



**OWNER'S MANUAL
FOR
DRY VACUUM PUMPS
MODELS 2090 and 2085**

Contents:	Safety Information
	Installation
	Operation
	Maintenance
	Trouble-Shooting Guide
	Specifications
	Warranty
	Parts List and Exploded View
	Applications Information



WARNING

**Be sure to properly identify intake and discharge
before using pump. See Section 2.5.**

Welch Rietschle Thomas
7301 North Central Avenue
Skokie, IL 60077
Phone: (847) 676-8800
Fax: (847) 677-8606 (Technical Support)
Fax: (920) 451-4397 (Ordering)
E-Mail: welchvacuum@thomasind.com
Web-Page: www.welchvacuum.com

**Part No. 67-1035R1.3
Printed in the U.S.A.**

Welch Rietschle Thomas

TABLE OF CONTENTS

SECTION	PAGE
1. Safety Information	3
2. Installation	5
3. Operation	8
4. Maintenance	8
5. Troubleshooting	9
6. Specifications	10
7. Warranty	11

Section 1: SAFETY INFORMATION

Read and understand the following information and instructions included with your Welch Dry Vacuum Pumps before using. This information is for your safety and to prevent damage to the pumps.

1.1 CAUTION: To Prevent Injury...

1.1a Never operate this product if it has a damaged cord or plug. If it is not working properly, has been dropped, damaged or has fallen into water, please return the product to a Welch service center for examination and repair.

1.1b Keep the cord away from heated surfaces.

1.1c Never block any air openings or place it on a soft surface where the openings may be blocked. The air openings are for ventilation of the motor inside the housing. Keep all air openings free of lint, dirt and other foreign objects.

1.1d Never drop or insert fingers or any other object into any openings.

1.1e Do not operate this product where oxygen is being administered.

1.1f This pump is thermally protected and can automatically restart when the protector resets. Always disconnect power source before servicing.

1.1g Wear safety glasses or goggles when operating this product.

1.1h Use only in well ventilated areas.

1.1i All electrical products generate heat. To avoid serious burns never touch unit during or immediately after operation.

1.1j Be sure to properly identify intake and discharge before using pump. See Section 2.5.

1.2 CAUTION: To Reduce Risk Of Electrical Shock...

1.2a Do not disassemble. Disassembly or attempted repairs if accomplished incorrectly can create electrical shock hazard. Refer servicing to qualified service agencies only.

1.2b Unit is supplied with a three pronged plug. Be sure to connect pump to a properly grounded outlet only.

1.3 WARNING: To Reduce Risk Of Electrocutation...

1.3a Do not use this product in or near area where it can fall or be pulled into water or other liquids.

1.3b Do not reach for this product if it has fallen into liquid. Unplug immediately.

1.3c Never operate this product outdoors in the rain or in a wet area.

1.4 DANGER: To Reduce Risk Of Explosion Or Fire...

1.4a Do not use this pump in or near explosive atmospheres or where aerosol (spray) products are being used.

1.4b Do not pump anything other than atmospheric air.

1.4c Do not pump combustible liquids or vapors with this product or use in or near an area where flammable or explosive liquids or vapors may exist.

I-4d. Do not use this product near flames.



WARNING

Failure to observe the above safety precautions could result in severe bodily injury, including death in extreme cases.

Section 2: INSTALLATION

2.1 Introduction

This manual has been compiled not only for the care and maintenance of the Welch Dry Vacuum pump now in your possession, but as a helpful reference and guide to prevent many problems which can occur if used improperly.

2.2 Unpacking

Carefully remove the Dry Vacuum pump from the shipping case and unfasten and remove the wooden skid. Preserve all paperwork for future reference. If damage has occurred from shipment a claim must be filed with the carrier immediately; preserve the shipping carton for inspection by the carrier. If you are required to communicate with your dealer or Welch Vacuum be sure to include your order numbers for quick identification. Do not return the pump to the factory without first calling for a returned goods number.

2.3 Pump Mounting

Rubber feet are attached to the pump. Rubber feet are excellent for applications involving a semi-flexible surface such as a bench top; they help to isolate noise and eliminate creeping. All Models of Dry Vacuum Pumps should be mounted in a horizontal plane.

2.4 Pump Location

The pressure/vacuum pump should be located preferably in a clean, dry and well ventilated area. Please be sure not to block the ventilation ports located on the motor housing. The pump should be placed where the surrounding temperature remains between 10°C and 40°C (50°F and 104°F). Always check to insure the location chose is protected from direct or indirect moisture contact. Welch recommends that the pump be installed at the highest point within the system to prevent possible water condensate from entering the pump. The pump should be located as closely to its system in order to utilize it most efficiently.



WARNING

The motor is thermally protected and will automatically restart unexpectedly when the overload device resets.



WARNING

Don't operate this pump in an atmosphere containing flammable or explosive gases or vapors.

2.5 Intake and Discharge Provisions

The intake provision is a hose barb which accepts 7/16" ID Hose(Welch part no. 331040-5 is a 5 ft length of 7/16" ID vacuum hose). A silencer is supplied for the exhaust.



WARNING

Bursting Hazard - use on exhaust port the silencer or air handling parts suitable for pressures not less than 100 PSIG.

Both Models 2090 and 2085 come with silencers. Since Model 2085 has two exhaust ports, Model 2085 has two silencers. The silencers are supplied in a plastic bag attached to the pump. By removing the exhaust fitting, the silencer with adapter can be threaded in. If air or non-hazardous gases are pumped through the pump, the silencer(s) may be installed to reduce noise coming from the pump.

Be sure to call Welch technical service prior to start-up at (847) 676-8800 ext. 1 if you have any questions.

2.6 Electrical Power

2.6a Power Source Review

Review the power source and the motor rating to be sure they agree in voltage, phase and frequency. Serious damage may occur to the motor if it is connected to an improper voltage. All Welch pumps must be grounded. Grounding reduces the risk of electric shock in the event of an electrical short circuit. The plug must be plugged into an outlet properly grounded. Consult your local electrical codes if you have doubts.

2.6b Overload Protection.

Motor thermal overload protection is made available by the motor manufacturer as an aid to minimizing motor failure. Overload protection is a standard feature on both 50 and 60 Hz single-phase motors. The motors have automatic overload protection. Automatic reset protection is designed to rest itself after a predetermined cooling period. If the fault to the drive remains unaltered, the motor will cycle on and off until the fault is corrected.

2.7 Vacuum Connections

All Dry Vacuum Pumps come with intake and discharge hose barbs which accept 7/16" ID rubber pressure/vacuum hose. Hose clamps should be used to hold the hose in place. Since both models operate in the viscous flow regime, the small diameter of the hose will generate minimal conductance loss. For best results, Welch recommends the length of the tubing between the pump and the chamber be kept as small as possible. The hose will act to muffle pump noise. A hose on the exhaust is a vent line. The vent line will allow gases and vapors pumped through the pump to be piped from the work area into a hood.

2.8 Vacuum Gauges

Typically in the rough vacuum range, a dial vacuum gauge is used to measure pressure in mm Hg or inches of Hg. The dial vacuum gauge gives negative pressure — that is pressure below atmospheric. The reference point for the vacuum gauge is atmospheric pressure. Please keep in mind that atmospheric pressure tends to vary from day to day. As a result of this variability, the dial vacuum gauge will indicate slightly different maximum vacuum readings from day to day.

2.9 Traps

2.9a The need for a Trap

The use of Teflon coated aluminum heads, Teflon liner over diaphragms and stainless valves allows the pumps to handle mildly corrosive solvents, acids and bases. If there is a chance liquid may be drawn from the process under evacuation, Welch recommends a liquid trap be placed between the process and the pump. A simple liquid trap is a filtering flask.

When a heavy load of vapor is evolved from the vacuum process, a cold trap is recommended to help prevent damage to the pump mechanism. The cold trap, immersed in a suitable Dewar flask, is installed so that the water vapors may come in contact with the surfaces of the trap and condense. Commonly used refrigerants are liquid nitrogen or dry ice and acetone or alcohol. Dry ice provides sufficient cooling to freeze out most heavy water vapor loads. A variety of cold traps are available from Welch.

The symptom of a high vapor load is if you have droplets of liquid coming out of the exhaust port. If you see droplets of water, Welch recommends you use a cold trap to capture the water before entering the pump or dilute the water vapor stream by adding dry nitrogen to the gas flow. Please call our customer service department for additional information at (847) 676-8800 Ext. 1.

2.9b The Care of a Trap

When using a cold trap the refrigerant should be maintained at a high level in the flask to keep the trap at a uniformly low temperature. If the trap is rewarmed it may allow re-evaporation of the condensate. The refrigerant add tube on the liquid nitrogen trap should not be obstructed as the refrigerant boil-off can produce dangerously high pressures. If the trap becomes saturated it should be disconnected from the system, drained and cleaned. An increase in pressure in the vacuum system will normally indicate that the trap has become saturated. To clean the trap, remove the trap from the system and allow the trap to warm up and rinse off the condensate with a suitable solvent in a fume hood. Thoroughly clean and dry the trap before reinstalling into the system.

Section 3: OPERATION

3.1 Starting Procedures

3.1a Starting a Welch Dry Vacuum Pump.

Before attaching the pump to a system it is well to familiarize yourself with the function and action of the pressure vacuum pump which you have acquired. Review the power requirements as described in Section 2.6. Welch recommends running the pump for a few minutes to warm it up before use. The warm-up improves the pumps ability to handle humid air. **Reminder: Welch Model 2085/90 will not start-up under vacuum. See Spec Table.**

3.1b Cleanliness

Take every precaution to prevent foreign particulates from entering the pump. Particulates will damage the pump's performance. If you find that particulates will come off the process during evacuation, a particulate trap in the foreline will work. A simple, inexpensive trap may be made by placing glass wool in a glass or plastic tube. Screens must be inserted to hold the glass wool in place.



WARNING

The pump is not recommended for pumping highly corrosive acid or base vapors or gases. Serious damage to the pump will result and will shorten the pump's service life.

3.2 Leak Detection

The importance of eliminating all leaks in a vacuum system is obvious. The pump must remove this added volume of leaked gas to maintain the desired vacuum. Leaks for these pump can be located by slightly pressuring the system and painting the suspected area with a thick soap solution. Escaping air will produce soap bubbles.

3.3 Operating Pressure Range

Models 2090 and 2085 Dry vacuum pumps are designed to be run from atmospheric to their maximum vacuum level on the intake side. Consult the Specification Table in the back of this manual for the ratings for your specific model.

3.4 Shutdown Procedures

After use, Welch recommends the pump be run for about 2 minutes disconnected from the vacuum process with air passing through the pump. The air pumped through the mechanism will purge out water vapor or droplets of water condensate that may have formed on the inside of the pump. This purge of the pump mechanism helps prevent corrosion. **Reminder: Turn off pump after releasing inlet on pump. The pump will rock momentarily if the pump is shut-off under vacuum.**

Section 4: MAINTENANCE

Welch dry diaphragm vacuum pumps are 100% oil-free. The pump employs a non-lube piston and cylinder. No maintenance is necessary for the bearings. All bearings are sealed and permanently lubricated. Lubrication should not be attempted.

Section 5: TROUBLESHOOTING

5.1 Vacuum Problems

Leakage, contamination and unusual outgassing are the general causes of problems associated with poor vacuum. To operate at maximum efficiency a system must be thoroughly clean. If the system is completely clean and free from leaks, and unwarranted vacuum problems still exist, the pump should be checked. A simple criterion for the condition of the pump is the determination of its maximum vacuum capability. This can be accomplished by blocking of the intake and reading the vacuum level on the gauge (See Section 2.8).

5.2 Troubleshooting Guide

Poor Pumping Speed	Poor Vacuum	Loud Unit	Possible Cause	Corrective Action
X	X	X	Damaged Valves	Replace flapper valves
X	X	X	Debris in Valves	Remove debris and check for valve damage
X	X	X	Damaged Gaskets	Replace gaskets
X	X	X	Loose Head Screws	Tighten head screws
X	X		Loose fittings	Tighten fittings

Others Symptoms:

1. Pump does not turn on - Cause: Inlet under vacuum - Corrective Action: Release vacuum at inlet.
2. Pump rocks when turned off - Cause: Inlet under vacuum - Corrective Action: Release vacuum at inlet prior to turning off the pump.

Section 6: SPECIFICATIONS

Welch Model	2090	2085
Free Air Displacement CFM (L/min)@60Hz m3/hr (L/min)@50Hz	3.1 (88) 2.3 (38)	6.2 (176) 8.8 (147)
Ult. Press., Torr (mbar)	25 (33)	100 (133)
Max Vacuum, in. Hg	29	26
Motor Horsepower	1/2	1/2
Maximum Restart Pressure*, Torr (mbar)	760 (1013)	760 (1013)
Maximum Restart Vacuum,* in. Hg	0	0
Tubing Needle, I.D. in.	7/16	7/16
Weight, lbs. (kg)	32 (14.5)	32 (14.5)
Catalog Number Wired for 115V, 60Hz, 1Ph with N. American 115V Plug	2090B-01	2085B-01
Catalog Number Wired for 220V, 50Hz, 1Ph with Cont. Euro (Schuko) Plug	2090C-02	2085C-02

* The pump is designed to be started with the inlet at atmospheric pressure. If the pump is switched on with a vacuum on the inlet, the motor will not turn over.

Section 7: WARRANTY

UNPACKING

Inspect the pump carefully. If any damage has occurred, file claim with the carrier immediately. Save the shipping container for carrier to inspect.

OPERATING PUMP

Refer to the enclosed Instruction/Operation Manual for all information to properly operate and maintain the pump.

WARRANTY

This Welch Vacuum product is warranted to be free from defects in material and workmanship. The liability of Welch Rietschle Thomas under this warranty is limited to servicing, adjusting, repairing or replacing any unit or component part which in the judgment of Welch Rietschle Thomas has not been misused, abused or altered in any way causing impaired performance or rendering it inoperative. No other warranties are expressed or implied. The method of executing this warranty: servicing, adjusting, repairing or replacing shall be at the discretion of Welch Rietschle Thomas. Vacuum pumps that have been used for any period, however short, will be repaired under this warranty rather than replaced.

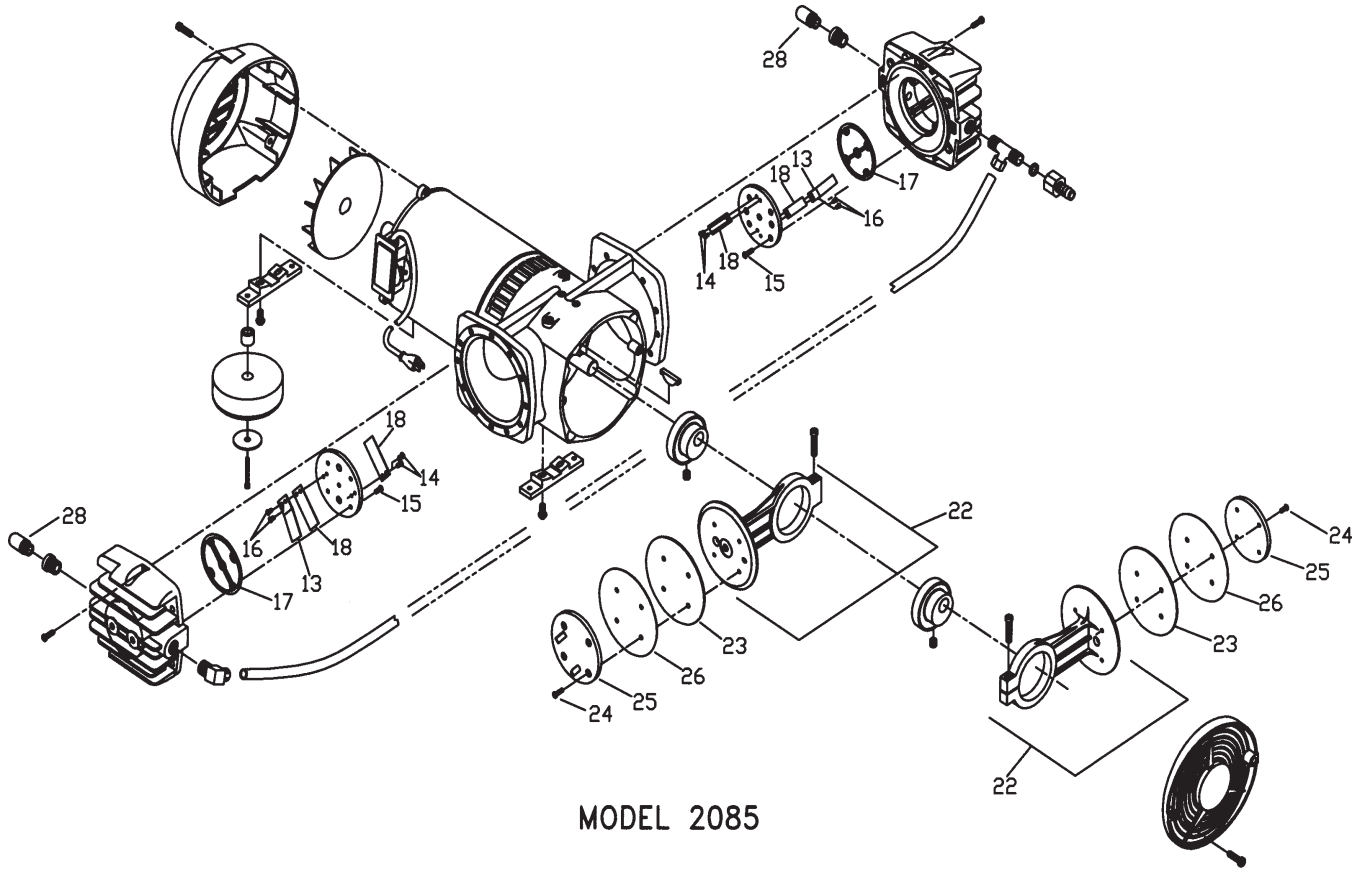
The warranty is effective for one year from the date of original purchase when:

1. The warranty card has been completed and returned.
2. The product is returned to the factory or other designated service centers, freight prepaid.
3. The product in our judgment is defective through no action or fault of the user.

If the product has become defective through misuse, abuse, or alteration, repairs will be billed regardless of the age of the product. In this event, an estimate of the repair costs will be submitted and authorization of these charges will be required before the product is repaired and returned.

To reduce additional charges and delays either within or outside of the warranty period, contact Welch Rietschle Thomas @847-676-8800 for a return authorization number. Products without a return authorization number will be refused by our receiving department. Before shipping, properly pack the pump, insure it against loss or damage, and on the outside of the pump packaging and the packing slip write in the return authorization number. Pumps damaged due to improper packaging are the customer's responsibility.

Exploded View for 2085



MODEL 2085

67-1342
SHEET 2 OF 2
REV.1 08/01

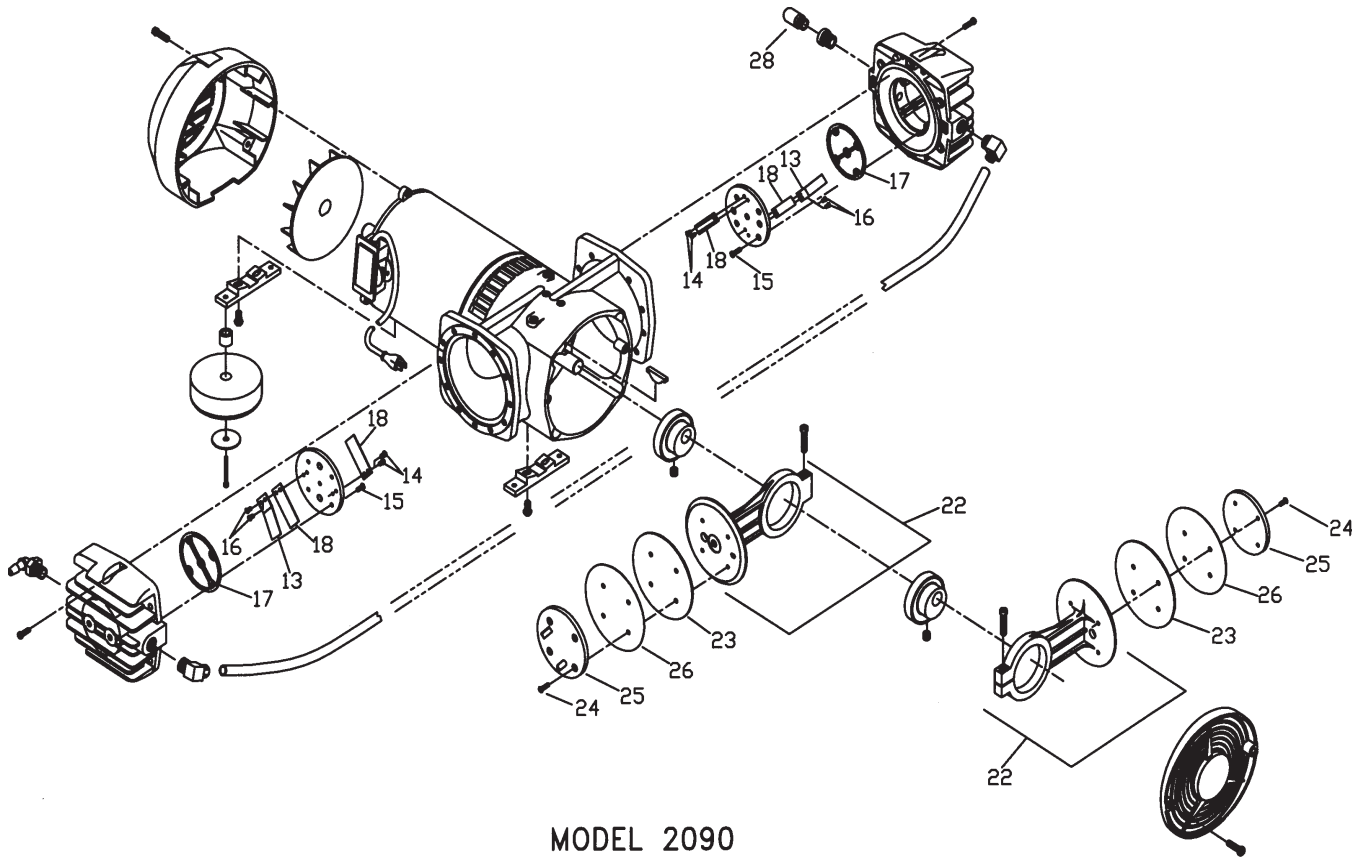
Parts List for 2085

Item No.	QTY	Part No.	Description	Diaphragm Service Kit 2090K-01	Valve Plate Service Kit 2090K-02
13	2	See Note 1	Valve Keeper	-	1
14	4	See Note 1	Screw-Valve Flapper-Intake	-	1
15	10	See Note 1	Screw-Valve Plate	-	5
16	4	See Note 1	Screw-Valve Flapper-Exhaust	-	5
17	2	See Note 1	Valve Plate Gasket	-	1
18	4	See Note 1	Valve Flapper-Intake & Exhaust	-	2
22	2	2090K-03	Connecting Rod	-	-
23	2	See Note 1	Diaphragm	1	-
24	8	See Note 1	Screw-Hold Down Plate	4	-
25	2	See Note 1	Hold Down Plate	1	-
26	2	See Note 1	PTFE Liner	1	-
28	1	See Note 1	Silencer	-	-

Note 1: These parts are not available separately, but are supplied within kits.

67-1342
Sheet 1 of 2
Rev.1 08/01

Exploded View for 2090



MODEL 2090

67-1341
SHEET 2 OF 2
REV. 1 08/01

Parts List for 2090

Item No.	QTY	Part No.	Description	Diaphragm Service Kit 2090K-01	Valve Plate Service Kit 2090K-02
13	2	See Note 1	Valve Keeper	-	1
14	4	See Note 1	Screw-Valve Flapper-Intake	-	1
15	10	See Note 1	Screw-Valve Plate	-	5
16	4	See Note 1	Screw-Valve Flapper-Exhaust	-	5
17	2	See Note 1	Valve Plate Gasket	-	1
18	4	See Note 1	Valve Flapper-Intake & Exhaust	-	2
22	2	2090K-03	Connecting Rod	-	-
23	2	See Note 1	Diaphragm	1	-
24	8	See Note 1	Screw-Hold Down Plate	4	-
25	2	See Note 1	Hold Down Plate	1	-
26	2	See Note 1	PTFE Liner	1	-
28	1	See Note 1	Silencer	-	-

Note 1: These parts are not available separately, but are supplied within kits.

67-1341
Sheet 1 of 2
Rev. 1 08/01

Sales and Service Offices For Welch Rietschle Thomas

USA, Canada, Latin America
Welch Rietschle Thomas
P.O. Box 183
Skokie, IL 60076-0183 USA
Phone: 847-676-8800
Fax (Technical): 847-677-8606
Fax (Orders): 920-451-4397
Email: welchvacuum@thomasind.com

Germany
Rietschle Thomas Puchheim GmbH
Siemensstraße 4
Gewerbegebiet Nord
82178 Puchheim
Germany
Phone: +49 89 80 900 136
Fax: +49 89 80 900 137
Email: mgraham@rt pumps.com

Switzerland/Liechtenstein
Rietschle Thomas Switzerland
Frauenfelder Str. 49
CH-8370 Siranch TG Switzerland
Phone: 41 71 969 3500
Fax: 41 71 969 3501
E-mail: info@rt pumps.ch

Australia
Rietschle Thomas Australia, Pty. Ltd.
30 Bearing Road, Seven Hills
New South Wales Australia 2147
Phone: 61 (2) 96 20 70 00
Fax: 61 (2) 96 20 79 55
Email: tiap@rt pumps.com

New Zealand
Rietschle Thomas New Zealand
P.O. Box 45
40 Anvil Road, Silverdale
Auckland, New Zealand 1330
Tel: 64 9 426 0370
Fax: 64 9 426 0371
Email: tiap@rt pumps.com

United Kingdom
Rietschle Thomas UK
Unit 2, Alton Business Centre
Omega Park, Alton Hants
Hampshire GU34 2YU United Kingdom
Phone: 01420 544 184
fax: 01420 544 183
E-mail: ukinfo@rt pumps.com

Denmark
Rietschle Thomas Denmark, A/S
Tåstrupvej 11
P O BOX 185
4300 Holbæk, Denmark
Phone: 45 59444050
Fax: 45 59444006
Email: rtpumpsdk@rt pumps.com

France
Rietschle Thomas France, S.A.S.
Zone Industrielle Liesbach
8, rue des Champs
68220 Hesingue, France
Phone: +33 3 89 70 26 76
Fax: +33 3 89 70 91 20
Email: service.commercial@rietschle.fr

Italy
Rietschle Thomas Italia, S.p.A
Via Brodolini, 17
20032 Cormano (Milano), Italy
Phone: +39 02 614 512 1
Fax: +39 02 66 50 33 99
Email: info.it@rt pumps.com

Netherlands
Rietschle Thomas Netherlands B.V.
Bloemendalerweg 52
1382 KC WEESP, Netherlands
Phone: +31 294 418686
Fax: +31 294 411706
Email: verkoop@rt pumps.com

Sweden
Rietschle Thomas Sweden AB
Götlundagatan 2
SE-12471 Bandhagen, Sweden
Phone: 46 8 447 1830
Fax: 46 8 447 1839
Email: infosweden@rt pumps.com

Mexico
Rietschle Thomas Mexico
la Privada Jesus Maria #110
San Jose del Arenal 20130
Aguascalientes, Mexico
Phone: 49 960 581
Fax: 49 960 380
E-mail: adiaz@rt pumps.com

Japan
Rietschle Thomas Japan
1794 Nippa-cho Kohoku-ku
Yokohama-shi, Kanagawa
223-0057 Japan
Phone: 81 45 533-0390
Fax: 81 45 533-0391
Email: tiap@rt pumps.com

Hong Kong/PRC
Rietschle Thomas Hong Kong
Units 1-5, 25th Floor, Metropole Square
No. 2 On Yiu St., Siu Lek Yuen
Shatin, New Territories, Hong Kong, P.R.C.
Phone: 852 2690 3502
Fax: 852 2792 4598
Email: tiap@rt pumps.com

Taiwan
Rietschle Thomas Taiwan
2F, No. 9, Rong 11, Lane 327
Chung Shan Road, Section 2
Chung Ho City, Taiwan
Tel: 886 2 2246 4236
Fax: 886 22 2245 0216
Email: tiap@rt pumps.com

Korea
Rietschle Thomas Korea
Room 501, Joong Ang Induspia Building
517-13, Sang Dae Won Dong, Joong Won Ku
Sung Nam City, Kyung Ki Do
Korea 462-713
Tel: 82 31 740 9533
Fax: 82 31 740 9538
Email: tiap@rt pumps.com

Brazil
Rietschle Thomas Brasilien Comérico Ltda.
Rua Shigeru Hayashi, 49 CIC
81170-640 CURITIBA - PR
Brazil
Tel: 55 41 347 0492
Fax: 55 41 347 0290
Email: mschmidt@rt pumps.com

Vacuum Pump Repair Facility



7301 N. Central Ave.
Skokie, IL 60077
Phone: (847) 676-8800 Ext. 1
Fax: (847) 677-8806

OWNER'S MANUAL
For
DRY VACUUM PUMPS
MODELS 2085, & 2090
Part No. 67-1035R1.3