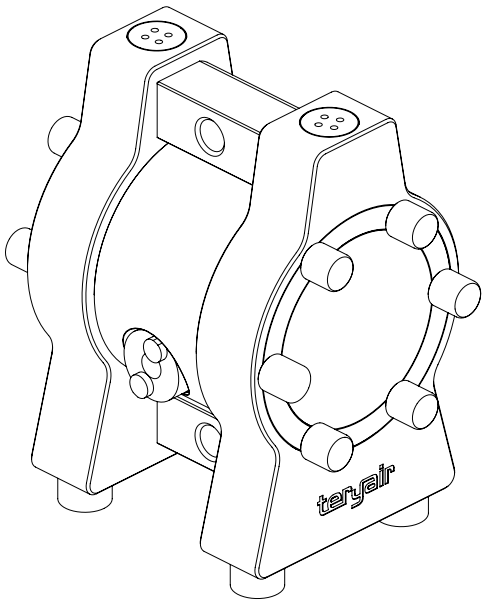
www.teryair.com

Operation and Maintenance Guide



15 PTFE

Models	Descriptions
TB15-PTI-PCX-XXX	Teryair ½" Diaphragm Pump TeryBlock PTFE PTFE-IntBuna BSPP Center Port

Read this manual carefully before installing, operating or servicing this equipment. It's the responsibility of the employer to ensure this manual is read by the operator. Please preserve this manual.

Table of Contents

Pump Nomenclature

Position	1	2	3	4	5	6	7	8	9	10	11
Example:	TB	15	A	B	X	R	E	X	A	X	X
Example: TB25-ZTI-PCX-AXX											
Position 1 Range		Position 2 Size	Position 3 Body	Position 4 Diaphragm/ Valve	Position 5 Back Up	Position 6 Port	Position 7 Port Position	Position 8 Speciality Code	Position 9 Safety Code	Position 10 Sanitary Code	Position 11 Speciality Code
TB- Block		15 - ½" 25 - 1"	U - UHMW / PE Z - Conductive PE P - PTFE C - Conductive PTFE	T - PTFE	I - Integrated Buna	G - BSPT F - Flanged ANSI/DIN R - NPT P - BSPP	C - Centre Ported Swiveling, See Foot Note	P - Pulse Dampener R - Remote Solenoid Driven T - Trolley Mounted X - None	A - ATEX/ IECEX X - None	F - FDA / EN 1935/2004 X - None	S - Speed Controller C - Cycle Counter D - Diaphragm Monitoring X - None

Foot note 1 - Can be swiveled to any degree between horizontal and vertical

Operating and Safety Instructions

⚠ Warning: Static Electricity

- Static sparks can cause explosion resulting in severe injury or death.
- Ground the pump and the pump connections like hoses and containers into which or from the fluid is being transferred. Connect the grounding wire to any bolt on the pump.
- Check continuity of electrical path to ground at regular intervals.
- Consult local building and electrical codes for grounding requirements where needed.
- Use hoses containing a grounding wire.

⚠ Warning: Pump Exhaust

In case of a diaphragm failure, fluid being pumped may spray out from the exhaust of the pump. This may cause severe injury depending on the fluid being pumped.

If the fluid is hazardous, pipe away the exhaust to a safe remote location using a generous diameter pipe preferably with a grounding arrangement, and refit the muffler at the end of this arrangement.
Always wear safety glasses while in the vicinity of an operating pump.

⚠ Warning: Over pressure / Hazardous Pressure

Do not exceed the max supply air pressure of 100 PSI.
Make sure all connected hoses and pipelines are rated to operate safely with the pressures generated by pump of 100 PSI.
Do not open or handle pump or hoses while pressurized.
Disconnect air supply line and relieve pressure from the system by carefully opening discharge and supply lines.

⚠ Warning: Hazardous Materials

Do not move a pump that contains hazardous fluids trapped inside it. Please observe prescribed handling and safety codes. Drain the pump safely, by turning it upside down and collecting the fluid safely, before moving the pump.

⚠ Warning: Explosion

Please check compatibility of fluids intended to be handled with the materials of construction of the pump. Severe reactions and explosions may occur if materials are incompatible.

Caution: Chemical compatibility

Please check that the fluid being pumped is compatible with the wetted parts of the pump. Re-fer Cole Parmer compatibility (http://www.coleparmer.in/Chemical-Resistance) guide for de-tails. Note that chemical compatibility may change with temperature; take this into account while selecting pump material.

Caution: Structural support

Please refer figure 1 and ensure that the piping system is independently supported and does not load the pump. The pumps are not designed to take the continuous and often pulsating load of a piping system. Important to use a flexible connection between rigid piping and pump casings.

Caution: Running dry, disconnection of hoses when not in use

Although these pumps can be run dry for long periods, it is advisable to avoid this as it causes unneces-sary wear of wearing parts

Caution: Operator understanding

Please ensure that all operators have read this manual and have the required understanding of safe working practices and are equipped with safety equipment when working on/around the pump.

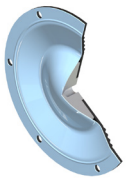
Caution: Using genuine teryair fittings & spares

Use genuine teryair parts to ensure correct pump operation and maximize life.

Operating Instructions

- The Teryair diaphragm pump generates a alternate stroking of the diaphragms against the fluid in the liquid chambers of the Pump. This reciprocatory action is responsible for the fluid being pumped.
- It is possible to control the output of the pump by controlling the supply air pressure.
- It is also possible to control the output of the pump by throttling action on the fluid flowing in the outlet piping by means of a valve. if such a valve is shut completely the pressure in the discharge piping increases to a point when the pressure at pump discharge equals it and the pump comes to a stop. This causes no damage to the pump and the pump consumes no more energy.
- Upon opening of the valve, the pump starts reciprocating once again and resumes fluid delivery.

Caution: Temperature limitations and diaphragm options

Modified PTFE		Longer diaphragm life in more abrasive applications that still require PTFE. Available for sanitary and industrial diaphragm pumps.

Suggested Lubricants

Brand	Above 27 Deg C (	From 5 Deg C to 27 Deg C	Below 5 Deg C
Shell	Toona R 72	Toona R 41	Toona R 27
Mobil	Almo 529	Almo 527	Almo 525
Esso	-- -- --	Arox EP 65	Arox EP 45
Caltex	Rando Oil 150	Rando Oil 100	Rando Oil 46
Texaco	Regal Oil F	Regal Oil PE	Regal Oil B
Daltron	Silkolene 881	Silkolene 548	Silkolene 773
Burmah Castrol	RD Oil 3	RD Oil Light	Megna SPX
BP	RD 220 HP60C	RD150 HP20C	RD80 HP10C
Duckham	Garnet 7	Garnet 6	Zero Flo 5
Sternol	Merlin 87	Merlin 71	Merlin 54
Petrofina	Purifoc 53	Purifoc 46	Purifoc 32
Chevron	Vistac Oil 18X	Vistac Oil 19X	Vistac Oil 9X

Suggested site selection and installation recommendations

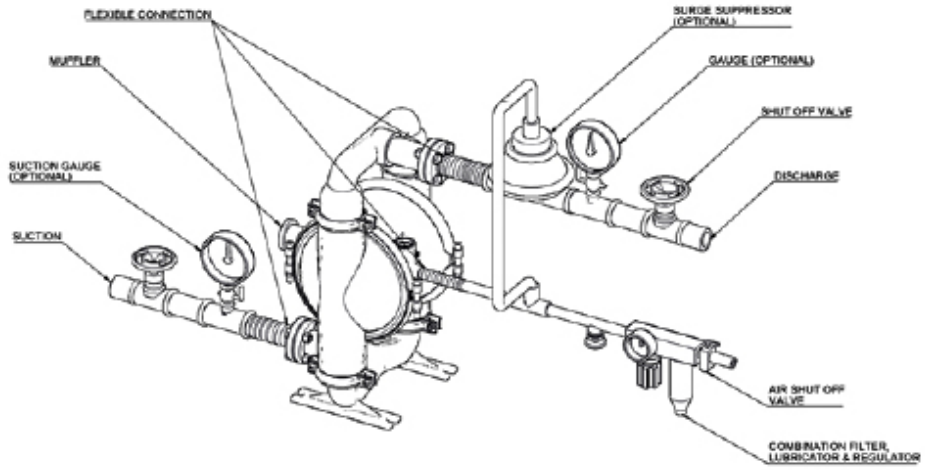


Figure 1

Location selection
Pump location must be easily accessible with reasonable space around for maintenance operations. Pump dimensional data for each variant is available in section showing exploded views

Air supply
Compressed air at 90 PSI (Stroke pumps can take a max of 100PSI), free from moisture and having an oil mist is essential. Use of a filter (50 microns), a lubricator and a regulator is highly recommended and should be installed as close as possible to the pump inlet.
Ensure correct grade of oil is used in thelubricator bowl. Too thick oil may slow down the valve shifting mechanism and affect pump performance. See suggested lubricants on page no 5.

Piping
A minimum number of bends and fittings to be used.
A flexible connection between suction, delivery and air supply piping is highly recommended such that piping stresses and loads do not transfer to pump housing. Select piping materials such that chemical compatibility is maintained with the fluid being pumped.

Suction
Ensure that the suction head after installation is well within the pumps suction capabilities

Muffler
Use of supplied muffler is recommended to bring pump operation sounds down to comfortable levels, in case of hazardous fluids handling, please read section of safety regarding piping away of exhaust see
Warning: Pump Exhaust) earlier in this manual.

Troubleshooting

Serial No	Description	Causes	Remedial Action
1	Pump stops and will not start	Insufficient Air Pressure	Check air pressure is as recommended at the pump air inlet
		Air Filter Blocked	Check if debris has clogged the inlet filter on the FRL unit/pump inlet air valve (some models have air filter on the air inlet valve) and ensure clear passage of air
		Internal damage or excessive wear on components	roceed to dismantle the pump, examine component for wear, replace any worn components, re assemble carefully as instructed in this manual and re start the pump.
2	Pumps runs slowly, poor delivery	Cavitation	Check if cavitation is occurring in the suction side, if so reduce suction vacuum by slowing down the pump.
		Worn Balls and Seats	Check proper sealing action of balls against seals, these components need to be replaced as a set if they are worn.
		Insufficient or wrong lubricant in the air supply.	Ensure that the lubricant is as per the recommended chart, a thicker lubricant often makes the air valve work sluggishly
		Internal damage or excessive wear on components	Proceed to dismantle the pump, examine component for wear, replace any worn components, re assemble carefully as instructed in this manual and re start the pump.
3	Pump air valve frerzes	Excessive moisture in supply air line.	Ensure that the dew point of the supplied air is low enough. Install a air dryer or moisture separator on the supply line
4	Air bubbles in pump discharge or product sprays out of exhaust vent	Broken Diaphragm	Proceed to dismantle the pump, examine component for wear, replace any worn components, re assembly carefully as instructed in this manual and re start the pump
		mproper seal between inner pistons, outer pistons and shaft.	
		Air leakage into product from balls / seats area	
		Air sucked into suction pipeline due to insufficiently tight joints on suction pipeline.	

Maintenance

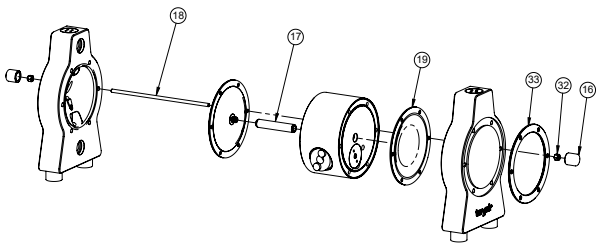
Regular inspection and maintenance schedules will greatly enhance the life of the pump and will ensure a trouble free and safe working environment with little chance of breakdowns.
Follow the instructions clearly in "Disassembly and Reassembly" of the pump and in the troubleshooting section.
Use genuine Teryair spares and if possible mention the serial number of the pump when ordering spares.
Always replace elastomers as a set, eg diaphragms, balls and seats.

Diassembly and Re-assembly

- Shut off air supply and allow residual Pressure to bleed off.
- Disconnect air supply
- Disconnect suction and discharge piping
- Turn pump upside down allow process fluid
- to drain away. If fluid is hazardous due care should be taken.
- Make a mark to indicate the positioning of eachliquid chamber relative to the housing.
- NOTE: Replace worn parts with genuine Teryair parts for reliable performance.

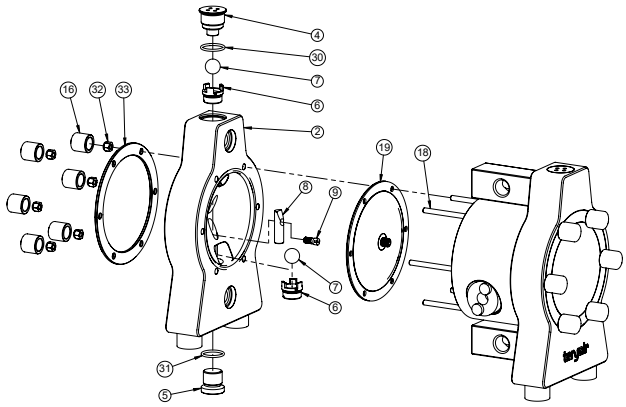
1. Replacement of Diaphragm

a. First unscrew the 6 no.s of safety cap (16) then unscrew Hex nylock nut (32).
b. Now remove the SS Ring (33) and pull the chamber plate assembly (2) from the Shaft Housing (1) and stud (18).
c. Now pull the Shaft Housing assembly with Diaphragm (19) from other side Chamber Plate assembly.
d. Now hold the primary Shaft (17) by spanner and unscrew the diaphragm (19) and replace with new one. Repeat the same process for another diaphragm (19).



2. Replacement of Ball & O-Rings

a. Follow the step a, b & c of replacement of Diaphragm.
b. Unscrew top plug (4) with the help of key & remove.
c. Now replace the O ring (30) & ball valve (7).
d. Now unscrew the valve stopper screw (9) with the help of screw driver & remove.
e. Now slide valve stopper (8) at up side in the chamber plate.
f. Now replace the ball valve (7).
g. Now unscrew bottom plug (5) with the help of key & remove.
h. Now replace the O ring (31).

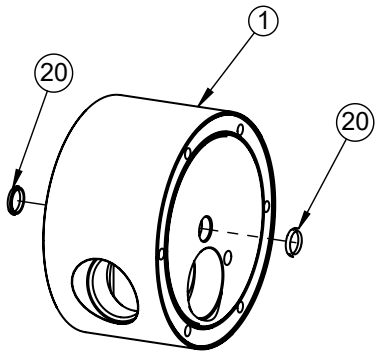


3. Replacement of Shaft Seals

a) For removing the seals from shaft housing, first follow the steps a, b, c & of diaphragm replacement.
b) Now remove the seals (20) with the help of needle Nose pliers. Care should be taken not to damage the inner face of shaft housing (1)
c) Once all the old seals are have been removed, the inside of the shaft housing (1) should be cleaned to ensure no debris is left that may damage to new seals (Pressurized air is preferable)
e) The Blunt point Needle can be used to aid in the installation of new seals.
d) These following tools can be used to aid in the installation of new seals:

- Needle Nose pliers
- Phillips Screwdriver
- Electrical Tape

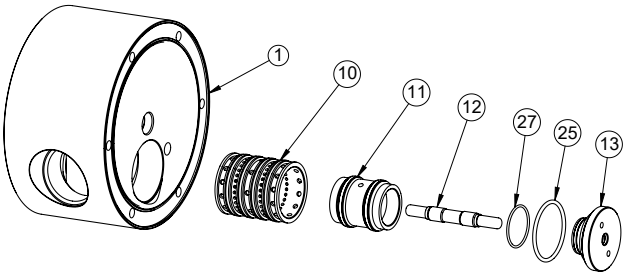
e. Wrap electrical tape around each leg of the needle nose pliers (heat shrink may also be used) . This is done to prevent damaging the inside portion of the new seals.
f. With a new seal in hand, place the two legs of the
nose pliers inside the seal ring. Open the pliers as wide as the seal diameter will allow, then two fingers pull down on the top portion of the seal to form kidney bean shape. (Refer Fig. A)
g. Lightly clamp the pliers together to hold the seal into the kidney shape. Be sure to pull the seal into as tight of a kidney shape as possible, this will allow the seal to travel down the bushing bore easier. (Refer Fig. B)
h. With the seal clamped in the pliers, insert the seal into the bushing bore and position the bottom of the seal into the correct groove. Once the bottom of the seal is seated in the groove, release the clamp pressure on the pliers. This will allow the seal to partially snap back to its original shape.
i. After the pliers are removed, you will notice a slight bump in the seal shape. Before the seal can be properly re-sized, the bump in the seal should be removed as much as possible. This can be done with either the Phillips screw driver or your finger, apply light pressure to the peak of the bump.
j. This pressure will cause the bump to be almost completely eliminated.
k. Lubricate the edge of the shaft with specified lubricant.
l. Slowly insert the shaft with rotating motion. This will complete the re-sizing of the seals.
m. Perform these steps for the remaining seals.



Air Valve/ Center Section Disassembly

4. Replacement Of Secondary Shaft Assembly

a. Follow the steps a, b, c, d from the diaphragm replacement.
b. Now unscrew the both side Side Plug (13) form shaft housing (1) with the help of proper tools.
c. Now remove the O-Rings (25) & (27) and replace with new one.
d. Also replace the Secondary Shaft (12) with new one.
e. For removing Sleeve from shaft housing, push the Sleeve (10) with its O-Rings from one side of Shaft housing (1) and replace with new one.
f. For removing Piston assembly (11) from shaft housing, push it from Sleeve (10 and replace with new one. [Sleeve & Spool replace with it's seals & O rings.



Re-Assembly

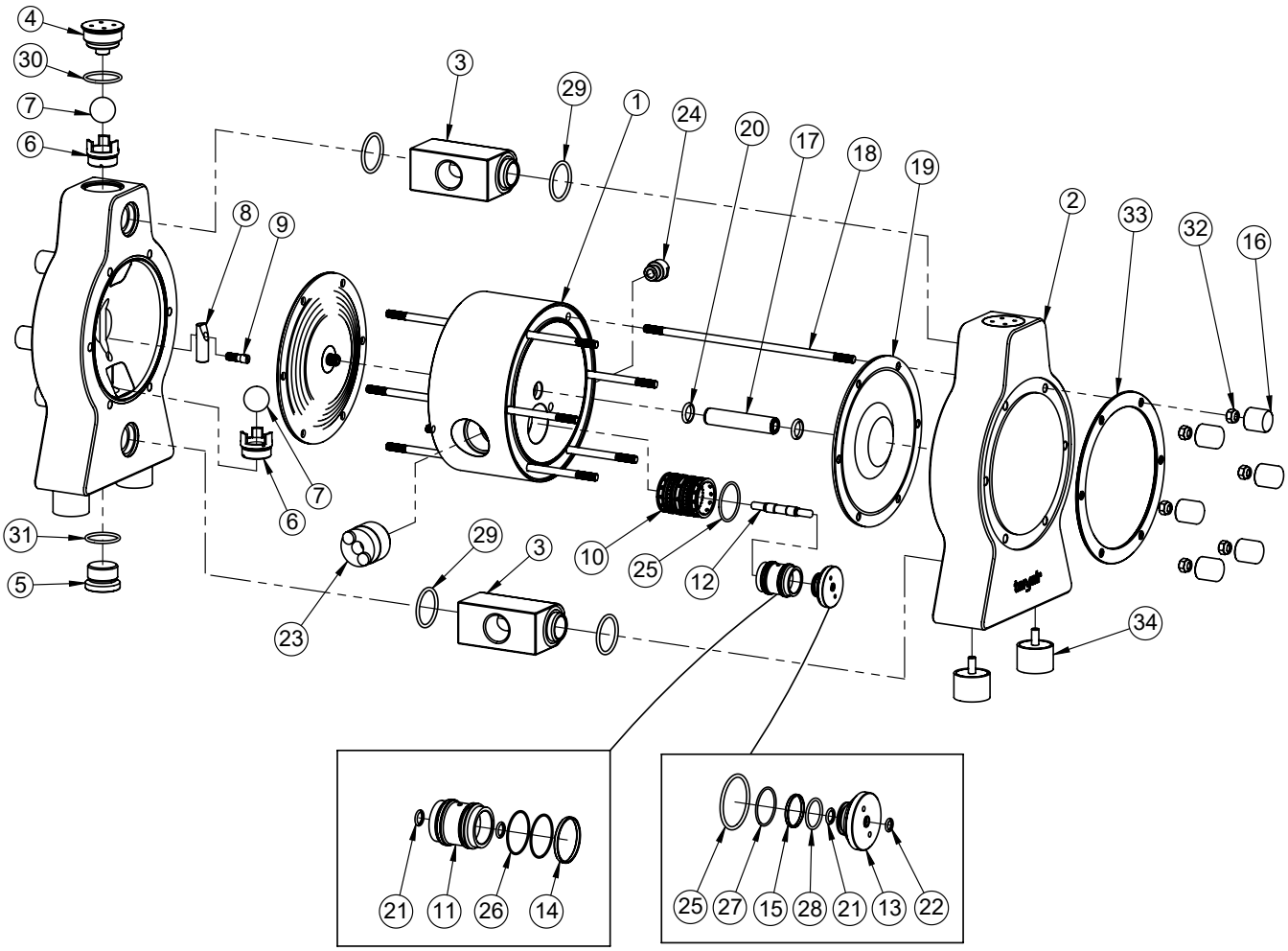
Upon performing applicable maintenance to the air distribution system, the pump can now be reassembled. Please refer to the dis-assemblyinstructions for photos and parts placement. Toreassemble the pump, follow the dis-assembly instructions in reverse order. The air distributionsystem needs to be assembled first, then the Dia-phragms and finally the wetted path. Please findthe applicable torque specifications on this page.The following tips will assist in the assembly process.

a. Clean the inside of the center section shaftbore to ensure no damage is done to new seals.
b. Stainless bolts should be lubed to reduce thepossibility of seizing during tightening.
c. Level the water chamber side of the intake/ discharge manifold to ensure a proper sealingsurface. This is most easily accomplished by placing them on a flat surface prior to tight- ening their clamp bands to the desired torque(see below for Torque Specifications).
d. Be sure to tighten outer pistons simultaneously on PTFE-fitted pumps to ensure propertorque values.
e. Ensure proper mating of liquid chambers to manifolds prior to tightening vertical bolts. Overhang should be equal on both sides.
f. Apply a small amount of Loctite 242 to the shaft interval threads before the diaphragmassembly. Concave side of disc spring in diaphragmassembly face

Maximum Torque Specifications (TB15-PTFE)

Description Of Part	Torque
Air Valve	5.1 N•m (45 in-lb)
Air Chamber/Center Block	47.5 N•m (35 ft-lb)
Outer Flanges, Rubber & PTFE, Excluding Stainless Steel Inner Pistons	106 N•m (78 ft-lb)
Outer Flanges, Rubber & PTFE, Stainless Steel Inner Pistons	119 N•m (88 ft-lb)
Outer Flanges, Ultra-Flex™	74.6 N•m (55 ft-lb)
Small Clamp Bands	6.6 N•m (58 in-lb)
Large Clamp Bands (Rubber-Fitted)	47.5 N•m (35 ft-lb)
Large Clamp Bands (PTFE-Fitted)	47.5 N•m (35 ft-lb)

Exploded View for TB15-PTFE Pump



Bill of Materials for TB15-PTI-PCX Pumps

ITEM NO.	PART NUMBER	DESCRIPTION	Qty
1	2133601	Shaft Housing-TB15	1
2	2133602	Outer Chamber-TB15	2
3	2133603	Manifold-TB15	2
4	2133604	Top Plug-TB15	2
5	2133605	Bottom Plug-TB15	2
6	2133606	Ball Seat-TB15	4
7	1763601	Ball-TB15	4
8	2133608	Valve Stopper-TB15	2
9	2133609	Screw-TB15	2
10	2133610	Sleeve-TB15/25	1
11	2133611	Air Piston-TB15/25	1
12	2133612	Secondary Shaft-TB15/25	1
13	2133613	Side Plug-TB15/25	2
14	2133614	Seal	2
15	2133615	Seal	2
16	2133616	Safety Cap-TB15	12
17	2132701	Primary Shaft-TB15	1
18	2132702	Chamber Stud-TB15	6
19	2136001A	Diaphragm Integrated-TB15	2
20	2136002	D Seal	2

ITEM NO.	PART NUMBER	DESCRIPTION	Qty
21	2136003	D Seal	4
22	2136004	D Seal	2
23	2130801	Silencer	1
24	2130802	Adapter	1
25	2134001	O Ring	6
26	2134002	O Ring	4
27	2134003	O Ring	2
28	6124032	O Ring	2
29	2134101	O Ring	4
30	2134102	O Ring	2
31	2134103	O Ring	2
32	2980075S	Hex Nylock Nut	12
33	2138201	Safety Ring-TB15	2
34	2135001	Shock Absorber-TB15	4

Replacement & Repair Kits for TB15 Series Pump

ITEM NO.	PART NUMBER	DESCRIPTION	Replacement Kit 2139701	Repair Kit 2139702
10	2133610	Sleeve-TB15/25	1	1
11	2133611	Air Piston-TB15/25	1	1
12	2133612	Secondary Shaft-TB15/25	1	1
13	2133613	Side Plug-TB15/25	2	2
14	2133614	Seal	2	2
15	2133615	Seal	2	2
19	2136001A	Diaphragm Integrated-TB15	-	2
20	2136002	D Seal	-	2
21	2136003	D Seal	4	4
22	2136004	D Seal	2	2
25	2134001	O Ring	6	6
26	2134002	O Ring	4	4
27	2134003	O Ring	2	2
28	6124032	O Ring	2	2
29	2134101	O Ring	-	4
30	2134102	O Ring	-	2
31	2134103	O Ring	-	2

Bill of Materials for TB15-UTI-PCX Pump

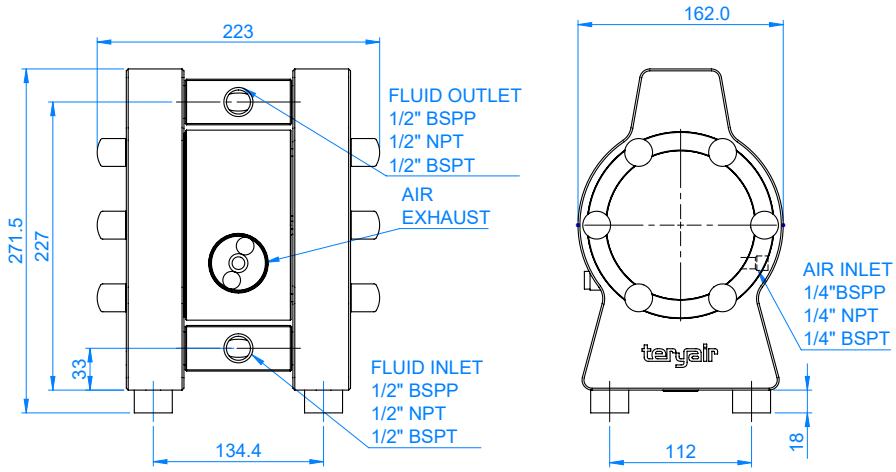
ITEM NO.	PART NUMBER	DESCRIPTION	Qty
1	2133601	Shaft Housing-TB15	1
2	2133602U	Outer Chamber-TB15	2
3	2133603U	Manifold-TB15	2
4	2133604U	Top Plug-TB15	2
5	2133605U	Bottom Plug-TB15	2
6	2133606U	Ball Seat-TB15	4
7	1763601	Ball-TB15	4
8	2133608U	Valve Stopper-TB15	2
9	2133609U	Screw-TB15	2
10	2133610	Sleeve-TB15/25	1
11	2133611	Air Piston-TB15/25	1
12	2133612	Secondary Shaft-TB15/25	1
13	2133613	Side Plug-TB15/25	2
14	2133614	Seal	2
15	2133615	Seal	2
16	2133616	Safety Cap-TB15	12
17	2132701	Primary Shaft-TB15	1
18	2132702	Chamber Stud-TB15	6
19	2136001A	Diaphragm Integrated-TB15	2
20	2136002	D Seal	2

ITEM NO.	PART NUMBER	DESCRIPTION	Qty
21	2136003	D Seal	4
22	2136004	D Seal	2
23	2130801	Silencer	1
24	2130802	Adapter	1
25	2134001	O Ring	6
26	2134002	O Ring	4
27	2134003	O Ring	2
28	6124032	O Ring	2
29	2134101	O Ring	4
30	2134102	O Ring	2
31	2134103	O Ring	2
32	2980075S	Hex Nylock Nut	12
33	2138201	Safety Ring-TB15	2
34	2135001	Shock Absorber-TB15	4

Replacement & Repair Kits for TB15 Series Pump

ITEM NO.	PART NUMBER	DESCRIPTION	Replacement Kit 2139701	Repair Kit 2139702
10	2133610	Sleeve-TB15/25	1	1
11	2133611	Air Piston-TB15/25	1	1
12	2133612	Secondary Shaft-TB15/25	1	1
13	2133613	Side Plug-TB15/25	2	2
14	2133614	Seal	2	2
15	2133615	Seal	2	2
19	2136001A	Diaphragm Integrated-TB15	-	2
20	2136002	D Seal	-	2
21	2136003	D Seal	4	4
22	2136004	D Seal	2	2
25	2134001	O Ring	6	6
26	2134002	O Ring	4	4
27	2134003	O Ring	2	2
28	6124032	O Ring	2	2
29	2134101	O Ring	-	4
30	2134102	O Ring	-	2
31	2134103	O Ring	-	2

Dimensional Data



EU DECLARATION OF CONFORMITY

Object of declaration

PRODUCT	:	**AIR OPERATED DOUBLE DIAPHRAGM PUMP**
MODEL	:	**TB15 Series**
MANUFACTURER'S NAME	:	**TERYAIR EQUIPMENT PVT. LTD.**
ADDRESS	:	**SITE - 1 : BUILDING A - 1/2, 102 TO 105 & BUILDING C 12 & 13, TIRUPATI UDYOG NAGAR, SATIVALI ROAD, VASAI (E), PALGHAR: 401208.** **SITE - 2: AUGUSTINE - II, COLACO INDUSTRIAL COMPLEX, GALA NO - 101 TO 107, SATIVALI ROAD, VILLAGE WALIV, VASAI (E), PALGHAR: 401208**

To provide presumption of conformity in order to directive 2014/34/EU; the following harmonized standards and/or other normative documents as referenced within the following official journals are applied:

APPLICABLE DIRECTIVE: ATEX DIRECTIVE (2014/34/EU)

APPLICABE STANDARDS:

EN ISO 80079-36: 2016	:	Explosive atmospheres —Part 36: Non-electrical equipment for explosive atmospheres —Basic method and requirements.
EN ISO 80079-37:2016	:	Explosive atmospheres —Part 37: Non-electrical equipment for explosive atmospheres —Non- electrical type of protection constructional safety 'c', control of ignition sources 'b', liquid immersion 'k'.

Notified body to whom Technical file has logged with: - Technicka Inspekcia (Ref: 1354).

DECLARATION: - TERYAIR EQUIPMENT PVT. LTD., declare that under our sole responsibility for the supply of the product defined above, the said product complies with all the applicable Directives, Regulations and all essential Health and Safety requirements applying to it.

I, the undersigned, hereby declare that the product specified above conforms to the above standard(s).

ATEX MARKING APPLIED Ex CE

Please Refer ATEX Rating for **Teryair Aodd Models Table**

Signed for and on behalf of

TERYAIR EQUIPMENT PVT. LTD.

Place of Issue : Vasai

www.teryair.com

Warranty Certificate

Every product manufactured by Teryair

is built to meet the highest standards of quality.

Teryair warrants that the Products, accessories and parts manufactured or supplied by the company be free from defects in material and workmanship for a period of six months from date of Teryair authorized dealer invoice to customer, or one year from date of Teryair invoice to dealer, whichever is earlier. Failure due to normal wear, misapplication, or abuse is, of course, excluded from this warranty.

Since the use of Teryair products and parts is beyond our control, Teryair cannot guarantee the suitability of any product or part for a particular application and Teryair shall not be liable for any consequential damage or expense arising from the use or misuse of its products on any application. Teryair does not warranty bought out products or components such as electric motors and hardware but will assist in directing warranty queries to the dealer/manufacturer responsible. Teryair responsibility is limited solely to replacement or repair of defective Teryair products or components.

Dealer/End User shall have no right or remedy and Teryair shall have no liability or obligation under the warranty, if: (i) a Product is altered, changed, modified or tampered with in any way, (ii) a Product is damaged after deposit with the transporter for shipment; (iii) a Product is not properly preserved, packaged, stored, processed or handled after receipt; (iv) a Product is not used and maintained in accordance with Teryair's recommended operating and maintenance manuals, instructions and procedures, if any; (v) a Product is not properly incorporated or installed in, or not properly combined with, an Other Product; (vi) the issue with a Product is directly or indirectly attributable to, or directly or indirectly results from or arises out of, a failure, substandard performance or other issue with another product, material, component or part not supplied by Teryair; (vii) the issue with a Product is directly or indirectly attributable to, or directly or indirectly results from or arises out of, compliance with any design, specification or other specific requirement of Dealer/End User; (viii) a Product is used in a manner, with a substance or for a purpose other than the normal manner, substance and purpose for which it is intended or is otherwise subjected to abnormal use or service; (ix) a Product is subjected to a power surge, brown out or other similar occurrence; (x) the issue with a Product is directly or indirectly attributable to, or directly or indirectly results from or arises out of, normal wear and tear of such Product (including, without limitation, things such as worn seals, diaphragms, balls, O rings, gaskets, chisels, cutters, hoses and other such wearing components; (xi) the issue with a Product is directly or indirectly.

M Yadav, Q.A. Manager

(Company Seal)

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