DOC022.53.00619MAI04

Digital Reactor Block 200 (DRB 200) Instrument Manual

eac/dk 5/04 4ed

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Safety Precautions

Please read this entire manual before unpacking, setting up, or operating this instrument. Pay particular attention to all danger and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment.

To ensure the protection provided by this equipment is not impaired, do not use or install this equipment in any manner other than that which is specified in this manual.

Use of Hazard Information

If multiple hazards exist, this manual will use the signal word (Danger, Caution, Note) corresponding to the greatest hazard.

DANGER
Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION
Indicates a potentially hazardous situation that may result in minor or moderate injury.

NOTE
Information that requires special emphasis.

Precautionary Labels

Read all labels and tags attached to the instrument. Personal injury or damage to the instrument could occur if not observed.

This symbol, if noted on the instrument, references the instruction manual for operational and/or safety information.

Hot Surfaces. Touching the reactor block surfaces and vials while hot can cause serious burns.

Protective Earth Ground. This product requires a protective earth connection. If not provided with a plug on a cord, connect positive earth to this terminal (U.S. cord set provides ground).

Safety Precautions

Safety Equipment

Use protective clothing when operating the reactor, including goggles or face mask, and gloves.

Reagent Spills

Clean up spilled reagents immediately. If reagent contacts skin, rinse the affected area thoroughly with water. Avoid breathing released vapors. Read the Material Safety Data Sheets (MSDS) supplied with each reagent for complete chemical information.

Fire Hazard

Avoid the presence of flammable liquids near the operating reactor. A fire hazard could be created.

Power Cord

A power cord suitable for 115 V ac line voltage is supplied with the DRB 200.

DANGER:
Do not allow the power cord to pass under the instrument.

Specifications

Specifications are subject to change without notice.

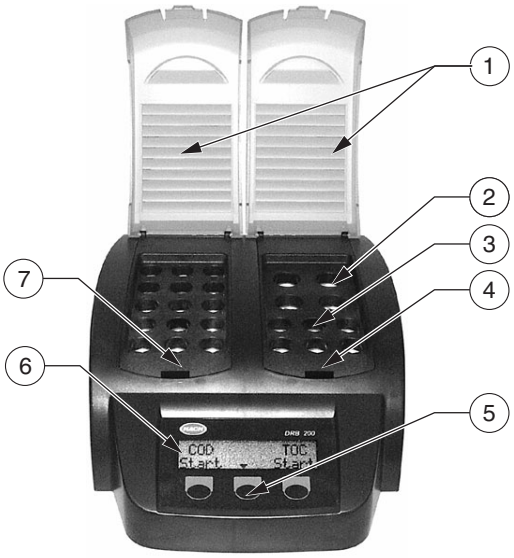
Dimensions	250 x 145 x 310 mm (W x H x D)
Weight	LTV082.53.30001: 2 kg instrument, 3.5 kg with packaging LTV082.53.40001: 2 kg instrument, 3.5 kg with packaging LTV082.53.42001: 2.8 kg instrument, 4.3 kg with packaging
Ambient Operating Temperature	10–45 °C
Storage Temperature	– 40–60 °C
Relative Humidity	maximum 90% non-condensing
Stored Programs	COD program (150 °C, 120 minutes)
	TOC program (105 °C, 120 minutes)
	100 °C program (100 °C, 30, 60, 120 minutes)
	105 °C program (105 °C, 30, 60, 120 minutes)
	150 °C program (150 °C, 30, 60, 120 minutes)
	165 °C program (165 °C, 30, 60, 120 minutes)
	Easily selected 37–165 °C (no cooling)
Programmable Temperature Range	37–165 °C
Programmable Timer Range	Easily selected 0–480 min; acoustic signal when the set time expires, heating stops when time expires.
Heating Rate	From 20 to 150 °C in 10 minutes
Temperature Stability	± 2 °C
Number of Vials	LTV082.53.30001: 9 holes for 16 vials, 2 holes for 20 mm vials LTV082.53.40001: 15 holes for 16 mm vials LTV082.53.42001: 21 holes for 16 mm vials, 4 holes for 20 mm vials
Power Requirements	100–240 V, +5%/–15%, 50/60 Hz, Protection Class I
Power Input	600 VA
Safety Checks	CE, GS, and cTUVus

Section 1 Introduction

The DRB 200 is supplied as two models, with either one or two heating blocks (*Figure 1*). The heating blocks can heat solutions in round vials of various sizes at 37–165 °C for a period of 0–480 minutes. The small, 16 mm diameter openings on the heating block are suitable for Hach COD, Unicell, TOC, and Test N' Tube tests. The larger, 20 mm diameter openings are intended for sample preparation reaction vessels, using the Metals Prep Set.

The DRB 200 has 6 stored and 3 programmable temperature programs.

Figure 1 Front View of the DRB 200 Digital Reactor Block (2 Block Version)



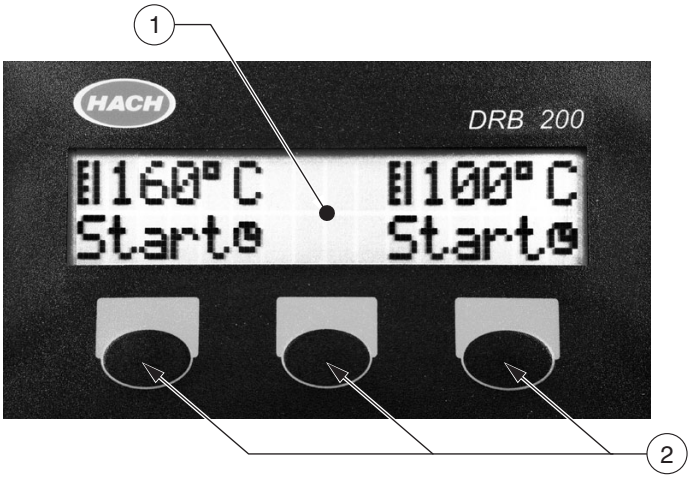
1.	Protective Lid
2.	20 mm Metal Prep Vials
3.	16 mm Digestion Vials
4.	Right Heating Block
5.	Keys
6.	Display
7.	Left Heating Block

1.1 Front Display

The instrument is operated using three touch-sensitive keys located below the display (*Figure 1*). The function of the key depends on the display. If no function is shown for a specific key, that key is not currently active.

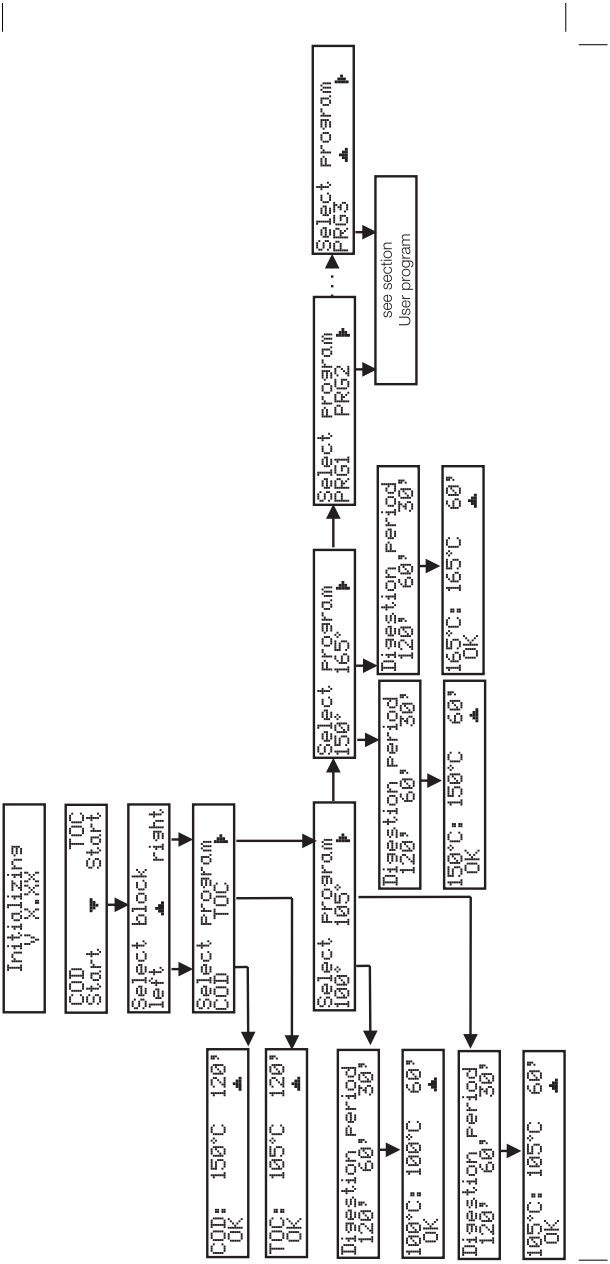
The actual temperatures of the heating blocks and the remaining time are visible in the display while temperature programs are active.

Figure 2 DRB 200 Display and Keys



1. Display	**2.** Touch-sensitive Keys

Figure 3 Menu Structure



OPERATION

DANGER

Handling chemical samples, standards, and reagents can be dangerous. Review the necessary Material Safety Data Sheets and become familiar with all safety procedures before handling any chemicals.

FARA

Att handskas med kemiska prover, standarder och reagenser kan vara farligt. Läs igenom säkerhetsdatabladen och gör dig förtrogen med alla säkerhetsåtgärder före hanteringen av kemikalier.

FARE

Håndteringen af kemiske prøver og reaktionsmidler kan være farlig. Læs de nødvendige materiale-sikkerhedsdatasider og gør Dem fortrolig med alle sikkerhedsforholdsregler, inden De omgås kemikalier af nogen art.

GEFAHR

Das Arbeiten mit chemischen Proben, Standards und Reagenzien ist mit Gefahren verbunden. Es wird dem Benutzer dieser Produkte empfohlen, sich vor der Arbeit mit sicheren Verfahrensweisen und dem richtigen Gebrauch der Chemikalien vertraut zu machen und alle entsprechenden Materialsicherheitsdatenblätter aufmerksam zu lesen.

PERICOLO

La manipolazione di campioni, standard e reattivi chimici può essere pericolosa. La preghiamo di prendere conoscenza delle Schede Techniche necessarie legate alla Sicurezza dei Materiali e di abituarsi con tutte le procedure di sicurezza prima di manipolare ogni prodotto chimico.

Section 2 Instrument Use

2.1 Starting-up

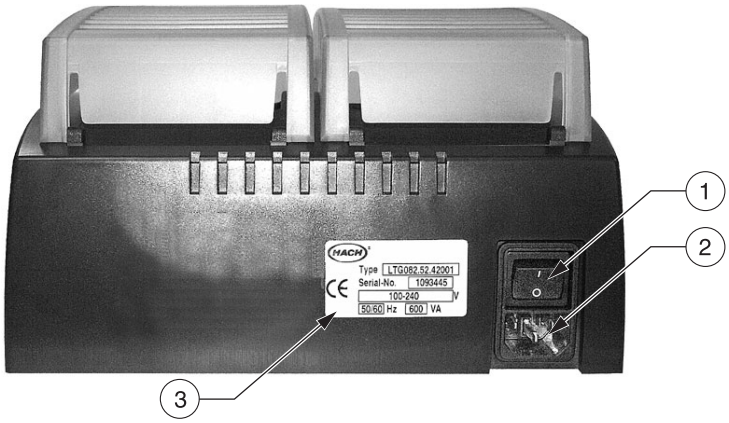
DANGER
The ventilation slits in the lid must not be covered, or overheating may occur.

1. Place the instrument on a stable, level, heat-resistant surface.
2. Plug in the power cord into a power socket (100–230 V +5%/–15%, 50/60 Hz).
3. Switch on the instrument by switching the power switch (*Figure 4*).

```
Initializing
V X.X
```

4. After initialization, the instrument will beep once, indicating that it is ready for operation. The display always shows the most recent setting of the temperature programs after initialization.

Figure 4 Back View of the DRB 200 Digital Reactor Block

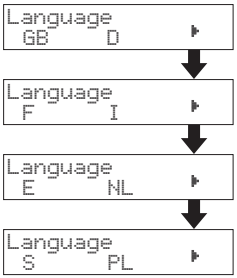


1. Power Switch	**2.** Power Plug	**3.** Nameplate

2.1.1 Setting the Language

The default factory setting is English. To change the default setting:

1. Hold down the left key while switching on the instrument.



2. Press the right arrow key to scroll through the menu. Select the required language (see *Table 1*).

3. The instrument is automatically initialized and is then ready for operation.

Table 1 Language Settings

Abbreviation	Country
GB	English
D	Germany
F	France
I	Italy
E	Spain
NL	Netherlands
S	Sweden
PL	Poland
DK	Denmark

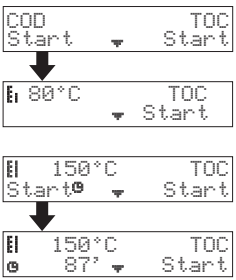
2.1.2 Adjusting the Contrast

1. Hold down the middle key while switching on the instrument.

2. Use the up and down arrow keys to adjust the contrast.

3. Press OK to accept the changes.

2.2 Routine Operation



1. Switch on the instrument.

2. Select the required temperature program using the appropriate keys (see section *2.4* on page *17*).

3. Prepare the test vials as described in the analysis procedure.

4. The instrument will be heated to the set temperature. Two beeps indicate that the required temperature has been reached.

5. Place the vials in the appropriate heating block and close the protective lid.

6. Start the program using the left key.

7. The time automatically counts down to zero (0). The actual temperature and the remaining time are visible on the display.

Clock Symbol	Description
	The remaining time counts down to zero (0).

8. The instrument will beep three times to indicate the temperature program is complete. It will turn off the heater and cool.

During operation, the display will indicate the status of the thermometer.

Table 2 Thermometer Symbols

Thermometer Symbol	Description
	Heating block is heating.
	Heating block has reached the set temperature.
	Heating block is cooling.

2.3 Using the Reducing Adapters

If using 16 mm tubes (COD, TNT, etc.) with a heating block with 20 mm diameter holes, insert the reducing adapters into the holes to reduce the diameter to fit the 16 mm tubes.

2.4 Selecting the Program

The temperature programs can be selected independently for the right and left heating blocks. If a change of setting is selected, the user is prompted to specify whether the change concerns the right or left heating block. Six permanently programmed temperature programs are available (*Table 3*). Use the touch-sensitive keys to select the appropriate temperature program.

Table 3 Stored Programs

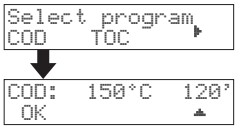
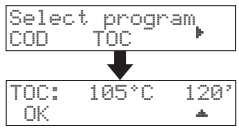
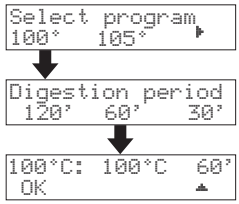
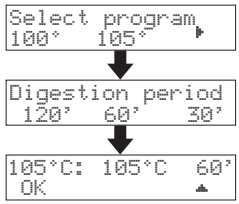
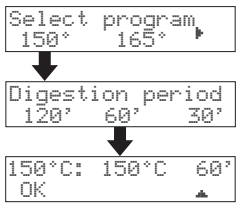
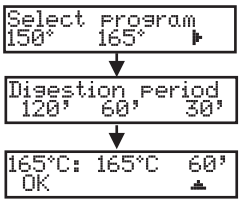
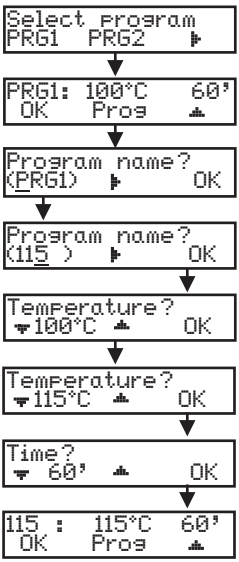
Program	Description
COD Program 	Heats vials for 2 hours at 150 °C. In the cooling phase, 4 beeps indicates that the vials have cooled to 120 °C. Remove and carefully invert the vials several times, before allowing them to cool further in a rack.
TOC Program 	Heats the vials for 2 hours at 105 °C. This setting is suitable for all Hach TOC vial tests.
100 °C Program 	Heats vials for 30, 60, or 120 minutes at 100 °C. For example, the “100 °C, 60 minutes” setting is needed to digest samples using the Methods Prep Set.
105 °C Program 	Heats vials for 30, 60, or 120 minutes at 105 °C.
150 °C Program 	Heats vials for 30, 60, or 120 minutes at 150 °C.

Table 3 Stored Programs (Continued)

Program	Description
165 °C Program 	Heats vials for 30, 60, or 120 minutes at 165 °C.

2.5 Setting User Programs



The DRB 200 can accommodate three user programs in storage locations PRG1, PRG2, and PRG3.

1. Select PRG1 from the Select Program menu.
2. Press Prog to enter the programming mode.
3. Assign a 4-character program name using the appropriate keys. Press OK to confirm the entry.
4. Use the up and down arrow keys to set the temperature value between 37–165 °C. Press OK to confirm the entry.
5. Use the up and down arrow keys to set the time between 0-480 minutes. Press OK to confirm the entry.
6. Press OK to confirm the program. The program can be changed by pressing Prog. Press the up arrow key to return to the program selection screen.

2.6 Error Messages

Error Message	Problem
“Block is too hot, Please Wait”	The temperature of the heating block is higher than the target temperature. Wait until the heating block cools.
“Init Error”	The instrument is defective. Contact Customer Service.

Section 3 Maintenance

There are no scheduled maintenance requirements for the instrument. To ensure reliable and precise operation, it must be kept clean.

3.1 Cleaning the Instrument

DANGER
Strong acids and bases can cause burns.

1. Switch off the instrument, unplug the power cord and allow the instrument to cool.
2. Wipe the instrument with a soft, damp cloth. Make sure no water penetrates into the instrument.

If a vial overflows or breaks, or a small amount of liquid is spilled, proceed as follows:

1. Switch off the instrument, unplug the power cord and allow the instrument to cool.
2. Draw off the liquid with a pipette, avoiding any contact with the skin.
3. Transfer liquid residues to a proper disposal.
4. Remove broken glass with tweezers and wipe out any remaining liquid, avoiding any contact with the skin.

3.2 Instrument Test

The temperature shown in the display corresponds to the temperature in a closed HACH vial filled with an aqueous medium. During the heating phase, the real block temperature in the vicinity of the heater may be higher than the temperature shown on the display.

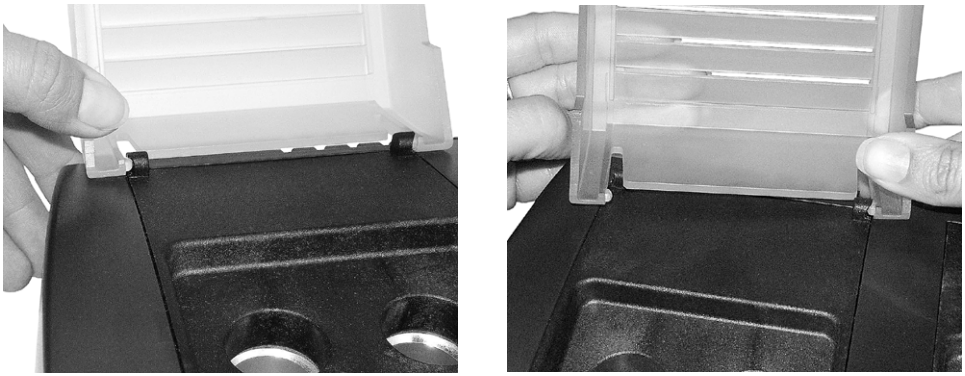
An empty Hach vial, glycerol (approximately 5 mL), and a calibration stem-type thermometer (95–155 °C) are needed to check the block temperature.

1. Fill a clean, empty vial with glycerol at room temperature, and insert the thermometer until it touches the bottom of the vial.
2. When the thermometer is in the vial, the level of the glycerol must be 51 mm ± 0.5 mm from the bottom.
3. Insert the vial in the center opening of the second row of the test block.
4. Start the temperature program for 150 °C, 60 minutes (or the COD program) for this block.
5. When the heating phase is complete, the thermometer temperature should be the same as the temperature shown on the display.

3.3 Changing the Protective Covers

1. Open the protective cover approximately 45°. Hold the inside of the external hinge with your thumb.
2. Press your thumb against the inside of the cover. Carefully lift each side of the cover out of its mounting.
3. Fit a new protective cover by following steps 1-2 in reverse order.

Figure 5 Changing the Protective Covers



General Information

At Hach Company, customer service is an important part of every product we make.

With that in mind, we have compiled the following information for your convenience.

Parts and Accessories

Description	Part No.
DRB200-1 with 9 holes for 16 mm vials and 2 holes for 20 mm vials	LTV082.53.30001
DRB200-1 with 15 holes for 16 mm vials	LTV082.53.40001
DRB200-2 with 21 holes for 16 mm vials and 4 compartments for 20 mm vials	LTV082.53.42001
Operating Manual US Version	DOC022.53.00619
Operating Manual D Version	DOC022.72.00619
Protective Cover Replacement	LZT048
Reducing Adapter 20 > 16 mm diameter	HAA155
Thermometer, 0 to 200 °C	45655-00
Tube, Culture DSPL 16x100 mm, Pk/1	2275800
Tube, Culture DSPL 16x100 mm, Pk/6	2275806

How To Order

By Telephone:

6:30 a.m. to 5:00 p.m. MST
Monday through Friday
(800) 227-HACH
(800-227-4224)
By Fax: (970) 669-2932

By Mail:

Hach Company
P.O. Box 389
Loveland, CO 80539-0389
U.S.A.

Ordering information by E-mail: orders@hach.com

Information Required

- Hach account number (if available)
- Your name and phone number
- Purchase order number
- Brief description or model number
- Billing address
- Shipping address
- Catalog number
- Quantity

Technical and Customer Service (U.S.A. only)

Hach Technical and Customer Service Department personnel are eager to answer questions about our products and their use. Specialists in analytical methods, they are happy to put their talents to work for you.
Call **1-800-227-4224** or E-mail **techhelp@hach.com**.

International Customers

Hach maintains a worldwide network of dealers and distributors. To locate the representative nearest you, send E-mail to **intl@hach. com** or contact:

In Canada, Latin America, Africa, Asia, Pacific Rim:
HACH Company
P.O. Box 389, Loveland, CO 80539-0389 U.S.A.
Telephone: (970) 669-3050; FAX: (970) 669-2932

In Europe, the Middle East, or Mediterranean Africa:
HACH Company, c/o
Dr. Bruno Lange GmbH
Willstätterstr. 11,
D-40549 Düsseldorf, Germany
Telephone: +49/[0]211.52.88.0; Fax: +49/[0]211.52.88.231

Repair Service

Authorization must be obtained from Hach Company before sending any items for repair. Please contact the HACH Service Center serving your location.

In the United States:
Hach Company
100 Dayton Avenue
Ames, Iowa 50010
(800) 227-4224 (U.S.A. only)
Telephone: (515) 232-2533
FAX: (515) 232-1276

In Canada:
Hach Sales & Service Canada Ltd.
1313 Border Street, Unit 34
Winnipeg, Manitoba
R3H 0X4
(800) 665-7635 (Canada only)
Telephone: (204) 632-5598
FAX: (204) 694-5134
E-mail: canada@hach.com

In Latin America, the Caribbean, the Far East, the Indian Subcontinent, Africa, Europe, or the Middle East:
Hach Company World Headquarters
P.O. Box 389
Loveland, Colorado, 80539-0389 U.S.A.
Telephone: (970) 669-3050
FAX: (970) 669-2932
E-mail: intl@hach.com

Warranty

Hach Company warrants this product to the original purchaser against any defects that are due to faulty material or workmanship for a period of **one year from date of shipment**.

In the event that a defect is discovered during the warranty period, Hach Company agrees that, at its option, it will repair or replace the defective product or refund the purchase price, excluding original shipping and handling charges. Any product repaired or replaced under this warranty will be warranted only for the remainder of the original product warranty period.

This warranty does not apply to consumable products such as chemical reagents; or consumable components of a product, such as, but not limited to, lamps and tubing.

Contact Hach Company or your distributor to initiate warranty support. Products may not be returned without authorization from Hach Company.

Limitations

This warranty does not cover:

- damage caused by acts of God, natural disaster, labor unrest, acts of war (declared or undeclared), terrorism, civil strife or acts of any governmental jurisdiction
- damage caused by misuse, neglect, accident or improper application or installation
- damage caused by any repair or attempted repair not authorized by Hach Company
- any product not used in accordance with the instructions furnished by Hach Company
- freight charges to return merchandise to Hach Company
- freight charges on expedited or express shipment of warranted parts or product
- travel fees associated with on-site warranty repair

This warranty contains the sole express warranty made by Hach Company in connection with its products. All implied warranties, including without limitation, the warranties of merchantability and fitness for a particular purpose, are expressly disclaimed.

Some states within the United States do not allow the disclaimer of implied warranties and if this is true in your state the above limitation may not apply to you. This warranty gives you specific rights, and you may also have other rights that vary from state to state.

This warranty constitutes the final, complete, and exclusive statement of warranty terms and no person is authorized to make any other warranties or representations on behalf of Hach Company.

Limitation of Remedies

The remedies of repair, replacement or refund of purchase price as stated above are the exclusive remedies for the breach of this warranty. On the basis of strict liability or under any other legal theory, in no event shall Hach Company be liable for any incidental or consequential damages of any kind for breach of warranty or negligence.

Certification

Hach Company certifies this instrument was tested thoroughly, inspected and found to meet its published specifications when it was shipped from the factory.

The DRB 200 has been tested and is certified as indicated to the following instrumentation standards:

Product Safety:
Certified to EN 61010-1 A1 / A2 & EN 61010-2-010 A/1 per 73/23/EEC LVD by TUV (Rheinland) with TUV-GS safety mark.

Listed to UL 61010A-1/UL 61010A-2-010 and CSA C22.2 No. 1010.1 A2 and CSA C22.2 No. 1010.2.010A by TUV (Rheinland) with cTUVus safety mark.

Immunity:
EN 61326 A1/ & A2 (EMC Requirements for equipment for measurement, control and laboratory use) per 89/336/EEC EMC: Supporting test records by Hach Company, certified compliance by Hach Company.

Required Standard/s include:
EN 61000-4-2 (IEC 1000-4-2) Electro-Static Discharge

EN 61000-4-3 (IEC 1000-4-3) Radiated RF Electro-Magnetic Fields

EN 61000-4-4 (IEC 1000-4-4) Electrical Fast Transients/Burst

EN 61000-4-5 (IEC 1000-4-5) Surge

EN 61000-4-6 (IEC 1000-4-6) Conducted Disturbances Induced by RF Fields

EN 61000-4-11 (IEC 1000-4-11) Voltage Dips, Interruptions and Variations

Emissions:
Per 89/336/EEC EMC: EN 61326:1998 (Electrical Equipment for measurement, control and laboratory use-EMC requirements) Class "B" emission limits. Supporting test records by REICHL (Report No. 030028) and certified compliance by Hach Company.

Standards include:
EN 61000-3-2 Harmonic Disturbances Caused by Electrical Equipment

EN 61000-3-3 Voltage Fluctuation (Flicker) Disturbances Caused by Electrical Equipment

Additional Emissions Standard/s include:
CANADIAN INTERFERENCE-CAUSING EQUIPMENT REGULATION, IECS-003, Class A: Supporting test records records by REICHL (Report No. 030028) and certified compliance by Hach Company.

This Class A digital apparatus meets all requirements of the Canadian Interference- Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

FCC PART 15, Class "A" Limits: Supporting test records by REICHL (Report No. 030028) and certified compliance by Hach Company.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense. The following techniques of reducing the interference problems are applied easily:

1. Disconnect the Model DRB 200 Digital Reactor Block from it's power source to verify that it is or is not the source of the interference.

2. If the Model DRB 200 Digital Reactor Block is connected into the same outlet as the device with which it is interfering, try another outlet.

3. Move the DRB 200 Digital Reactor Block away from the device receiving the interference.

4. Reposition the receiving antenna for the device receiving the interference.

5. Try combinations of the above.