PANDROL

Self Feed Rail Drill

MODEL 03500

OPERATION AND MAINTENANCE MANUAL

ENG_OMM_SELF_FEED_RAIL_DRILL_P01
15th November 2021

Partners in excellence

Thank you for choosing Self Feed Rail Drill!

You are now the owner of a quality product from Pandrol.

1. Preface

This manual aims to help you get to know your new Self Feed Rail Drill, to use it in the best way and to maintain it properly for a long lifetime. It also presents important safety regulations and warnings.

The manual is intended for people who handle and operate the machine. It is originally written in English and translated into the local language by Pandrol.

Pandrol reserves the right to change specifications, equipment, instructions and maintenance guidelines without prior notice.

The manual contains instructions about the following topics:

1. Installation
2. Operation
3. Safety features and warnings
4. Maintenance and troubleshooting

(1) refers to a component in a figure/illustration.

IMPORTANT

This manual contains ordered actions, e.g.

1. Do this
2. ...and then this...
3. ...and finally this

These actions **must** be done in the numerical order presented.

2. Revision

Revision	Date	Comments
P01	2021-11-15	New Manual

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3. Safety Information

3.1. General

- Tool operators and maintenance personnel must always comply with the safety precautions given in this manual, and with all stickers and tags attached to the tool and hoses.
- All safety precautions are given for your safety. Read to understand and follow all safety, maintenance and operation instructions before you use or maintain the tool.
- Review the manual daily before using the tool.
- Follow all safety guidelines given you by your supervisor. Do not use the tool if you have any questions about the operation, safety or maintenance of this tool . Failure to follow these instructions can result in personal injury or equipment damage.
- Pandrol has no control over the tool use or operation once it leaves the plant. Pandrol has no control over operator or maintainer selection. The customer must assume responsibility for the tool suitability for a particular function.
- During use of the tool, good judgement must be used to work safely and efficiently without endangering themselves or bystanders.
- Understanding of the operation and maintenance manual is essential for anyone using or maintaining the tool.
- Warnings and safety precautions described in this document shall only be considered as a minimum. National conditions, standards and regulations override conditions, standards and regulations described in this document.
- Work with the machine is only to be carried out by qualified personnel, well-informed and educated in general railway workmanship and specifically in the conditions, standards and regulations on specific rail track.
- The machine may only be used for its specified purpose.
- Any adjustments or service on the machine is only allowed to be done by qualified personnel that have read and understood this manual and have had training and information from Pandrol.

3.2. Safety actions

- Read and understand all safety regulations and warnings before installation, operating or performing maintenance on this machine.
- Do not operate the tool until you have been thoroughly and properly trained or under the supervision of an instructor.
- Check power source daily to determine if correct flow and pressure are available. Never exceed flows or pressures for the tool being used. Personal injury or damage to the tool can result.
- Operators must clear the work area of non-essential personnel. Flying debris can cause serious injury.
- The operator must be familiar with all prohibited work areas such as unsafe grades, poor footing areas and overhead hazards.
- Use standards and regulations, accident prevention regulations and regulations concerning special ambient conditions (e.g. areas potentially endangered by explosive materials, heavy pollution or corrosive influences).
- Maintain balance and proper footing at all times. Never overreach to the extent that a broken part or sudden movement of the tool can cause you to lose your balance and fall, or cause injury to your self or someone else.

- Do not operate the tool at excessive fluid temperatures operator discomfort and potential burns can result at high oil temperatures.
- Do not clean inspect or repair the tool while connected to the power source. Accidental engagement of the tool can cause serious personal injury.
- Oil injection hazard exists with this tool. Oil injection is a condition where hydraulic oil is injected under the skin from pressure in the line. Always wear gloves and repair any leaks immediately. Never carry a tool by the hoses.
- Do not use damaged equipment. Immediately replace any damaged hoses, fittings, or other components showing wire braid, nicks, cuts, damage or abrasions. Failure to do so may result in equipment damage and / or personal injury or death.
- Clean up any oil or fluid spills immediately.

3.3. Personal/Safety equipment

- Never wear loose clothing that can get entangled in the working parts of the tools or be careless with hands, feet or other body parts around the working parts of the tools. Hydraulic tools exert high torque and force and can cause serious injury or death if improperly used.
- When working near electrical conductors, always assume that the conductors are energized and that hoses and clothing can conduct harmful electricity. Use hoses labeled and certified as nonconductive.
- Always wear safety equipment such as oil injection resistant work gloves, safety glasses, safety boots, ear protection and other safety apparel dictated by your supervisor applicable for the job you are doing and the tool you are using.
- The use of an compressed air, which must be less than 8 BAR (116 PSI), to blow parts clean or to blow them dry after being cleaned with a solvent will cause particles of dirt and/or droplets of the cleaning solvent to be airborne. These conditions may cause skin and/or eye irritation. When using an air jet do not direct it toward another person. Improper use of air jet could result in bodily injury.

3.4. Safety precautions

- Always wear protective equipment such as gloves, safety glasses, ear protection and safety shoes.
- Do not wear clothing which may become entangled in the tool.
- Always keep work area free of tools or any other objects which may impair sound footing.
- Caution - oil injection hazard exists with this tool. Oil injection is a condition where the hydraulic oil is forced under the skin through pressure in the line. Always wear gloves, do not carry the tool by the hydraulic hoses, and repair leaks immediately.
- Do not inspect, replace the drill bit or clean the tool while the hydraulic power source is connected. Accidental engagement of the tool can cause serious injury.
- Always connect hoses to the tool hose couplers before energizing the hydraulic power source. Be sure all hose connections are tight.
- Do not operate the tool at oil temperatures above 140°f/60°c. Operation at higher temperatures can cause higher than normal temperatures at tool which can result in operator discomfort.
- Never transport or carry tool with unit energized.
- Do not operate a damaged, improperly adjusted, or incompletely assembled tool.
- Keep hands and fingers away from rotating parts.

- Safety symbols are used to emphasize all operator, maintenance and repair actions which, if not strictly followed, could result in a life threatening situation, bodily injury or damage to equipment. Always observe safety symbols. They are included for your safety and protection of the tool.
- Always store the tool in a clean dry space, safe from damage or pilferage.
- Do not exceed the rated limits or use the tool for applications beyond its design capacity.

3.5. Qualified personnel

The machine is only to be used by trained personnel, thoroughly familiar with and trained in general railway workmanship. The equipment should be operated according to the conditions and standard regulations applying to the track they are working on.

The equipment must be serviced, maintained, or in any way modified only by trained personnel, who are familiar with the Operation & Maintenance Manual and have received training and information from Pandrol.

In order to avoid personal injury and/or material damage, everyone involved with assembling, starting-up or overhaul must possess relevant knowledge of the equipment, its use, maintenance requirements and procedures.

4. Summary

The Pandrol Self Feed Rail Drill is a light weight maintenance tool that offers cost effective operation. Maintenance crews will appreciate the simple clamp for quick setup on track. The use of arrowhead inserts (patented), allows for quick drilling time and precision holes. The drill includes a lubrication system.

Fig 1.

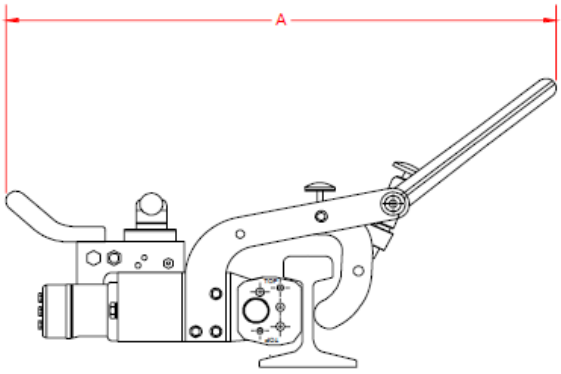


Fig 2.

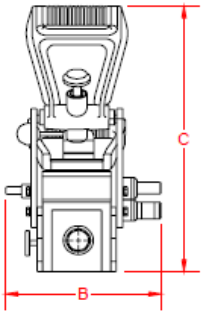


Fig 3.

Flow	**Pressure**	**Dimensions**	**Weight**
10GPM (38 LPM)	2000 PSI (140 BAR)	A - 35" (88.9 cm) B - 9" (22.86 cm) C - 15 - 1/2" (39.37 cm)	66 lbs (30 kg)

Accessories:

03532 - Rail templates (Specify rail profile)

01540 - Index bars (Specify rail profile)

03598 - Storage case

03599 - Biodegradable cutting fluid (1 or 5 US gallons)

5. Pre-operation procedures

- The tool as shipped has no special unpacking or assembly requirements before usage. Inspection to assure the tool was not damaged in shipping and that it does not contain packing debris is all that is required.
- Check hydraulic power source using a calibrated flowmeter and pressure gauge to confirm flow rates and back pressure as outlined in the hydraulic system requirements.
- The hydraulic circuit control valve must be in the "OFF" position when coupling or uncoupling the tool. Failure to do so may result in damage to the quick couplers and cause overheating of the hydraulic system.
- Connect the hoses from the hydraulic power source to the hose couplers on the tool. It is a good practice to connect the return hose first and disconnect it last to minimize or avoid trapped pressure within the tool.
- Observe the “P” and “T” port lettering on the valve block assembly to ensure that the hydraulic flow is in the proper direction. The “P” port lettering indicates the inlet (pressure) side.
- The pressure increases in uncoupled hoses left in the sun, resulting in making them difficult to connect. When possible, connect the free ends of operating hoses together.
- The 03500 self-feed rail drill comes complete with a separate coolant container assembly that is used to deliver coolant to the drill bit. Follow instructions on side of coolant tank or below for mixing coolant.

    A. Pour 12 oz. Of Pandrol part no. 03599 Or equal biodegradable coolant concentrate into coolant tank.

    B. Add 2 gal. Of water (20:1 ratio).

    C. Screw in pump mechanism and shake coolant tank to mix coolant and water.

    D. Pressurize the coolant tank using the carrying handle pump.

    E. Connect the coolant tank assembly to the drill using the supplied hose on the coolant tank and the quick disconnect coupler on the drill.

6. Operation

- Observe all safety procedures and precautions.
- Make sure the drill bit holder intended to use contains insert with good cutting surfaces. If surfaces are worn or chipped, unscrew the retaining screws and replace insert. Make sure the drill holder is not damaged.
- Install the drill holder into the drill piston and then turn it clockwise until it stops.
- Install the form block templates onto the self- feed rail drill with the desired rail profile facing the rail. Templates are marked with an "⬅","top" and the rail profile designation i.e.: "133RE". When attaching template to drill make sure rail profile designation is towards rail web and arrow is pointing toward rail and the word "top" is up on template.
- Install an indexing BAR onto rail and position it where you want to drill. See chart in manual for selection of indexing BARs available and corresponding part numbers.

NOTE!
- **To avoid drill bit damage, make sure the drill bit/piston assembly is fully retracted before placing the self-feed rail drill on the clean section rail**

- Set the self feed rail drill over the indexing BAR on the rail so that the form block templates are nested between the ball and the base of the rail and the adjusting screw (item 52) fits in the slot on the indexing BAR.
- Adjust the threaded shaft (item 44) until there is no movement of the selffeed rail drill as it sits on the rail and indexing BAR. Wiggle the drill to remove all looseness. Lift the handle (item 49) up and turn the threaded shaft (item 44) clockwise approximately ½ turn. Push handle (item 49) down hard to firmly clamp drill to the rail. Repeat procedure as needed to obtain required rigidity of drill.

NOTE!
- **If drill is not firmly clamped to rail, breakage of drill bits and out of tolerance holes will result**

- Turn the control valve(s) on the hydraulic source to the "ON" position.
- To begin drilling, move the control lever on the self feed rail drill to the "drill" symbol as indicated by the decal on the valve, or move the control lever toward the rail. The drill bit will turn and advance simultaneously. Make sure coolant is spraying on drill bit.
- To stop drilling move the control lever to center position or the "stop" symbol.
- To retract the drill bit move the control lever to the "retract" symbol or away from the rail.
- When drilling is complete:

  A. Uncouple the coolant hose from the rail drill.

  B. Remove drill bit by turning the bit counterclockwise and pull out.

  C. Retract the piston

  D. Clean the drill thoroughly.

  E. Store in a dry area.

6.1. Cold weather operation

Hydraulic system performance is affected when the temperature drops below 50°F. Therefore, measures should be taken to pre-warm tools and fluids before operating.

NOTE!

- **Refer to operating procedures of this manual before starting**

7. Self feed rail drill bit options

Fig 4.

Arrowhead insert

(Patented)

Insert specifications:

Part no.	Insert diameters english	Insert diameters metric
03570-1	1 1/16”, 1 1/8”, 1 3/16”, 1 1/4”,	22MM, 23MM, 24MM, 25MM
03571-1	1 5/16”, 1 3/8”	26MM, 27MM, 28MM, 29MM, 30MM, 31MM, 32MM, 33MM, 34MM, 35MM
03572-1	1 7/16”, 1 1/2”, 1 5/8”	36MM, 37MM, 38MM

Part no. Designates which diameter inserts are available for that particular holder.

Accessories:

03532 - Rail templates (specify rail profile)

01540 - Index bars (specify rail profile)

03598 - Storage case

03599 - Biodegradable cutting fluid (1 or 5 US gallons)

Arrowhead Inserts - (See chart above)

Rail templates

Part no.	Description
03532-1	112-115-119 / 131-132-136
03532-3	100 Area - U.P. / 105 Dudley
03532-4	133 Area / 140 Area
03532-5	127 Dudley / 130 PS
03532-06	90 A.R.A.-B
03532-7	90 A.R.A.-A
03532-8	110 Area / 110 Area - U.P.
03532-9	112-115-119 / 141 AB
03532-10	100 Area (2-45/64" to centerline of hole)
03532-11	131-132-136 Re / 133 RE
03532-12	100 A.R.A.-B.
03532-13	85 A.S.C.E.
03532-15	100 a.R.A.-A.
03532-16	22 kg/m
03532-17	30 kg/m
03532-18	48 kg/m
03532-19	57 kg/m
03532-20	152 Ps

Indexing bars

Part no.	Description
01540-1	2-11/16 x 5-1/2
01540-2	2-1/2 x 6-1/2
01540-3	3-1/2 x 6 x 6
01540-4	2-13/32 x 5 x 5
01540-5	2-3/4 x 5-5/8 x 5-5/8
01540-6	2-11/32 x 5 x 5
01540-7	2-23/32 x 6 x 7
01540-8	2 x 7
01540-9	2-3/16 x 4-1/2
01540-10	2-5/8 x 5-1/2
01540-11	2-5/16 x 6-1/2 x 6-1/2
01540-12	2-1/2 x 6
01540-13	3 x 6-1/2 x 6-1/2
01540-14	2-1/2 x 5-1/2
01540-15	2-1/2 x 5
01540-16	2 x 4-1/2
01540-17	2-3/4 x 5.6 x 5.6
01540-18	2-7/16 x 6-1/2

ACCESSORIES:

Part no.	Description
03598	Storage case
03599-1	Biodegradable cutting fluid - 1 Gallon
03599-5	Biodegradable cutting fluid - 5 Gallons
03500	Self feed rail drill

8. Troubleshooting

If symptoms of poor performance develop, the following chart can be used as a guide to correct the problem. When diagnosing problems with operation of the drill, always check that the hydraulic power source is supplying the correct hydraulic flow and pressure to the drill as listed in the specifications. Use a flowmeter to be accurate. Check the flow with the hydraulic oil temperature at least 80°F / 27°C.

Problem	Cause	Remedy
Drill does not run	Hydraulic power source not functioning Couplers or hoses blocked Hydraulic motor failure Hydraulic lines not connected	Check power source for proper flow and pressure (10 GPM @ 2000PSI) Locate and remove restriction Inspect and repair Connect lines
Drill bits dulls quickly	Incorrect oil flow Insufficient amount of coolant	Check power source for proper flow and pressure (10 GPM @ 2000PSI) Replace insert, increase flow of coolant make sure pressure tank is fully pumped. Check for clogs in supply line from coolant tank.
Drill moves on rail during drilling operation	Not clamped properly Wrong templates Template knobs loose	See clamping instructions Use correct templates and verify fit Tighten knobs securely
Drill viberates during drilling	Wrong templates Template knobs loose Not clamped properly	Use correct templates and verify fit Tighten knobs securely See clamping instructions
Inserts chipped	Some chipping is normal incorrect templates insufficient amount of coolant Not clamped properly template knobs loose handling damage	Replace is poor hole finish is noticed use correct templates and verify fit replace insert, increase flow of coolant make sure pressure tank is fully pumped. Check for clogs in supply line from coolant tank. See clamping instructions Tighten knobs securely Make sure drill bit is retracted when installing the drill on the rail. Avoid insert contact with hard objects.
Insert screw difficult to remove	Not assembled with lubricant	Install screw with antiseize lubricant on the threads

9. Hydraulic system requirements

- The hydraulic system should provide a flow of 10 GPM / 38LPM at an operating pressure of 2000 PSI / 140 BAR. Recommended relief valve setting is 2100-2250 PSI / 145-155 BAR.
- The system should have no more than 250 PSI / 17 BAR back pressure measured at the tool end of the operating hoses. The system conditions for measurement are at maximum fluid viscosity at minimum operating temperatures.
- The hydraulic system should have enough heat rejection capacity to limit the maximum oil temperature to 140°F / 60°C at the maximum expected ambient temperature.
- The hydraulic system should have a minimum of 25-micron filtration. Use of filter elements sized for a flow of at least 30 GPM / 114 LPM for cold temperature start-up and maximum dirt holding capacity is recommended.

10. Review of hydraulic principles

Tool circuit

10.1. Hydraulic formulas

$$GPM = \frac{CID \times RPM}{231}$$

$$HP = \frac{GPM \times PSI}{1714\ (.85)\ 1456.9}$$

Example: HP required to deliver 10 GPM at 1500 PSI.

$$\frac{10\ GPM \times 1500\ PSI}{1456.9} = \frac{15000}{1456.9} = 10.3\ HP$$

(subtract back pressure for tool HP)

Estimated HP delivered by pump or used by tool

	PSI					
GPM	**500**	**1000**	**1500**	**2000**	**2500**	**3000**
3	1.03	2.06	3.09	4.12	5.15	6.18
5	1.72	3.43	5.15	6.86	8.58	10.30
10	3.43	6.86	10.30	13.70	17.20	20.60
15	5.15	10.30	15.40	20.60	25.70	30.90

10.2. Back pressure

Back pressure measured at the tool return port must not exceed the manufacturers back pressure rating. Most manufacturers list the maximum back pressure for their hydraulic tools at 250 PSI. Back pressure measured on the return side of the tool is the force required to get the oil back to the tank. In almost all cases the lower the back pressure the better the tool performance. First, the back pressure is subtracted from the maximum tool pressure to arrive at a maximum tool operating pressure. For example, tools with 2000 PSI operating pressure are installed on a system with 250 PSI back pressure. This leaves 1750 PSI as a maximum tool pressure. Imagine a system with 500 PSI back pressure. 2000 Minus 500 PSI back pressure leaves only 1500 PSI for the tool. Second, tools are designed for pressure to build on the pressure side of the tool. If too much pressure builds on the return side, not only is performance effected, but seals may blow. This is why it is very important to direct the flow into the tool correctly. Reversing the hoses to test may result in blown seals, damage to the tool, and personal injury.

11. Maintenance

11.1. General

Maintenance and overhaul is to be carried out by qualified personnel only
Warranty is based on parts and spares delivered by Pandrol.

Check tools DAILY for proper operation, leaks, or damage.

Inspect hoses DAILY. Replace cut, burned, or otherwise damaged hoses.

Keep quick disconnect couplers clean and lubricated.

Use hydraulic fluids that comply with HTMA Specification 5.7, The hydraulic fluid should have a viscosity between 100 and 400 SSU (20-82 centistokes) at the maximum and minimum expected operating temperatures. Petroleum based hydraulic fluids with anti-wear properties and a viscosity index of over 140 work for a wide range of operating conditions.

The following oils meet HTMA Specification 5.7

AMOCO RYKON MV	CITGO A/W ALL TEMP
SUNVIS 706	MOBIL D.T.E. 13
CHEVRON EP-MV	TEXACO "RANDO" HDAZ

Other fluids that meet or exceed this specification can be used.

*** See cold weather operation hydraulic oil note.**

Have tool inspected, at least annually, by Pandrol or a Pandrol qualified service representative to determine if tool is in need of safety changes or worn part replacement.

Contact Pandrol on a periodic basis, at least annually, for service Bulletins, safety notices, or other important information pertaining to this tool.

WARNING!

- **All adjustments work, overhaul and service must take place with the machine turned off. Failure to do so could lead to fatal injury.**
- **It is of great importance that qualified personnel accomplish all service and overhaul**

11.2. Warning labels and information symbols

Below are examples of warning labels and information symbols on the machine. If any of these labels become damaged or lost, they are to be replaced with new original warning labels that are available from Pandrol.

12. Limited warranty

Pandrol, INC warrants to the original purchase of this product that the product will be free from defects in material and workmanship for the period of one (1) year after the delivery of such product to the customer. Other equipment and parts used, but not manufactured by Pandrol are covered directly by the warranty of the manufacturer of those products. Proof of purchase must be documented including reference to a serial number located on each tool. The purchaser's only remedies under this limited warranty shall be limited at Pandrol's sole option to the following: repair, replacement or refund of the purchase price of the defective products. Each of these remedies requires timely notification of the defect in the product and substantiation that the product has been properly stored, maintained and used. Pandrol's obligations hereunder extend only to the purchaser of the product and not to any third party.

As a condition precedent to Pandrol's obligation hereunder, the defective product must not have been altered or modified without the express written approval of Pandrol. The product must not have been subjected to deliberate damage, shipping damage, neglect, tampering by unauthorized personnel or damage by improper use, storage or maintenance. Serial numbers must not have been altered, defaced or removed. Such action voids limited warranty.

12.1. Exclusions to limited warranty

This limited warranty is exclusive and is in lieu of any other warranty, written or oral, expressed or implied, including, without limitation, any implied warranty or merchantability or fitness for a particular purpose.

Limited warranty does not cover normal wear and tear items such as filters, hoses, couplers, bits, sockets, augers, and batteries

12.2. Limitation of liability

Except as provided above, Pandrol shall in no event be liable or responsible for any injury, loss or damage, direct, incidental or consequential, arising out of the use or misuse or inability to use the product, however caused and on any theory of liability including, without limitations, breach of contract, tort, (including negligence or street liability) and not withstanding any failure of any remedy herein of its essential purpose, even if Pandrol was aware of this possibility of such damage. Pandrol's limited warranty as set forth above shall not be enlarged, diminished or affected by, and no obligation or liability shall arise or go out of the rendering of technical advice or service by Pandrol or its agents. The foregoing may not be changed except by written agreement signed by an authorized officer of Pandrol, the remedies set forth herein are exclusive.

13. Customer information

Name _____

Company _____

Serial # of your Pandrol tool _____

Upon receiving your Pandrol tool, make sure to list serial number above so that a good record is kept for order information.

Pandrol hydraulic tool list

All Pandrol Hydraulic Tools operate at 5 GPM (19 LPM) or 10 GPM (38 LPM) @ 2000 PSI (140 BAR)

Power units:

00100K – Gasoline powered (1) 10 GPM or (2) 5 GPM circuits
02900A – Diesel (1) 10 GPM or (2) 5 GPM circuits (optional catalytic exhaust)
05500 – Twin power dual circuit (1) 10 GPM or (2) 5 GPM circuits & 5000 watt generator
02050RM – Modular power unit (1) 9 GPM
03700A – Electric power (1) 10 GPM or (2) 5 GPM circuits

Grinders:

09200A – Precision frog grinder
06000 – Profile grinder
06950 & 06950A – Multi-purpose grinder
05900 – Frog/profile grinder (trigger version available)
00700 – Rail surfacing guide
04600 – Straight stone grinder cw rotation (trigger version available)
04700 – Straight stone grinder ccw rotation (trigger version available)
07500 – Chamfer tool
04800 – 6" Cup stone grinder (trigger version available)
00600 – 8" Cup stone grinder
05400 – Angle grinder
09300 - Head wash grinder

Track tools:

03900A – Reversing rail saw
05100A & 05100B – Power weld shear
03500 – Self feed rail drill
04500D – 1/2” Hydraulic drill impact wrench
08200 – Tamper
02800A – 60 Ton bridge spreader
01200 – Spring anchor applicator
01100A – Spike puller (Single, 2 stage & trigger versions available)
00800A – 16” Rail saw
05000 – Hand pump weld shear
02500 – 10 GPM 1” Impact wrench
08300 – Spike driver
01600A – 5 GPM 1” Impact wrench
01100RM – Light-weight spike puller

Other products:

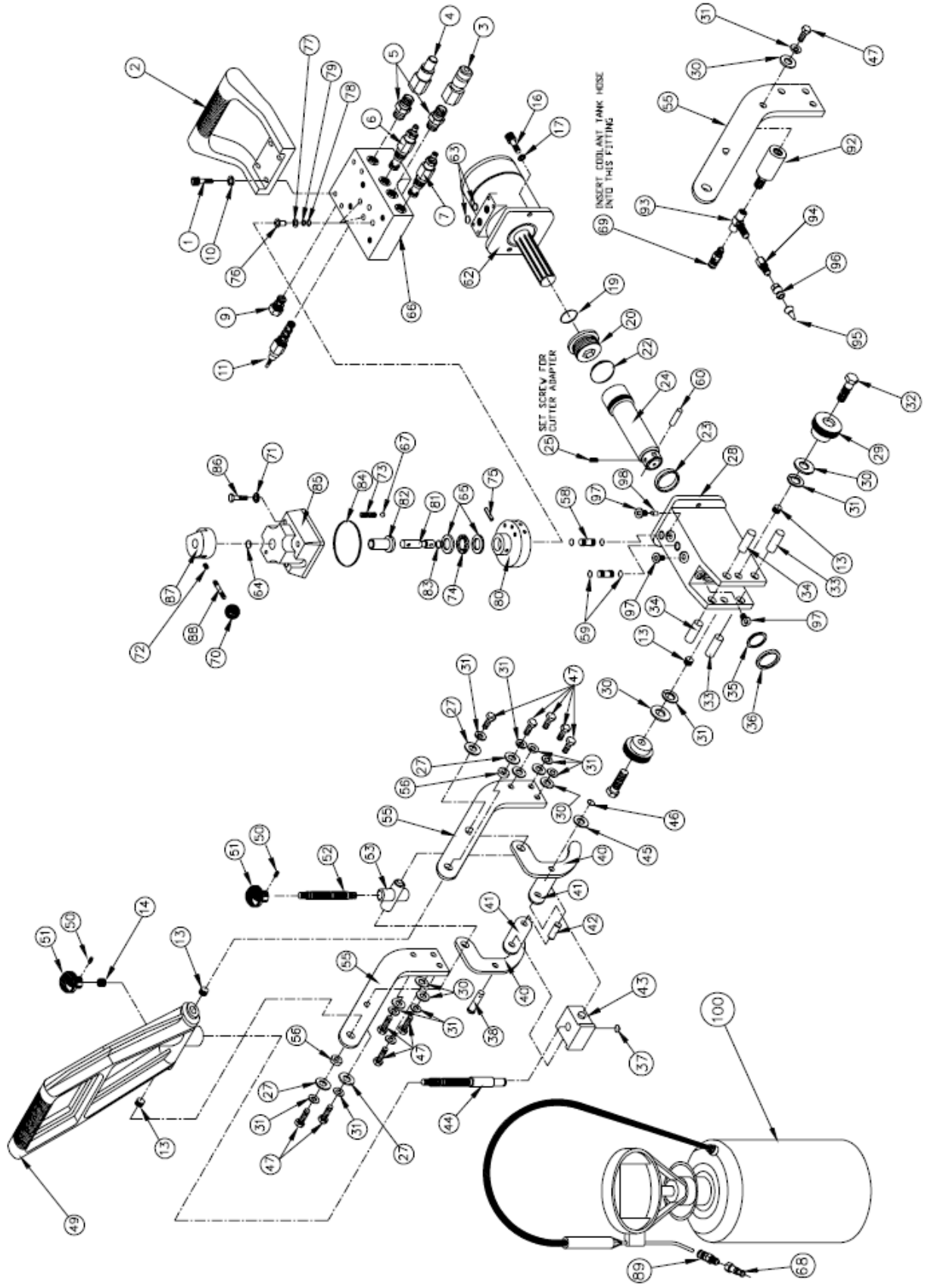
Hydraulic manifolds
Hydraulic test gauges
Hose reels
Hydraulic hoses

Accessories

Drill bits
Shear Blades
Saw Blades
Grinding Stones
Sockets

14. Assembly

14.1. Parts diagram



14.2. Parts list

ITEM NO.	PART NO.	DESCRIPTION	QUANTITY
1	A5469	5/16-18 x 4 LG. SHCS	4
2	03502	CARRY HANDLE	1
3	00145	QUICK DISCONNECT COUPLER	1
4	00146	QUICK DISCONNECT NIPPLE	1
5	249-08-08	SAE-8 MALE x 1/2 MALE NIPPLE	2
6	03506	PRESSURE REDUCING VALVE	1
7	03507	FLOW CONTROL VALVE	1
8			
9	03509	CHECK VALVE	1
10	A3812	5/16 HIGH COLLAR LOCK WASHER	4
11	03510	FLOW CONTROL VALVE	1
12			
13	03513	3/8-16 KEENSERT	4
14	03514	5/8-11 KEENSERT	1
15			
16	A5445	1/2-13 UNC x 1 1/2 SHCS	2
17	A3813	1/2 LOCK WASHER	2
18			
19	03519	END CAP O-RING	1
20	03520	END CAP	1
21			
22	03522	CYLINDER BODY END CAP O-RING	1
23	03523	PISTON SEAL	1
24	03524	CYLINDER PISTON	1
25	A5604	1/4-20 UNC x 1/2 LG. SET SCREW	1
26			
27	A3860	3/8 x 1 1/4 FENDER WASHER	4
28	03528	CYLINDER HOUSING	1
29	03529A	FORM BLOCK TIGHTENING KNOB	2
30	A2192	3/8 FLAT WASHER	9
31	A3811	3/8 LOCK WASHER	13
32	A5475	3/8-16 UNC x 2 LG. BHCS	2
33	03533	DOWEL PIN	2
34	03534	DOWEL PIN	2
35	03535	2.00 I.D. QUAD RING	1
36	03536	ROD WIPER	1
37	03537	E-RING	1
38	03538	LEVER ASSEMBLY CLEVIS PIN	1
39			
40	03540	LEVER ASSEMBLY HOOK PLATE	2
41	03541	LEVER ASSEMBLY LINK	2
42	03542	LEVER ASSEMBLY SPACER	1
43	03543	LEVER ASSEMBLY STOP BLOCK	1
44	03544	THREADED SHAFT	1
45	A2196	5/8 SAE FLAT WASHER	1
46	03546	KLIPRING RETAINER	1
47	A1042	3/8-16 UNC x 1 LG. HEX HEAD	11
48			
49	03549	LEVER HANDLE	1
50	A5592	10-32 x 3/8 LG. SET SCREW	2
51	03551	KNURLED PLASTIC KNOB	2
52	03552	ADJUSTMENT SCREW	1
53	03553	ADJUSTMENT NUT	1
54			
55	03555	CLAMP ARM	2
56	03555-01	CLAMP ARM BEARING	2
57			
58	03558	MANIFOLD OIL TUBE	2
59	03550	O-RING	4
60	03560	DRILL CHUCK DOWEL PIN	1
61			
62	03562	HYDRAULIC MOTOR	1
63	03504	O-RING	2
64	00905-30	O-RING	1
65	045041	THRUST WASHER	2
66	03566	VALVE MANIFOLD	1
67	045026	DETENT BALL	1
68	23-2	SHUT OFF PLUG - 1/8 FPT	1
69	2202	SHUT OFF SOCKET - 1/8 MPT	1
70	00905-09	SELECTOR KNOB	1
71	A2191	5/16 SAE FLAT WASHER	4
72	A5627	3/8-16UNC x 1/4 LG. SET SCREW	1
73	00905-11	DETENT SPRING	1
74	045014	THRUST BEARING	1
75	A6081	3/16 x 1 3/8 ROLL PIN	1
76	00905-02	VALVE INSERT	3
77	00905-10	VALVE WASHER	9
78	00419	O-RING	3
79	00905-14	BACK UP RING	3
80	00905-04	ROTOR VALVE	1
81	00905-05	SELECTOR SHAFT	1
82	00905-06	ROTOR HOUSING BEARING	1
83	00420	O-RING	1
84	03584	CONTROL VALVE MOUNTING RING	1
85	00905-03	ROTOR HOUSING - DETENT VERSION	1
86	A1024	5/16-18 x 1 1/2 HEX HEAD	4
87	00905-07	SELECTOR CAP	1
88	00905-13	HANDLE	1
89	12-425-0518	5/16 x 1/8 MP TUBE FITTING	1
90			
91			
92	03595	MOUNTING STUD	1
93	5604-02	1/8 MP x 1/8 FP x 1/8 FP TEE	1
94	2405-04-02	1/4 MJIC x 1/8 FP	1
95	03567	1/16 NOZZLE	1
96	03568	1/4 SAE FLARE NUT ADAPTER	1
97	231P-04	SAE -4 O-RING PLUG	3
98	03528-04	BRASS PLUG	1
99			
100	01533A	COOLANT TANK	1

15. Disclaimer

Pandrol exempts itself from liability in the event of usage that deviates from that recommended in this manual.

16. Contact

Address	Phone	Internet and E-mail
		www.Pandrol.com

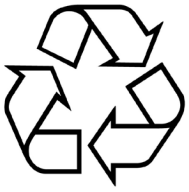
17. Recycling and Environment

Sustainable environment is a great part of Pandrol.

All components of the product can either be:

- Recycled
- Taken care of
- Be re-used

We recommend you to follow your local region regulations of environmental and recycling policies.



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Find out more at

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