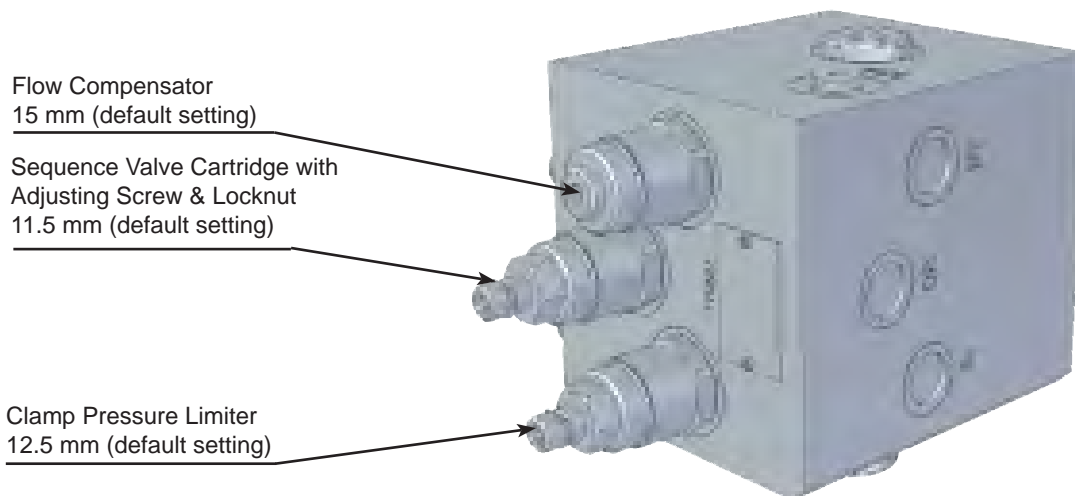
## EMV CLAMP CLOSSES BUT THE UNIT WILL NOT VIBRATE

- 7.2.1 Check the base machine operating pressure and flow rate. If the pressure output of the excavator is too low the EMV will not run at all. This is because the sequence valve pressure setting has to be overcome before oil can pass to the drive motor.
  - 7.2.2 Check the sequence valve setting by installing a pressure test gauge in the clamp close line and monitoring the pressure at which the valve opens. Ensure this is set to 165 bar.
  - 7.2.3 Damaged sequence valve – remove and inspect but replace if in doubt using new seals.
  - 7.2.4 Motor failure or gearbox problem. Try connecting the two main oil supply lines directly to the hydraulic motor ports and running the unit with low engine speed – effectively low oil flow rate. Caution - it will be easy to over-speed the motor in this case because the flow regulator is now out of the circuit.
  - 7.2.5 If the unit does not vibrate either the motor has become damaged or there is a fault with the gearbox. Check the oil level in the gearbox to see that it has not become filled with hydraulic oil from the motor shaft seal – in this case the unit usually runs very slowly unless metal fragments have become entrapped in the transmission system as result.
  - 7.2.6 Remove the motor from the gearbox and test.
  - 7.2.7 As a last resort take the saddle assembly off the EMV and remove the gearbox lid for an internal inspection. The gears, shafts and bearings should rotate freely.
- Caution - pay attention to trapping body parts in the mechanism during inspection!
- 7.2.8 Consult the manufacturer from section 7.2.5 onwards.



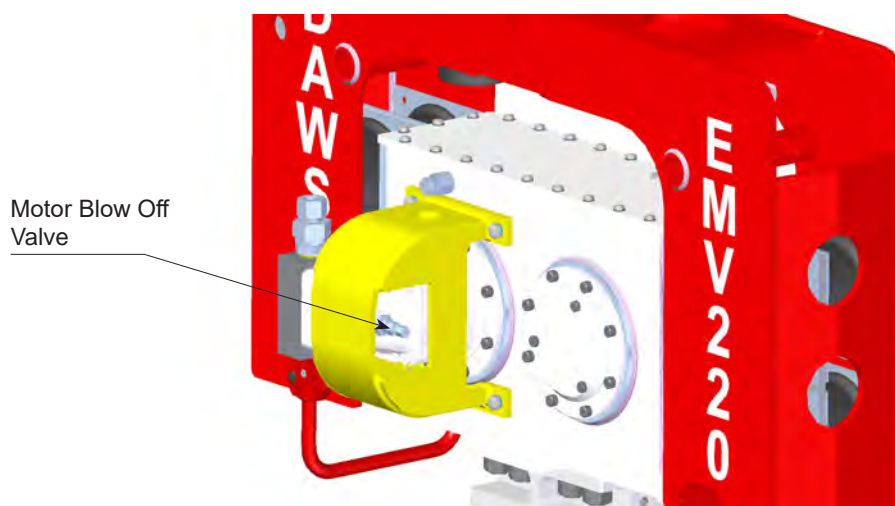
## UNIT WILL NOT RUN AT THE CORRECT SPEED - "JUMPS AROUND" OR SPEED FLUCTUATES

- 7.3.1 Check that the base machine hydraulic output complies with the minimum specified for the unit. Specifically check with the excavator supplier/manufacturer what system pressure is available on the bucket ram circuit at 90 l/min.
- 7.3.2 Check the setting of the flow regulator to ensure adequate flow is reaching the drive motor.
- 7.3.3 Check the sequence valve pressure setting – see section 7.2.2. If this setting is too close to the operating pressure the EMV will speed up then slow down, speed up then slow down etc.
- 7.3.4 Check the gearbox oil level. If it is much higher than the sight glass the motor shaft seal has probably blown – see section 7.4.



**OIL BLOWING OUT OF THE MOTOR BLOW-OFF VALVE**

7.4.1 Drain line restricted or blocked – stop work immediately.



7.4.1.1 Check the drain line hose for obvious restrictions at fittings, filters etc.

7.4.1.2 Check the drain hose for damage – look carefully as the bore of the hose can be crushed even when the outside of the hose looks to be in good order at a casual glance.

7.4.1.3 Check the drain hose point of entry into the base machine hydraulic oil system – it is always best to run it directly to tank.

7.4.1.4 Do not work with quick disconnects as they can cause restriction

7.4.2 Drain line being pressurised – check that the line is not connected to a supply line e.g. the pressure line from a breaker circuit.

# continued - troubleshooting

- 7.4.3 Long drain hose or the hose bore too small – either of these can contribute to an increase in back pressure.
- 7.4.4 Extremely cold weather – if the base machine hydraulic oil is of an inappropriate viscosity grade for the ambient temperature it may well be too thick. This will cause an increase in back pressure in the drain hose.
- 7.4.5 Faulty Blow-Off Valve on the motor casing – check that this has a minimum crack pressure of 6 bar and a maximum of 7 bar. Replace if unsure using a new calibrated valve and a new sealing ring.
- 7.4.6 Leaking seals on the sequence valve cartridge leading to excessive drain line flow rate – remove the drain line from the EMV and measure leakage flow rate. Leakage in excess of 5 l/min (1.33 gpm) indicates either a seal kit problem with the sequence valve or high internal motor leakage. Split the sequence valve drain line and motor case drain line and measure leakage rates independently – the sequence drain line should have little or know leakage.



## **OIL BLOWING OUT OF THE GEARBOX BREATHER VALVE & THE GEAR BOX IS FULL OF OIL**

The drive motor case seal has been blown, typically because the drain line pressure has been exceeded – see also section 7.4.

The unit will need to be removed from the job site and repaired in a suitably equipped workshop. The oil in the box will be a mixture of hydraulic and gear oils.

Once in the workshop drain the oil from the gearbox and inspect the oil for signs of debris. If only the seal has blown out without any damage to the motor casting then it may be possible to repair the motor with an authorised Parker Hydraulics (VOAC) distributor, change the gear oil and rebuild the unit.

If however, the motor casting has also been damaged in the area of the seal housing it will be necessary to completely inspect the inside of the gearbox. Remove the gearbox lid and inspect the gear teeth and inspect all bearings. Check the gears for any signs of damage. Remove all bearing covers from the gearbox sides and inspect the outer races for signs of grooves or any other contamination or damage – look at the rollers in each bearing. The bearings and all running faces should be in perfect condition, if not they will need to be replaced. Consult with the manufacturer at this stage or one of their approved distributors – it is strongly recommended that the unit be repaired by the manufacturer in order to ensure correct procedures and materials are used for an effective repair



## **CLAMP CLOSSES ITSELF IMMEDIATELY AFTER BEING OPENED**

This fault can only occur on older units prior to serial number 45-083 without the reverse flow check valve fitted to the return motor port. It occurs when the D reg check valve on the flow regulator becomes jammed shut. When opening the clamp the drive motor can then rotate slowly. Once the control lever is released the motor effectively becomes a pump, driven by the inertia of the eccentric weights in the gearbox.

Consequently the clamp can be driven closed again. Should this problem occur Dawson could supply a reverse flow check valve as a fix.

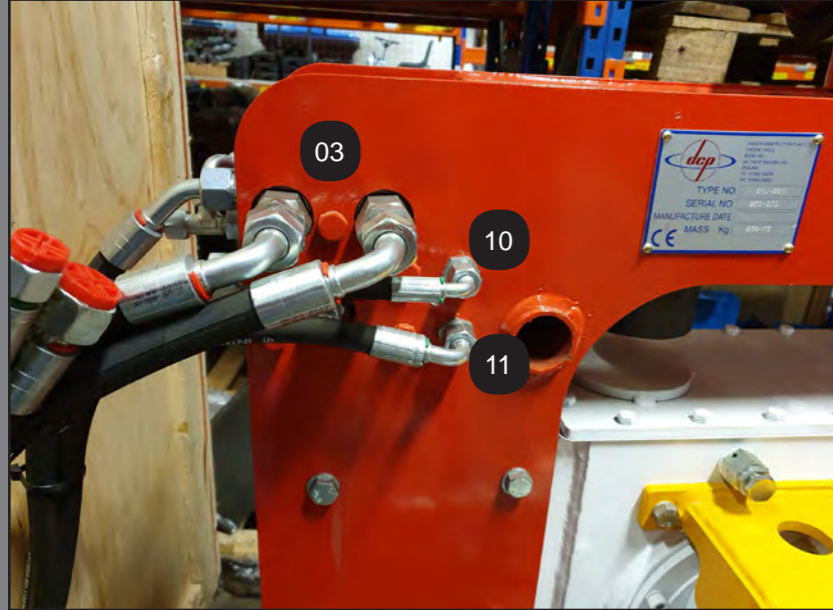
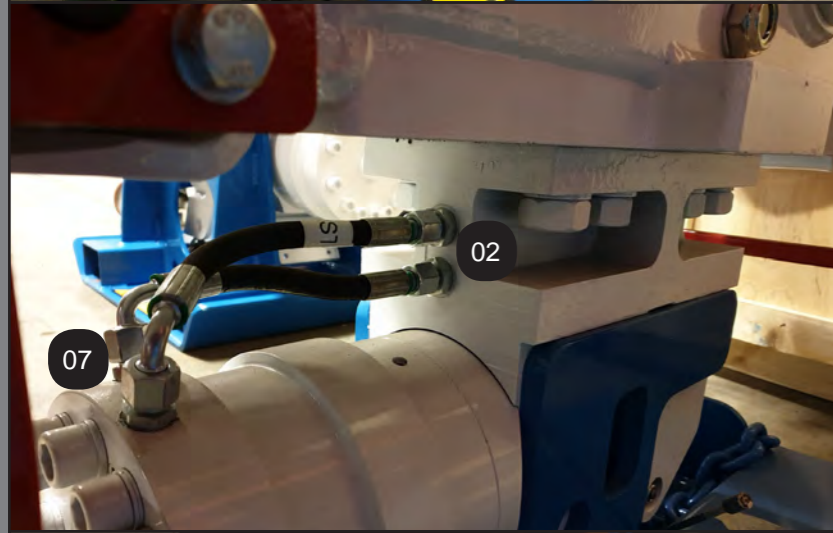
Check the condition of the Hard Jaws – see section (61.f).



## **CLAMP LOOSES GRIP ON THE PILE**

The clamp can also loose grip on the pile when clamped, with the vibrator not vibrating, if the check valve on the rear of the clamp cylinder has faulty/leaking seals or if the clamp cylinder piston seals are damaged/worn.

Alternatively there may be insufficient system operating pressure if the sequence valve setting has been adjusted down in order to attempt running on an unsuitable excavator. Check the system operating pressure and excavator specifications.



# EMV220 METRIC

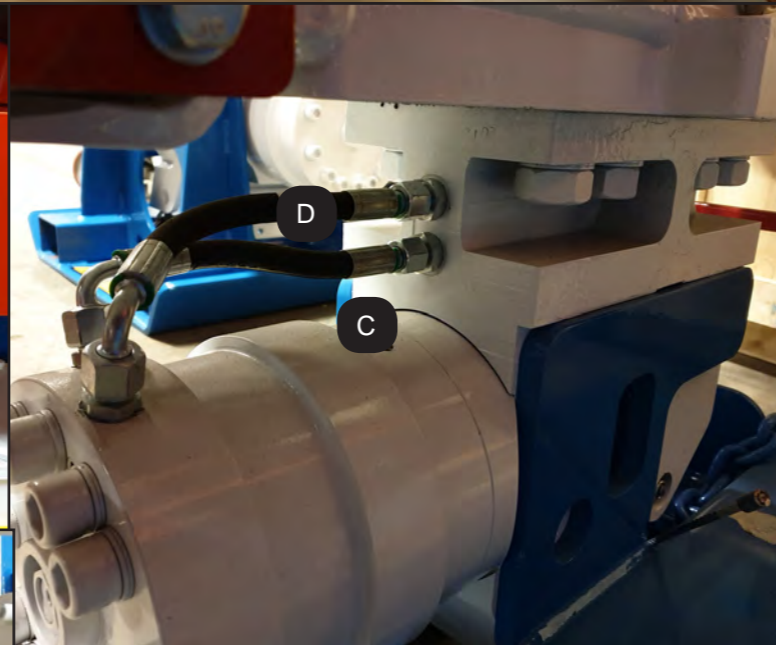
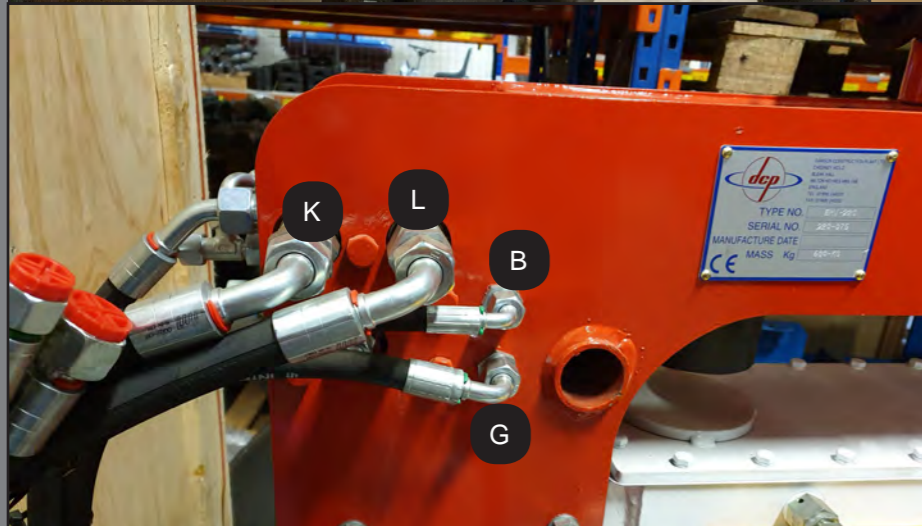
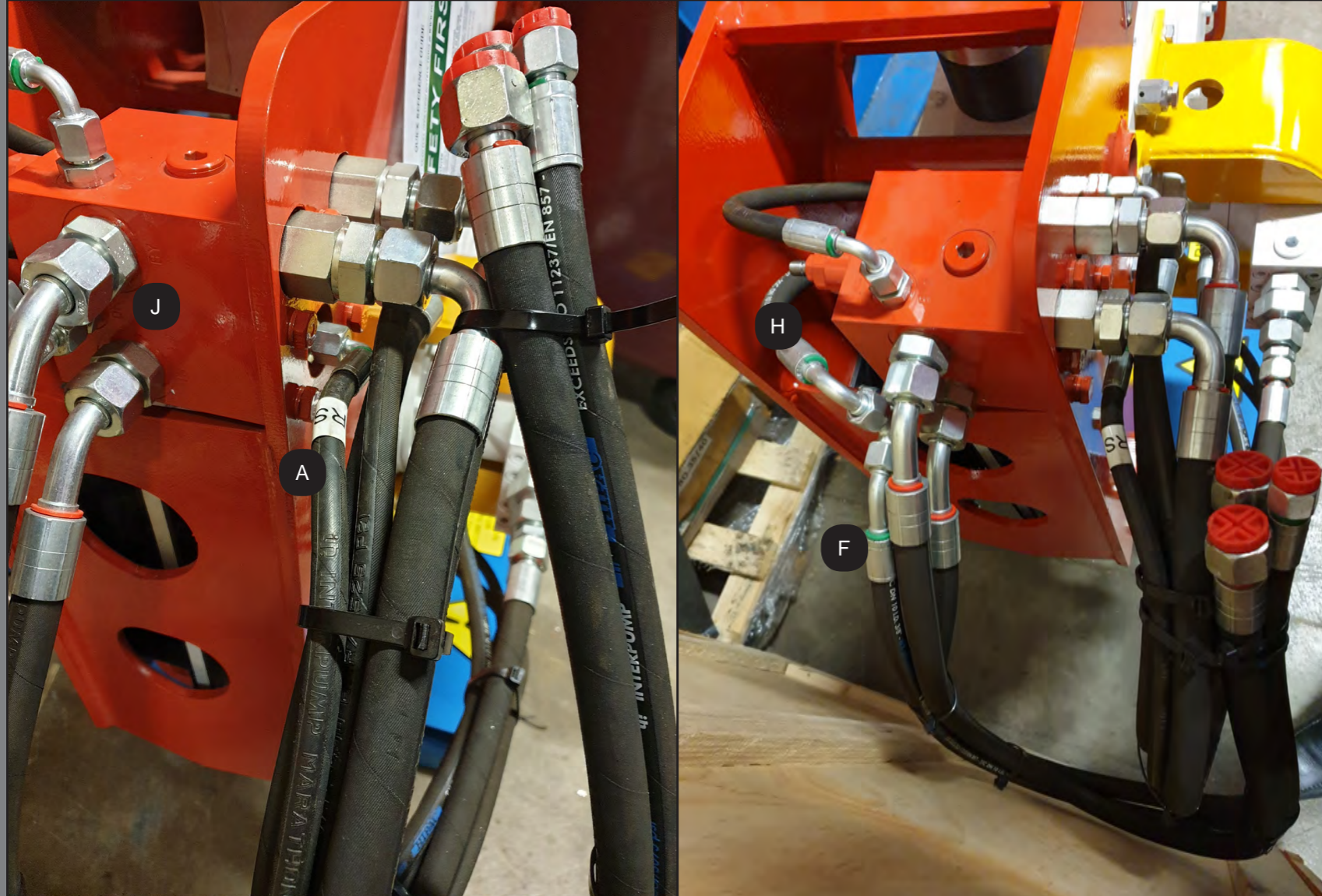
hydraulic circuit

EMV220 hose kit  
Part No 220-028-00-01

### Fittings

1 REDVDN20/16 reducer	1off
2 GEV10LR3/8WD stud coupling	6off
3 4BX12 fixed female	2off
4 GEV12LM22x1.5WD adaptor	1off
5 GEV16SR3/4WD stud coupling	5off
6 ELVD12L run tee	1off
7 GEV10LRWD stud coupling	2off
8 GEV12LRWD	1off
9 RVV20SWD non-return valve	1off
10 GSV10L bulkhead fitting	1off
11 GSV12L bulkhead fitting	1off





# EMV220 METRIC

hydraulic circuit

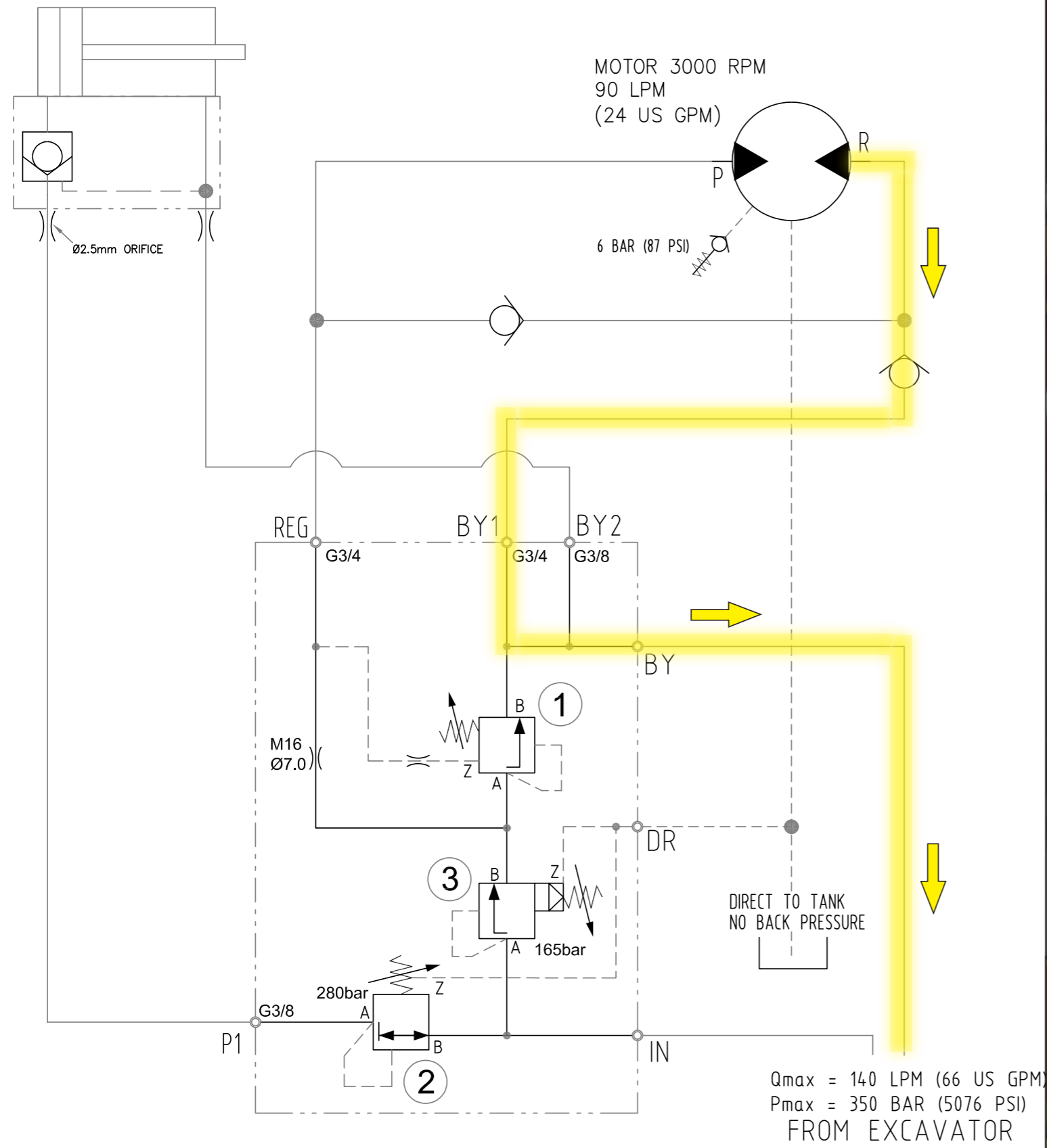
## EMV220 hose kit Part No 220-028-00-01

- Hoses:
- A 1/4"EP 10L 90° to 10L 90° AOR 90° 1280mm CHL 1off
  - B 1/4"EP 10L 90° to 10L 90° AOR 90° 1225mm CHL 1off
  - C 1/4"EP 10L 90° to 10L straight 120mm CHL 1off
  - D 1/4"EP 10L 90° to 10L straight 145mm CHL 1off
  - E 1/4"EP 10L 90° to 10L straight 320mm CHL 1off
  - F 3/8"EP 12L 45° to 12L straight 1230mm CHL 1off
  - G 3/8"EP 12L 90° to 12L 45° 970mm CHL 1off
  - H 3/8"EP 12L 90° to 12L straight 320mm CHL 1off
  - J 1/2"4SP 16S straight to 16S 45° 1200mm CHL 2off
  - K 1/2"4SP 16S 90° to 16s straight 745mm CHL 1off
  - L 1/2"4SP 16S 90° to 16s straight 830mm CHL 1off

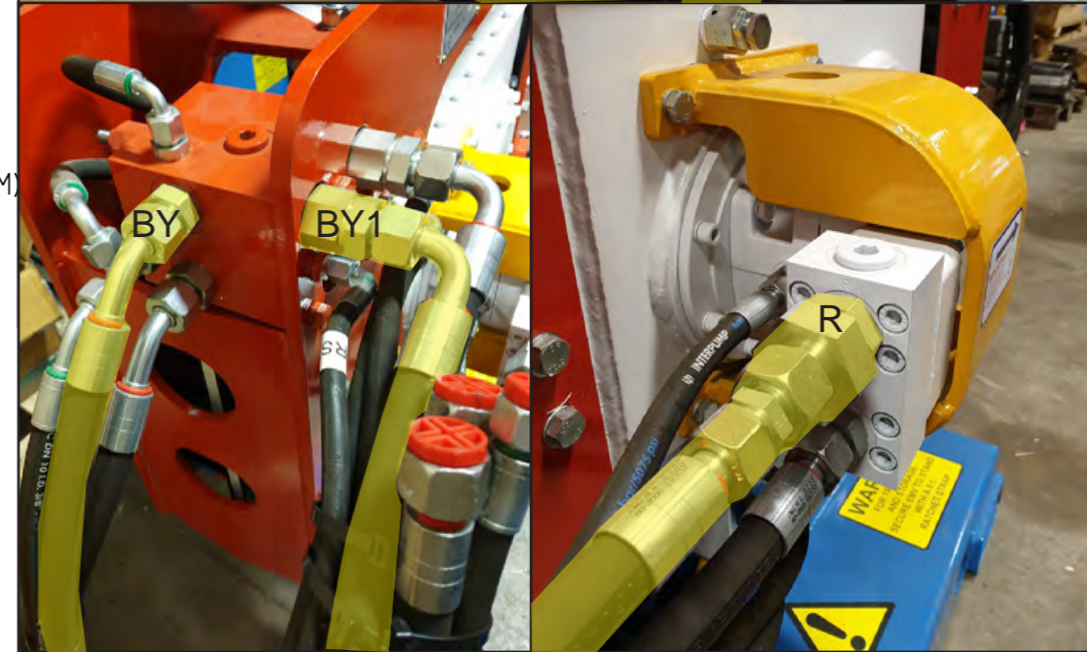
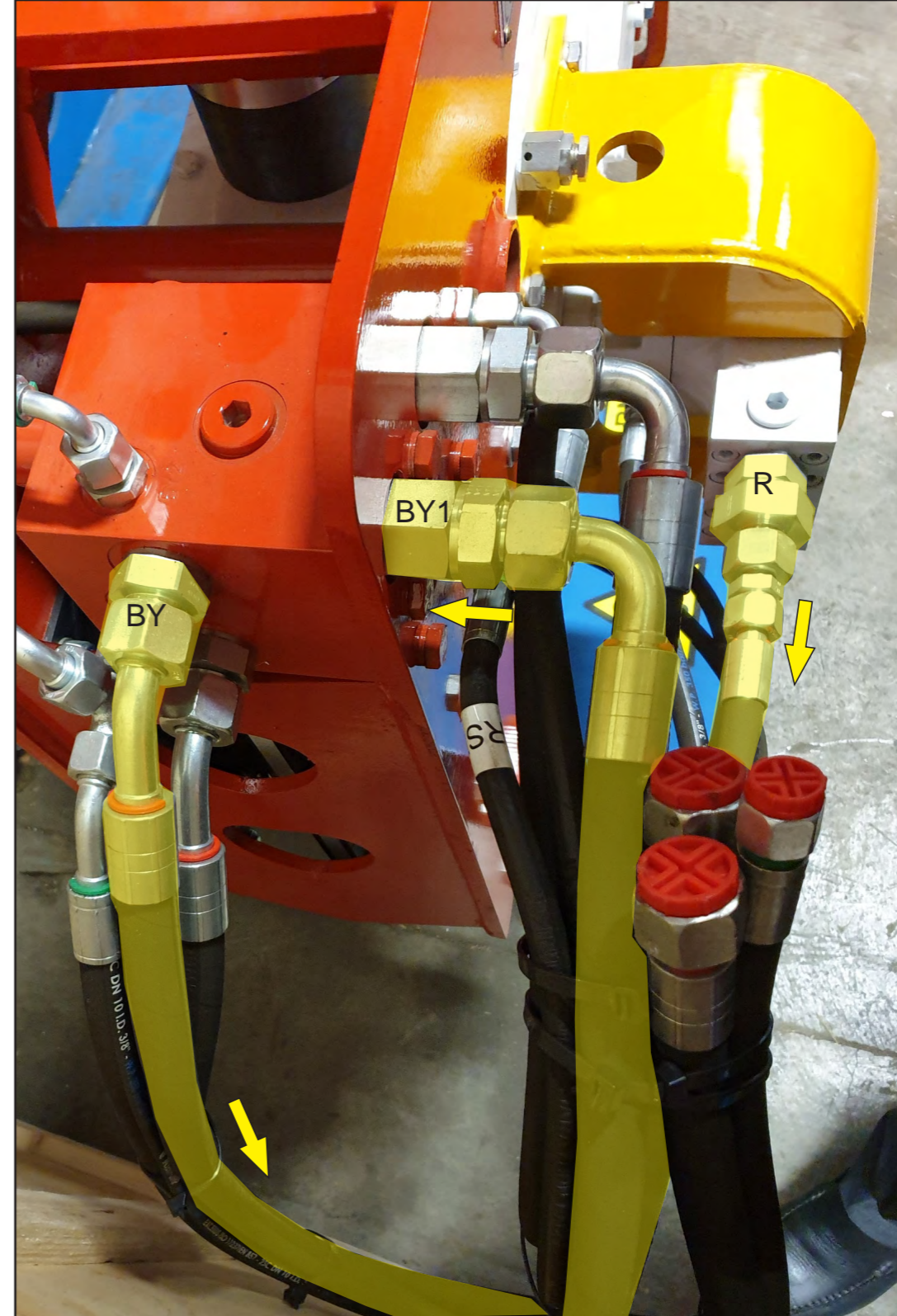




CLAMP FORCE GENERATED  
27T @ 280 BAR



1 BAR = 14.5 PSI

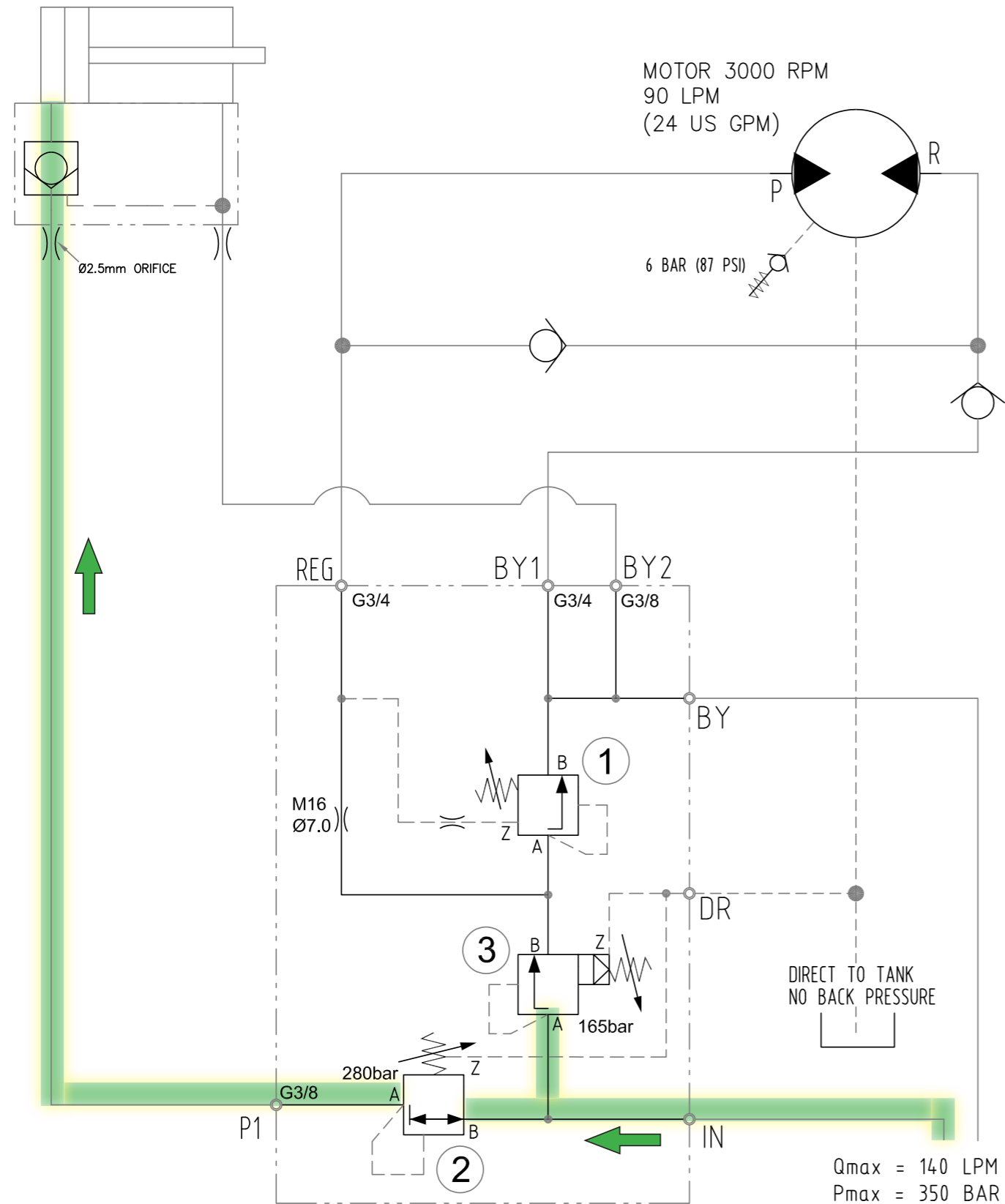


emv220 JIC  
hydraulic circuit

return line



CLAMP FORCE GENERATED  
27T @ 280 BAR



Q<sub>max</sub> = 140 LPM (66 US GPM)  
P<sub>max</sub> = 350 BAR (5076 PSI)  
FROM EXCAVATOR

1 BAR = 14.5 PSI

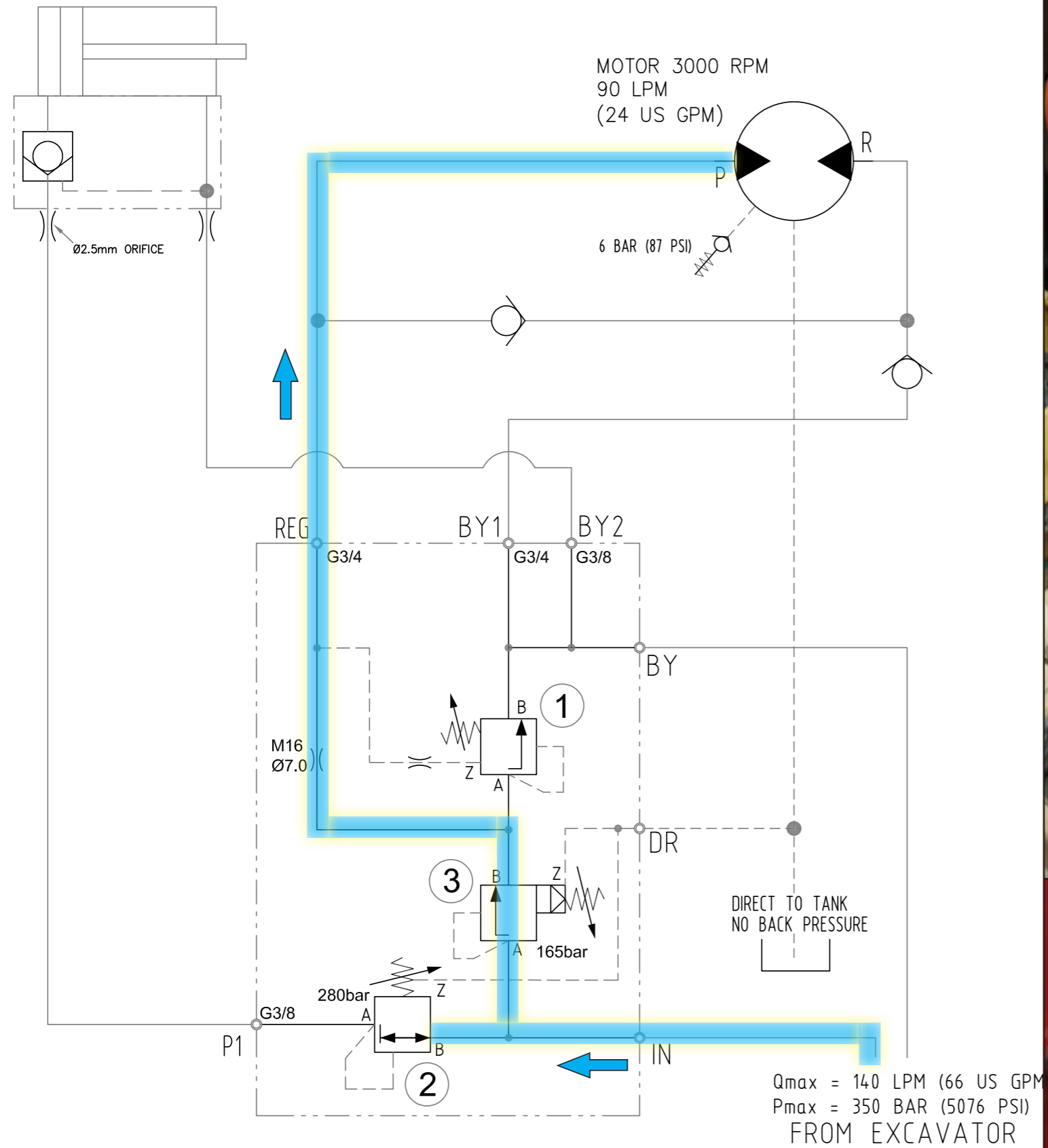


clamp engaged

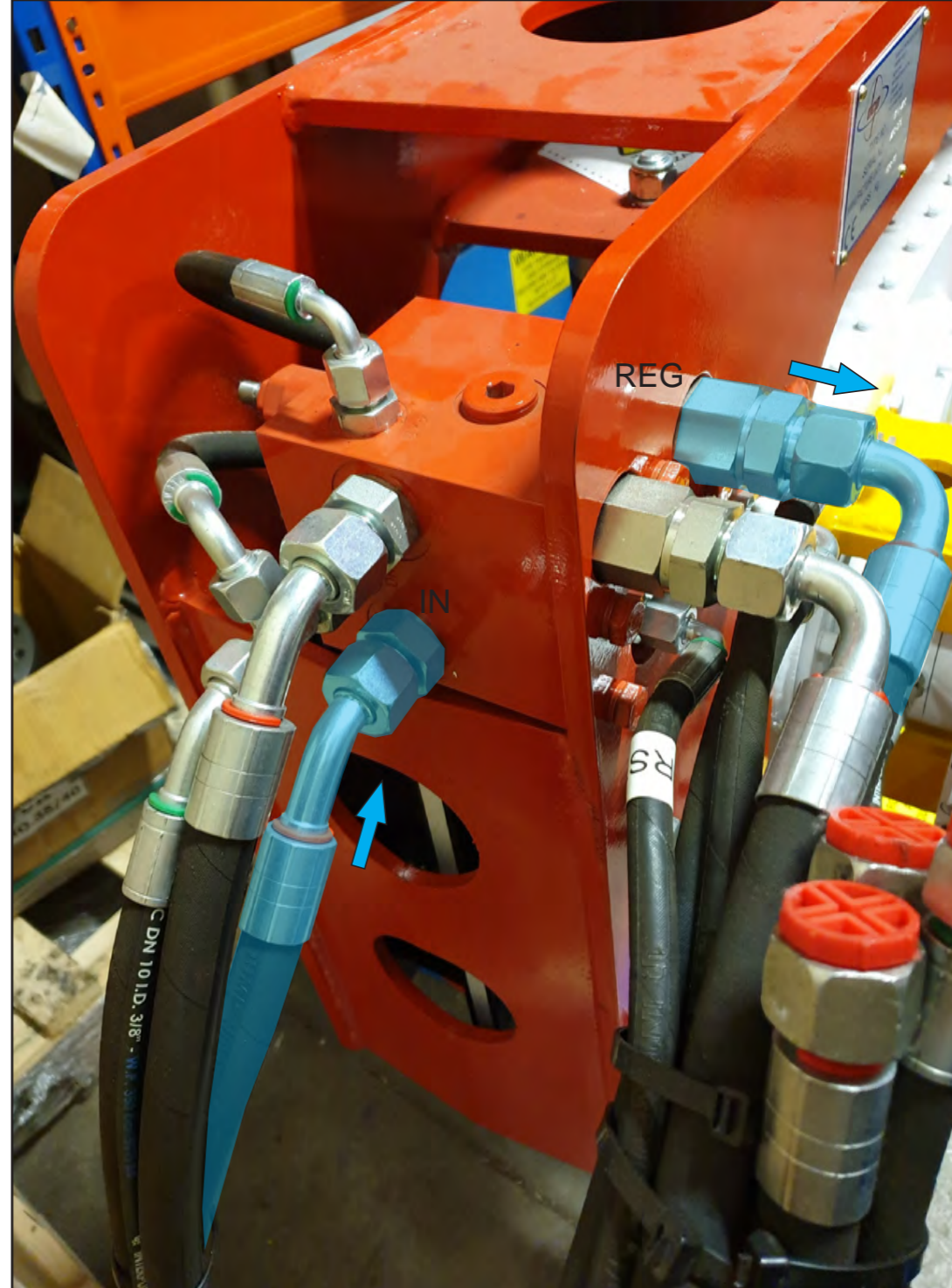
emv220 JIC  
hydraulic circuit



CLAMP FORCE GENERATED  
27T @ 280 BAR



1 BAR = 14.5 PSI

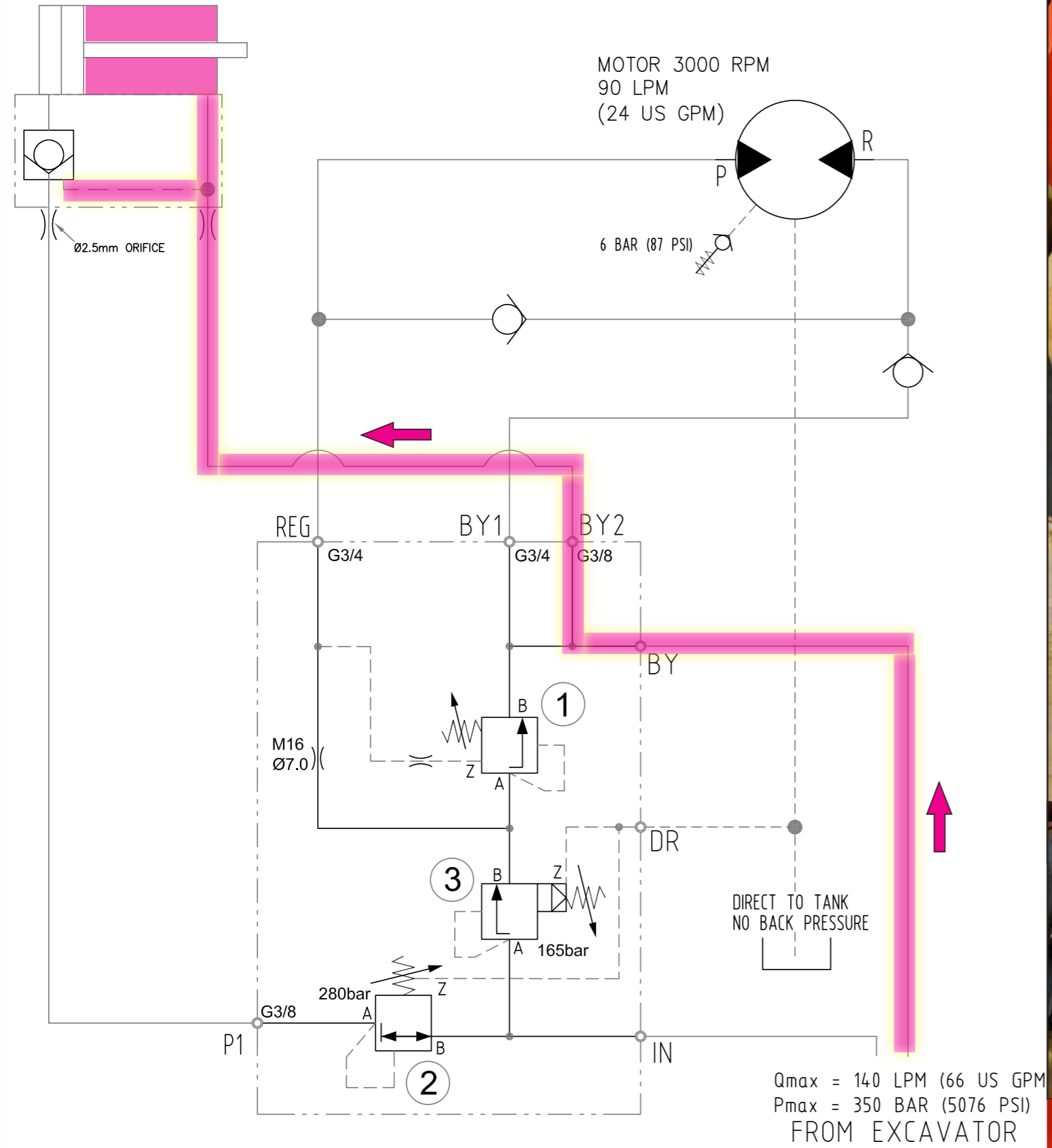


drive motor supply

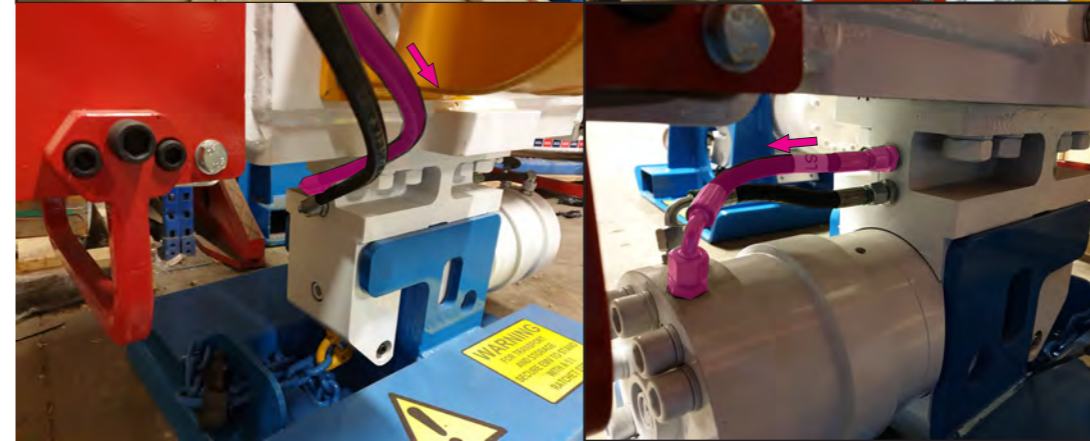
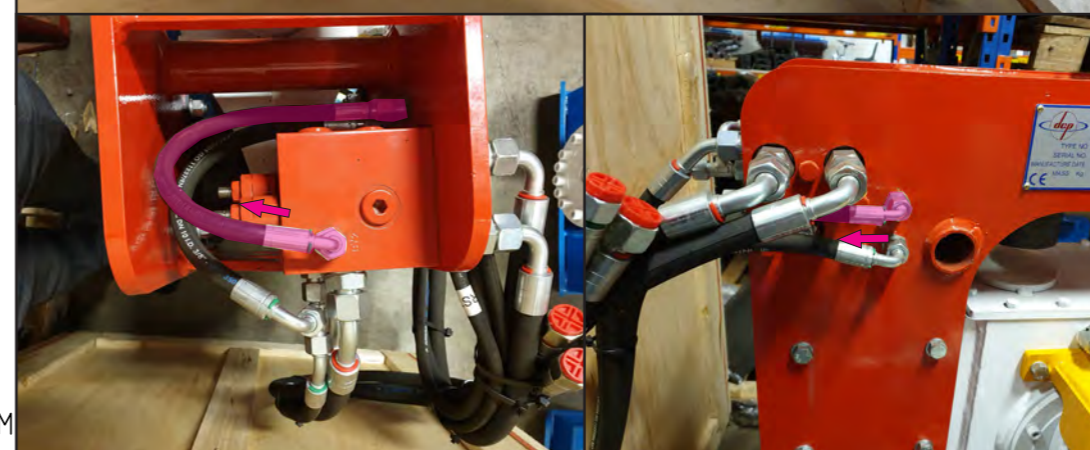
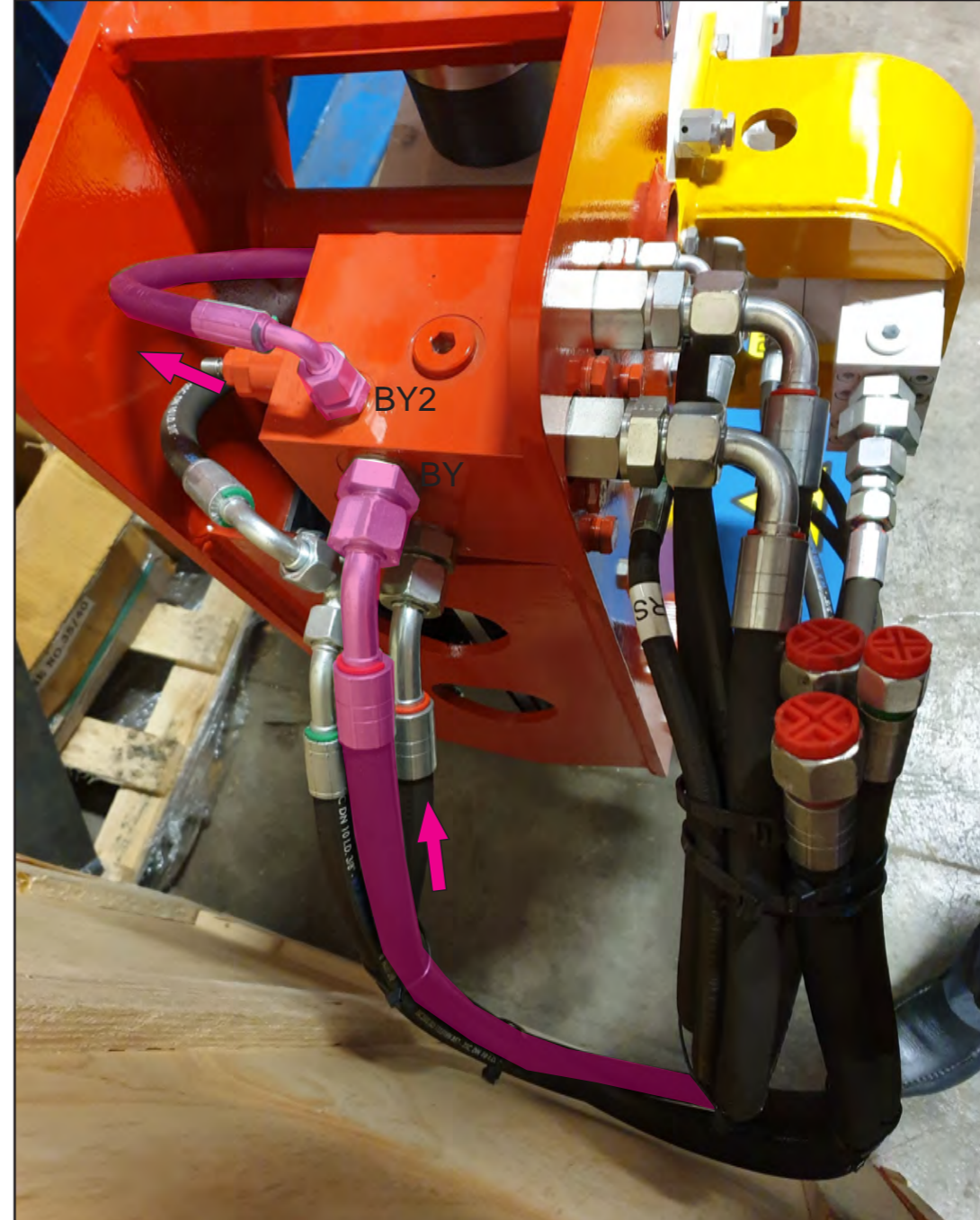
emv220 JIC  
hydraulic circuit



CLAMP FORCE GENERATED  
27T @ 280 BAR



1 BAR = 14.5 PSI

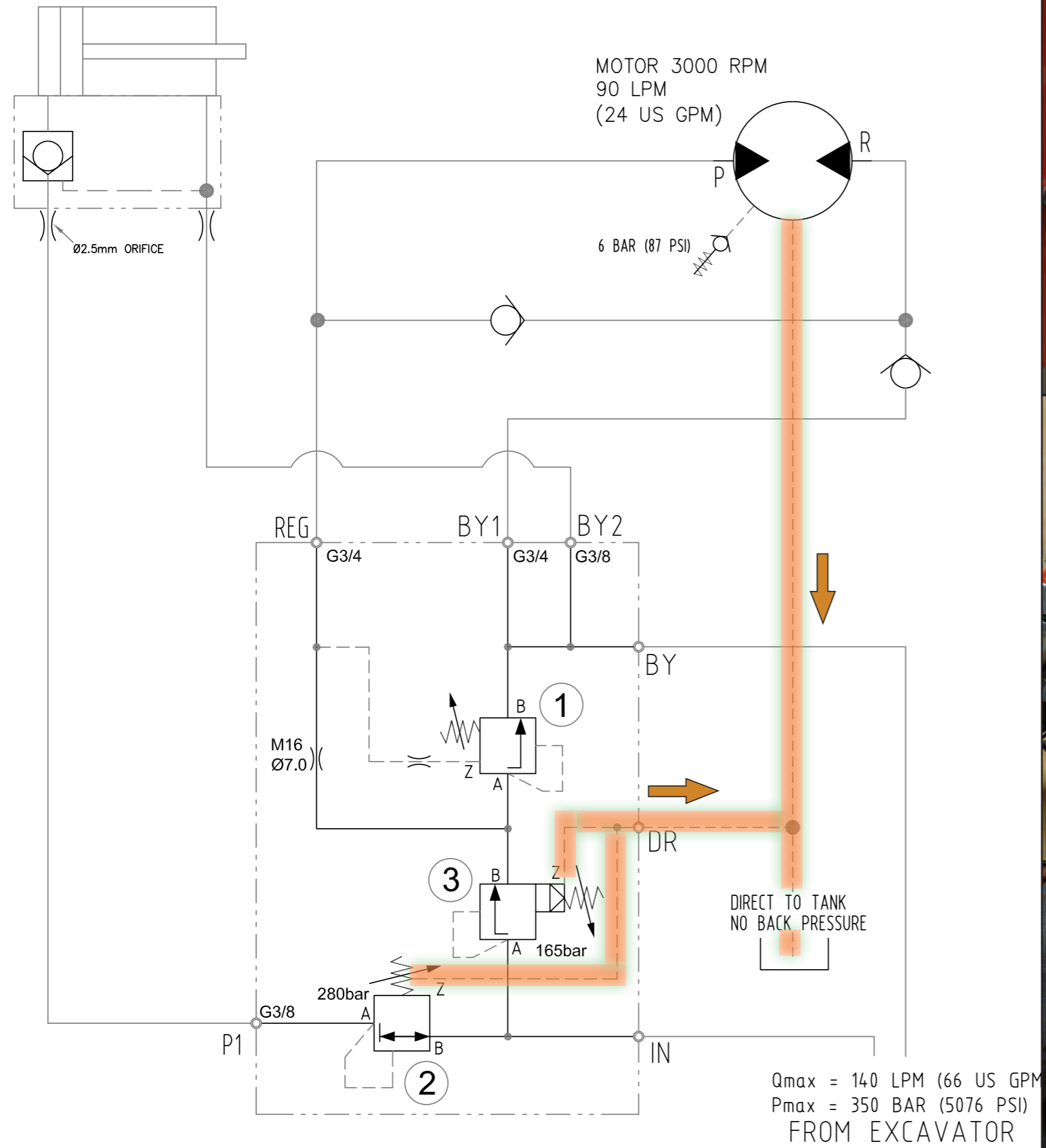


clamp disengaged

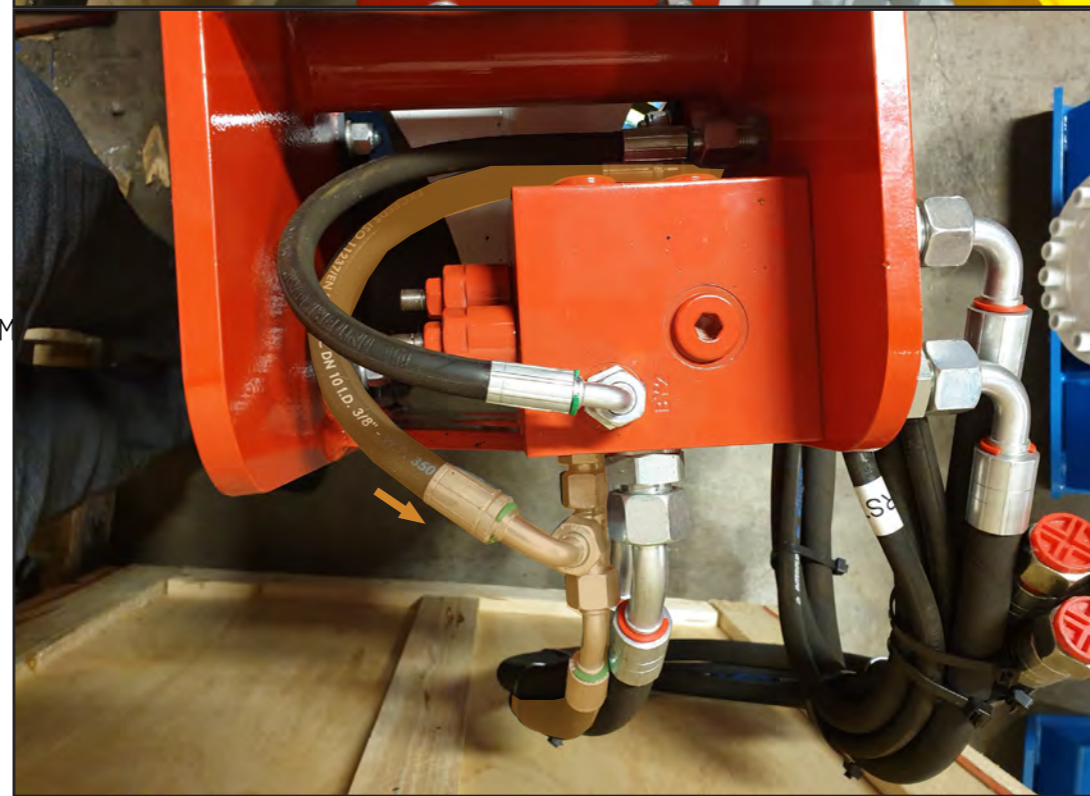
emv220 JIC  
hydraulic circuit



CLAMP FORCE GENERATED  
27T @ 280 BAR



1 BAR = 14.5 PSI



drain

emv220 JIC  
hydraulic circuit



# emv220 hose kit

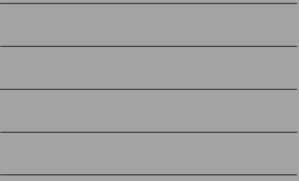
## Fittings:

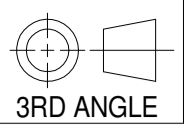
	QTY
REDVDN20/16 reducer	1off
GEV10LR3/8WD stud coupling	6off
4BX12 fixed female	2off
GEV12LM22x1.5WD adaptor	1off
GEV16SR3/4WD stud coupling	5off
ELVD12L run tee	1off
GEV10LRWD stud coupling	2off
GEV12LRWD	1off
RVV20SWD non-return valve	1off
GSV10L bulkhead fitting	1off
GSV12L bulkhead fitting	1off

## Hose:

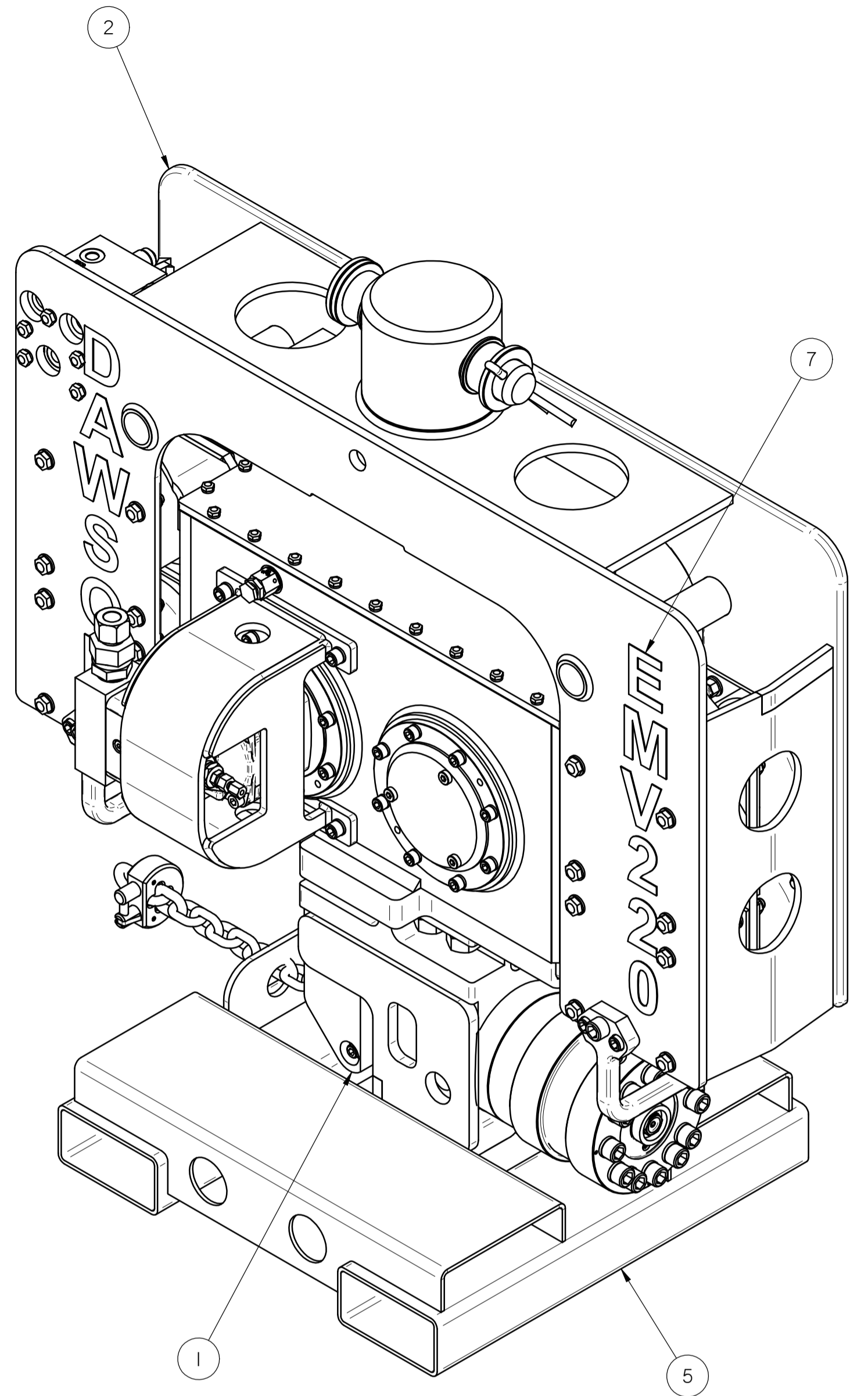
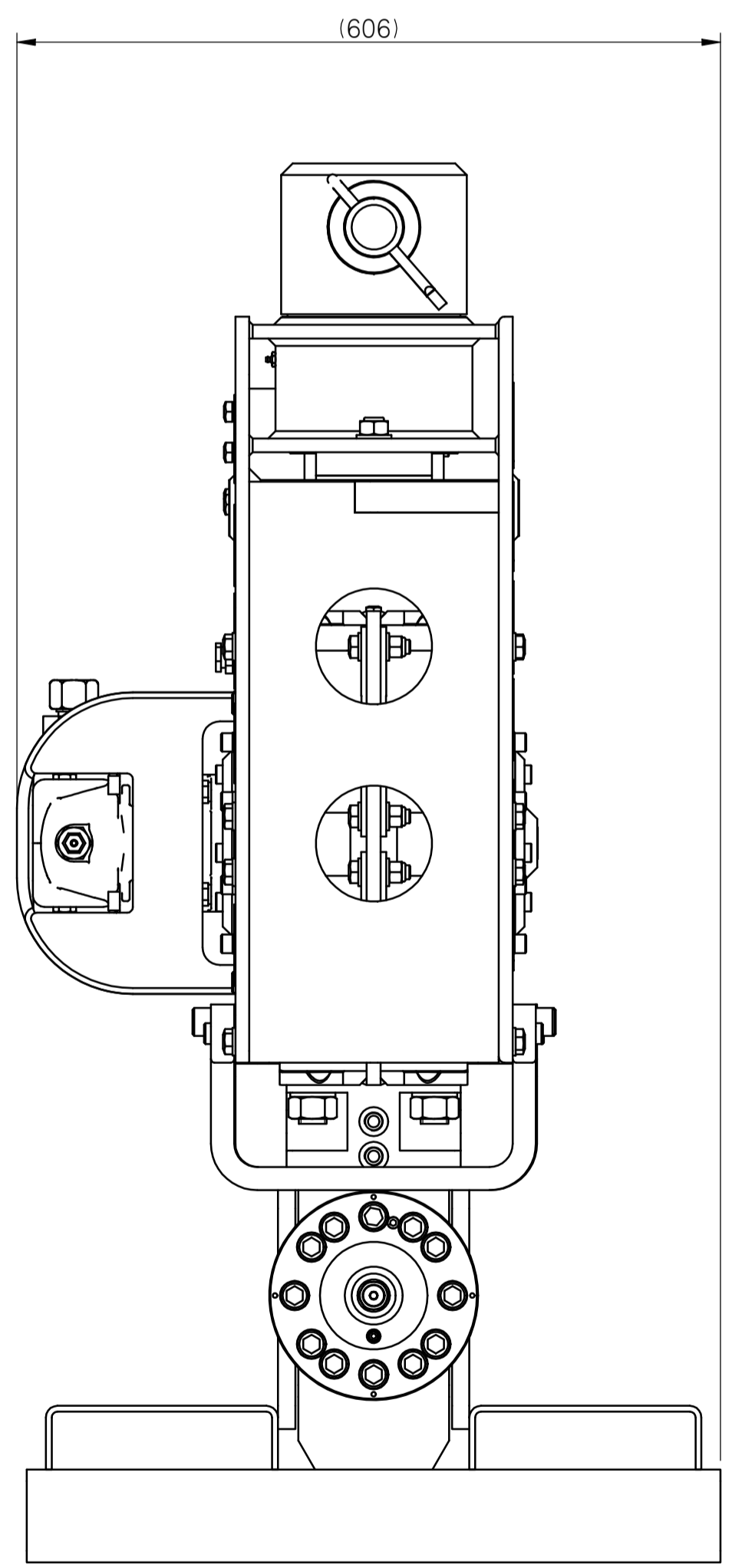
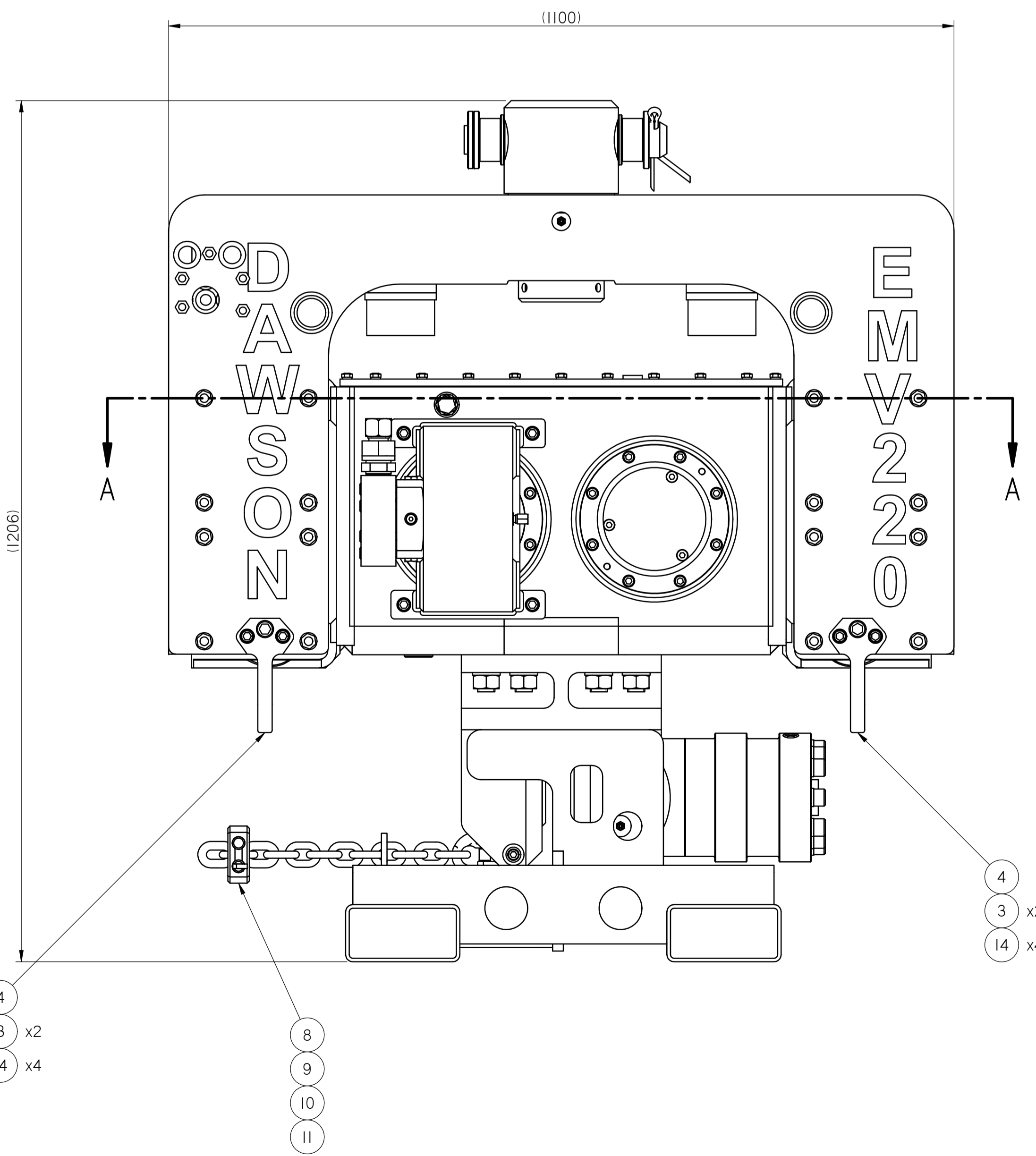
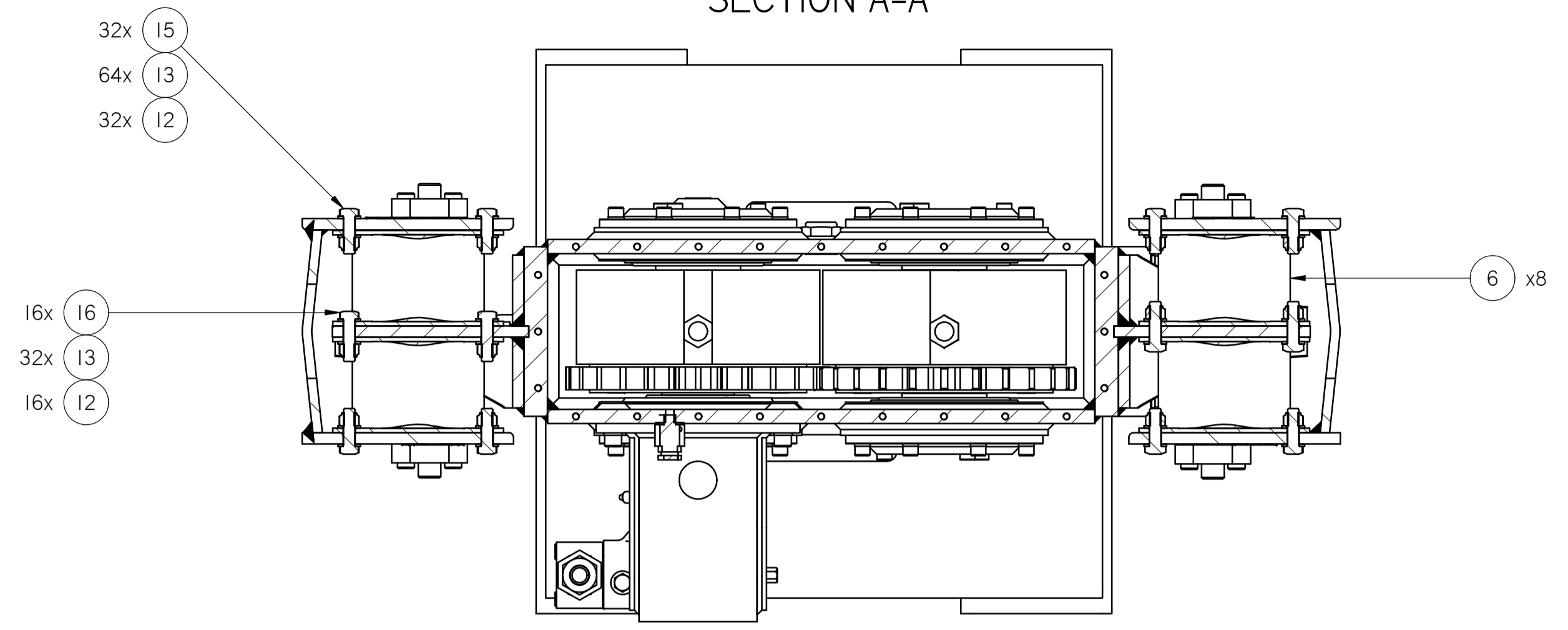
1/4"EP 10L 90° to 10L 90° AOR 90° 1280mm CHL	1off
1/4"EP 10L 90° to 10L 90° AOR 90° 1225mm CHL	1off
1/4"EP 10L 90° to 10L straight 120mm CHL	1off
1/4"EP 10L 90° to 10L straight 145mm CHL	1off
1/4"EP 10L 90° to 10L straight 320mm CHL	1off
3/8"EP 12L 45° to 12L straight 1230mm CHL	1off
3/8"EP 12L 90° to 12L 45° 970mm CHL	1off
3/8"EP 12L 90° to 12L straight 320mm CHL	1off
1/2"4SP 16S straight to 16S 45° 1200mm CHL	2off
1/2"4SP 16S 90° to 16s straight 745mm CHL	1off
1/2"4SP 16S 90° to 16s straight 830mm CHL	1off

# parts lists for the emv220





SECTION A-A



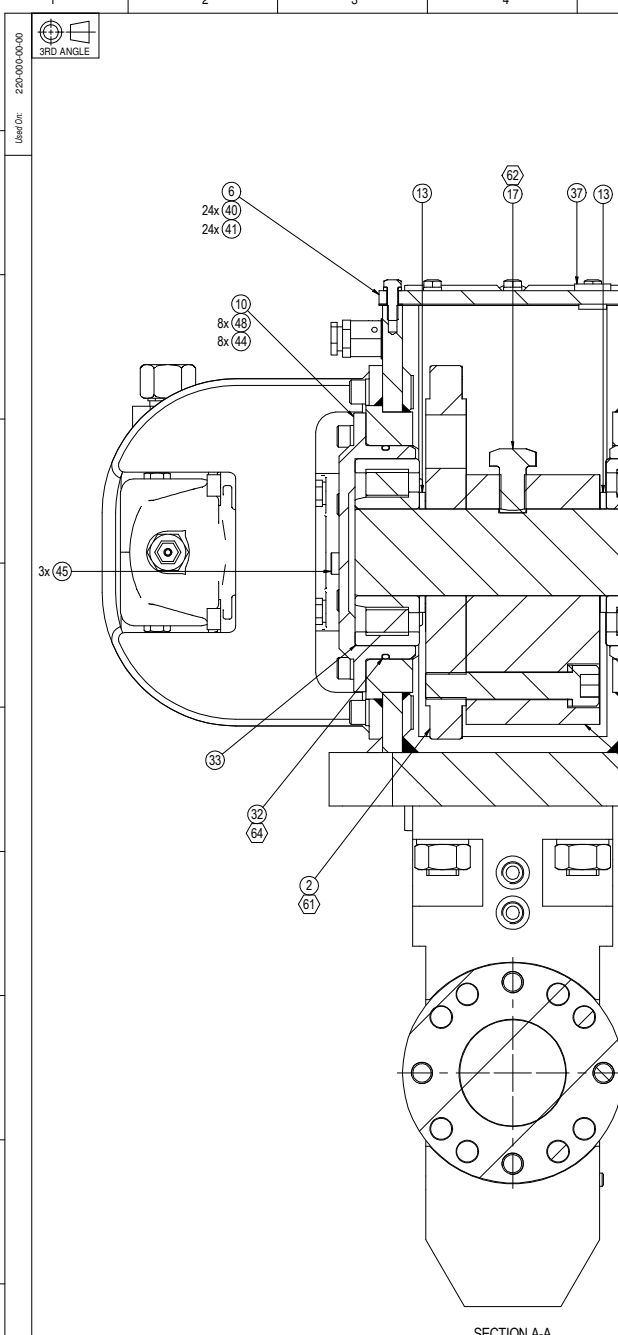
Item	Part Number	Description	Qty
16	0M12-045-01	BOLT, HEX HEAD, M12 x 45, GRADE 10.9 BZP	16
15	0M12-040-01	BOLT, HEX HEAD, M12 x 40, GRADE 10.9 BZP	32
14	0M12-025-02	SCREW, SOCKET CAP HEAD, M12 x 25, GRADE 12.9	8
13	0M12-000-20	WASHER, PLAIN, M12, FORM A, BZP CARBON STEEL	96
12	0M12-000-11	NUT, NYLOC TYPE P, M12	48
11	TLR368	SLEEVE	1
10	TLR362	G10-8 COUPLER	1
9	TLR361	10mm G80 CHAIN x 27 LINKS	1
8	TLR360	10mm CHAIN CLAMP	1
7	4400-4A	EMV 220 FULL STICKER SET	1
6	4025A	SANDWICH MOUNT	8
5	220-027-00-00	TRANSPORT STAND EMV220	1
4	220-010-00-00A	SAFETY RESTRAINT	2
3	220-007-21-01	SADDLE STOP BOLT	4
2	220-200-00-00	EMV 220 SADDLE ASSEMBLY	1
1	220-100-00-00	EMV 220 GEARBOX ASSEMBLY	1

UNLESS OTHERWISE STATED					
ALL DIMENSIONS IN MILLIMETERS. ALL MASSES IN KILOGRAMS.					
GENERAL TOLERANCES:	SURFACE FINISH:	JAM	AIB	3	10/09/24
X ± 0.5	RB (0.3 μm) MINIMUM	MDB	MDB	2	22/02/22
XX ± 0.25	ALL EDGES TO HAVE A RADIUS UNLESS OTHERWISE SPECIFIED	MDB	SDD	1	24/10/12
XXX ± 0.15	IF IN DOUBT, ASK	Drawn	Appr.	ECN No.	Date
ANGLES ± 0.5°					Rev.

**DAWSON CONSTRUCTION PLANT LTD.**  
 CHESENEY WOLD, BLEAK HALL, MILTON KEYNES, MK6 1NE

**Material** SEE PARTS LIST  
**Description** EMV220 METRIC HOSE  
**Est. Mass** 655 kg  
**Scale** 1 : 5  
**Sheet** 1 of 1  
**Date** 24/10/12  
**Drawing No.** 220-000-00-00

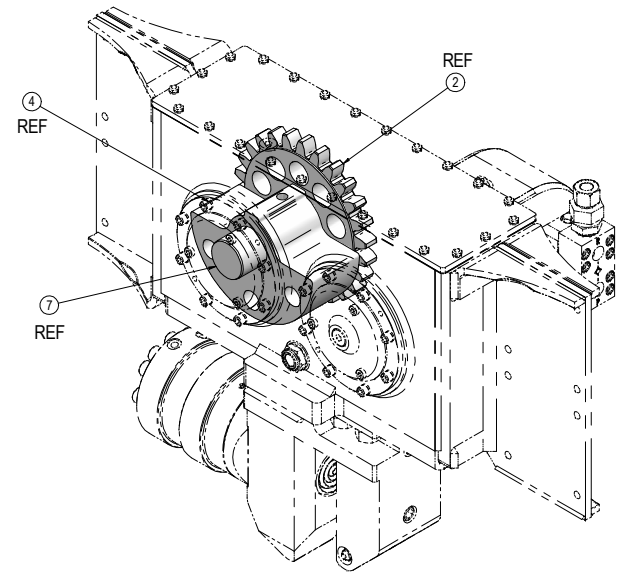




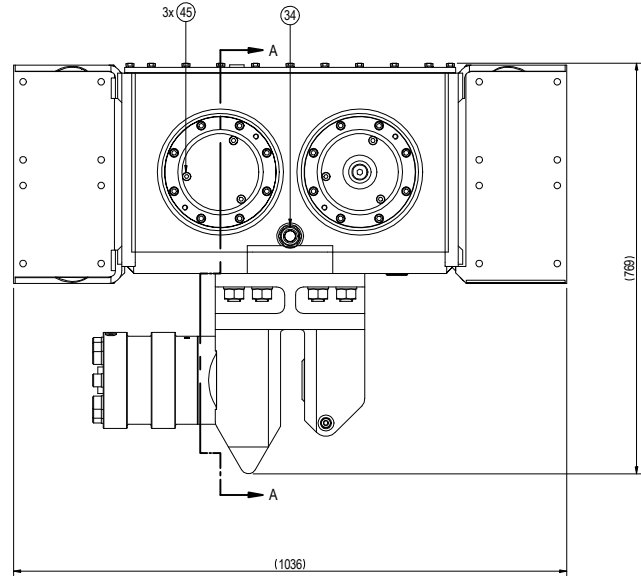
SECTION A-A

NOTES:

1. MACHINED SURFACES SHOULD BE CLEANED & LIGHTLY LUBRICATED WITH GEARBOX OIL, [ITEM 64], BEFORE ASSEMBLY.
2. TAPPED HOLES & DRILLINGS SHOULD BE CHECKED & CLEANED BEFORE ASSEMBLY.
3. CAP HEAD BOLTS WILL BE CLASS 12.9 UNLESS SPECIFIED OTHERWISE.
4. HEX BOLTS WILL BE CLASS 10.9 UNLESS SPECIFIED OTHERWISE.
5. BOLTS WILL BE TIGHTENED TO THE CORRECT TORQUE FOR THEIR SIZE & CLASS.
6. PRIOR TO FITTING THE CYLINDER ASSEMBLY TO THE GEARBOX CASING, APPLY A VERY THIN LAYER OF HP2 GREASE, [ITEM 61], TO THE MATING FACE.



# DRIVEN GEAR



Item	Part Number	Description	Qty
64	GEARBOX OIL	OIL, GEARBOX (80W - 90)	AR
63	LOCTITE - 290	THREADLOCKER, LOCTITE, GREEN	AR
62	LOCTITE - 242	LOCTITE - BLUE - THREADLOCKER	AR
61	HP2 - GREASE	LITHIUM GREASE, HIGH LOAD	AR
60	0M24-000-10	NUT, PLAIN HEX, M24, GRADE 8 B2P	8
59	0M24-000-27	WASHER, NORDLOC, M24	8
58	0M22-000-25	WASHER, DOWTY, M22	1
57	0M20-110-02	SCREW, SOCKET CAP HEAD, M20 x 110, GRADE 12.9	6
56	0M20-000-27	WASHER, NORDLOC, M20	6
55	0M16-240-02	SCREW, SOCKET CAP HEAD, M16 x 240, GRADE 12.9	8
54	0M16-075-02	SCREW, SOCKET CAP HEAD, M16 x 75, GRADE 12.9	1
53	0M16-000-27	WASHER, NORDLOC, M16, ZINC PLATED	9
52	0M12-025-02	SCREW, SOCKET CAP HEAD, M12 x 25, GRADE 12.9	4
51	0M12-000-27	WASHER, NORDLOC, M12	4
50	0M10-120-02	SCREW, SOCKET CAP HEAD, M10 x 120, GRADE 12.9	1
49	0M10-055-02	SCREW, SOCKET CAP HEAD, M10 x 55, GRADE 12.9	8
48	0M10-030-02	SCREW, SOCKET HEAD CAP, M10 x 30, GRADE 12.9	32
47	0M10-030-01	BOLT, HEX HEAD, M10 x 30, GRADE 10.9	4
46	0M10-020-02	SCREW, SOCKET CAP HEAD, M10 x 20, GRADE 12.9	1
45	0M10-010-09	SCREW, LOW CAP HEAD, M10 x 10, GRADE 10.9	9
44	0M10-000-27	WASHER, NORDLOC, M10	45
43	0M10-000-20	WASHER, PLAIN, M10, FORM A, B2P CARBON STEEL	2
42	0M10-000-11	NUT, NYLOC TYPE P, M10	1
41	0M08-025-01	BOLT, HEX HEAD, M8 x 25, GRADE 10.9	24
40	0M08-000-27	WASHER, NORDLOC, M8	24
39	1-064-00-01	1" BSPP MALE BLANKING PLUG & SEAL NBR	1
38	1-057-00-01	GREASE NIPPLE, G1/8" (CA039)	1
37	1-018-15-01	BLANKING PLUG, 1/2" BSP, (F1-VS-R12-WD-B-W3)	1
36	4695	7 BAR PRESSURE RELIEVE VALVE - 74032748	1
35	4043	SAFETY VALVE	1
34	4039	OIL LEVEL SIGHT GLASS 1" BSP SF083363	1
33	4032	CYLINDRICAL ROLLER BEARING NJ2213-E-M1-C3	3
32	4030	O RING Ø150 I.D. x Ø4 C.S. (204-250-4470)	4
31	3076	FILLER PLUG (V-S-M22X1.5W)	1
30	3033-1	O-RING, Ø C.S. x Ø97.1 I.D., VITON, 75 SHORE	1
29	2616	CLAMP CYLINDER ASSEMBLY	1
28	2094	O-RING, Ø60 I.D. x Ø3.53 C.S., BS 229 NITRILE RUBBER	1
27	2075	HYDRAULIC MOTOR F12-30MF-AVK	1
26	2071-CV	MANIFOLD BLOCK - MOTOR MOUNT CHECK	1
25	2032	CYLINDRICAL ROLLER BEARING NJ2212-E-M1-C3	1
24	2030	CENTRE BOSS	1
23	2019	ADAPTOR FOR PRESSURE RELIEF VALVE EMV220	1
22	2017	STUD, MODIFIED, M24 x 80, GRADE 10.9	8
21	2015	BUSH	1
20	2014	JAW PAD MOVING	1
19	2013	STATIC JAW	1
18	2012	CLAMP BODY	1
17	220-035-00-00	FLAT MACHINED TIP BOLT, HEX HEAD, M20 x 35, GRADE 10.9	2
16	220-032-00-00	MOTOR BEARING END CAP	1
15	220-028-00-01	EMV220 MKII - METRIC HOSE AND FITTING KIT	1
14	220-026-00-00	MOTOR SPACER WASHER	1
13	220-025-00-00	BEARING SPACER WASHER	3
12	220-021-00-00	GASKET	1
11	220-019-00-00	KEY EMV220	1
10	220-017-00-00	BEARING END CAP	2
9	220-016-00-00	DRIVE SHAFT	1
8	220-015-00-00	MOTOR END CAP	1
7	220-011-00-00	DRIVEN SHAFT	1
6	220-009-00-01	LID	1
5	220-008-00-00	SHROUD	1
4	220-005-00-00	ECCENTRIC DRIVEN	2
3	220-003-00-00	DRIVE GEAR	1
2	220-002-00-00	DRIVEN GEAR	1
1	220-001-00-00	GEARBOX	1

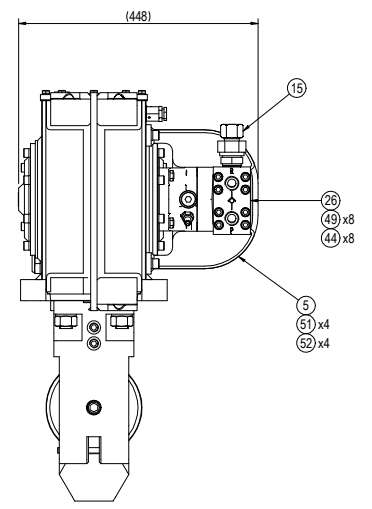
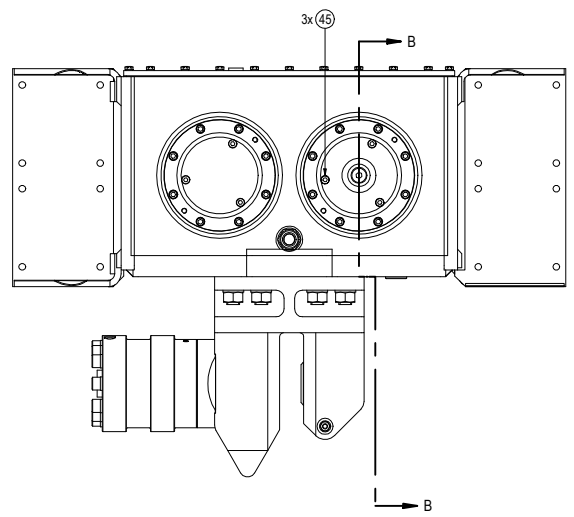
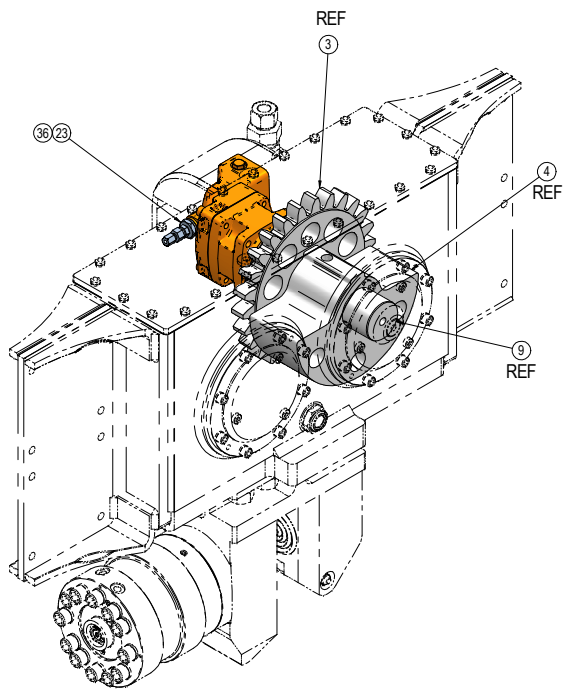
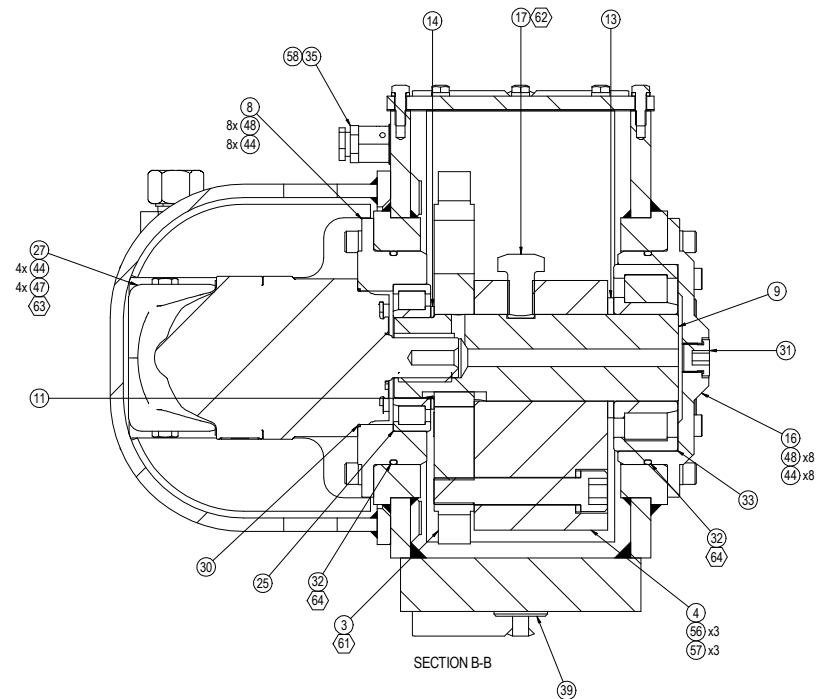
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Checked:	JAM	AIB	T	10/09/24	A
Drawn:					



Material	Qty	Unit	Scale	Shr Size
SEE PARTS LIST	300	kg	1:1.5	A1
EMV 220 GEARBOX ASSEMBLY	1			
Sheet	3	Date	13/09/24	
Drawn No:	220-100-00-00			

3RD ANGLE  
 220-000-00-00  
 Level: 01

# DRIVE GEAR



Item	Part Number	Description	Qty
64	GEARBOX OIL	OIL, GEARBOX (80W - 90)	AR
63	LOCTITE - 290	THREADLOCKER, LOCTITE, GREEN	AR
62	LOCTITE - 242	LOCTITE - BLUE - THREADLOCKER	AR
61	HP2 - GREASE	LITHIUM GREASE, HIGH LOAD	AR
60	0M24-000-10	NUT, PLAIN HEX, M24, GRADE 8 B2P	8
59	0M24-000-27	WASHER, NORDLOC, M24	8
58	0M22-000-25	WASHER, DOWTY, M22	1
57	0M20-110-02	SCREW, SOCKET CAP HEAD, M20 x 110, GRADE 12.9	6
56	0M20-000-27	WASHER, NORDLOC, M20	6
55	0M16-240-02	SCREW, SOCKET CAP HEAD, M16 x 240, GRADE 12.9	8
54	0M16-075-02	SCREW, SOCKET CAP HEAD, M16 x 75, GRADE 12.9	1
53	0M16-000-27	WASHER, NORDLOC, M16, ZINC PLATED	9
52	0M12-025-02	SCREW, SOCKET CAP HEAD, M12 x 25, GRADE 12.9	4
51	0M12-000-27	WASHER, NORDLOC, M12	4
50	0M10-120-02	SCREW, SOCKET CAP HEAD, M10 x 120, GRADE 12.9	1
49	0M10-055-02	SCREW, SOCKET CAP HEAD, M10 x 55, GRADE 12.9	8
48	0M10-030-02	SCREW, SOCKET HEAD CAP, M10 x 30, GRADE 12.9	32
47	0M10-030-01	BOLT, HEX HEAD, M10 x 30, GRADE 10.9	4
46	0M10-020-02	SCREW, SOCKET CAP HEAD, M10 x 20, GRADE 12.9	1
45	0M10-010-09	SCREW, LOW CAP HEAD, M10 x 10, GRADE 10.9	9
44	0M10-000-27	WASHER, NORDLOC, M10	45
43	0M10-000-20	WASHER, PLAIN, M10, FORM A, B2P CARBON STEEL	2
42	0M10-000-11	NUT, NYLOC TYPE P, M10	24
41	0M08-025-01	BOLT, HEX HEAD, M8 x 25, GRADE 10.9	1
40	0M08-000-27	WASHER, NORDLOC, M8	24
39	1-064-00-01	1" BSPP MALE BLANKING PLUG & SEAL NBR	1
38	1-057-00-01	GREASE NIPPLE, G1/8" (C4039)	1
37	1-018-15-01	BLANKING PLUG, 1/2" BSP, (F1-VS-R12-WD-B-W3)	1
36	4695	7 BAR PRESSURE RELIEVE VALVE - 74032748	1
35	4043	SAFETY VALVE	1
34	4039	OIL LEVEL SIGHT GLASS 1" BSP SF083353	1
33	4032	CYLINDRICAL ROLLER BEARING NJ2313-E-M1-C3	3
32	4030	O RING Ø150 I.D. x Ø4 C.S. (204-250-4470)	4
31	3076	FILLER PLUG (VS-M22X1.5WD)	1
30	3033-1	O-RING, Ø C.S. x Ø97 I.D., VITON, 75 SHORE	1
29	2616	CLAMP CYLINDER ASSEMBLY	1
28	2094	O-RING, Ø60 I.D. x Ø3.53 C.S., BS 229 NITRILE RUBBER	1
27	2075	HYDRAULIC MOTOR F12-30MF-IV-K	1
26	2071-CV	MANIFOLD BLOCK - MOTOR MOUNT CHECK	1
25	2032	CYLINDRICAL ROLLER BEARING NJ2212-E-M1-C3	1
24	2030	CENTRE BOSS	1
23	2019	ADAPTOR FOR PRESSURE RELIEF VALVE EMV220	1
22	2017	STUD, MODIFIED, M24 x 80, GRADE 10.9	8
21	2015	BUSH	1
20	2014	JAW PAD MOVING	1
19	2013	STATIC JAW	1
18	2012	CLAMP BODY	1
17	220-035-00-00	FLAT MACHINED TIP BOLT, HEX HEAD, M20 x 35, GRADE 10.9	2
16	220-032-00-00	MOTOR BEARING END CAP	1
15	220-028-00-01	EMV220 M20 - METRIC HOSE AND FITTING KIT	1
14	220-026-00-00	MOTOR SPACER WASHER	1
13	220-025-00-00	BEARING SPACER WASHER	3
12	220-021-00-00	GASKET	1
11	220-019-00-00	KEY EMV220	1
10	220-017-00-00	BEARING END CAP	2
9	220-016-00-00	DRIVE SHAFT	1
8	220-015-00-00	MOTOR END CAP	1
7	220-011-00-00	DRIVEN SHAFT	1
6	220-009-00-01	LID	1
5	220-008-00-00	SHROUD	1
4	220-005-00-00	ECCENTRIC DRIVEN	2
3	220-003-00-00	DRIVE GEAR	1
2	220-002-00-00	DRIVEN GEAR	1
1	220-001-00-00	GEARBOX	1

Appr:	UNLESS OTHERWISE STATED				
AB	10/09/24				
Checked:	JAM	AB	T	10/09/24	A
Drawn:	ECW	AB			

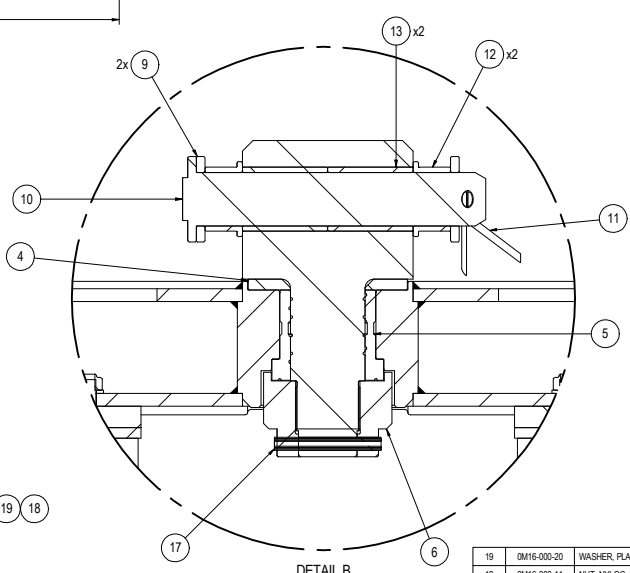
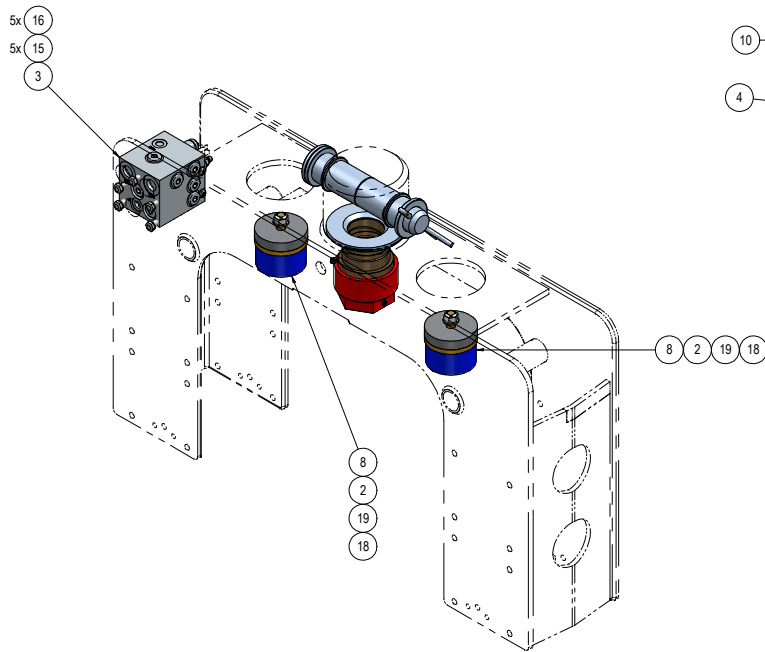
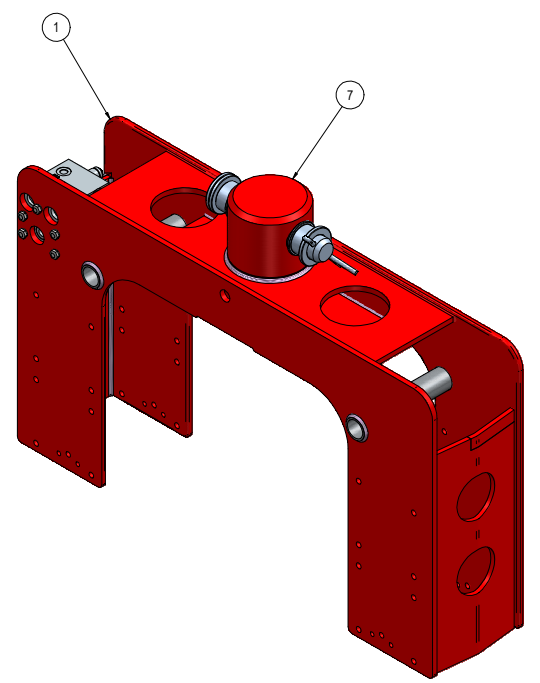
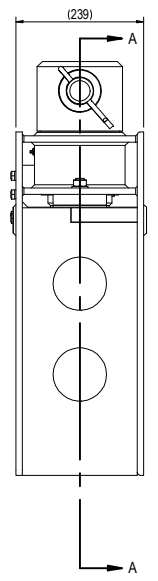
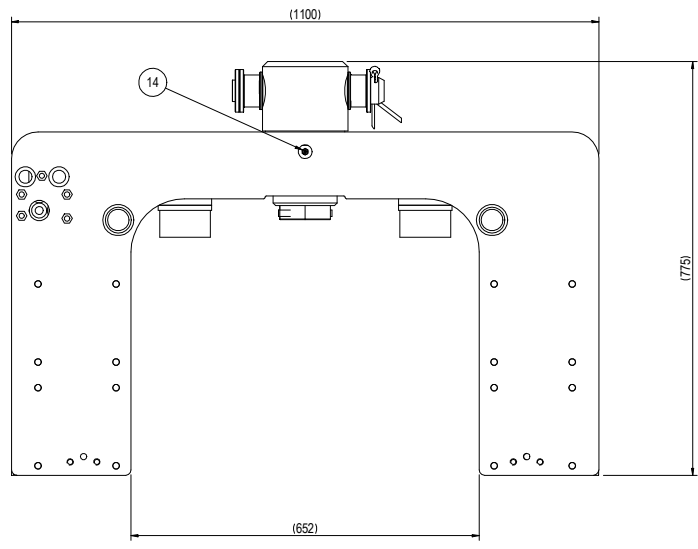
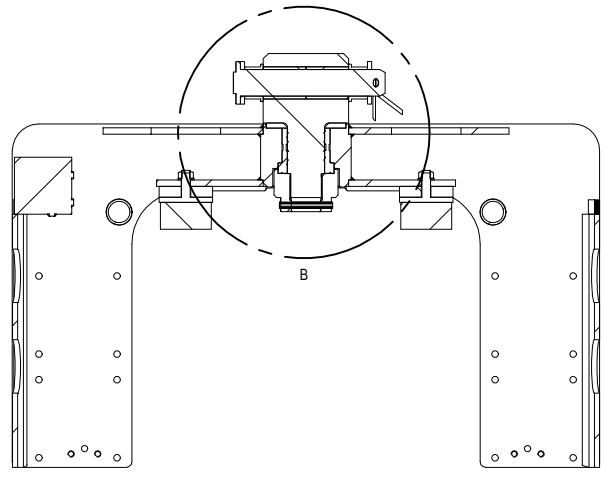
**SEE PARTS LIST**

EMV 220 GEARBOX ASSEMBLY

Scale: 1:1.5  
 Date: 13/09/24  
 Drawing No: 220-100-00-00



Libel On: 220-000-00-00  
 3RD ANGLE



Item	Part Number	Description	Qty
19	0M16-000-20	WASHER, PLAIN, M16, FORM A, B2P CARBON STEEL	2
18	0M16-000-11	NUT, NYLOC - TYPE P, M16	2
17	0M12-100-36	PIN, COILED, M12 x 100	1
16	0M10-030-01	BOLT, HEAD, M10 x 30, GRADE 10.9	5
15	0M10-000-27	WASHER, NORDLOC, M10	5
14	1-057-00-01	GREASE NIPPLE, 1/8" (CA039)	1
13	4069	SLEEVE (OD 65mm)	2
12	4068	FLANGED BUSH	2
11	4067	SPLIT PIN, 3/8" x 5, MLD STEEL	1
10	4066	SHEAR PIN	1
9	4065	SPACER	2
8	4028	CIRCULAR BUFFER MOUNT, TYPE D, MALE STUD M16 x 55, V4-100-60-N65	2
7	4024-1	LIFTING BOLT, (FOR HEADED BUSH)	1
6	4023-1	NUT (HEADED BUSH STYLE)	1
5	4022-1	BUSH (SADDLE) - HEADED	1
4	4021	THRUST WASHER (SADDLE)	1
3	220-090-00-00	FLOW REG SEQUENCE VALVE BLOCK	1
2	220-039-00-00	BUMP STOP SPACER	2
1	220-007-00-01	SADDLE	1

**COILED PIN INSTALLATION INSTRUCTIONS:**  
 1. APPLY PRELOAD/TENSION TO NUT AND LIFTING BOLT.  
 2. USE A MAG DRILL TO PUT A HOLE THROUGH NUT AND LIFTING BOLT.  
 3. HAMMER THROUGH 1 ROLL PIN.  
 4. GRIND DOWN PROTRUDING EDGES OF THE ROLL PIN.

UNLESS OTHERWISE STATED			
APPROVED	DESIGNED	DRAWN	CHECKED
JAM	AIB	2	08/10/24
JAM	AIB	1	08/09/24
ECOV	APR		

**DAWSON CONSTRUCTION PLANT LTD.**  
 SHEET 1 OF 1  
 DATE: 13/09/24  
 SHEET SIZE: A1  
 SCALE: 1:1.5  
 DRAWING NO: 220-200-00-00





Sequence Valve Cartridge with  
Adjusting Screw & Lockout  
11.5 mm (default setting)

Flow Compensator  
15 mm (default setting)

Clamp Pressure Limiter  
12.5 mm (default setting)

# appendix a- auxiliary equipment

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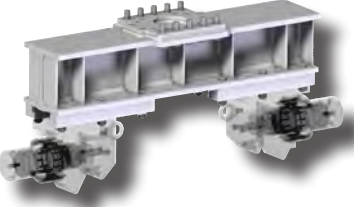
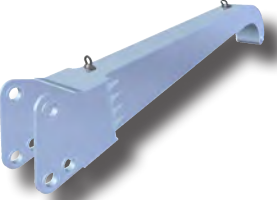

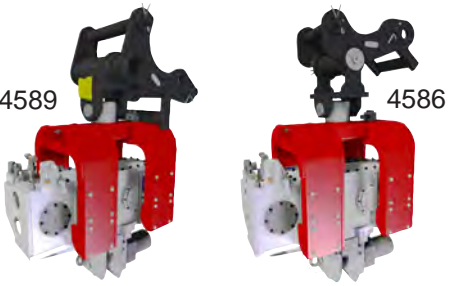
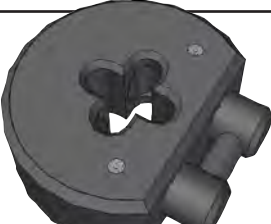
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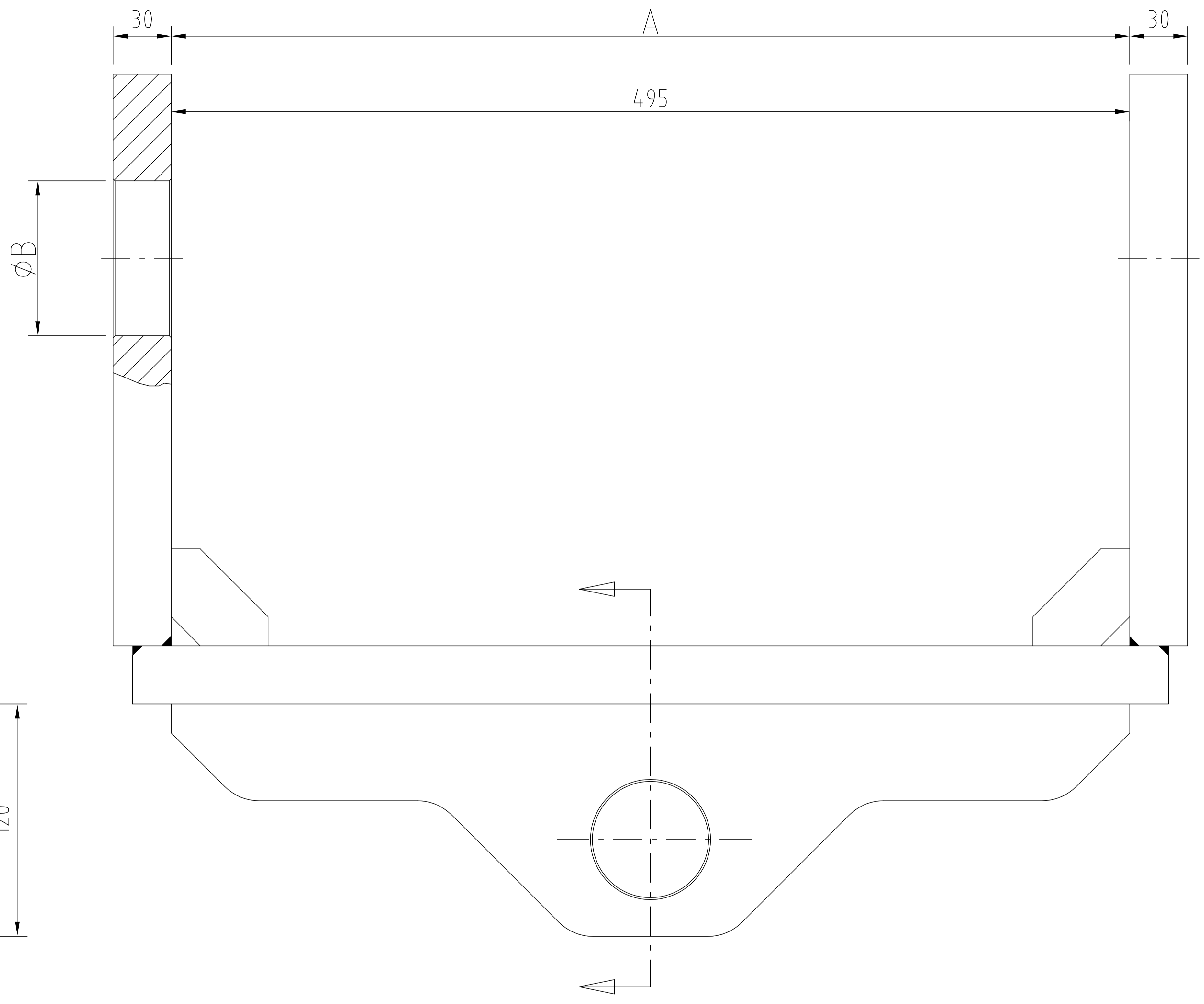
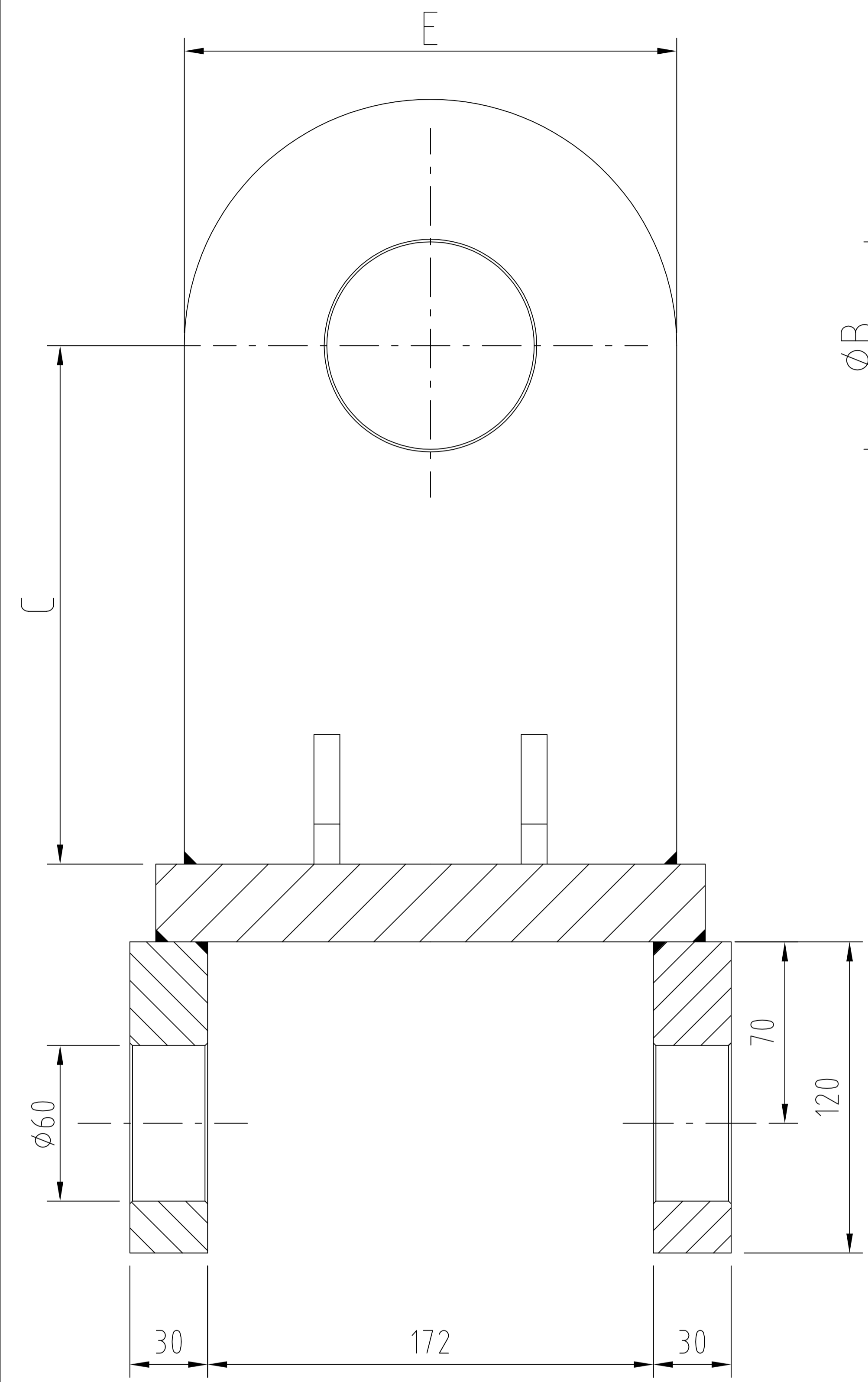
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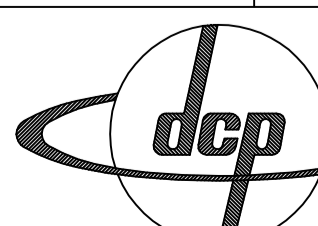
# EMV - AUXILLARY EQUIPMENT

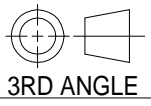
ITEM	DESCRIPTION	ITEM No.	WEIGHTS														
	<p><b>CAISSON BEAM</b> Caisson beam jaw assemblies can be positioned to suit any tube size between Ø300 I.D &amp; Ø1100 mm O.D.</p>	4900	<p>Weight EMV300 = 1500kg + (adaptor bracket)</p> <hr/> <p>Weight EMV450 = 1700kg + (adaptor bracket)</p> <hr/> <p>Weight EMV550 = 1800kg + (adaptor bracket)</p>														
	<p><b>SWAN NECK</b> For extended reach and greater pile clearance on your excavator arm, enabling longer piles to be driven.</p>	<p>4939</p> <hr/> <p>4932</p> <hr/> <p>4931</p>	<p>1.5m = 340kg</p> <hr/> <p>2m = 470kg</p> <hr/> <p>4m = 1100kg</p>														
	<p><b>ADAPTOR BRACKETS</b> A range of brackets to suit the EMV connection to various size excavators.</p>	4063	<p>50kg (see table on drawing 4063 summary table for all variables).</p>														
	<p><b>QUICK HITCH ADAPTOR</b> When an excavator has a guide hitch fitted and a double acting breaker to supply the EMV, the quick hitch adaptor supplies fast, easy connection to the end equipment while maintaining the same degree of movement.</p>	<p>4586</p> <hr/> <p>4589 (with intergrated adaptor bracket)</p>	<p>112kg</p> <hr/> <p>200kg</p>														
	<p><b>CHAIN CLAMP</b> For all lifting applications. The unit indexes along the links of the chain and locks into place giving a quick and simple chain lock for lifting.</p>	<p>4130</p> <hr/> <p>TLR 360</p> <hr/> <p>4082</p>	<table border="1"> <thead> <tr> <th>SWL</th> <th>WEIGHT</th> <th></th> </tr> </thead> <tbody> <tr> <td>2000kg</td> <td>1kg</td> <td>8 mm chain clamp</td> </tr> <tr> <td>3200kg</td> <td>1.2kg</td> <td>10 mm chain clamp</td> </tr> <tr> <td>8000kg</td> <td>3.7kg</td> <td>16 mm chain clamp</td> </tr> </tbody> </table>			SWL	WEIGHT		2000kg	1kg	8 mm chain clamp	3200kg	1.2kg	10 mm chain clamp	8000kg	3.7kg	16 mm chain clamp
SWL	WEIGHT																
2000kg	1kg	8 mm chain clamp															
3200kg	1.2kg	10 mm chain clamp															
8000kg	3.7kg	16 mm chain clamp															





Part Number	Dimensions - mm				Dipper Pin Part Number
	A	ØB	C	E	
4063	340	60.00	175	140	4089
4063A	495	80.00	200	190	4089A
4063C	458	89.50	225	190	4089C
4063D	410	60.00	200	190	4089D
4063E	458	60.00	225	190	4089E
4063F	495	63.75	200	190	4089F
4063M	458	63.75	225	190	4089M
4063R	495	69.85	225	190	4089R

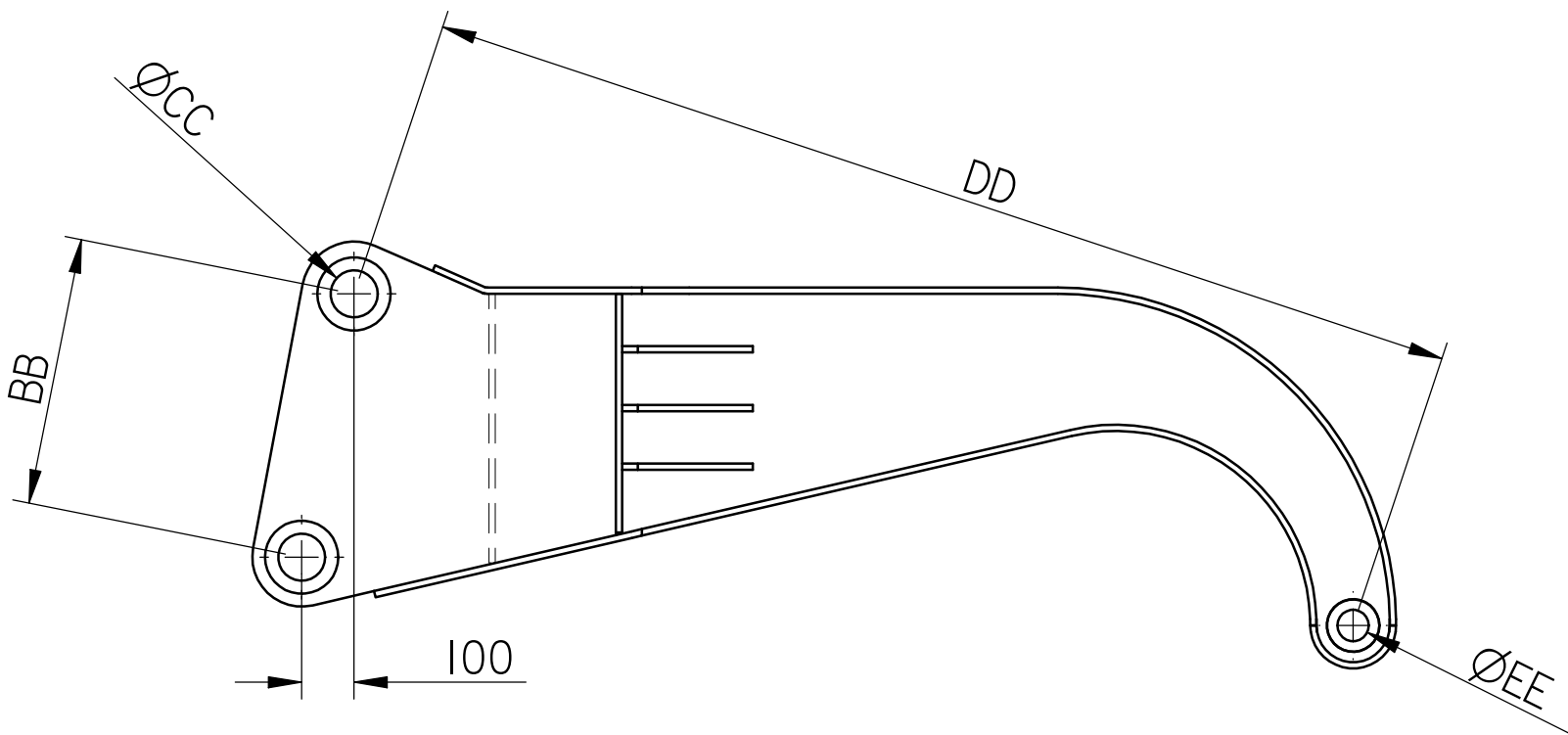
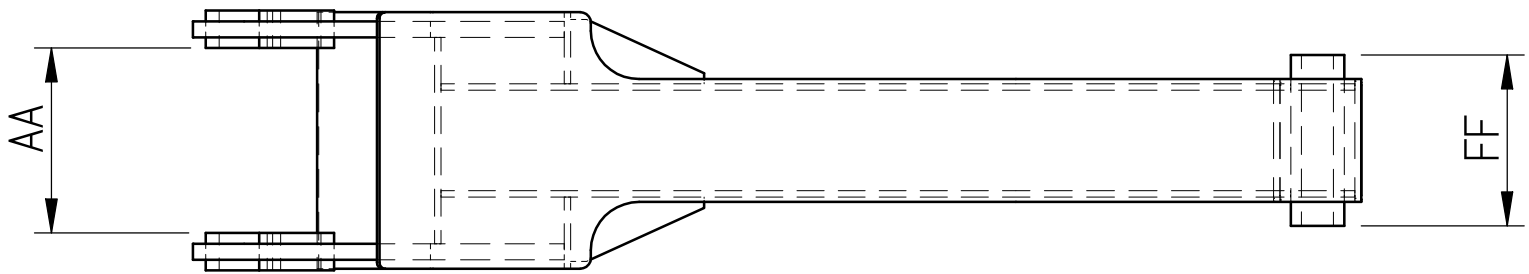
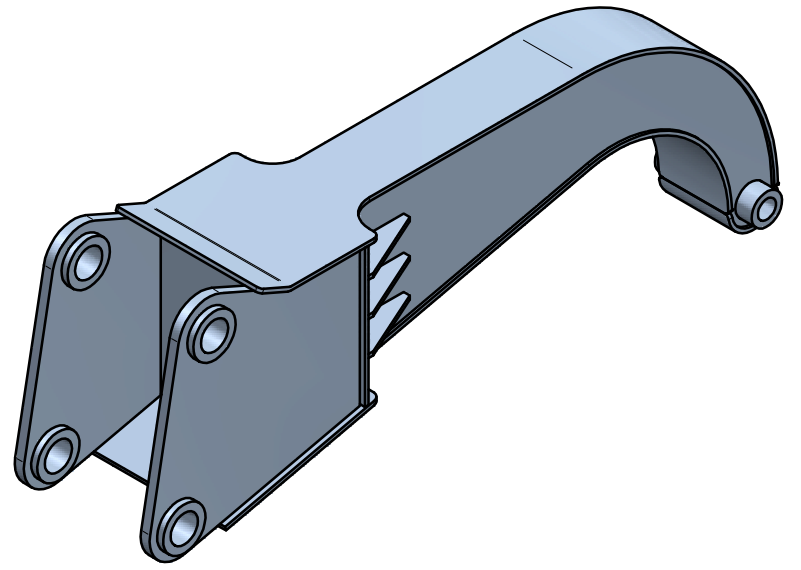
Ref.no.	Qnt.	Part name			Material	Dimension	Remark	
Design by	Drawn at	Copied	Checked	Standard	Affirmed	Scale	Replace	Replaced by
M.LEE				A3		1 : 2.5		
 DAWSON CONSTRUCTION PLANT LTD.		EMV ADAPTOR BRACKETS				File name	Date	
						Drawing no.	03-05-06	
						4063SummaryTable		



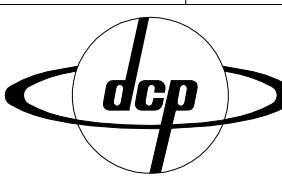
3RD ANGLE

Rf.nr	Qnt.	Revision	Date	Intro.	Appr.by
A		ADDED 'ØEE' AND 'FF'	22/08/23	AIB	MOB
B		ADDED PAINT REQUIREMENTS	24/08/23	AIB	MOB

PAINT INFORMATION	
COLOUR	CODE



DIMENSIONS OF EXCAVATOR BUCKET CONNECTION		
	DIM (mm)	DIM (mm)
AA		
BB		
ØCC		
DD		
ØEE		
FF		

Ref.no.	Qnt.	Part name			Material	Dimension	Remark	
Design by PLW	Drawn by PLW	Copied -	Checked -	Standard A4	Affirmed -	Scale -	Replace -	Replaced by -
 <b>DAWSON CONSTRUCTION PLANT LTD.</b>							Sheet 1 of 1	Date 04/02/11
							Drawing no. SN01-000-01	

SWAN NECK DIMENSIONAL DATA



# TIGHTENING TORQUES FOR SCREWS WITH STANDARD METRIC THREAD

**DAWSON**  
CONSTRUCTION PLANT LTD

Screw size	Preload values $F_M$ based on Grades in N			Tightening torques $M_A$ based on Grades in Nm			Wrench size for			
	8.8	10.9	12.9	8.8	10.9	12.9	Hex head screw		Socket head screw	
							mm	Inch	mm	Inch
M4 x 0.7	3,900	5,700	6,700	3.1	4.5	5.3	7	9/32	3	-
M5 x 0.8	6,400	9,300	10,900	6.1	8.9	10.4	8	-	4	5/32
M6 x 1	9,000	13,200	15,400	10.4	15.5	18.0	10	-	5	-
M7 x 1	13,100	19,300	22,600	17.0	25.0	30.0	11	-	-	-
M8 x 1.25	16,500	24,200	28,500	25	37	43	13	1/2	6	-
M10 x 1.5	26,000	38,500	45,000	51	75	87	17	11/16	8	-
M12 x 1.75	38,500	56,000	66,000	87	130	150	19	3/4	10	-
M14 x 2	53,000	77,000	90,000	140	205	240	22	7/8	12	-
M16 x 2	72,000	106,000	124,000	215	310	370	24	61/64	14	9/16
M18 x 2.5	91,000	129,000	151,000	300	430	510	27	1-1/16	14	9/16
M20 x 2.5	117,000	166,000	194,000	430	620	720	30	1-3/16	17	43/64
M22 x 2.5	146,000	208,000	243,000	580	970	830	32	1-9/32	17	43/64
M24 x 3	168,000	239,000	280,000	740	1,060	1,240	36	1-7/16	19	3/4
M27 x 3	221,000	315,000	370,000	1,100	1,550	1,850	41	1-5/8	19	3/4
M30 x 3.5	270,000	385,000	450,000	1,500	2,100	2,500	46	1-13/16	22	7/8
M33 x 3.5	335,000	480,000	560,000	2,000	2,800	3,400	50	2	24	61/64
M36 x 4	395,000	560,000	660,000	2,600	3,700	4,300	55	2-3/16	27	1-1/16
M39 x 4	475,000	670,000	790,000	3,400	4,800	5,600	60	2-3/8	27	1-1/16

**NOTE!**

Preload forces and tightening torques are based on lightly lubricated screws and nuts (corresponds to medium friction  $\mu_G = 0.14$ ). Nm = x 0.7375 = ft. lbs.



D.C.P. RESERVES THE RIGHT TO DISCONTINUE EQUIPMENT AT ANY TIME, OR CHANGE SPECIFICATIONS OR DESIGNS WITHOUT NOTICE OR INCURRING OBLIGATIONS

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INNOVATIVE PILING EQUIPMENT

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excavator mounted vibrator

emv220

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