IMTEC

INSTRUCTION MANUAL

FOR

QZ-SERIES ACCUBATHS

U. L. Recognized

Imtec Acculine

49036 Milmont Dr.
Fremont, CA 94538

Tel: 510-770-1800
Fax: 510-770-1400

PUBLICATION NUMBER 15-A264-0595

IMTEC

TABLE OF CONTENTS

IMTEC

INTRODUCTION

IMTEC's constant-temperature quartz process Accubath systems have been explicitly designed and constructed for the demanding high-purity, high-reliability requirements of advanced semiconductor fabrication. IMTEC's quest is to provide the highest quality state-of-the-art process equipment, optimizing yield, throughput and cost of ownership.

IMTEC's Accubaths have been designed with the purity of materials and chemical resistance required for use in such semiconductor wet processes as: H_2SO_4 pre-diffusion cleaning and oxide resist stripping, nitride etch, solvent-based resist stripping, hot DI water rinsing, metal etching and other demanding semiconductor fab applications. The QZ-Series Accubath systems are designed to operate at temperatures ranging from zero up to 190°C.

In addition to standard-model baths, IMTEC offers process configurations customized to specific user needs.

IMTEC

LIST OF FIGURES

IMTEC

SECTION 1.0

UNPACKING PROCEDURE

1.1 UNPACKING THE QZ-SERIES ACCUBATH

NOTE

These unpacking instructions have also been included with the shipping manifest ATTACHED TO THE OUTSIDE OF THE SHIPPING CONTAINER.

When opening the Accubath shipping container, look for evidence of transportation damage and retain the shipping container and materials until you are certain there is no hidden damage. Responsibility for claiming freight damage is that of the buyer. Claims should be made promptly with the shipper. Please also advise IMTEC so that we may help you both in your damage claim and in an expeditious repair or replacement of the damaged goods.

IMTEC should be advised immediately of any missing parts.

KEEP the pre-formed packing and box in which your Accubath was shipped. If the bath should ever need repair, it must be returned in the appropriate container to minimize risk of shipping damage. It is required that a returned bath be shipped in its original container. If original container is not available, a packaging kit may be purchased from IMTEC.

(Refer to Return Policy, Page 12-1.)

1.2 CONTENTS

The shipping carton should contain the Accubath with power cable, warranty registration card, heater wiring diagram and this manual. If the bath is consolidated in shipment with other system components, check your receiving documents and/or additional manuals for the pertinent items.

1.3 PROCEDURE

Unpacking of the Accubath should be done with normal and reasonable handling care.

PLEASE REMEMBER - QUARTZ, LIKE GLASS, BREAKS UPON IMPACT.

1.4 WARRANTY CARD

The warranty card is enclosed (with this manual) in a large, clear, plastic envelope packed inside the bath unit. The card must be completed and mailed to IMTEC when the bath is installed in your process station. The warranty period starts on the postmarked date of the warranty card or on the bath shipment date if the warranty card is not returned within 120 calendar days of bath shipment.

IMTEC

SECTION 2.0

SAFETY ADVISEMENTS

2.1 GENERAL

Consult your company's Wet Station Safety Regulations and Specification and local fire marshal and electrical code requirements when planning and installing any Accubath unit.

Please read this section COMPLETELY before installing and operating your Accubath. The following instructions are included for YOUR safety as well as protection of bath unit.

This section is only suggestive; IMTEC assumes no responsibility for the correct installation of this equipment in any user's facility. The use of licensed contractors, O.E.M.-provided personnel and/or trained Facility Maintenance personnel is recommended.

2.2 ELECTRICAL SAFEGUARDS

2.2.1 If your Accubath is operating with an IMTEC controller, refer to IMTEC controller manual shipped with that unit. In the case of a non-IMTEC controller being used, refer to that manufacturer's controller literature.

2.2.2 Do NOT immerse the power cable or connectors in water or other liquids.

2.2.3 When performing a re-install, unplug power cable before moving the Accubath.

2.3 HANDLING SAFEGUARDS

2.3.1 Guard against mechanical impact when handling the bath - even a small chip can start a running fracture.

2.3.2 <u>CAREFUL! DO NOT TOUCH HOT SURFACES OF QUARTZ TANK</u> These surfaces could be as hot as 200°C!

2.3.3 Do NOT move a bath that is still hot.

2.3.4 Do NOT move a bath containing any solution.

2.3.5 Do NOT turn ON the bath <u>unless</u> it contains liquid filled to the freeboard line (the horizontal interface line formed by the Accubath gray and white backgrounds).

2.3.6 Do NOT unduly flex or crimp the electrical cable.

2.4 IN-USE SAFEGUARDS

2.4.1 Make sure all protective sensors and automatic shutdowns are attached and functional.

2.4.2 Do NOT use Accubath with any process chemistry or solvents unless the bath is properly installed in an operating fume hood.

2.4.3 Be sure to always wear protective outer garments; these include approved-type safety glasses or goggles, splash-guard sleeves and aprons, and resistant gloves when handling any type of corrosive chemical solution.

2.4.4 Do NOT aspirate (manually drain) hot solution from any process vessel. Allow the liquid to cool to a maximum temperature of 90°C first.

2.4.5 Accubath process tank is constructed of QUARTZ. Do NOT use Hydrofluoric Acid, B.O.E., or other HF-bearing solutions in this Accubath product. Such compounds will etch the quartz tank and void the warranty.

2.4.6 Do NOT leave an operating bath system unattended. If cognizant personnel are NOT in the immediate area, TURN THE SYSTEM POWER OFF.

2.4.7 Heater mesh and safety over-temperature sensors MUST be completely covered by bath liquid level.

2.4.8 Do NOT operate at temperatures exceeding 190°C.

2.4.9 Take extra care when using volatile flammables; fumes are more dangerous than liquids. The use of a liquid level sensor is highly recommended.

IMTEC

SECTION 3.0

PHYSICAL SPECIFICATION

3.1 EXPLANATION OF ACCUBATH MODEL NUMBERS

The Accubath model number contains useful information. Each Accubath is delivered with model number, serial number and other pertinent information inscribed on a faceplate affixed to the bath exterior. The serial number is also stamped on the outer surface of the process tank.

The information contained in the bath model number is best explained by use of a typical example; i.e., the QZ-A1501-10.

EXAMPLE: QZ-A1501-10

Information Fields:	QZ	-	A	150	1	-	10
Refer to Note:		1	2	3	4		5

Notes

1: Model Type: QZ (static bath, with or without drain); QR (Quartz Recirculating; QRT/S (Quartz Recirculating with Trough and Sump), etc.

2: A, B, C, etc.: Indicates different configurations of the same basic design (usually small dimensional variations); "A" indicates the first configuration of this bath; "B" the second, and so on.

3: Wafer Size: 150mm (6-inch).

4: Accubath Wafer Cassette Capacity: "1" wafer cassette; "2" cassettes.

5: Capacity (in liters) to Top Lip of Working Tank: 10 liters. (Actual fill amount is less, only to freeboard line.)

Should you have any doubt as to which model Accubath you have, our factory can give you complete information if you will call with the serial number ready.

A typical Accubath, Model QZ-A1502-18 [static bath, first design configuration, 150mm (6-inch) wafers, two cassettes, 18 liters], is illustrated in Figure III-1.

3.2 DATA

The physical characteristics of the various QZ models are described in Figures III-2 through III-4.

3.3 MATERIALS

IMTEC's QZ process tank is fabricated of annealed virgin quartz; all wetted surfaces are fire-polished. The tank enclosure is manufactured of flame-retardant polypropylene (FRP) welded to a single-piece white or natural poly flange (for optimal chemical resistance of this highly exposed part). The poly flange, in turn, is attached to the mating quartz flange. The seal material may vary depending upon intended bath use. If no chemical usage is stipulated at time of order, our standard fluoroelastomer RTV seal will be supplied. The patented Inconel heating element is bonded directly to the quartz tank. Insulation is refractory alumina-silica. Drains (optional) are typically quartz and terminate with Teflon fittings outside of the FRP housing.

3.4 DESCRIPTION

FUNCTION	For use in semiconductor and other similar wet process and solvent-based applications; for example: H_2SO_4 pre-diffusion cleaning and oxide resist stripping, H_3PO_4 nitride-etch solvent-based resist stripping, metal etching, hot DI water rinsing and other similar applications.
TEMPERATURE RANGE	0° to 190°C.
OVER-TEMP. SENSOR #1	Thermocouple (T/C), J-type. Two (2) thermocouples are included, one active, one spare, and are mounted on the outside of quartz tank wall, just above the heaters unless otherwise specified.
OVER-TEMP. SENSOR #2	One thermostatic snap switch, normally closed, set to open at 210°C ±7°C, mounted on outside of quartz tank wall.
ADDITIONAL DATA	Refer to Paragraph 2.2.1.

Figure III-1. QZ-A1502 Accubath

IMTEC

Figure III-1. QC-A1502 Accubath

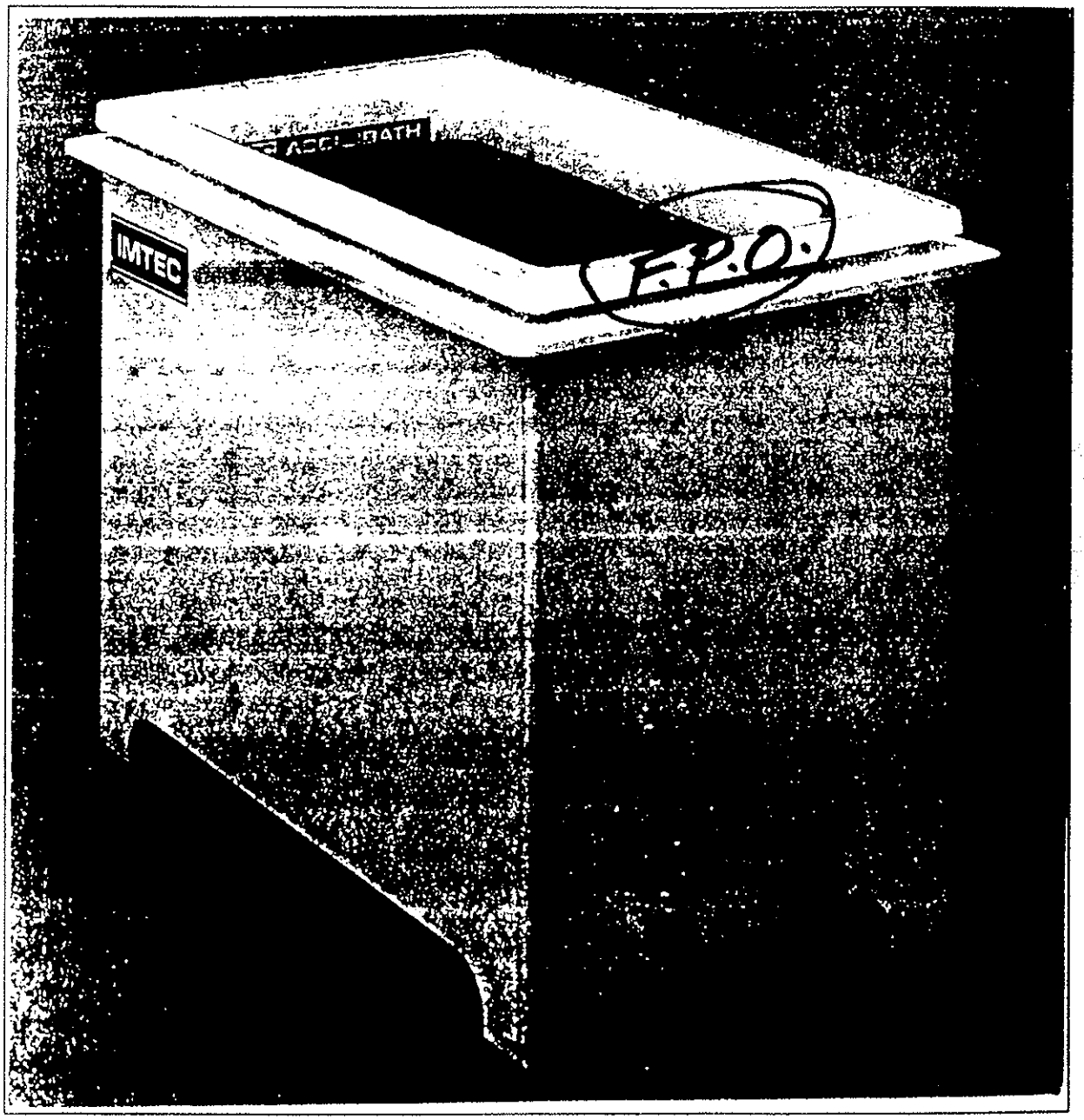


Figure III-2. Dimension Guide

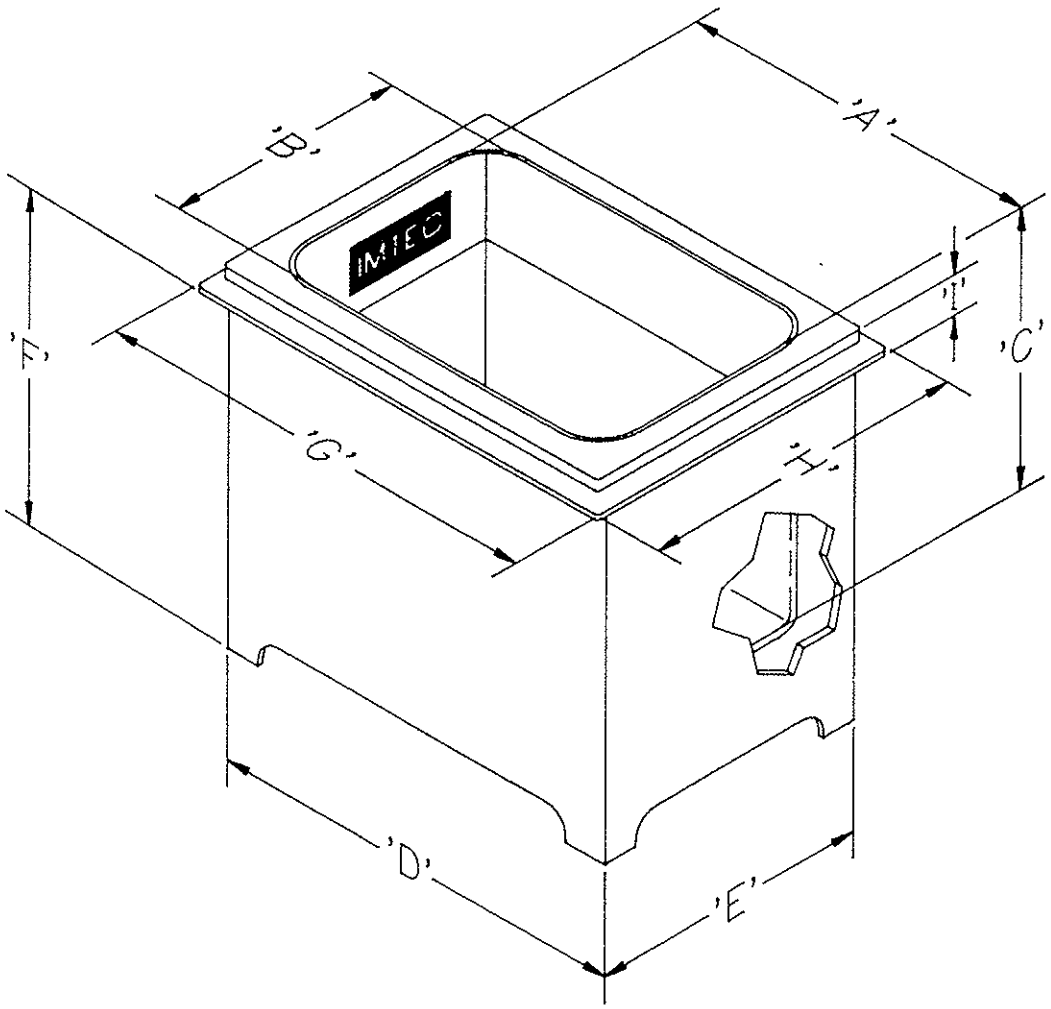


Figure III – 3. Table - Accubath Dimensions

Model	Inside Process Vessel			Below Mounting Flange			Above Mounting Flange		
	Length (A)	Width (B)	Depth (C)	Length (D)	Width (E)	Depth (F)	Length(G)	Width (H)	Height (I)
QZ-A1002-11	11.5" (29.2 cm)	7.5" (19.1 cm)	7.8" (9.8 cm)	14.0" (35.6 cm)	10.0" (25.4 cm)	11.1" (28.2 cm)	15.0" (38.1 cm)	11.0" (27.9 cm)	1.1" (2.8 cm)
QZ-A1252-14	13.5" (34.3 cm)	7.5" (19.1 cm)	8.8" (22.4 cm)	16.0" (40.6 cm)	10.0" (25.4 cm)	12.1" (30.7 cm)	17.0" (43.2 cm)	11.0" (27.9 cm)	1.1" (2.8 cm)
QZ-A1254-27	13.5" (34.3 cm)	13.5" (34.3 cm)	8.8" (22.4 cm)	16.0" (40.6cm)	16.0" (40.6 cm)	12.1" (30.7 cm)	17.0" (43.2 cm)	17.0" (43.2 cm)	1.1" (2.8 cm)
QZ-A1501-10	7.8" (19.8 cm)	7.8" (19.8 cm)	9.8" (24.9 cm)	10.3" (26.2 cm)	10.3" (26.3 cm)	13.1" (33.3 cm)	11.3" (28.7 cm)	11.3" (28.7 cm)	1.1" (2.8 cm)
QZ-A1502-18	16.0" (40.6 cm)	8.0" (20.3 cm)	9.8" (27.9 cm)	18.5" (47.0 cm)	10.5" (26.7 cm)	13.1" (33.1 cm)	19.5" (49.5 cm)	11.5" (29.2 cm)	1.1" (2.8 cm)
QZ-A2001-25	12.0" (30.5 cm)	11.0" (27.9 cm)	11.7" (29.7 cm)	14.5" (36.8 cm)	13.5" (34.3 cm)	15.0" (38.1 cm)	15.5" (39.4 cm)	14.5" (36.8 cm)	1.1" (2.8 cm)
QZ-B2001-34	16.0" (40.6 cm)	10.5" (26.7 cm)	12.0" (30.5 cm)	18.6" (47.2 cm)	13.1" (33.3 cm)	15.1" (38.4 cm)	19.8" (50.3 cm)	14.3" (36.3 cm)	1.1" (2.8 cm)
QZ-A2002-51	21.5" (54.6 cm)	11.5" (29.2 cm)	12.6" (32.0 cm)	24.1" (61.2 cm)	14.1" (35.8 cm)	15.6" (39.6 cm)	25.3" (14.3 cm)	15.3" (38.9)	1.3" (3.3 cm)

* Add 1.6" (4.1 cm) if optional quartz drain is installed

IMTEC

Figure III-4. Table - Accubath Characteristics

Model	Liquid Fill Amount (liters)	Wafer Cassette Capacity-Wafer Size	Electrical at 208VAC (V)			Weight, Empty
			Power, Watts (W)	Nominal* Resistance, Ohms (R)	Current, Amps. (I)	
Q2-A1002-11	8.9	2 - 100 mm	2242	19.3	10.8	17 lb. (7.7 kg)
Q2-A1252-14	12.1	2 - 125 mm	2242	19.3	10.8	20 lb. (9.1 kg)
Q2-A1254-27	21.8	4 - 125 mm	2738	15.8	13.2	35 lb.(15.9 kg)
Q2-A1501-14	8.2	1 - 150 mm	1518	28.5	7.3	15 lb. (6.8 kg)
Q2-A1502-18	17.4	2 - 150 mm	2622	16.5	12.6	24 lb.(10.9 kg)
Q2-A2001-25	22.0	1 - 200 mm	3101	14.0	14.9	32 lb.(14.5 kg)
Q2-B2001-34	28.9	1 - 200 mm or 2-150 mm	2996	14.4	14.4	39 lb.(17.7 kg)
Q2-A2002-51	45.0	2 - 200 mm	5700	7.6	27.4	59 lb.(26.8 kg)

* Heater resistance may vary ±10%; voltage will vary locally. If your heater voltage is other than 208 VAC,

then: $I = V/R$ and $W = V^2/R$

IMTEC

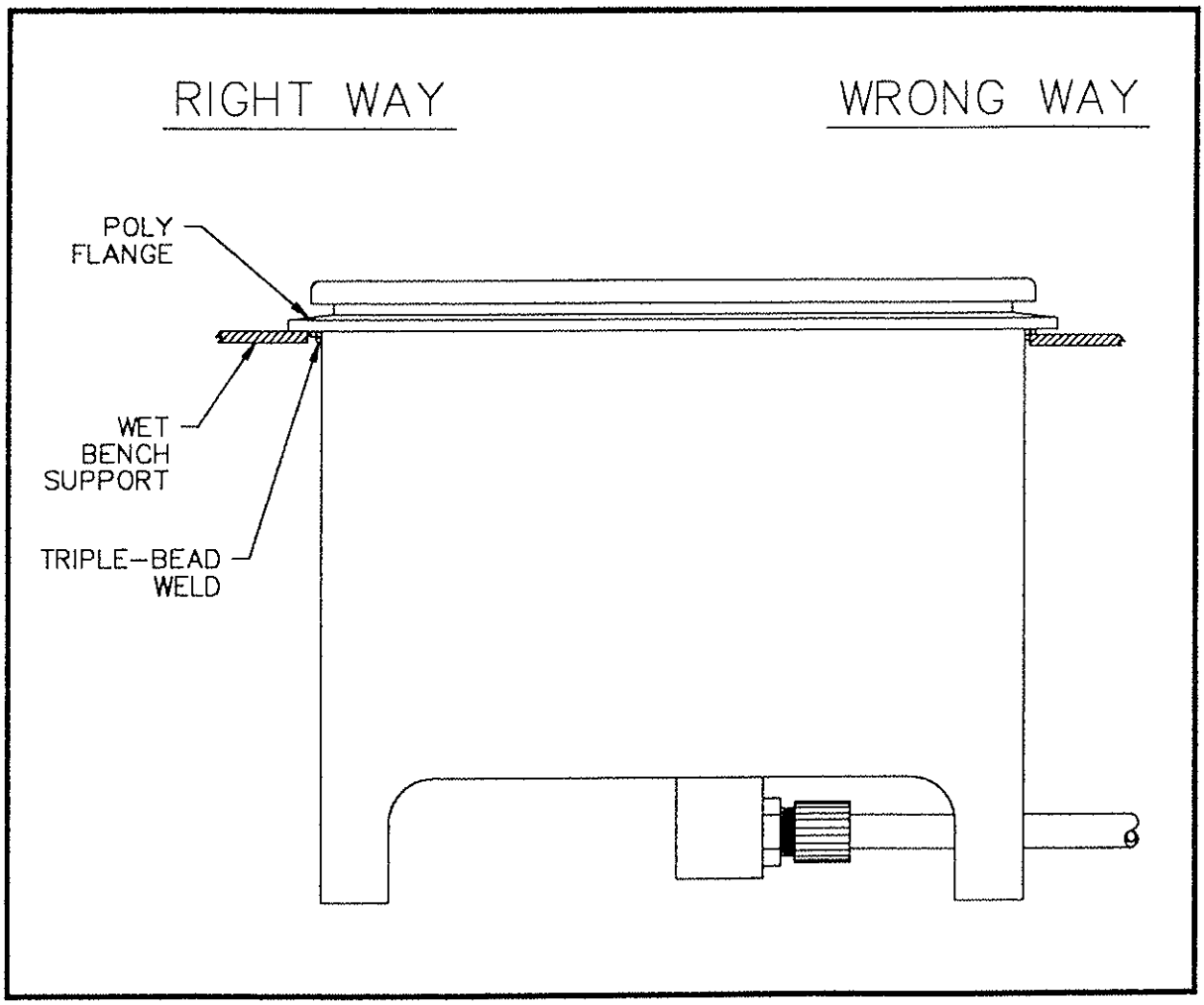
Figure V-1. Table - Mounting Cutout Dimensions

Model	Length	Width	*Depth below Mounting Flange
QZ-A1002-11	14.0" (35.6 cm)	10.0" (25.4 cm)	11.1" (28.2 cm)
QZ-A1252-14	16.0" (40.6 cm)	10.0" (25.4 cm)	12.1" (30.7 cm)
QZ-A1254-27	16.0" (40.6 cm)	16.0" (40.6 cm)	12.1" (30.7 cm)
QZ-A1501-10	10.3" (26.2 cm)	10.3" (26.2 cm)	13.1" (33.3 cm)
QZ-A1502-18	18.5" (47.0 cm)	10.5" (26.7 cm)	13.1" (33.3 cm)
QZ-A2001-25	14.5" (36.8 cm)	13.5" (34.3 cm)	15.0" (38.1 cm)
QZ-B2001-34	18.6" (47.2 cm)	13.1" (33.3 cm)	15.1" (38.4 cm)
QZ-A2002-51	24.1" (61.2 cm)	14.1" (35.8 cm)	15.6" (39.6 cm)

* Add 1.6" (4.1 cm) if optional quartz drain is installed.

IMTEC

Figure V-2. Aligning Bath



IMTEC

SECTION 4.0

FACILITY REQUIREMENTS

4.1 GENERAL

POWER, BATH HEATER

Dedicated circuit, breaker-protected, 208 VAC,nominal,single-phase, 50/60 Hz. Breaker required. Line noise filtering as required. The table below is based on 208 VAC power. If your input voltage differs from this, amperage will vary and watt-density limits MAY BE EXCEEDED. Be sure the voltage range specified on the Accubath label includes your local supply voltage. If in doubt, contact the IMTEC factory.

15 amperes: QZ-A1002-11
QZ-A1252-14
QZ-A1254-27
QZ-A1501-10
QZ-A1502-18(15A)
QZ-A2001-25
QZ-B2001-34(15A)

20 amperes: QZ-A1502-18(20A)*
QZ-B2001-34(20A)

30 amperes: QZ-A2002-51

ENVIRONMENT

Fume hood, or equivalent.

4.2 SUPPLEMENTARY DATA

Refer to Paragraph 2.2.1.

* QZ-A1502-18(20A) is a higher-wattage version of the standard Model QZ-A1502-18. Higher-wattage versions of other Accubaths may also be specified. Confirm your Accubath voltage limit requirements and nominal wattage at 208 VAC by checking the bath's data plate or contact your IMTEC representative.

IMTEC

SECTION 5.0

INSTALLATION

5.1 INTRODUCTION

The Accubath can be utilized as a free-standing unit or mounted into the deck area. Instructions for deck mounting are given in the following paragraphs.

5.2 DECK CUTOUT DIMENSIONS

See Figure V-1 for cutout dimensions.

5.3 PHYSICAL INSTALLATION

5.3.1 Remove all chemicals from adjacent work areas. Clean up any chemical spills on wet bench and in the bath plenum before proceeding. Observe all normal safety precautions followed when working with electricity.

5.3.2 Using the appropriate tools, make the mounting cut-out. Work carefully, maintaining the exact dimensions for your particular Accubath, as specified in Figure V-1.

NOTE

If an IMTEC controller and RTD are to be used, refer to the IMTEC Controller Manual shipped with that equipment for important installation procedures prior to initiating the steps described in Paragraphs 5.3.3 through 5.3.4.

5.3.3 Gently lower the bath into sink cut-out, making sure the heater power cable harness is led through the cut-out into the plenum and that the harness remains clear of the enclosure hanging brackets. Take care in aligning bath in the cut-out so that the Accubath is evenly supported by its flange, clear of its triple-bead weld, as shown in Figure V-2.

CAUTION

If the tank weight is inadvertently supported on the triple-bead weld, damage to the bath can result.

5.3.4 Run the heater power cable harness through the plenum wall or floor, using appropriate fittings for your wet bench, to ensure that plenum integrity is maintained.

5.3.5 If optional drain is installed, complete the necessary plumbing connections.

IMTEC

SECTION 6.0

OPERATING INSTRUCTIONS

6.1 PRE-START PROCEDURE

After completing the physical installation and power hook-up, your Accubath is ready for operation.

6.1.1 If Accubath is equipped with (optional) drain, ensure that drain valve is closed before initiating fill.

6.1.2 Fill bath to freeboard line (horizontal interface line formed by the Accubath gray and white backgrounds). Use the appropriate amount of solution, as follows:

Model QZ-A1002-11: 8.9 liters
Model QZ-A1252-14: 12.1 liters
Model QZ-A1254-27: 21.8 liters
Model QZ-A1501-10: 8.2 liters
Model QZ-A1502-18: 17.4 liters
Model QZ-A2001-25: 22.0 liters
Model QZ-B2001-34: 28.9 liters
Model QZ-A2002-51: 45.0 liters

6.1.3 As an absolute minimum, fill Accubath to a level ½-inch above the top of the heater mesh (visible through the quartz).

CAUTION

DO NOT POWER-ON THE ACCUBATH SYSTEM WITHOUT THE PROPER AMOUNT OF LIQUID IN THE PROCESS TANK!

6.2 INITIAL START-UP

Before performing this operation, refer to the pertinent controller manual, whether IMTEC- or third-party-supplied.

6.2.1 Turn ON the controller power switch.

6.2.2 Actuate temperature control and heating systems.

6.2.3 Set controller to desired process temperature.

6.3 PRE-CLEANING

Your new Accubath has been carefully cleaned and seal-packaged prior to shipment. Nevertheless, on-site cleaning prior to processing will be necessary. A general pre-clean sequence is a standard SC-2 process, followed by several D.I. rinses and one load dump of process chemistry. This initial process chemistry run may be used to satisfy the recommendations of the following paragraph (6.4).

6.4 RAMP-UP

As part of the initial start-up of your Accubath, IMTEC recommends that the bath be filled with the correct amount of process fluid, set temperature at 90°C, stabilize temperature and heat soak for one hour. After heat soaking at 90°C, increase the temperature in 30°C increments, permitting ½-hour soak at each plateau until process temperature is reached. After first ramp-up, bath may be taken directly from ambient to process temperature. During initial ramp-up, visual inspection should be performed to ensure that no previously hidden quartz breakage is uncovered by ramping stresses.

6.5 VERIFICATION OF CONTROLLER ACCURACY

Process control temperature sensors are typically supplied with the controller, not the bath. Refer to the controller manual, whether supplied by IMTEC or other vendor, for process temperature calibration and other controller-related parameter checks.

6.6 PRODUCTION OPERATION/START-UP

6.6.1 Fill the Accubath quartz tank with appropriate quantity of process solution (refer to Paragraph 6.1.2). NEVER POWER-ON AN EMPTY BATH!

6.6.2 Turn ON the controller, check process temperature set-point and initiate bath power (IMTEC controllers: take out of Hold condition.)

6.6.3 When the specified operating temperature has been reached, initiate processing.

IMTEC

6.7 PRODUCTION OPERATION/SHUT-DOWN

6.7.1 Turn the power OFF.

6.7.2 Allow chemistry to cool per normal procedure.

6.7.3 Aspirate (or drain*) solution. Observe all safety precautions. DO NOT ASPIRATE OR DRAIN HOT CHEMICALS!

* If optional drain is installed.

MTEC

SECTION 7.0

ELECTRICAL/ELECTRONICS DESCRIPTION

7.1 GENERAL

A wiring diagram for your specific Accubath has been enclosed in the envelope attached to the inside front cover of this manual copy. Refer to this diagram for specific wiring information on your Accubath. Figures VII-1 through VII-3 in this manual are typical wiring diagrams shown only for general familiarization.

Most QZ-Model Accubaths include a cable which contains wires for the overtemperature thermocouples, the high-temp safety snap switch, and leads for the heaters. Each cable contains two pairs of wires for the thermocouples, one pair for the snap switch, and up to four pair for the heater elements. If there is more than one pair of heater element leads, the load on each pair is identical. It is recommended that each pair of heater leads be serviced by a dedicated two-pole circuit breaker.

Figure VII-1 presents a typical wiring diagram for an Accubath with a monolithic cable terminated in an Amp connector.

A typical wiring diagram for an Accubath with a single pair of heater cables is provided in Figure VII-2.

An Accubath with multiple pairs of heater cables permits the user to combine leads to interface to one 30-ampere circuit or retain separate lead pairs and wire to two separate 15-amp circuits. Figure VII-3 presents a typical wiring diagram for an Accubath with multiple pairs of heater cables.

Accubath electrical description and power requirements are covered in Sections 3.0 and 4.0, respectively, of this manual.

IMTEC

SECTION 8.0

ADJUSTMENTS

8-1. FUNCTION

Your Accubath includes, as the primary over-temperature sensors, two J-type thermocouples (one active and connected to system controller and one spare). It is recommended that the over-temperature setting on your controller be set at 10°C or less over the intended process temperature of the bath but not higher than 200°C. The controller should shut off power to the bath when this set-point is reached and go into a "hold" mode (not power-up when bath temperature falls until operator-initiated. IMTEC 951/952 Controllers operate in this manner.

The bath's secondary over-temperature sensor, a thermostatic snap switch (normally closed) mounted inside the Accubath, is factory-preset to open at 210°C ±7°C and close at 193°C ±7°C, and cannot be adjusted. It should be attached to an independent shut-down circuit, such as is provided by the "redundant over-temperature" safety circuit of your IMTEC controller.

IMTEC

SECTION 9.0

CALIBRATION PROCEDURES

9.1 GENERAL

Standard IMTEC Accubath units require no calibration. However, when combined with the controller and various sensors, the bath may become part of the general system calibration requirements: refer to your controller manual.

IMTEC

SECTION 10.0

TROUBLE-SHOOTING

10.1 BATH HARNESS CONNECTED TO IMTEC CONTROLLER

If power is present at the controller and bath heating element still does NOT heat, check for proper electrical connection of the bath wiring harness connector to the controller receptacle. Check continuity of heaters with meter.

Accubaths drawing up to 15 amperes (Paragraph 4.1) usually are provided with a pre-wired Amp connector. These components are keyed and will only connect when in the proper orientation. DO NOT FORCE. Baths rated up to 20 amperes may be hard-wired to the controller or to an external relay package of adequate capacity which in turn is hard-wired to the controller. Baths rated over 20 amperes MUST be connected to the IMTEC controllers through intermediary external relays.

10.2 FAILED OVER-TEMPERATURE THERMOCOUPLE

Over-temperature thermocouples do not have to be highly accurate to perform their safety function. However, if a T/C sensor open, short or highly deviant voltage is detected (may be checked at ambient), disconnect the T/C leads, fish the stand-by T/C wire pair out of the cable and reconnect, ensuring that the white and red leads are reconnected in the correct polarity.

10.3 OTHER TROUBLE-SHOOTING PROCEDURES

All other trouble-shooting procedures are performed at the controller.

Refer to Paragraph 2.2.1 and footnote.

NOTE: Further difficulties (that are unable to be resolved by study of IMTEC/Vendor literature) should be referred to the factory or your local IMTEC representative.

IMTEC

SECTION 11.0

WARRANTY

ACCUBATH LIMITED WARRANTY

(NON-WARRANTY OF MERCHANTABILITY, FITNESS AND LIMITATION OF LIABILITY)

IMTEC warrants ACCUBATH products, whether new or remanufactured*, to be free from manufacturing defects in materials and workmanship for a period of *ONE (1) YEAR* from the date of original shipment from our factory with the following exceptions:

1. ***IMTEC quartzware is guaranteed to remain sound and whole in normal usage for a period of 45 days from the date of initial shipment.***

2. ***Baths with optional Teflon drain stems shall be warranted against drain stem leakage for a period of 120 days.***

Such warranty of IMTEC is limited as follows: In the event of such defect, IMTEC agrees at its option, to either repair or replace the defective unit or to refund the purchase price and IMTEC's liability is limited thereto. Units repaired or replaced under warranty will bear the remainder of the original equipment warranty in Terms and Conditions.

All repairs will be made at IMTEC's place of business. Buyer shall pay the cost of returning the product to IMTEC's factory. Any such return must be pre-authorized by IMTEC, through issuance of an IMTEC RGA number. That number must be shown on the returned merchandise.

The period of warranty commences upon shipment of the product unless the warranty registration card provided with each Accubath is properly filled out and returned to IMTEC within the prescribed time. If the warranty card has been returned, the warranty will start at the "in-service" date stipulated by the customer on the returned warranty card; however, in no case will initiation of the warranty period be delayed more than 120 days from date of initial shipment.

---

* "Remanufactured" applies to the complete rebuilding of a customer-owned bath to new bath specifications including heaters, cable attachments, insulation and the like. Replacement of simple items, such as internal thermocouples, is restricted to the replaced part and shall be for 45 days.

IMTEC

IT IS THE BUYER'S RESPONSIBILITY TO RETAIN ORIGINAL PACKING MATERIALS AND CAREFULLY INSPECT EACH QUARTZ ACCUBATH UNIT UPON RECEIPT FOR BREAKAGE, INCLUDING HAIRLINE CRACKS. CLAIMS FOR QUARTZ FOUND BROKEN IN SHIPMENT SHOULD BE SUBMITTED TO YOUR CARRIER. IT IS RECOMMENDED THAT SUCH CLAIM BE SUBMITTED WITHIN 5 DAYS OF RECEIPT OF SHIPMENT.

A. WHAT IS INCLUDED IN THE ONE-YEAR WARRANTY

IMTEC guarantees its equipment only if used with approved chemistries, within proper temperature ranges for these chemistries, in proper environments and voltage ranges. With these conditions met, IMTEC guarantees:

1. That the sealing material between the Accubath outer case and quartz chamber shall not fail before the base material of the case. This guarantee holds providing IMTEC has been advised, as a condition of sale, of the generic nature of the chemistry and conditions of its use and has been permitted to supply the seal of IMTEC's choice.

2. That case welds and seams not fail before base material of the case.

3. Heaters.

4. Built-in sensors.

5. General workmanship.

B. WARRANTY EXCLUSIONS

While other exclusions may apply, IMTEC specifically does not guarantee and accepts no responsibility for:

1. Penetration of the base material of the outer case wall or flange by any user chemistries.

2. Chemical attack on quartz components.

3. Breakage of quartz or other product by impact, improper facility / wet-station installation, handling or other abusive treatment, or damage related to such impact-related or physically induced damage, such as internal corrosion.

4. Damage to any portion of the bath resulting from operating the unit with a liquid level so low as to expose the heater strips or at temperatures above 190°C.

5. Unauthorized customer modifications to any portion of the system (that may disqualify all warranties).

6. Controller enclosure component or hardware failures caused by controller enclosure installation directly within the process-sink hood or other fume areas where it is subjected to corrosive environments in violation of normal accepted industry practice in appropriate sink control areas.

7. External temperature sensors where the protective outer coating has been torn, cut or abraded.

8. Where failure is due to negligence, abuse or vandalism.

9. Submersion of the unit or other non-standard practices.

IMTEC DOES NOT WARRANT MERCHANTABILITY OR FITNESS FOR ANY PURPOSE AND THERE ARE NO WARRANTIES, EXPRESSED OR IMPLIED, OTHER THAN THOSE EXPRESSLY STATED HEREIN. IMTEC IS NOT RESPONSIBLE FOR ANY CONSEQUENTIAL, INCIDENTAL OR OTHER DAMAGES WHATSOEVER. IMTEC'S LIABILITY IS LIMITED TO THE REPAIR OR REPLACEMENT OF SUCH DEFECTIVE PRODUCT OR REFUND OF PURCHASE PRICE AT IMTEC'S SOLE OPTION, AS STATED ABOVE. ALL CLAIMS MUST BE MADE TIMELY AND WITHIN THE WARRANTY PERIOD.

IMTEC

SECTION 12.0

POLICY AND INSTRUCTIONS FOR RETURNING QUARTZ BATHS

12.1 When you receive an Accubath, save the original shipping container and all its components.

12.2 An Accubath must be returned within its original shipping container. If you no longer have the original container, a shipping container is available from IMTEC. Telephone Customer Service: (408) 745-7800.

12.3 All Accubath returns must be pre-authorized by an IMTEC representative. If a bath should be returned without a Returned Goods Authorization (RGA) number, the bath will be refused by the IMTEC Receiving Department and returned to the sender. When calling to get an RGA number, please have the following information ready: (1) The reason for the repair, (2) Chemistry used in bath, (3) Process temperature, (4) Purchase Order Number (used for tracking; there can be no charge amount until the bath is evaluated at IMTEC). Items (1) through (4) help speed the repair process once the Accubath is received at IMTEC. An RGA number will be provided ONLY with this information.

12.4 All freight charges are the responsibility of the customer. Insure for full or repaired value.

12.5 DO NOT SHIP UPS! UPS handling practices typically result in a broken and/or unrepairable bath.

12.6 **Baths must be neutralized of all chemicals.** Test with pH paper. Specify the chemistry used and process temperature on all paperwork. Include a detailed description and a rough sketch of the condition of the quartz before packing bath for return. IMTEC will then be able to readily identify baths damaged in shipment.

12.7 If quartz is cracked or broken, carefully tape damaged pieces in position on quartz bath or assembly, using the approved white vinyl tape*.

* Tape, 5-mil, 1-inch width, pressure-sensitive vinyl plastic, "Slipknot 44", OSHA White, meets Federal Spec. PPP-T-66E, Type I and CID A-A-1689A, Type I.

Pub. # 15-A298-0595

IMTEC

12.8 It is recommended that all baths, with or without quartz damage, be photographed with a Polaroid camera. Photos should show any quartz damage and include the serial number label visible through the quartz. Two pictures of each view should be taken; one set enclosed in a zip-lock bag sent with the bath, and the other set kept with your shipping documentation.

12.9 This step is ONLY for those Accubaths that have been contaminated (quartz cracked or seal breached). Obtain the contamination shipping kit from IMTEC. Be sure the bath is fully neutralized and dry. Install the drain plug. Cut power cord* flush with bottom (1/2"OD) end of fitting and install power cord plug*.

12.10 Tape the power cable to outside of bath away from the quartz (preferably on the bottom of the Accubath).

12.11 DO NOT PACK MORE THAN ONE (1) BATH IN EACH CONTAINER.

12.12 In returning a QRD bath, ship the inner and outer tanks in separate containers.

12.13 This step is ONLY for QZ-A2002-51 and all QRT/S baths. Locate the four "corners". Tape a corner in place on each of the bath "feet". If the corners are not available, invert the bath and tape the original "scored" fiberboard piece in place over the bath feet. When this has been completed, turn the Accubath onto its feet.

12.14 Insert the Accubath into an approved plastic bag of the appropriate size (which can be obtained from IMTEC). Carefully and COMPLETELY squeeze out all the trapped air. Use a tie-wrap to seal the bag.

12.15 Repeat the previous step (12.14) twice, using an additional large plastic bag each time.

12.16 Carefully place bagged bath into the lower molded foam section in the shipping container. Lay bath on its side (except for QZ-A2002-51 and all QRT/S Accubaths; these are installed feet-down).

12.17 Put upper molded foam section in place over bath.

* 1 each power cord and plug for models through 1500-series.
2 each power cords and power cord plugs for 2000-series.

IMTEC

12.18 Pull the bag liner up, twist its top once and then squeeze out all trapped air. (IT IS IMPORTANT THAT ALL TRAPPED AIR BE REMOVED.) Twist the liner excess to seal out the air and use a tie-wrap to secure the liner top.

12.19 Seal the bath's shipping container with packing tape. (DO NOT STAPLE THE CONTAINER CLOSED.)

12.20 Remove backing and secure a shock watch (orange for QZ baths, red for QRT/S baths) and companion label to the side of container. Then, remove backing and secure a similar shock watch and companion label to opposite side of container.

12.21 This step is ONLY for QRT/S Accubaths. With "arrow" up, remove the backing and secure two tilt watches with companion labels, one each, on two sides of shipping container that share a common vertical edge.

12.22 Write or apply these labels on all sides of container (except bottom): "GLASS", "FRAGILE". "THIS END UP" (on top side only).

12.23 This step is ONLY for QZ-A2002-51 and all QRT/S baths. Position four edge protectors in place and firmly strap shipping container to a pallet, using strapping and buckles.

12.24 Mark the RGA number legibly on the side of container.

12.25 We will arrange pick-up by IMTEC truck for all baths (requiring repairs) located in the Santa Clara Valley, California, area. If you are outside this area, ship the container to IMTEC.

12.26 If you have any questions, call IMTEC Customer Service: 510-770-1800

IMTEC

SECTION 13.0

QUARTZ BATH REPAIR PROCESS

The following is an outline of IMTEC's standard repair process for quartz baths.

A. DISASSEMBLY AND CLEANING

1. Tank neutralization as required . . . . . 1 to 3 days.

2. Housing removed and quartz strip-down . . . . 3 to 4 days.

B. QUARTZ REPAIR

1. This procedure is dependent upon the extent of repairs and/or modifications . . . . . 4 to 14 working days.

NOTE

IMTEC IS NOT RESPONSIBLE FOR DAMAGE WHICH OCCURS TO QUARTZWARE DURING HEAT STRIP OR QUARTZ REPAIR PROCEDURES. Quartz is prone to spontaneous fracture and/or propagation of existing fracture points when heat is applied. IMTEC has more than a decade of experience in handling quartzware and takes every precaution possible to eliminate quartz damage.

C. REASSEMBLY AND TEST

1. Quartz/poly flange seal cure . . . . . 10 days.

2. Assembly and test . . . . . 4 days.

IMTEC

SECTION 14.0

SPARE PARTS LIST

Item #	Description	Part Number
01	RTD Sensor-Standard Bath-6.75"	10-001-0169
02	RTD Sensor-QRD/QRT Series Baths-6.75"	10-001-0170
03	RTD Sensor-QN Bath/Collar-6.75"	10-001-0171
04	J-Type Thermocouple-Standard Bath-6.75"	10-001-0172
05	J-Type Thermocouple-QRD/QRT Bath-6.75"	10-001-0173
06	J-Type Thermocouple-QN/Collar Bath-6.75"	10-001-0174
07	Alarm Reset Switch (Square, Old Style)	10-002-0022
08	Timer Reset Switch (Square, Old Style)	10-002-0023
09	140 Overtemp. 800/801/850/851 Controller	10-004-0005
10	Rifle Rack (Specify Qty needed per Collar)	10-004-0067
11	Spacer 1", Teflon, for QRD-B1502 non-SC. Tank	10-004-0455
12	Output Cap, Teflon	10-004-0519
13	Input Cap, Teflon	10-004-0520
14	Teflon Fitting-Union Panel Mount (Qty 3 per Collar)	10-004-0602
15	Stir Motor, Bracket	10-004-0665
16	Stir Motor, Magnetic, Modified	10-004-0666
17	Spacer 2", Teflon for QRD-B1502 SC. Tank	10-004-0746
18	Bulkhead Connector, Bath Cable 3/8-inch	10-005-0026
19	Stir Bar	10-005-0034
20	Collar Tubing (sold in 50 ft. Rolls)	10-005-0059
21	Rotometer, 0-20 cc Water/Autodrip	10-005-0132
22	Flowmeter, 2-10 GPH Water/Cooling	10-005-0136
23	Solenoid Valve (Flowmeter W/Autodrip)	10-005-0137
24	Teflon Fitting-Conn., Panel Mount 1/2" x 3/8" (Qty 1 per Collar)	10-005-0316
25	Teflon Fitting-Female Elbow 1/2" x 3/8" (Qty 1 per Collar)	10-005-0317
26	Teflon Fitting-Conn. Panel Mount 1/4" x 1/8" (Qty 3 per Collar)	10-005-0318
27	Teflon Fitting-Female Elbow 1/4" x 1/8" (Qty 3 per Collar)	10-005-0319
28	Aspivalve O-Ring Replacement Kit, Viton	10-005-0320
29	Aspivalve O-Ring Replacement Kit, Kalrex (Acids)	10-005-0321
30	3/4" Cap for Overflow Tube	10-005-0348
31	Lens, Timer Reset Switch (Yellow, Sq. Old Style)	10-006-0005
32	Lens, Alarm Reset Switch (Red, Sq. Old Style)	10-006-0006
33	Lamp, 24VDC	10-006-0008
34	Lens, Alarm Reset Switch (Red, Rectangular)	10-006-0015

IMTEC

Item #	Description		Part Number
35	Amp Line Connector, 3-Pin Male-RTD Sensor		10-006-0026
36	Strain Relief for 3-Pin Male Amp Connector		10-006-0030
37	Bath Power Harness Amp Line Conn., 6-Pin Male		10-006-0031
38	Strain Relief for Power Harness, 6-Pin Male		10-006-0032
39	Amp Pins, Female		10-006-0033
40	Amp Pins, Male		10-006-0034
41	P.I.D. Temp. Controller-800/801		10-006-0035
42	Circuit Breaker Airpax Illuminated Switch		10-006-0037
43	Timer Reset Switch (Rectangular)		10-006-0038
44	Mercury Relay		10-006-0039
45	Power Receptacle, Male ML-3		10-006-0040
46	Amp Connector, 6-Pin Female, Panel Mount		10-006-0041
47	Amp Connector, 6-Pin Female, Panel Mount -RTD		10-006-0042
48	Timer, Digital, 999 Sec-Standard 801		10-006-0047
49	PCB Extender Board, 800/801		10-006-0049
50	Timer, Bargraph, 999 Hrs		10-006-0051
51	Amp Connector Pin Extraction Tool		10-006-0055
52	Amp Connector Pin Insertion Tool		10-006-0056
53	Timer, Digital, 999 Mins. -401 Controller		10-006-0294
54	Teflon Rifle Rack Screws (Qty 2 per Rifle Rack)		10-009-0072
55	QZ-Series User Manual		10-018-0001
56	Lens, Timer Reset Switch (Yellow)		30-006-0005
57	Alarm Reset Switch (Red)		30-006-0007
58	RTD Sensor, 100 Ohm, Gordon		88-006-0402
59	PVC Cover for 801 Controller Assembly-		
		Bezel	10-004-0445
		PVC Cover	10-004-0446
		Set of Screws	10-009-0108
		Teflon Knob	10-009-0117
60	Teflon Film-Manual Hinged Lids	A1501	10-011-0245
		A1002	10-011-0383
		A1252	10-011-0384
		A1502	10-011-0385
		A2001	10-011-0386
		B2001	10-011-0399
		A2002	10-011-0387
61	Bottom Teflon Gasket-Dome Lid	A1501	10-011-0180
		A1002	10-011-0388
		A1252	10-011-0389
		A1502	10-011-0390

IMTEC

Item #	Description		Part Number
62	Top Teflon Seal, Dome Lid	A1501	10-011-0241
		A1002	10-011-0391
		A1252	10-011-0392
		A1502	10-011-0393
63	Spare Teflon Gasket-Collar (Supplied with Bottle of Sealant)	A1501	10-011-0239
		A1002	10-011-0394
		A1252	10-011-0395
		A1502	10-011-0396
		A2001	10-011-0397
		A2002	10-011-0398

IMTEC

Figure VII-1. Typical Wiring Diagram, Bath with Monolithic Cable Terminated in Amp Connector

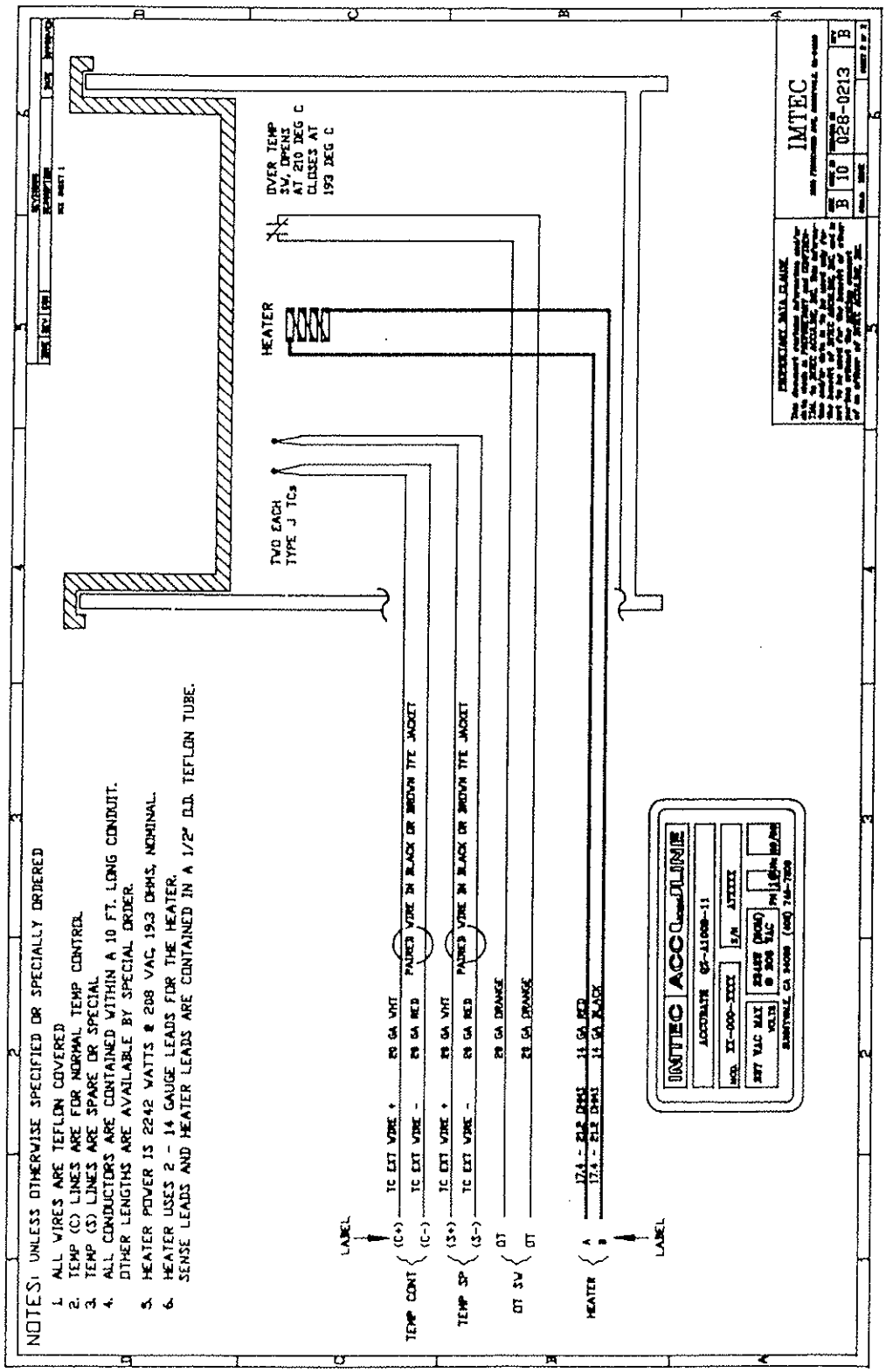


Figure VII-2. Typical Wiring Diagram, Bath with Single Pair of Heater Cables

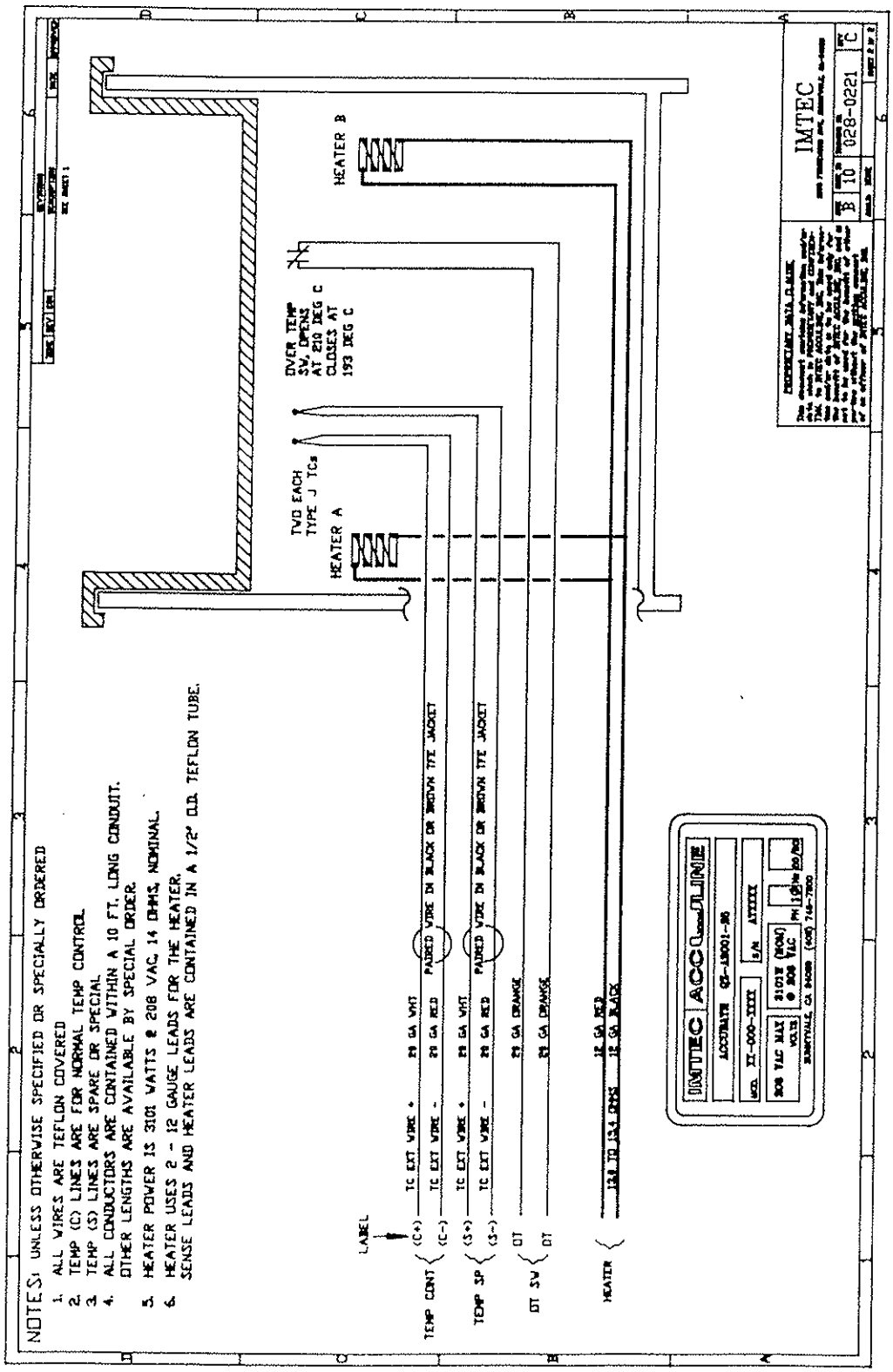


Figure VII-3. Typical Wiring Diagram, Bath with Multiple Pairs of Heater Cables