

OPERATOR INSTRUCTION MANUAL

SM9T, SH15T, SH15TC

FLANGE EXPANDING WEDGES

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1. INTRODUCTION

The SM9T, SH15TC and SH15T are aids for use in normal maintenance and installation procedures, and allow the expanding of flanges with an access gap of 6 mm (0.24") or greater. For example, they may be used to assist in the replacement of ring and other type joints. The use of these instructions will promote safe use, and maximize the service life of the tools. It is recommended that the operator read the relevant sections of this instruction manual for the particular flange expanding wedge to be used.

2. SAFETY INFORMATION

The operator MUST read this manual prior to using the tools.

Failure to comply with the following cautions and warnings could cause equipment damage and personal injury; read the manual fully!

Read all the following instructions, warnings and cautions carefully. Follow all safety precautions to avoid personal injury or property damage during system operation.

We cannot be responsible for damage or injury resulting from unsafe product use, lack of maintenance or incorrect product and/or system operation.

To protect your warranty, use only good quality hydraulic oil of the grade 15cSt.

Only people competent in the use of mechanical and hydraulic equipment should use these tools.

In all installations the site safety requirements must be adhered to. ALSO the safety of the operator, and when present, any assisting personnel, is of paramount importance along with the safety of others including, when present, the general public.

These instructions are only to cover the safe operation of THE SM9T, SH15TC AND SH15T FLANGE EXPANDING WEDGES, during normal maintenance/installation operations. All other safety aspects must be controlled by the operation supervisor.

A **CAUTION** is used to indicate correct operating or maintenance procedures and practices to prevent damage to, or destruction of equipment or other property.

A **WARNING** indicates a potential danger that requires correct procedures or practices to avoid personal injury.

A **DANGER** is only used when your action or lack of action may cause serious injury or even death.



IMPORTANT: Operator must be competent in the use of hydraulic equipment. The operator must have read and understood all instructions, safety issues, cautions and warnings before starting to operate the equipment.



WARNING: To avoid personal injury and possible equipment damage, make sure all hydraulic components are rated to a safe working pressure of 700 bar (10,000 psi)



WARNING: Do not overload equipment. Overloading causes equipment failure and possible personal injury.

The risk of overloading can be avoided by using the Hand Pump, which has its safety valve set to 700 bar by the factory. If alternative pumps are used, ensure they are rated at a safe working pressure of 700 bar (10,000 psi).



CAUTION: Make sure that all system components are protected from external sources of damage, such as excessive heat, flame, moving machine parts, sharp edges and corrosive chemicals.



CAUTION: Avoid sharp bends and kinks that will cause severe back-up pressure in hoses. Bends and kinks lead to premature hose failure. Do not drop heavy objects onto hoses. A sharp impact may cause internal damage to hose wire strands; applying pressure to a damaged hose may cause it to rupture. Do not place heavy weights on the hoses, or allow vehicles to roll over the hoses; crush damage will lead to premature hose failure.



WARNING: Immediately replace worn or damaged parts with genuine parts. Parts are designed to fit properly and withstand rated loads. For repair or maintenance service contact your distributor or service centre.



DANGER: To avoid personal injury keep hands and feet away from the tool and workpiece during operation.



WARNING: Always wear suitable clothing and Personal Protective Equipment (PPE).



DANGER: Do not handle pressurised hoses. Escaping oil under pressure can penetrate the skin, causing serious injury. If oil is injected under the skin, seek medical attention immediately.



WARNING: Never pressurize unconnected couplers. Only use hydraulic equipment in a connected system.



IMPORTANT: Do not lift hydraulic equipment by the hoses or couplers. Use the carrying handle or other means of safe transport.



CAUTION: Do not operate the equipment without lubricating all moving parts as in section 5. Use only high pressure molybdenum disulphide grease.

3. TECHNICAL DATA

	Expanding Force
SM9T	9.4 T (94 kN) from 203 N·m (150 ft·lb) of torque
SH15TC	14.5 T (145 kN) from 10,000 psi (700 bar) of hydraulic pressure
SH15T	15.5 T (155 kN) from 10,000 psi (700 bar) of hydraulic pressure

4. FUNCTIONING PRINCIPLE

- 1.** The flange expanding wedge is placed between the flanges to be spread with the full step area fully inserted as far as the heel of the chosen step.

NB. When expanding a flange joint, it is recommended to use two wedges set 180 degrees apart on the joint. This will ensure that the flange joint can be opened evenly.

-
- 2.** The flange is expand using either mechanical (SM9T) or hydraulic power (SH15TC & SH15T).

-
- 3.** Once the joint has been opened to the desired distance, the safety blocks are inserted into the flange joint and the pressure released gradually back onto them.

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- 4.** The wedges can then be re-inserted using the next step and the flange joint can be opened further.

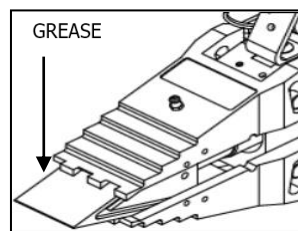
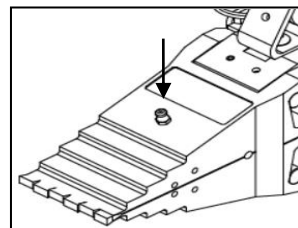
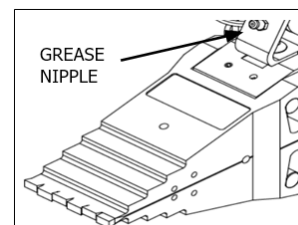
-
- 5.** Repeat this procedure until the flange joint has been opened wide enough to carry out the remedial work (e.g. gasket change-out).
-

5. EXAMINATION, MAINTENANCE AND STORAGE

- On return from each job and before allocation against subsequent work the completeness of the SM9T, SH15TC or SH15T kit must be established and items examined to ensure that they are serviceable.
- Any missing or damaged items are to be replaced as soon as possible and prior to the tool being used again.
- Store the SM9T, SH15TC or SH15T in a cool dry place and ensure all machined surfaces are greased
- Grease all moving parts prior to use:

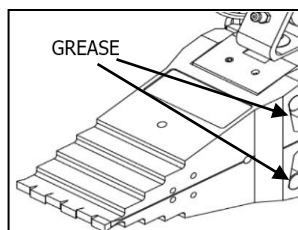
Greasing the wedge:

- Remove the grease nipple from the handle of the tool
- Screw the grease nipple into the jaw, attach the grease gun and squeeze grease into the wedge
- OR
- Connect the hose to the wedge and advance the wedge forward, smear grease onto the surfaces of the wedge



Greasing the slide pins:

- Simply smear some grease into the slots.



6. SM9T MECHANICAL FLANGE EXPANDING WEDGE

6.1 KIT COMPONENTS

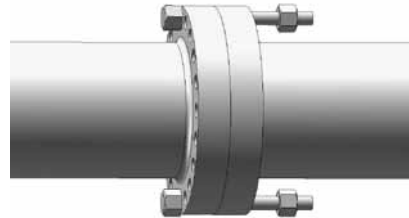
- 1 x Wedgehead
- 1 x 203 N·m (150 ft·lb) Torque Wrench with 22 mm socket
- 1 x Safety Block
- 1 x Pair of Stepped Blocks
- 1 x Hex Key
- 1 x Carton Packaging

Product Code: SM9T

6.2 INSTALLATION AND OPERATION



Before attaching the tool ensure at least two flange bolts remain in place 180 degrees apart with nuts loosened sufficiently enough for flange work to be carried out. These bolts will reduce lateral flange movement during flange spreading.

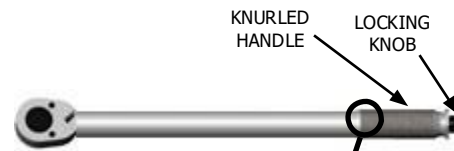


How to use the torque wrench

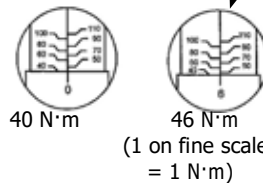
Balance the wrench in your left hand and unlock the knurled handle by turning the locking knob anti-clockwise. Set the torque amount by turning the knurled handle - see example 40-46 N·m

1. Turn the handle till 0 on fine scale reach 40 N·m on base scale
2. To set 46 turn handle till fine scale reach 6
3. Lock handle by turning the locking knob clockwise

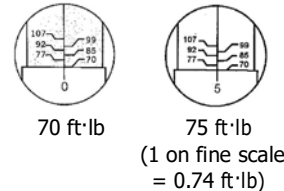
Install the proper socket and attach to the tool. Pull handle till you feel and/or hear the wrench click. Setting of ft·lb scale is done in the same way as above.



Newton Scale (N·m)



Foot Pound (Ft·lb)

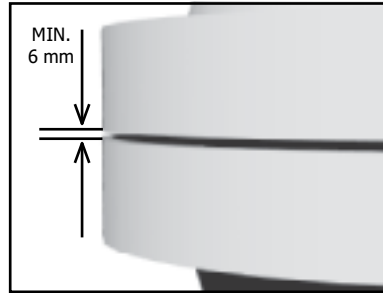


Do not pull after the wrench clicks. Use special care at low torque settings. If the wrench has not been used for some time: operate it several times at low torque to allow internal lubricant to recoat. When not in use set to lowest torque setting. Don't turn handle below lowest torque setting. Your torque wrench is a precision measuring instrument and should be treated as such. Clean only by wiping, do not use any type of cleaner which may affect the special internal lubricant with which this wrench is packed at the factory.

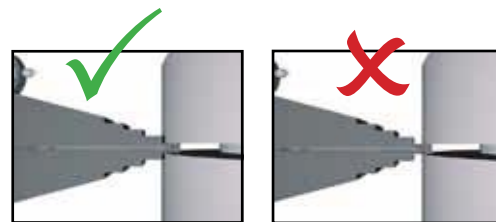


1. Do not attempt to turn the grip while it is locked
2. Do not turn the grip more than one turn below the lowest scale reading or above the highest scale reading

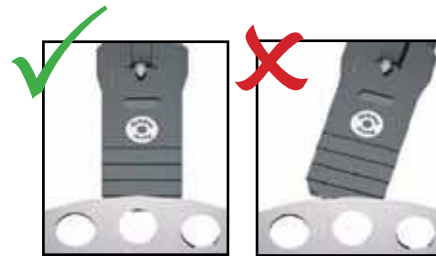
-
- 1.** Ensure the flange joint access gap - a minimum access gap of 6 mm (0.24") is required.



-
- 2.** Insert the wedge into the joint until the heel of the step is in contact with the outer surface of the joint.

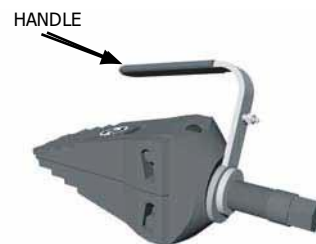


Ensure that the full step is used and that the jaw is positioned centrally.



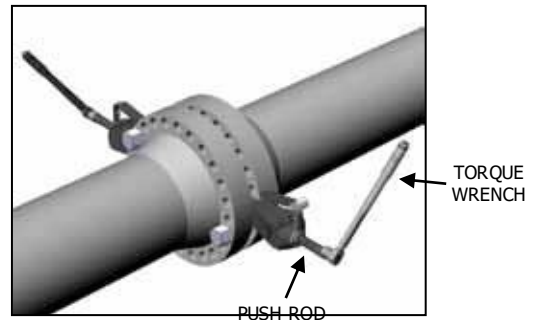
Inserting the wedge incorrectly may result in tool breakage and render the warranty void.

The rotating handle on the SM9T allows ease of access to the joint and can be rotated out of the way of any obstructions present.



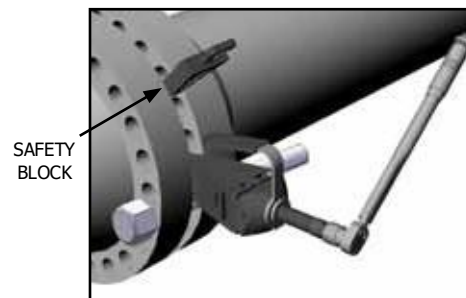
-
- 3.** It is strongly recommended that two SM9T wedges be used on the flange joint positioned 180 degrees apart.

Turn each push rod in a clockwise direction using the torque wrench. Do this on each wedge in turn, ensuring the joint opens evenly. The torque wrench should be set at staged increases, ensuring both tools are applying similar forces e.g. 20 ft·lb, 40 ft·lb etc. until the maximum setting of 150 ft·lb is reached.



Max. torque wrench setting	N/m	203
	Ft/lb	150
Max. spreading force	T	9
	kN	90

-
- 4.** When the joint has been opened to the desired expanding distance, or the maximum spreading distance on the current step is reached, the safety block should be inserted into the joint and the pressure released back onto it.



-
- 5.** The wedge can then be re-inserted on its next step and the joint opened further.

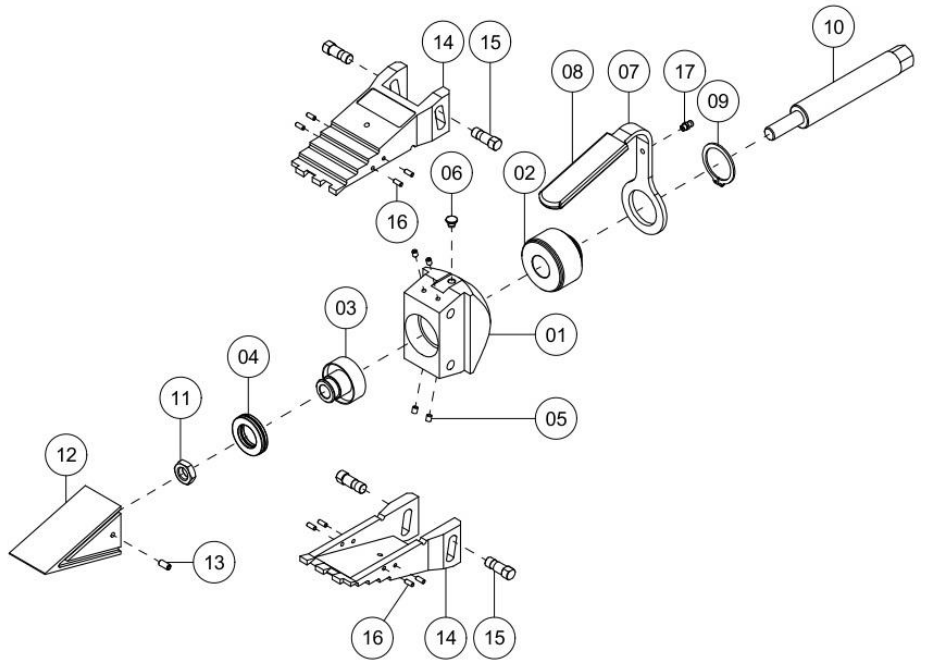
-
- 6.** Once the joint has been spread and all work completed, the wedges should be removed by reversing steps 3-5. Ensure the wedges are released evenly until completely closed.

Care should be taken not to drop any of the component parts when removing them from the flange joint. This action will prevent injuries to either the operator's lower limbs, or to passers-by.

6.3 PARTS LIST

SM9T

ITEM NO.	DESCRIPTION	QTY
01	Main Body	1
02	Adaptor	1
03	Thrust bearing carrier	1
04	Bearing Set	1
05	Screw	4
06	White Plastic Cap	1
07	Handle	1
08	Handle Sleeve	1
09	Snap Ring	1
10	Push Rod	1
11	Nut	1
12	Wedge	1
13	Screw	1
14	Forged Jaw	2
15	Slide Pin	4
16	Roll Pin	8
17	Grease Fitting	1



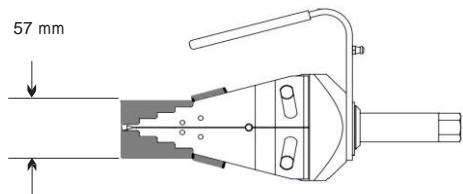
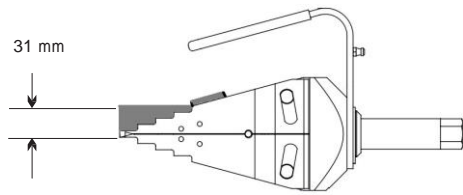
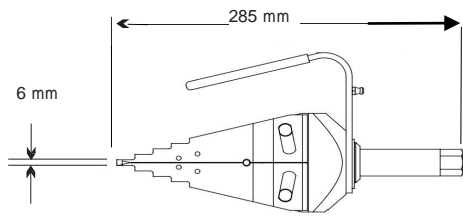
6.4 WEIGHTS AND DIMENSIONS

SM9T Wedgehead = 5.5 kg

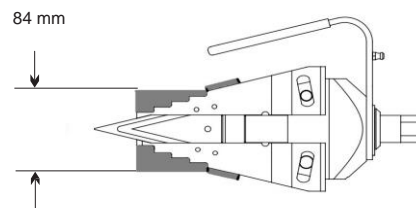
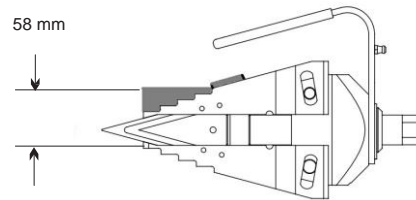
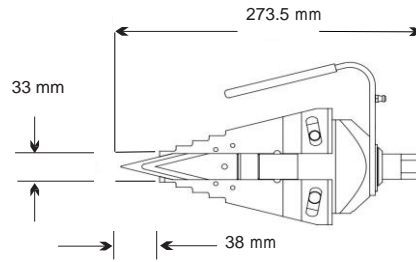
GROSS KIT WEIGHT = 7.5 kg

Packaging Dimensions: 190 x 180 x 320 mm

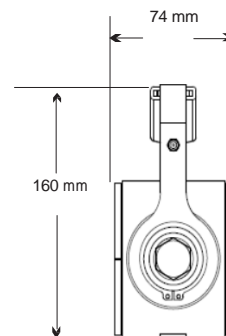
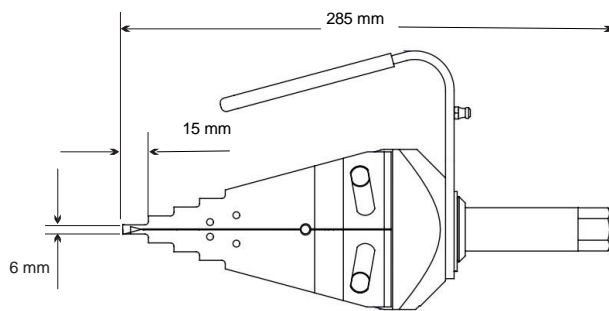
MINIMUM EXPANSIONS



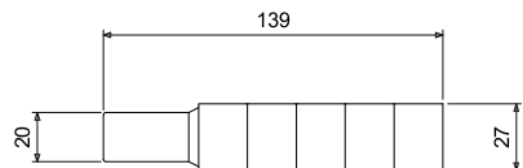
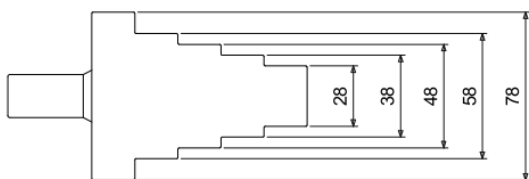
MAXIMUM EXPANSIONS



OVERALL DIMENSIONS



SAFETY BLOCK DIMENSIONS



7. SH15TC INTEGRAL HYDRAULIC FLANGE EXPANDING WEDGE

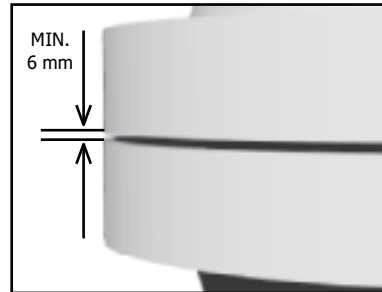
7.1 KIT COMPONENTS

1 x Wedge head
1 x 10,000 psi (700 bar) Integral Hydraulic
Pump/Cylinder
1 x Safety Block
2 x Stepped Blocks
1 x Hex Key
1 x Handle Rod
1 x Molding Case

Product Code: SH15TC

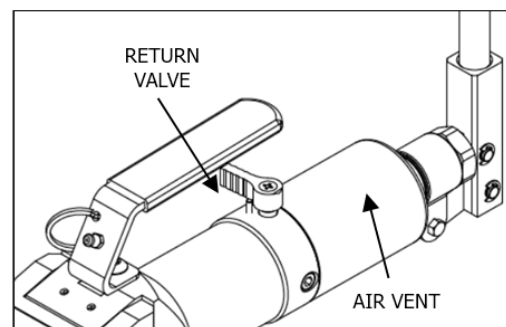
7.2 INSTALLATION AND OPERATION

1. Determine the flange joint access gap - a minimum access gap of 6 mm (0.24") is required.

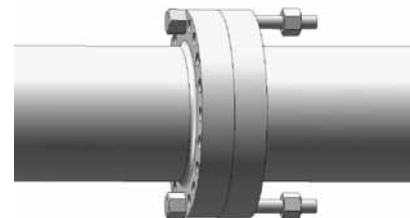


2. Before installing the wedge, ensure that it is fully retracted and tighten the return valve in a clockwise direction to the closed position.

Also ensure the air vent is not obstructed in any way as this will result in a vacuum within the system and the wedge will not advance.



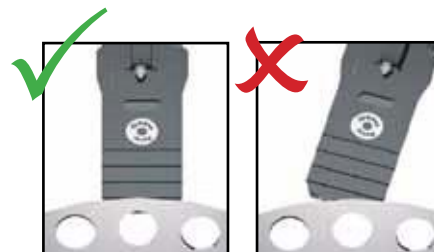
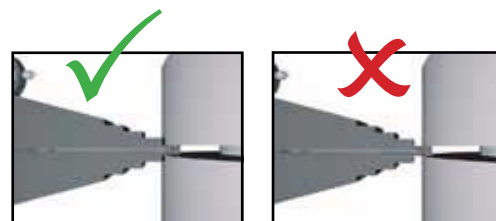
Before attaching the tool ensure at least two flange bolts remain in place 180 degrees apart with nuts removed. These bolts will reduce lateral flange movement during flange spreading.



3. Insert the wedge into the joint until the heel of the step is in contact with the outer surface of the joint.

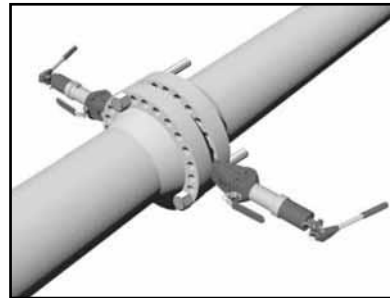
Ensure that the full step is used and that the jaw is positioned centrally.

Inserting the wedge incorrectly may result in tool breakage and render the warranty void.

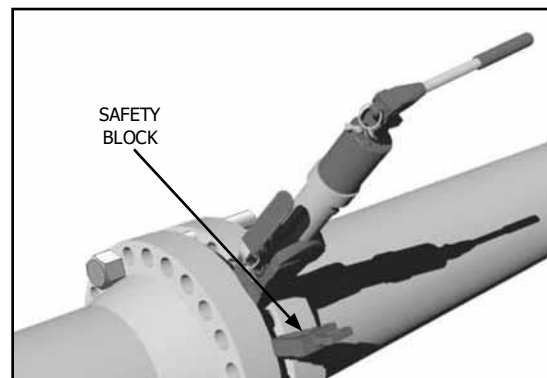


-
- 4.** It is strongly recommended that two SH15TC wedges be used on the flange joint positioned 180 degrees apart.

Prime each pump individually ensuring that the flange joint opens evenly.



-
- 5.** When the joint has been opened to the desired spreading distance, or the maximum expanding distance on the current step is reached, the safety block should be inserted into the joint and the pressure released back onto it.



-
- 6.** The wedge can then be re-inserted on its next step and the joint opened further.

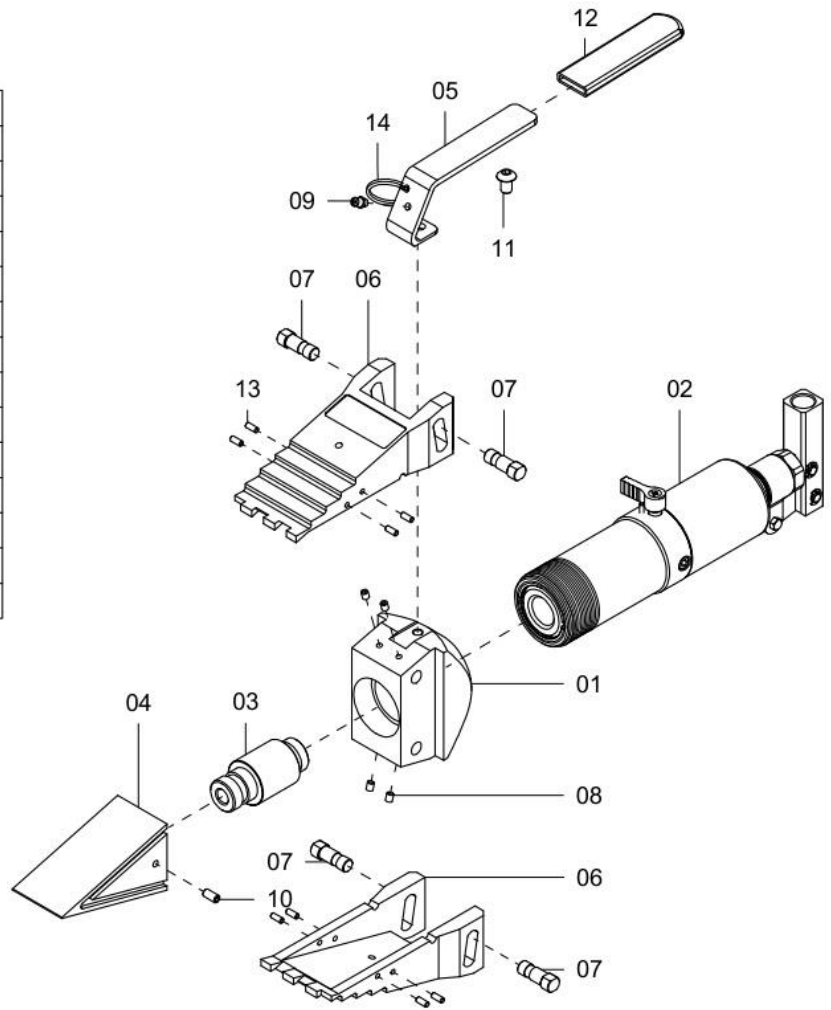
-
- 7.** Once the joint has been spread and all work completed, the wedges should be removed by reversing steps 4 - 6. Release the wedges by turning the return valve anti-clockwise. Ensure the wedges are released evenly until completely closed.

Care should be taken not to drop any of the component parts when removing them from the flange joint. This action will prevent injuries to either the operator's lower limbs, or to passers-by.

7.3 PARTS LISTS

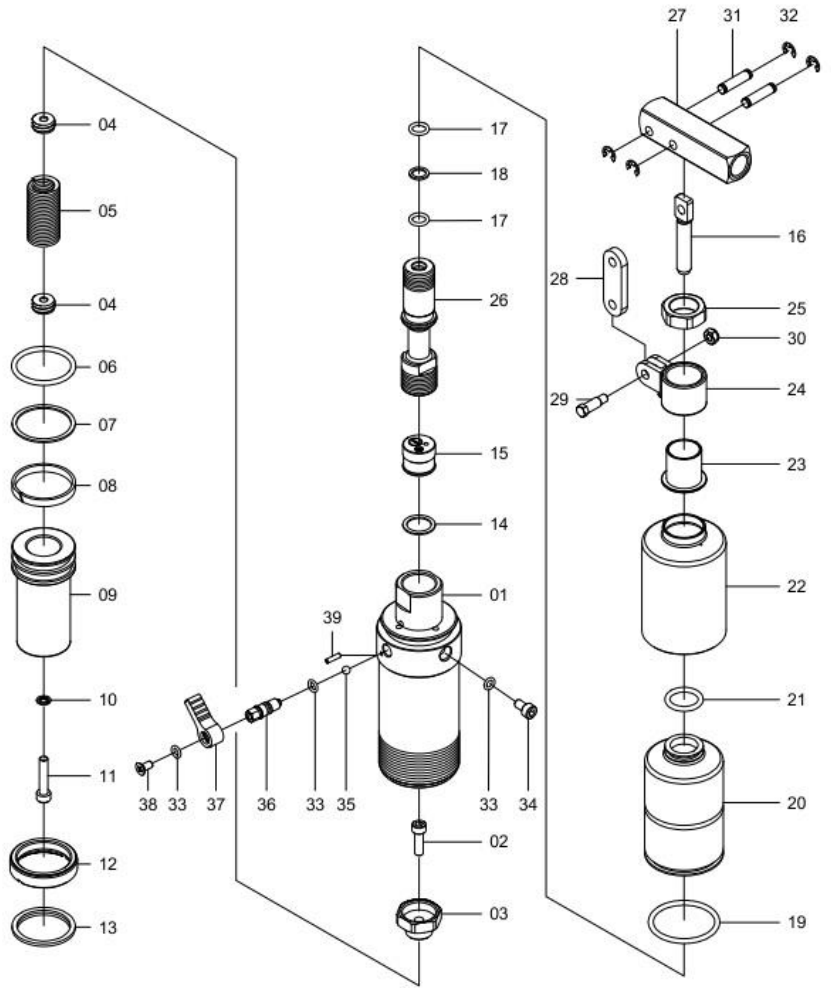
SH15TC

ITEM NO.	DESCRIPTION	QTY
01	Main Body	1
02	Integral Pump And Cylinder	1
03	Push Pin	1
04	Wedge	1
05	Handle	1
06	Forged Jaw	2
07	Slide Pin	4
08	Screw	4
09	Grease Fitting	1
10	Screw	1
11	Screw	1
12	Handle Sleeve	1
13	Roll Pin	8
14	Split Ring	1



INTEGRAL HYDRAULIC PUMP/CYLINDER

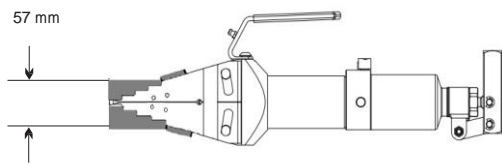
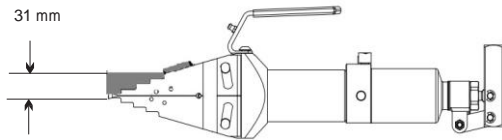
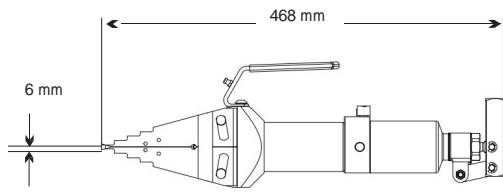
REF NO.	DESCRIPTION	QTY
01	Puller Body	1
02	Screw	1
03	Stop Collar	1
04	Spring Lock	2
05	Spring	1
06	O-Ring	1
07	Back-Up Ring	1
08	Split Ring	1
09	Piston Rod	1
10	Gasket Seal	1
11	Screw	1
12	Fasten Nut	1
13	Wiper	1
14	Copper Washer	1
15	Safety Valve	1
16	Pump Piston Rod	1
17	O-Ring	2
18	Back-Up Ring	1
19	O-Ring	1
20	Reservoir Bladder	1
21	O-Ring	1
22	Bladder Housing	1
23	Piston Housing Cap	1
24	Swivel Clevis	1
25	Retaining Nut	1
26	Pump Piston Housing	1
27	Handle Clevis	1
28	Link Connector	1
29	Clevis Screw	1
30	Anti-Loosen Nut	1
31	Clevis Pin	2
32	E-Ring	4
33	O-Ring	3
34	Screw	1
35	Steel Ball	1
36	Relief Valve Screw	1
37	Relief Valve Knob	1
38	Screw	1
39	Roll Pin	1



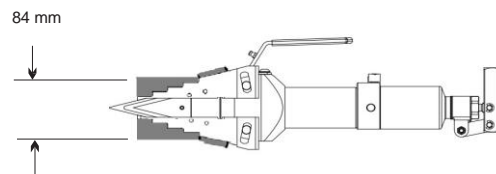
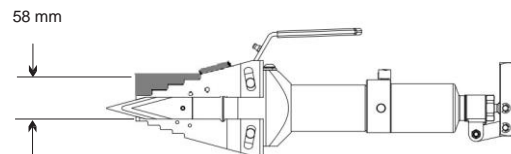
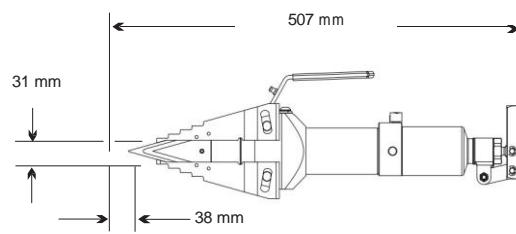
7.4 WEIGHTS AND DIMENSIONS

SH15TC Wedgehead with Integral Hydraulic Pump/Cylinder	= 9.0 kg
Molding Case	= 2.5 kg
GROSS KIT WEIGHT	= 14 kg
Molding Case Dimensions: 580 x 340 x 180 mm	

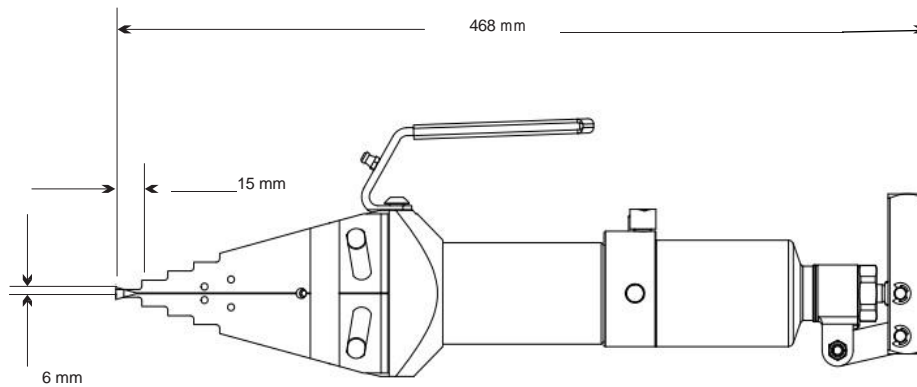
MINIMUM EXPANSIONS



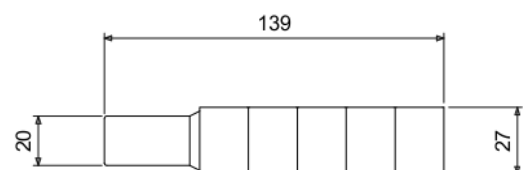
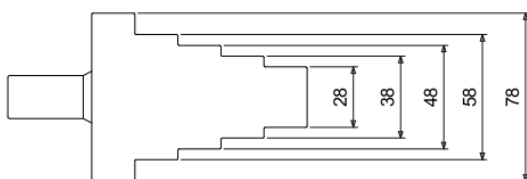
MAXIMUM EXPANSIONS



OVERALL DIMENSIONS



SAFETY BLOCK DIMENSIONS



7.5 TROUBLESHOOTING

Problem: Wedge advances 50% and then stops functioning

- › A sticker has been placed over the air vent ← Remove sticker
- › The operator is covering the air vent with his finger while operating the pump ← One hand should be on the handle of the tool while the other hand operates the pump handle
- › The air vent has become blocked with dirt ← Carefully unblock the air vent using a small blunt object

Problem: No wedge movement

- › Air lock within system ← Open release valve and prime pump to circulate oil around the system
- › Insufficient oil ← Refill with clean oil and bleed system
- › Release valve open ← Close release valve
- › Air accumulates around pump inlet when used upside down ← Bleed out air from reservoir. Look for any oil leaks on reservoir which may indicate a perished bladder. Refer to SH15TC Repair Manual or an approved distributor for further instructions.
- › Inlet check or intermediate valve ball stuck ← Dismantle check valve, free and clean balls. Refer to SH15TC Repair Manual or an approved distributor for further instructions.

Problem: Wedge moves but under load feels as if it is not reaching full pressure

- › Intermediate valve not seating / relief valve leaking ← Check ball for dirt then re-seat using a hammer and punch. Refer to SH15TC Repair Manual or an approved distributor for further instructions.

Problem: Pressure leaks away, handle rises of its own accord

- › Outlet check valve leaking ← Check ball for dirt then re-seat using a hammer and punch. Refer to SH15TC Repair Manual or an approved distributor for further instructions.

Problem: Pressure leaks away, handle remains static

- › Release valve leaking ← Release lever may not be tight enough. Refer to SH15TC Repair Manual or an approved distributor for further instructions.
- › Piston seal leaking ← Look for oil leaking from cylinder bearing. Refer to SH15TC Repair Manual or an approved distributor for further instructions.
- › Leaks on cylinder or pump body ← Check blanking plugs for leaks, tighten. Refer to SH15TC Repair Manual or an approved distributor for further instructions.

Problem: Spongy action

- › Air in system ← Bleed system. Refer to SH15TC Repair Manual or an approved distributor for further instructions.

8. SH15T HYDRAULIC FLANGE EXPANDING WEDGE

8.1 KIT COMPONENTS / KIT OPTIONS

KIT

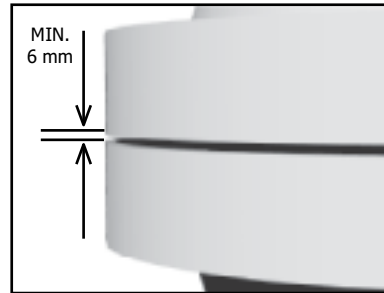
- 1 x Wedgehead
- 1 x 10,000 psi (700 bar) Hydraulic Cylinder
- 1 x Safety Block
- 2 x Stepped Blocks
- 1 x Hex Key
- 1 x Carton Packaging

Product Code: SH15T

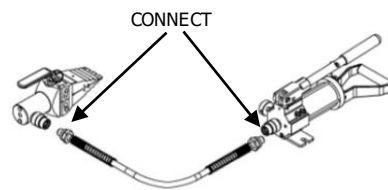
8.2 INSTALLATION AND OPERATION

The SH15T Mini Kit does not contain either a 10,000 psi (700 bar) hydraulic hand pump or a 10,000 psi (700 bar) hydraulic hose. These items will come from the user's inventory.

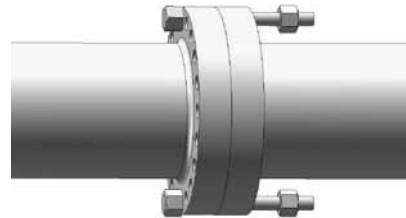
1. Ensure the flange joint access gap - a minimum access gap of 6 mm (0.24") is required.



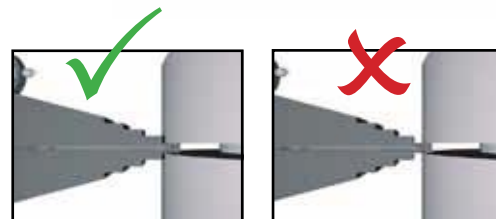
2. Before installing the wedge, the hose should be connected to the respective couplings on the pump and cylinder.



Before attaching the tool ensure at least two flange bolts remain in place 180 degrees apart with nuts removed. These bolts will reduce lateral flange movement during flange spreading.

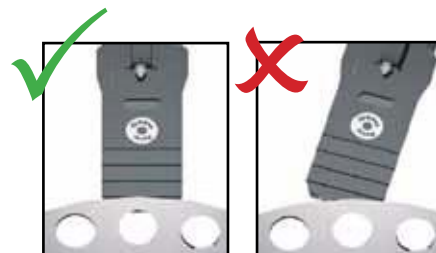


3. Insert the wedge into the joint until the heel of the step is in contact with the outer surface of the joint.



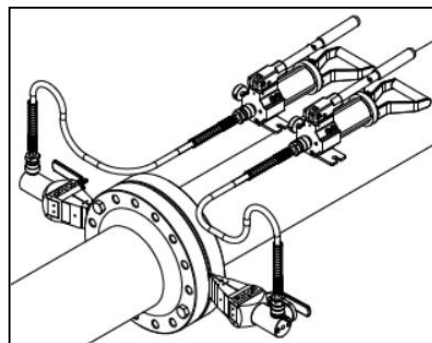
Ensure that the full step is used and that the jaw is positioned centrally.

Inserting the wedge incorrectly may result in tool breakage and render the warranty void.

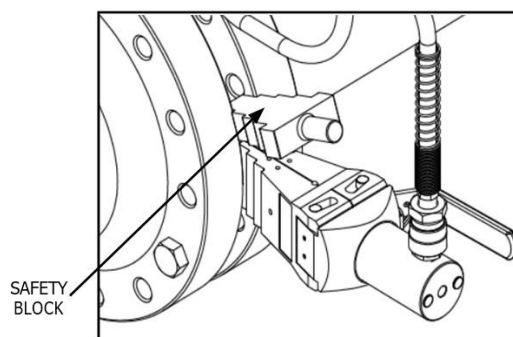


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- 4.** It is strongly recommended that two SH15T wedges be used on the flange joint positioned 180 degrees apart.

Prime each pump individually ensuring that the flange joint opens evenly.



-
- 5.** When the joint has been opened to the desired expanding distance, or the maximum spreading distance on the current step is reached, the safety block should be inserted into the joint and the pressure released back onto it.



-
- 6.** The wedge can then be re-inserted on its next step and the joint opened further.

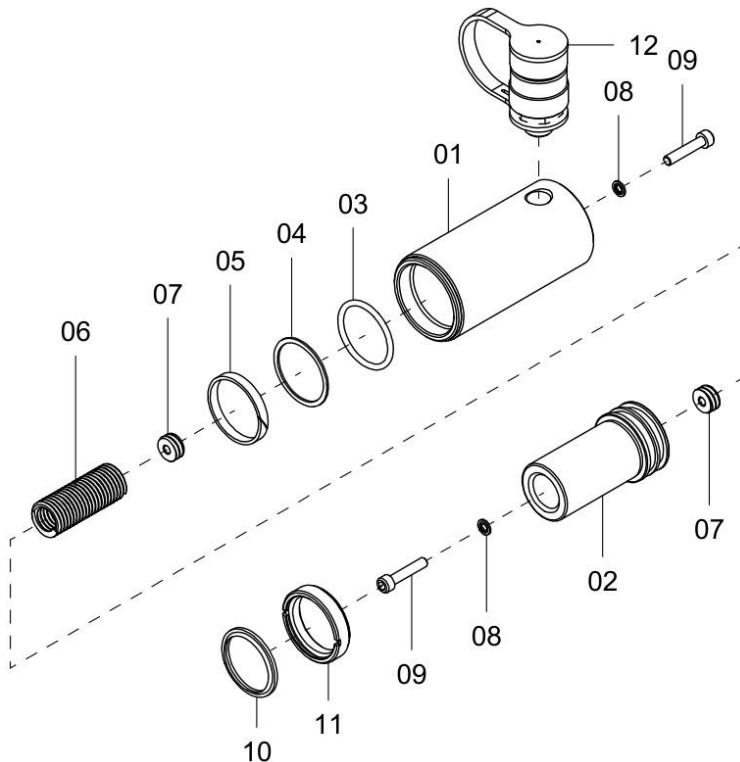
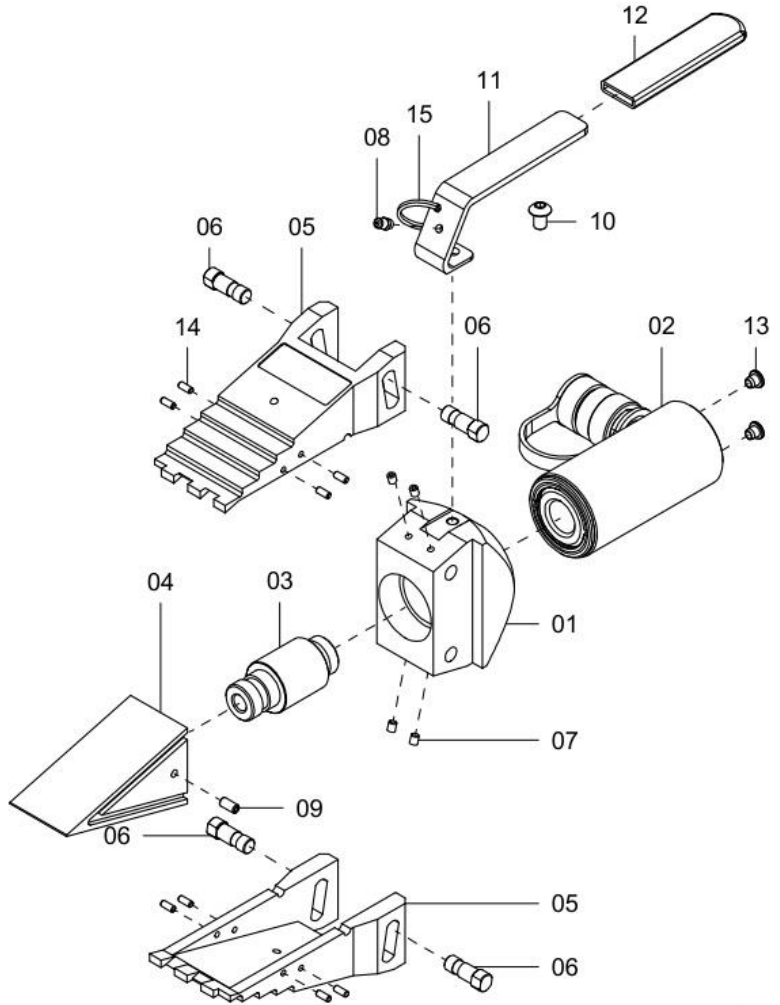
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- 7.** Once the joint has been expanded and all work completed, the wedges should be removed by reversing steps 4 - 6. Release the wedges by turning the release valve on the pump anti-clockwise. Ensure the wedges are released evenly until completely closed.

Care should be taken not to drop any of the component parts when removing them from the flange joint. This action will prevent injuries to either the operator's lower limbs, or to passers-by.

8.3 PARTS LISTS

SH15T

ITEM NO.	DESCRIPTION	QTY
01	Main Body	1
02	Cylinder	1
03	Push Pin	1
04	Wedge	1
05	Forged Jaw	2
06	Slide Pin	4
07	Screw	4
08	Grease Fitting	1
09	Screw	1
10	Screw	1
11	Handle	1
12	Handle Sleeve	1
13	White Plastic Cap	2
14	Roll Pin	8
15	Split Ring	1



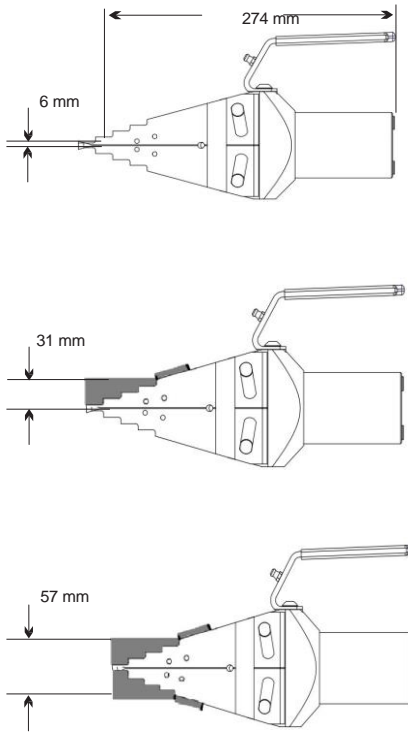
ITEM NO.	DESCRIPTION	QTY
01	Cylinder Base	1
02	Piston Rod	1
03	O-Ring	1
04	Back-Up Ring	1
05	Split Ring	1
06	Retracting Spring	1
07	Spring Lock	2
08	Gasket Seal	2
09	Screw	2
10	Wiper	1
11	Fasten Nut	1
12	Quick Coupler	1

8.4 WEIGHTS AND DIMENSIONS

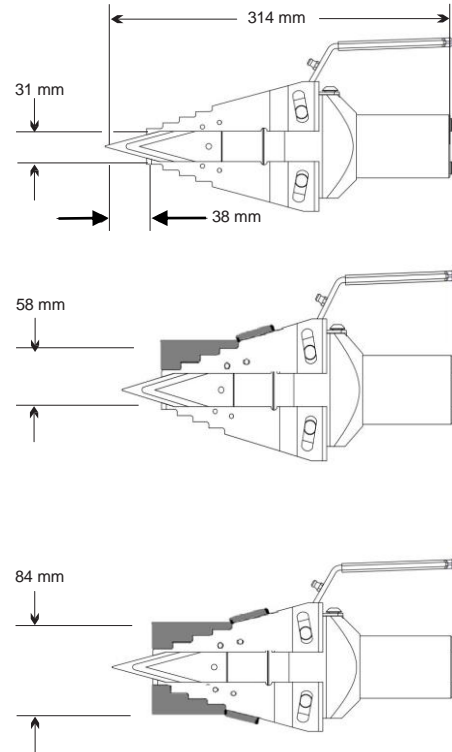
SH15T Wedgehead with Hydraulic Cylinder	= 7 kg
KIT GROSS WEIGHT	= 7.5 kg

Packaging Dimensions: 190 x 180 x 320 mm

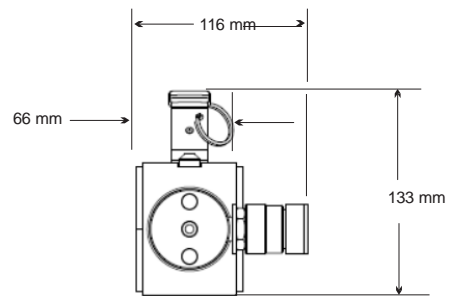
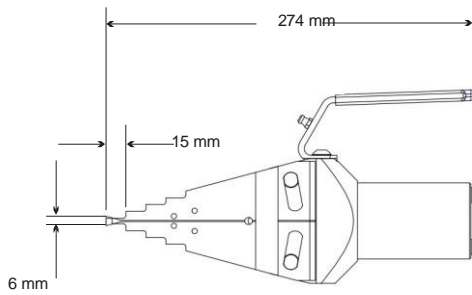
MINIMUM EXPANSIONS



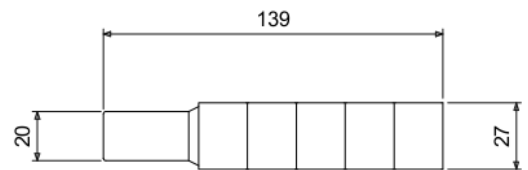
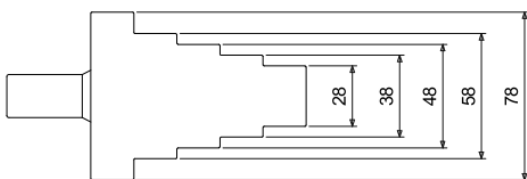
MAXIMUM EXPANSIONS



OVERALL DIMENSIONS



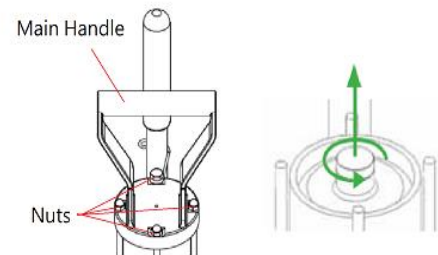
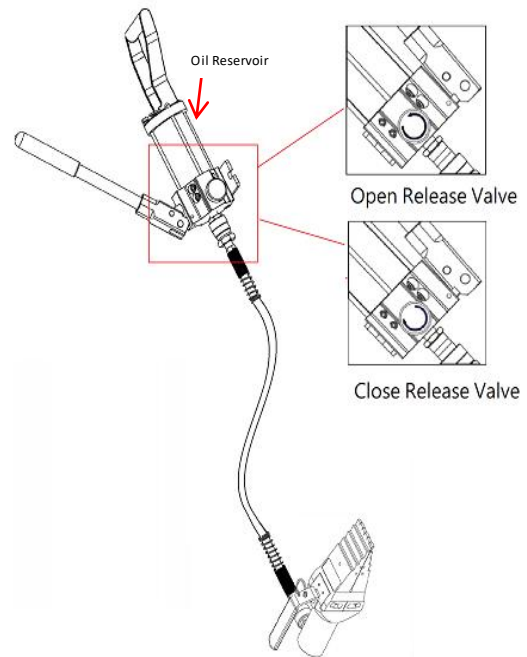
SAFETY BLOCK DIMENSIONS



8.5 TROUBLESHOOTING

Problem: The wedge is advancing but does not reach full pressure

- ↗ Air could be present in the hydraulic system ← Use the airlock removal procedure as follows:
1. Connect the hand pump to the tool with the hydraulic hose
 2. Close the release valve on the pump, and prime the pump until the hydraulic cylinder is fully extended and a small pressure is achieved
 3. With the hand pump held above the tool and the tool in an upright position, open the release valve causing any air that is within the system to be forced up through the pump and vented into the oil reservoir
 4. Repeat steps 1 - 3 three or four times to ensure that all air is removed from the system and the tool will reach full working pressure
 5. Disconnect the hand pump from the hydraulic hose, grip the baseplate of the hand pump body in a vice with the pump body vertical and the main handle at the top
 6. Remove the four nuts holding the main handle and lift off
 7. Grip the refilling plug with pliers and extract it by pulling and twisting simultaneously. Ensure the reservoir body is held down when removing the refilling plug as pulling up on the reservoir body will release the bladder within, and oil will spill out.
 8. Fill the reservoir to the top with a good quality hydraulic oil of the grade 15 cSt
 9. Reinsert the refilling plug, wipe away any oil, and reassemble by reversing the disassembly process

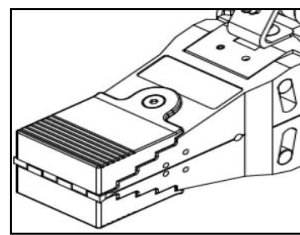
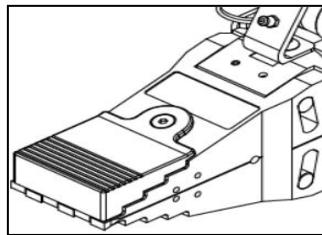


9. STEPPED BLOCK ACCESSORY

9.1 INSTALLATION AND OPERATION

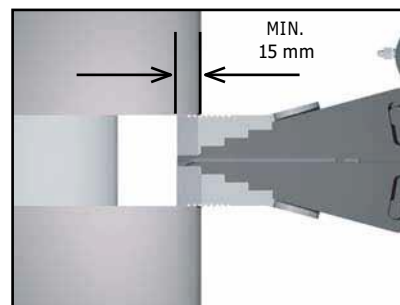
The Stepped Block enables the SM9T, SH15TC and the SH15T to be used in a joint with a larger gap, and to be used to open a joint further with less penetration (allowing, for example, spectacle blinds to be change with ease).

The stepped blocks can be used individually or as a pair.



1. Attach the stepped block to the tool using the M6 countersunk screw

2. Insert the tool into the joint. Ensure there is a minimum hold of 15 mm (0.59") and that the full width of the block is used



9.2 KIT COMPONENTS

2 x Stepped Blocks
2 x M6 Countersunk Screws

PRODUCT CODE: SBM62



9.3 WEIGHTS AND DIMENSIONS

Stepped Block = 0.52 kg

GROSS KIT WEIGHT = 1.5 kg

