Kuwac USA Industrial Vacuums BA2100 Series

Installation, Operation, Maintenance & Service



✤ BA2100 SERIES







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RUWAC warrants that new equipment which are complete units and are sold and/or manufactured by RUWAC, Inc. will be free from defects in material and workmanship for a period of 18 months from date of shipment or 12 months from date of start-up, whichever come first. RUWAC warrants that replacement parts sold hereunder will be free from defects in material or workmanship for a period of 120-days after the date of shipment. RUWAC machines that have been completely re-built at the factory will carry a 180-day warranty from date of shipment. All field repairs preformed by authorized RUWAC service personnel are covered by a 120-day parts only warranty.

RUWAC, Inc. will not assume any responsibility under the terms of this limited warranty on equipment, which has not been paid in full. This warranty does not apply to any equipment that has been disassembled, repaired, or otherwise altered by any person without the written authorization of RUWAC'S service department, nor does it apply to any product that has been subjected to failure sure to corrosive or abrasive attack, misused, damaged, or improperly installed, nor does it apply to motors, controls, and components not manufactured by RUWAC, Inc. Motors, controls, and other Sub vendor's components therefor are warranted only to the extent of the manufacture's warranty. All warranty work on such products must be authorized by RUWAC, Inc. and must be performed in an authorized shop as designated by the manufacturer. RUWAC sole liability and buyer's sole and exclusive remedy hereunder is the replacement or repair at RUWAC'S option of products not complying with this warranty. Such repair or replacement shall be F.O.B. RUWAC'S factory, and RUWAC reserves the right to invoice all expenses incurred when repairs are made in the field at the request of the customer, except as specifically set forth herein, RUWAC makes no warranty express or implied, with respect to the products and/ or service supplied hereunder, this warranty is in lieu of and excludes all other warranties, including without limitation, any warranty of merchantability, fitness for a particular purpose, or conformance to purchaser's specifications.

IMPORTANT SAFETY INSTRUCTIONS

When using an electrical vacuum system, basic precautions should always be followed, including the following:

READ ALL INSTRUCTIONS BEFORE USING THIS VACUUM

The Ruwac BA2100 is designed for use in dry environments only.

WARNING - To reduce the risk of fire, electric shock or injury:

1. Make sure that this vacuum is connected to proper power source

2. Use only for the pickup of dry settled material. Do not use for the pickup of liquids.

3. Do not pick up ignition sources such as smoldering cigarettes, matches or hot ashes.

4. Insure that the ignition temperature of the material being vacuumed is above that of the operating temperature of the motor.

5. Pay special attention to the reactive properties of the material being vacuumed. Insure that the material is not reactive with other materials present in the machine or its materials of construction. Check your MSDS carefully for special hazards ie. Impact sensitivity.

6. Do not operate this vacuum with missing or damaged filters.

7. Inspect the vacuum for visible damage, especially to the power cord, power pole and connectors. The vacuum must be removed from service and repaired prior to use.

8. Use only Ruwac replacement parts, accessories and hoses specifically designed for your machine.

9. Turn off battery module output circuit breaker when no being used or when being serviced.

- 10. Do not use the power cord/wire connections to displace this vacuum.
- 11. This vacuum is not designed for outside use or use in wet applications.
- 12. Hoses and accessories must be checked for continuity prior to each use.

SAVE THESE INSTRUCTIONS

WARNING:

The attached 18A charger must be used to charge the power source (battery).

If a non-certified charger is used, the power source may be damaged. The machine and the power source must be properly grounded.

WARNING:

A qualified electrician in accordance to the NATIONAL ELECTRIC CODE and all local codes should perform all wiring and or electrical adjustments during servicing if needed and approved by Ruwac.

BA2100 SERIES STANDARD INSTRUCTIONS: GROUNDING INSTRUCTIONS

This appliance must be grounded. If it should malfunction or breakdown, grounding provides a path of least resistance for electrical current to reduce the risk of electric shock. This appliance is fully grounded. Verify continuity before operating the machine.

Grounding Check

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ABOUT RUWAC'S BA2100 UNITS AND GROUND:

- All BA2100 units are constructed of carbon impregnated compression cast composite hous-ings which dissipate static charge.
- Metal components are eclectically grounded through a series of internal ground wires. Grounding can be confirmed using a standard multimeter.



Check for continuity battery handle to inlet and battery handle to ground strap

Note: If continuity is not found across any of these points, consult the parts manual to check that all ground wires are in place. For further assistance, contact Ruwac.

BA2100 SERIES STANDARD INSTRUCTIONS: BATTERY CHARGER

Protection Features: The Battery Charger monitor outputs and will shut-down operation if the Battery Charger detects any of the followings:

- Output Over Voltage Protection
- Output Over Current Protection
- Output Short Circuit Protection
- Reverse Polarity Protection

II.

- Charge Over Temperature Protection
- Ambient Temperature Protection

Installation Environment

The location for installing and using the Battery Charger is important to ensure that the charger operates normally and to avoid situations where there may be damage to the charger or the battery it is connected to.

The Battery Charger has built in intelligent temperature protection which operates in two aspects. The first is stopping the charge function when the battery or unit is too hot. It is best to place the charger in the same location so it can use it's ambient temperature sensor to ensure it is not charging while the temperature is not appropriate for the battery. The second is to achieve the best charging current according to the environmental temperature by adjusting the charging voltage. For these reasons, it is highly recommended that the installation of the charger is close to the battery it is charging.

Please place the charger in a location where there is adequate airflow to prevent overheating, dust accumulation, and in a location where there is no chance of flammable substances coming into contact with the charger.

Lastly, although the charger is designed to be water resistant, it should not be installed in a location that would frequently be exposed to water. The water resistant design is to ensure safe operations in the event that water is splashed onto or around the charger. It is not designed to be consistently submerged or exposed to water during operations.

Connections

Please adhere to the following information to ensure proper operation of the charger.

- The charger power supply is a standard three port plug that includes a grounding pin. Please ensure the plug is connected to a ground for safety reasons.
- If you are connecting this charger to an extension cord, please verify that the extension cord can bear the charger maximum input current. An undersized cord can cause the charger to not operate properly, and may cause damage.
- When connecting to the battery, please use the provided connectors.

Note: Do not change, modify or alter the vacuum units and any of its components without Ruwac's representative approval.

BA2100 SERIES STANDARD INSTRUCTIONS: BATTERY CHARGER

Safety Information

II.

- If the Battery Charger appears to be damaged or abnormal, please immediately disconnect the charger and contact Ruwac Inc..
- This charger is not designed to be opened, disassembled, or repaired for any reason. Opening the battery charger can be dangerous, resulting in electric shock, injury, or even death. Do not open the cover.
- If there appears to be any damage to the wiring harness, please do not connect the charger or use the charger. There are locations on the harness where damage may occur if dropped or smashed into. Please visually inspect prior to use and if there is damage, replace the wiring harness or contact Ruwac Inc.

Indicator Light

- Red indicator flashes every second:
- Yellow indicator flashes every second:
- Green indicator flashes every second:
- Green indicator on:

Battery Charge <80% Battery Charge >80% Battery Charge ~100%

Battery Charge 100% and not currently charging

*Note: It is not uncommon for LiFePo batteries to register directly from a red indicator to green due to the charging graph for this type of battery. Do not be alarmed if you do not see the yellow flashing indicator.

** Even when the battery reaches 100%, the charger may still blink red for up to 30 minutes if cell equalizing is needed.

Fault Indication

- Red indicator flashes every three seconds: Battery Abnormal
- Yellow indicator flashes every three seconds: Source Electric Anomaly
- Green indicator flashes every three seconds: Charger Abnormal

Common Fault Solutions

- Battery Abnormal
 - Output Short Circuit: Check wire output to verify there is no short circuit
 - No Battery/Reverse Polarity: Check battery connection is secure and correct
 - Battery Low Voltage: Ensure battery voltage is above minimum required for charger
 - Battery Overheat: Ensure proper ventilation and that you are within operating range
- Source Electric Anomaly
 - Error Input Voltage: Verify input voltage is in the correct range for charger
 - Thin Input Wire Line: Ensure input wire line is of correct size
- Charger Abnormal
 - Charger Overheat: Verify proper ventilation and allow charger to cool before continued use

II. _____ Safety Instructions BA2100 SERIES STANDARD INSTRUCTIONS: **BATTERY CHARGER**

Working Environment and Input Characteristics

Item	Technical Target
Working Temperature	- 40 [°] C to 60 [°] C
Storage Temperature	- 40 [°] C to 90 [°] C
Relative Humidity Heat	5% to 95% Forced
Dissipation Method	Cooling
Input Voltage	AC 90-264V + 20%
Input Frequency	45Hz-65Hz

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BA2100 SERIES STANDARD INSTRUCTIONS: BATTERY

Ctata	Warning/		ALM	SOC LED				Definition
State	Normal	RUN		25%	50%	75%	100%	
OFF		OFF	OFF	OFF	OFF	OFF	OFF	All OFF
Standby	Normal	ON	OFF					
	Warning	ON	Flash 2					
	Protection	OFF	ON					
	Normal	Flash 1	OFF					
Charge	Warning	Flash 1	Flash 2	ON a				
	Protection	OFF	ON					
	Normal	Flash 2	OFF					
Discharge	Warning	Flash 2	Flash 2					
	Protection	OFF	ON					
BMS failure		OFF	Flash2	OFF				

Table 1: LED indicator description

Note: For State of Charge (SOC), each ON LED indicates an increment of 25% SOC. Note: Flash 1——Flash once every 1.2S; Flash 2——Flash once every 2.4S.

Table 2: Communication interface definition for front panel RJ45 connectors

Definition	RJ45B (most common)							
Dominion	PIN-1	PIN-2	PIN-3	PIN-4	PIN-5	PIN-6	PIN-7	PIN-8
0.4.14	WHI/OKG	UNG		DLU	VVITI/DLU	GRN		DRN
CAN								
RS485							D+	D-
Battery								
Comm								

Table 3: Environmental Requirements

Туре	Requirement		
Working Ambient Temperature Range	-13F~158F		
Storage Ambient Temperature Range	-13F~158F		
Relative Humidity	≤95%		
Atmospheric Pressure Range	86kPa~106kPa		
Site Environment	No conductive dust, corrosive gas, or vibration. Keep away from heat and flame.		

II. _____ BA2100 SERIES STANDARD INSTRUCTIONS: BATTERY

VOLTAGE PROTECTION

Over Voltage

While charging, if any individual cell voltage exceeds the cell protection limit or if the battery module voltage exceeds the module protection limit, the BMS will disconnect the battery module terminals to shut off charging. Once all cell voltages and the battery module voltage have decreased below the set recover limits, the BMS will automatically reconnect the battery module terminals and allow charging to resume. The voltage settings are shown in table 2.

• Under Voltage

While discharging, if any individual cell voltage is below the cell protection limit or if the battery module voltage is below the module protection limit, the BMS will disconnect the battery module terminals to shut off discharging. Once all cell voltages and the battery module voltage have increased above the set recover limits, the BMS will automatically reconnect the battery module terminals and allow discharging to resume. The voltage settings are shown in table 2.

CURRENT PROTECTION

Charge Over Current

While charging, if the current exceeds the maximum continuous current rating by 2% and remains for greater than 10 seconds, or if the current exceeds the rating by 20% and remains for greater than 3 seconds, the BMS will disconnect the battery module terminals to shut off charging. The BMS will automatically reconnect the battery module terminals and allow charging to resume after 180 seconds. Resolve the fault condition to avoid further shutdowns or the BMS will lock the module after 5 attempts and require a manual reset. The settings are shown in table 2.

Discharge Over Current

While discharging, if the current exceeds the maximum continuous current rating by 2% and remains for greater than 10 seconds, or if the current exceeds the rating by 50% and remains for greater than 3 seconds, the BMS will disconnect the battery module terminals to shut off discharging. The BMS will automatically reconnect the battery module terminals and allow discharging to resume after 60 seconds. Resolve the fault condition to avoid further shutdowns or the BMS will lock the module after 5 attempts and require a manual reset. The settings are shown in table 2.

Short Current Protection

While discharging, if the current exceeds the maximum continuous current rating by 100% and remains for greater than 1 second, the battery module output circuit breaker will trip and disconnect the battery module terminals to shut off discharging. The BMS will require a manual reset. Resolve the fault condition to avoid further shutdowns. The settings are shown in table 2.

• Reverse Polarity Protection

If the battery module terminals are connected to a load or source with the polarity of the terminals reversed, the BMS will immediately disconnect the battery module terminals and enter the polarity protection state to protect the battery module from damage. The BMS will require a manual reset. Ensure the terminal polarity error is corrected before proceeding.

II. _____ BA2100 SERIES STANDARD INSTRUCTIONS: BATTERY

TEMPERATURE PROTECTION

Cell

There are several thermal sensors to monitor cell temperature. If the temperature of any cell is less than 23F or greater than 158F, the BMS will disconnect the battery module terminals to terminate charging. The BMS will automatically reconnect the battery module terminals and allow charging to resume after the temperature returns to within 32F to 140F. If the temperature of any cell is less than -4F or greater than 167F, the BMS will disconnect the battery module terminals to terminate discharging. The BMS will automatically reconnect the battery module terminals and allow discharging to resume after the temperature returns to within 14F to 149F. The settings are shown in table 2.

• PCB

A thermal sensor exists to monitor the printed circuit board (PCB) temperature. If the PCB temperature exceeds 221F, the BMS will disconnect the battery module terminals. The BMS will automatically reconnect the battery module terminals once the temperature is less than 176F. The settings are shown in table 2.

Module

A thermal sensor exists to monitor the battery module ambient temperature. If the ambient temperature is less than -13F or greater than 158F, the BMS will disconnect the battery module terminals.

The BMS will automatically reconnect the battery module terminals once the temperature returns to within 5F to 140F. The settings are shown in table 2.

CELL BALANCE

Smart Cell Balance

While charging, if any cell voltage exceeds 3.40V and the voltage difference between the cells becomes greater than 40mV, the BMS will initiate the balancing process for those cells. The balance current is based on the cell voltage differences and limited to 100mA.

BA2100 SERIES INSTRUCTIONS: START-UP / SHUT DOWN OPERATION

WARNING: A qualified electrician in accordance to the NATIONAL ELECTRIC CODE and all local codes should perform all wiring and/or electrical adjustments during servicing if approved by Ruwac.







Note: To charge the battery or run the vacuum, the breaker must be on

Pull up on the dust pan lever to release the dustpan. Check that the dustpan is completely empty.

Return the dustpan to initial position and lock dust pan in place by pushing the lever arm Turn the breaker on revise LED's at the lower right corner for state of charge and operating status. See LED Indicator description on the next page



Use the filter shaker to clean the filter before and after each use.



To empty the machine, release the dustpan lever.



Turn on the motor before removing the dustpan. This will ensure that excess material sticks to the filter.



Remove the dustpan and empty contents. The dustpan should be emptied after ever use.

BA2100 SERIES STANDARD INSTRUCTIONS: FILTER MAINTENANCE

WARNING: Always wear a dust mask and have adequate help when performing filter inspections or service. Never try to inspect a filter on your own.





Use the shaker bar to clean the filter while the machine is off

Turn the vacuum on and block the inlet to place vacuum under pressure



Remove all motor deck screws while the vacuum is under pressure. Turn off the vacuum after screws are removed



Remove the motor deck. Disconnect the ground wire.

5



Disconnect the filter ground and remove the filter spacer hardware.

Remove the filter ring and shaker assembly.



Remove and replace the filter. Keep the black mesh inserts.

8



Inspect filter pleats for any tears or damage. Do not use sharp tools to clean the filter.

Note: Using an object to dislodge material may tear the filter. Consult your RUWAC representative if material blockage is excessive. Do not use high pressure compressed air or water to clean off filter, as material may become permanently lodged into filter membrane.

BA2100 SERIES STANDARD INSTRUCTIONS: FILTER MAINTENANCE

CAUTION: Motor deck will be heavy and will require a hoist to remove. Always wear a dust mask when performing filter inspections or service.



V.



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Insert motor deck. Connect ground wire.

Place back the filter pleats. If replacing filter, reinsert black mesh into the new filter

Insert filter cage into the filter pleats





Turn the vacuum on and block the inlet to place vacuum under pressure



Insert motor-deck hardware

NOTE: The presence of material between motor-deck and filter is often the result of a misaligned seal or damaged filter. Consult your RUWAC representative if either is the case.

BA2100 INSTRUCTIONS: BRUSH MAINTENANCE



Turn the machine off, then turn off breaker of the battery.



Remove hardware from the hood.



Remove silencer hood from motordeck.





Lift motor shield up from deck to expose motors.



Remove the 2 metal motor-cap-retaining clips locating on each motor (for Ametek motors only)



ElectroMotor brush

SEE PAGE 12 FOR ELECTRO MOTOR BRUSH INSPECTION INSTRUCTIONS

BA2100 SERIES STANDARD INSTRUCTIONS: BRUSH INSPECTION

NOTE: A motor brush should be replaced if its length is less than 0.25 inches.





3



Carefully dislodge the plastic motor cap via the built-in hooks on both sides of motor brush. (**TIP:** Dislodge one side of a cap first followed by the other.) With a flathead screwdriver, flip brush tab upward. Use pliers to then pull the brush out by the tab. If the brush is worn down to a length of 0.25" or less, replace the brush. To replace or reinstall brush, hold down internal spring using the tool supplied with brush. While holding spring down, push the brush back in. Remove the brush tool once the brush is in.

5



Push the motor brush in until it's flush.

NOTE: Consult the BA2100 Series parts manual (available at www.ruwac.com) for help identifying the specific replacement brush required for your machine.

V. _

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
Insufficient Vacuum	- Dustpan improperly seated	- Remove dustpan, inspect seal, replace dustpan.
Fiessure	- Filter clogged or improperly	- Follow filter maintenance procedure (Section V.)
	- Clogged hose	- Remove hose and re-inspect vacuum pressure, if vacuum pressure returns to normal snake hose.
	- Unit is improperly sealed	- Block the inlet with a flat and rigid material to place the unit under vacuum pressure then inspect for air leaks.
Air Leaks	- Worn or poorly seated seals, Retainers improperly installed	- Block the inlet with a flat and rigid material to place the unit under vacuum pressure then remove retainers and turn the unit off. Inspect the seals for completeness, then reseat and secure components again under vacuum pressure.
Material In Exhaust / On Top Side of Filter	- Poor filter seal or torn filter	- Follow filter maintenance procedure (Section V.)
Unusual or High Pitched Noises	- Motor bearings, turbine bearing	 Follow relevant motor bushing inspection procedure (Section V.) Check motor bearings for noise by hand.
	- Worn or poorly seated seals, Retainers improperly installed	- Block the inlet with a flat and rigid material to place the unit under vacuum pressure then remove retainers and turn the unit off. Inspect the seals for damage, then reseat and secure components again under vacuum pressure.

Vacuum Motor Shuts
Down Prematurely- Confirm the amperage setting
on motor overload

ACCEPTANCE: The terms and conditions of sale set forth herein apply to any order accepted or acknowledged by RUWAC, Inc. Buyer's acceptance of RUWAC'S proposal or delivery of all or any part of the goods covered hereunder constitutes acceptance of the terms and conditions of sale contained herein, and RUWAC hereby rejects any additions to or modification to these terms and conditions. Any representations, promises, warranties, or statements by RUWAC or its agents that differ in anyway from these terms and conditions shall be given no force or effect. No contract is final until accepted in writing by RUWAC at its corporate office in Holyoke, Massachusetts.

PRICES: Prices quoted orally expire the same day they are made unless accepted in writing on that day or confirmed by written communication by RUWAC. Written price quotations are guaranteed for thirty (30) days after the date issued, but may be terminated by written notice within that period. After thirty (30) days, any written price quotations are subject to adjustment to reflect prices in effect at the time of shipment, including any changes in packing, storage, or shipping charges. This order or proposal includes only the equipment specified herein, and does not include freight or installation of RUWAC equipment. All prices are F.O.B. RUWAC'S plant in Holyoke, Massachusetts and are exclusive of all taxes, levies, and duties that may be assessed in connection with the sale or delivery of goods, and Buyer shall be responsible for all such taxes, levies, and duties. In the event RUWAC pays any such tax, levy, or duty, Buyer shall promptly reimburse RUWAC therefor. Any packaging requirements other than RUWAC'S standard packaging and commercial container will be invoiced as an extra charge.

PAYMENT: Payment is due in full thirty (30) days after the date of invoice. All invoices paid after the due date will be assessed a late payment charge of one and half percent (1.5%) per month or any portion thereof, or the maximum amount allowed by applicable law, whichever is less. Buyer shall be responsible for all costs of collection, including reasonable legal fees. Sales on the foregoing terms are subject to the approval of RUWAC'S credit department and may be changed at any time at RUWAC'S sole discretion. If RUWAC has reasonable grounds with respect to Buyer's ability or willingness to make timely payments for the goods. RUWAC may at any time suspend performance, decline to ship, or require advance payment in cash or other adequate assurance satisfactory to RUWAC.

SHIPMENTS AND DELIVERY: RUWAC shall use its reasonable efforts to meet all shipment or delivery dates recited in RUWAC'S proposal or in Buyer's order but any such dates are estimated only and are not guaranteed. RUWAC shall have no liability to Buyer for damages or penalties, direct or indirect, for any delay in shipment or delivery, whether such delay is minor or substantial, nor shall Buyer have the right to declare a breach of contract because of any such delay. In any event, delivery schedules are based upon the effective date of the order and are subject to prompt receipt by RUWAC of all necessary down payments, information and instructions from Buyer, including any required approval of drawings. RUWAC shall have the right to make partial shipments, and invoiced covering the same shall be payment terms hereof. RUWAC will attempt to ship in accordance with Buyer's instructions, but RUWAC will make the final selection of a method of shipment and a carrier unless Buyer clearly and conspicuously specifies that shipment must be by a particular method of carrier. RUWAC is not responsible for damage or loss in transit, and all such claims must be by Buyer directly against the carrier.

<u>CHANGE ORDERS</u>: RUWAC shall not be obligated to make any changes in or additions to the scope of the work which are initiated by Buyer or result from circumstances beyond RUWAC'S control unless there is an equitable adjustment in price and or delivery.

CANCELLATION, SUSPENSION OR DELAY: In the event Buyer requests or causes a cancellation, suspension or delay in any RUWAC'S work under this proposal or order based thereon, Buyer shall indemnify and pay to RUWAC all appropriate charges, including but not limited to any costs, expenses, and commitments incurred by RUWAC up to the date of receipt of notice of such cancellation, suspension or delay, plus RUWAC'S overhead and reasonable profit. If shipment is delayed on account of Buyer, the purchase price shall be due and payable as if delivery had been made. Additionally, all charges related to storage, disposition and/or resumption of work, at RUWAC'S plant or elsewhere, shall be for Buyer's sole account and Buyer thereto shall assume all risks incidental.

CLAIMS: NOTICE OF DEFECTS: Buyer shall give written notice of rejection of any shipment or portion thereof within thirty (30) days after the date of shipment specifying the reasons therefor. Failure to give such notice shall be deemed a waiver of any right of rejection and any claim with respect thereto (except as to claims under the warranty) and shall be deemed an acceptance of such shipment. Buyer shall set aside and hold rejected goods without further processing until RUWAC has an opportunity to inspect and advise of the disposition, if any, to be made of such goods. In no event shall any rejected goods be returned reworked, or scrapped by Buyer without the express written authorization of RUWAC.

INSPECTION OF EQUIPMENT: RUWAC shall have the right to inspect, after prior notices, the equipment supplied by it when in operation. If Buyer requires, RUWAC shall execute an appropriate secrecy agreement.

<u>CONFIDENTIALITY</u>: All proposals, drawings, diagrams, specification, pricing, and other materials relating to the goods included are the property and confidential information of RUWAC. Buyer shall not disclose such material or information without the written approval of RUWAC.

BACK CHARGE: RUWAC will pay claims for expenses of Buyer relating to labor and/or material supplied by Buyer only if (a) RUWAC is advise in writing before such expenses are incurred (2) RUWAC gives Buyer its prior written consent to the supply of such labor and/or material by buyer.

LIMITED WARRANTY: RUWAC warrants that new equipment which are complete units and are sold and/or manufactured by RUWAC, Inc. will be free from defects in material and workmanship for a period of 18 months from date of shipment or 12 months from date of start-up, whichever comes first. RUWAC warrants that replacement parts sold hereunder will be free from defects in material and workmanship for a period of 120-days after the date of shipment. RUWAC machines that have been completely re-built at the factory will carry a 180-day warranty from date of shipment. All field repairs by authorized RUWAC service personnel are covered by a 120-day parts only warranty. RUWAC, Inc. will not assume any responsibility under the terms of this limited warranty on equipment, which have not been paid for in full. This warranty does not apply to any equipment that has been disassembled, repaired, or otherwise altered by any person without the written authorization of RUWAC'S service department, nor does it apply to any product that has been subject to failure due to corrosive or abrasive attack, misused, damaged, or improperly installed, nor does it apply to motors, controls, and components not manufactured by RUWAC, Inc. Motors, controls, and other Sub vendor's components therefor are warranted only to the extent of the manufacturer's warranty. All warranty work on such products must be authorized by RUWAC, Inc. and must be performed in an authorized shop as designated by the manufacturer. RUWAC sole liability and buyer's sole and exclusive remedy hereunder is the replacement or repair at RUWAC'S option of products not complying with this warranty. Such repair or replacement shall be F.O.B. RUWAC'S factory, and RUWAC reserves the right to invoice all expenses incurred when repairs are made in the field at the request of the customer, except as specifically set forth herein, RUWAC makes no warranty express or implied, with respect to the products and/or service supplied hereunder, this warranty is in lieu of and excludes all other warranties, including without limitation, any warranty of merchantability, fitness for a particular purpose, or conformance to purchaser's specifications.

LIMITATION OF LIABILITY: RUWAC'S responsibility with respect to the goods and RUWAC'S obligations related thereto should in no event exceed the purchase price of the goods. RUWAC shall not be liable to Buyer for any special incidental, indirect, or punitive damages for any reason whatsoever, including, but without limitation damages in the form of (a) loss of profits, revenues, or anticipated savings resulting from the failure of the equipment to meet specifications or warranties (b) damages suffered by Buyer as a result of loss of production facilities or equipment (c) cost of replacement equipment (d) damages suffered by customers of the Buyer (e) any fines or penalties assessed for failure to comply with any law or government regulations.

REPAIR OF GOODS EXPOSED TO HAZARDOUS, TOXIC, OR INFECTIOUS MATERIAL: Buyer shall ensure that any goods submitted by Buyer or any of its customers to RUWAC for repairs or other service have been decontaminated and cleaned (including sterilization, if appropriate) of any hazardous, toxic or infectious materials, including without limitation any materials listed by the Environmental Protection Agency, OSHA, or any applicable state law as deserving or requiring special treatment. Upon RUWAC'S request, Buyer or its customer shall certify in writing that such goods contain no such hazardous, toxic, or infectious materials, and that such decontamination has taken place in accordance with accepted parties and in accordance with all applicable laws and regulations. If special safety equipment is required to protect RU-WAC'S service personnel from any such hazardous, toxic, or infectious materials during field service work or otherwise. Buyer shall ensure that such safety equipment is provided and that the personnel are properly instructed. The provision of this paragraph shall apply to all work to be performed by RUWAC'S service personnel at any time, whether or not covered by warranty. Buyer shall defend and indemnify RUWAC for any and all losses, liabilities, expenses, and damages (including attorneys' fees) arising out of any failure of buyer or its customer to comply fully with the terms of this paragraph.

BUYER SUPPLIED DATA: Buyer acknowledges that RUWAC has relied upon all specifications and other data supplied by Buyer to RUWAC in the selection and design of the equipment and the preparation of this proposal. In the event the site operating conditions differ from those represented by Buyer and relied upon by RUWAC, any warranties or performance guarantees contained herein affected by such conditions shall be null and void, unless otherwise mutually agreed upon in writing.

<u>REMEDIES OF SELLER:</u> In addition to any other remedies of RUWAC provided hereby or by law, in the event Buyer becomes bankrupt, insolvent, assigns assets for the benefit of creditors or its financial condition has substantially deteriorated, RUWAC may, at its sole option, declare a breach of contract, stop all work hereunder or demand payments in advance as security for its performance hereunder.

FACTIONS: GOVERNING LAW: Any dispute, controversy, or claim against RUWAC with respect to the goods or any of RUWAC'S obligations related thereto must be commenced within one year from the date of shipment. All contract between Buyer and RUWAC shall be governed by and construed in accordance with the laws of the state of Massachusetts except that body of laws controlling conflict of laws.

BONDS: In addition to the price specified herein, Buyer shall pay the cost of any bonds, which Buyer requires RUWAC to obtain.

ENTIRE AGREEMENT: These terms and conditions, together with the provisions of the proposal constitute the entire agreement between the parties pertaining to the goods, and they supersede any prior or contemporaneous agreements, representations, or understandings between the parties. No waiver or modification of these terms and conditions is binding unless such waiver or modification is set out in writing signed by an authorized manager or officer of RUWAC. RUWAC'S failure to strictly enforce any right on one occasion does not constitute a waiver of that or any on any other occasion.