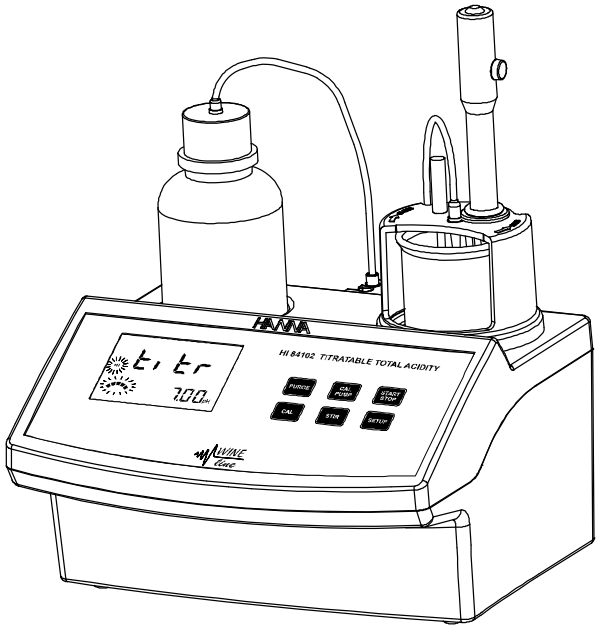
Instruction Manual

HI 84102
TITRATABLE TOTAL ACIDITY MINITITRATOR
for wine analysis



HANNA instruments
www.hannainst.com

Dear Customer,

Thank you for choosing a Hanna product. This manual will provide you with the necessary information for the correct use of the instrument. Please read it carefully before using the meter. If you need additional technical information, do not hesitate to e-mail us at tech@hannainst.com. This instrument is in compliance with CE directives.

TABLE OF CONTENTS

PRELIMINARY EXAMINATION

Please examine this product carefully. Make sure that the instrument is not damaged. If any damage occured during shipment, please notify your Dealer.

Each **HI 84102** minititrator is supplied complete with:

- Reagents set for 20 titrations
- One 2000 µL automatic pipette
- Two plastic tips for the 2000 µL automatic pipette
- Two 50 mL beakers
- Tubes set with cap
- pH electrode
- Temperature probe
- Stir bar
- Power cable
- One 30 mL bottle of Refill Solution
- One 1 mL syringe
- Two sachets of cleaning solution for wine deposits
- Two sachets of cleaning solution for wine stains
- Instruction manual

Note: Save all packing material until you are sure that the instrument works correctly. Any defective item must be returned in its original packing.

GENERAL DESCRIPTION

The **HI 84102** is a low cost, easy to use, microprocessor-based automatic titrator that benefits from Hanna's years of experience as manufacturer of analytical instruments.

It has an simple and yet accurate peristaltic pump to ensure the best accuracy and repeatability. By performing pump calibration with the provided Hanna standards, the instrument accuracy is assured.

The instrument comes with a preprogrammed analysis method designed for Total Titratable Acidity measurements on wine.

The **HI 84102** performs automatic analysis, all the necessary calculations and assures to the user a simple and effective interface.

The instrument has a powerful and effective built-in algorithm to analyze the shape of the pH electrode response and to determine the reaction completion.

By simply pressing the START STOP button, the instrument will automatically make the titration up to the end point. The result is immediately displayed in convenient units, then the instrument is ready for another titration.

SIGNIFICANCE OF USE

Acids occur naturally during the growing of grapes and as part of the fermentation process. Wines show lower levels of acid when there are hot growing seasons or when the grapes come from hotter regions. In the proper proportion, acids are a desirable trait and give the wine character.

The three predominant acids in wine are tartaric, malic and citric, all of which are intrinsic to the grape. Tartaric acid is the principal acid in grapes and is a component that promotes a crisp flavor and graceful aging in wine. A moderate amount of a wine's acid comes from malic acid, which contributes to fruitiness, and a small amount comes from citric acid. Wine also contains trace amounts of other acids. The least desirable acid in wine is acetic acid, which, when present in more than a nominal amount, gives wine a sour or vinegary aspect.

Total acidity, also called titratable acidity, is the sum of the fixed and volatile acids. In the United States the total acidity is usually expressed in terms of tartaric acid, even though the other acids are measured.

Total Acidity directly effects the color and flavor of wine and, depending on the style of the wine, is sought in a perfect balance with the sweet and bitter sensations of other components. Too much acidity makes wine tart and sharp; too little makes wines flat, flabby and uninteresting. Proper acidity in wine is what makes it refreshing and an ideal accompaniment to food.

The proper acid level of a wine varies, with sweeter wines generally requiring somewhat higher levels to retain the proper balance. For dry table wine the acceptable range is usually 0.60 to 0.75%; for sweet wine it's 0.70 to 0.85%.

SPECIFICATIONS

Range	0.0 to 25.0 g/L of tartaric acid
Resolution	0.1 g/L
Accuracy	5% of reading
Method	Acid-base titration method
Principle	End-point titration
pH Calibration	One-point in selected end-point: 7.00 pH or 8.20 pH
Sample volume	2 mL
Temperature Compensation	Automatic from **0.0 to 100.0** °C
pH Electrode	**HI 1048B** (included)
Temperature Probe	**HI 7662-T** (included)
Pump debit	0.5 mL/min
Stirring speed	1500 rpm
Environment	0 to 50 °C (32 to 122 °F); max 95% RH non-condensing
Power supply	220V/50Hz; 10VA
Dimensions	208 x 214 x 163 mm (8.2 x 8.4 x 6.4") (with beaker)
Weight	2200 g (77.6 oz.)

REQUIRED REAGENTS

Code	Description	Quantity/test
HI 84102-50	Titrant	
HI 84102-55	Standard	2 mL
HI 84102-60	Buffer Solution 1 pH 7.00	50 mL
HI 84100-61	Buffer Solution 2 pH 8.20	50 mL

PRINCIPLE OF OPERATION

The determination of total acids in wine is made according to a neutralization reaction, that is the reaction between the acids found in wine and a base. This type of reaction forms the basis of titration methods of analysing acids.

Titratable acidity is measured on a degassed sample at the end-point of 8.20 for Australian requirements and 7.00 to fulfil the requirements of the European Union. Both results are expressed as g/L tartaric acid.

For precise results it is very important to know the exact sample volume, titrant volume and concentration.

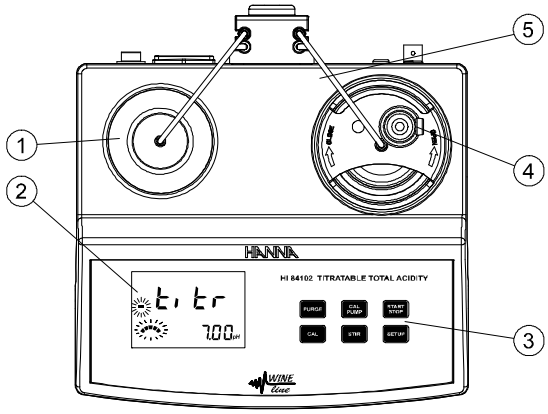
The peristaltic pump has a good repeatability but the dosing volume depends on many factors as the diameter of the tube or the tube streching. To compensate for all this errors, the pump need to be calibrated. The calibration of the pump is also needed in order to have high precision of the titrations. It is important to calibrate the pump at the pH value you want to use as the endpoint of the titrations.

The calibration procedure is in fact the analysis of a known solution. By doing this, the instrument makes a differential analysis between the standard and the wine sample. The pump volumetric debit and the real concentration of the titrant is compensated. Only the sample volume has to be precisely known.

FUNCTIONAL DESCRIPTION

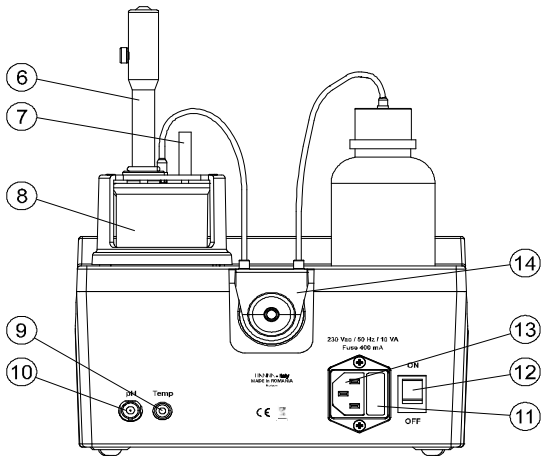
INSTRUMENT DESCRIPTION

FRONT PANEL



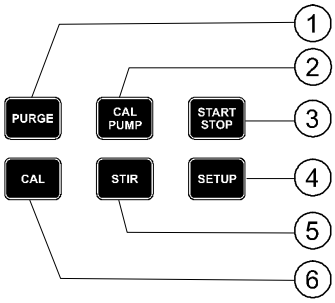
1) Titrant bottle
2) Liquid Crystal Display (LCD)
3) Keypad
4) Electrode holder
5) Peristaltic pump tube

REAR PANEL



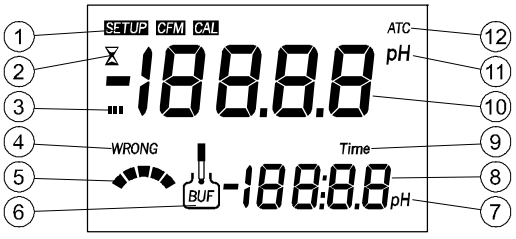
6) pH Electrode
7) Temperature probe
8) Beaker
9) Temperature probe socket
10) BNC electrode connector
11) Fuse
12) Power switch
13) Power cable connector
14) Peristaltic pump

KEYPAD DESCRIPTION



1) **PURGE** - to start/stop purging (max purging time is 5 min)
2) **CAL PUMP** - to enter pump calibration mode
3) **START STOP** - to start/stop titration, pump calibration or pH calibration
4) **SETUP** - to enter/exit SETUP menu
5) **STIR** - to start/stop the stirrer while in measurement, pH calibration or purging mode
6) **CAL** - to enter/exit pH calibration or to select the end-point while in SETUP mode

LCD DESCRIPTION

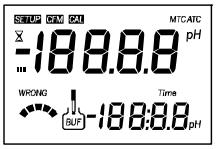


1) Selected mode: SETUP, CAL or CFM for confirming different values
2) Stability indicator: when reading is unstable or calibration is in progress
3) Stirrer active tags
4) Calibration messages
5) Pump active tags
6) Calibration messages
7) "pH" tag: when a buffer is displayed on the secondary display
8) Four digit and half secondary display
9) "Time" tag: when the time is displayed on the secondary display
10) Four digit and half main display
11) "pH" upper tag: when performing a pH calibration or entering SETUP mode to change the end-point
12) Automatic Temperature Compensation: when ATC blinks the temperature probe is not connected and the temperature value will be considered to be 25^0C.

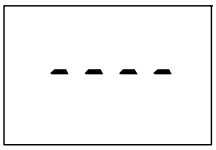
START UP

- Place the instrument on a flat table. Do not place the instrument on direct sun light.
- Connect the titrator to mains socket with ground connection and the correct voltage and frequency. See the label on the instrument rear for this.
- Place the peristaltic pump tube on the pump. See the Pump Tube Replacement section for the procedure.
- Remove the reagent bottle cap and place the bottle cap of the tubes set. Place the reagent bottle in the appropriate place on the titrator top.
- Turn the instrument ON using the power switch from the rear panel of the instrument and wait until it displays dashes.

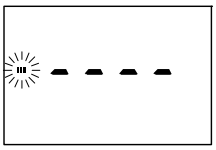
GUIDE TO DISPLAY CODES



This prompt appears for a few seconds each time the instrument is turned ON.



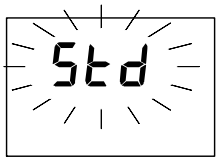
Main screen display.



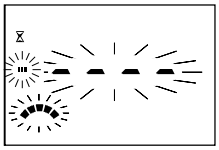
Main screen display with stirrer active.

Purging mode message.

PUMP CALIBRATION MESSAGES

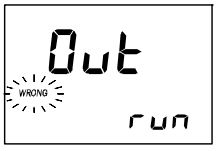


This screen appears each time the meter enters pump calibration mode. The meter is ready to start pump calibration by pressing the START STOP button.

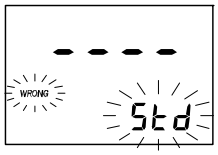


This screen appears while pump calibration is in progress. Pressing CAL PUMP or START STOP button, the minititrator returns to the main screen.

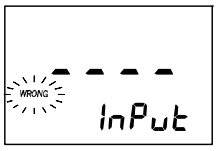
This prompt appears for a few seconds before returning to the main screen, when pump calibration is done.



This error message appears when the sample concentration exceeds 25g/L.

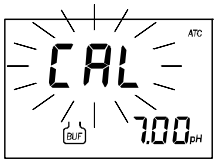


This error message appears when the standard solution is wrong.

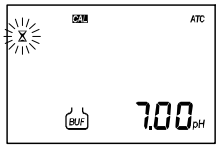


This error message appears when the input readings (pH, temperature) exceed the input limits.

pH CALIBRATION MESSAGES

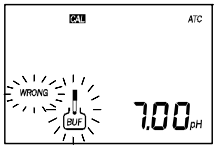


This screen appears each time the titrator enters pH calibration mode.



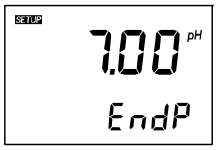
This screen appears when the pH calibration is started by pressing the START STOP button. Pressing again START STOP or the CAL button, the pH calibration is aborted and the instrument returns to the main screen.

This prompt appears for a few seconds before returning to the main screen, when the pH calibration is done.



The "WRONG" "🌡" / "WRONG" "BUF" tags alternatively blinking appear when the buffer solution is not correct or when the probe is wrong. Clean the electrode by following the Cleaning Procedure or check the quality of the buffer in order to continue the pH calibration.
Press the CAL or START STOP button to leave pH calibration mode.

SETUP MESSAGES



This screen appears each time the minititrator enters SETUP mode. Press the CAL button in order to change the end-point. Press the SETUP button to exit SETUP mode at any time.

TITRATION MESSAGES

This screen appears each time the minititrator enters TITRATION mode. Press the START STOP button in order to stop the titration and return to the main screen.

The titration result, expressed as concentration of tartaric acid in g/L, is displayed at the end of the titration process. Press the START STOP button to return to the main screen.

This error message appears when the input reading (pH, temperature) exceeds the input limits.

This screen appears when the evaluated concentration is out of range.

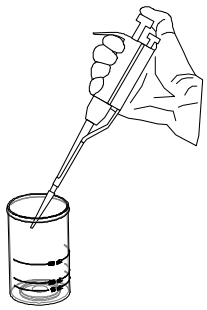
TIPS FOR AN ACCURATE MEASUREMENT

The instructions listed below should be carefully followed during testing to ensure best accuracy.

- Purge the peristaltic pump to have fresh titrant when starting a new analysis or calibration.
- Calibrate the peristaltic pump before performing an analysis.
- Analyze the wine immediately after the sample is obtained.
- Clean the electrode with the **HI 700635** or **HI 700636** cleaning solution, specially made for wine industry, if it was unused for a long time.

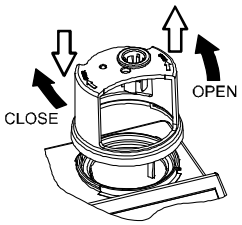
MEASUREMENT PROCEDURE

Warning: Make sure the instrument has been calibrated (pH and pump calibration) before performing a wine sample analysis.

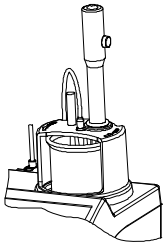


- Use the 2000 μL automatic pipette to add exactly 2 mL of wine sample to the 50 mL beaker.

- Fill the beaker up to the 50 mL mark with deionized water, place the stirrer bar into the beaker and then place the beaker in the appropriate place on the minititrator top.

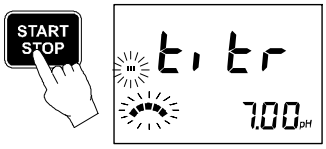


- Place the electrode holder on the top of the beaker and secure it by turning clockwise.



- Immerse the pH and the temperature probe approximately 2 cm (0.8") into the sample to be tested while paying attention to not touch the stir bar.

- Insert the dosing tip in the appropriate holder place and pay attention to not be immersed into solution.



- Press the START STOP button to start the titration. The display will show "titr" during titration, along with stirrer and pump tags blinking on the LCD, and 7.00 or 8.20 pH buffer on the secondary display.

- At the end of the titration, the Total Titratable Acidity concentration is displayed in g/L.

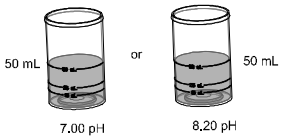
Note: If the end-point is not reached or it is not recognized because of the noisy solution, an error message will be displayed.

pH CALIBRATION PROCEDURE

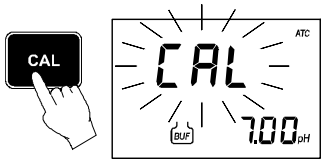
The pH calibration must be performed each time the pH electrode is changed.

- Turn the instrument ON using the power switch from the rear panel of the instrument.

- Fill the 50 mL beaker up to the 50 mL mark with Buffer Solution 1 (7.00 pH) or Buffer Solution 2 (8.20 pH).



- Place the pH electrode into solution and press the CAL button. The CAL message will appear blinking along with pH value.



- Press START STOP in order to start the electrode calibration.

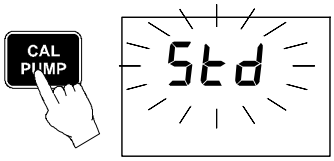
- At the end of the calibration procedure done appears for a few seconds and then the meter automatically returns to measurement mode.

PUMP CALIBRATION PROCEDURE

The calibration of the pump must be performed each time the pump tube, the reagent bottle or the pH electrode is changed. It is recommended to perform the pump calibration before each set of measurements.

- To prepare the sample for calibration, follow the measurement procedure for Total Titratable Acidity measurements by using **HI 84102-55** Total Titratable Acidity Standard instead of wine sample.

- After sample preparation, press the CAL PUMP button. Std will blink on the screen.

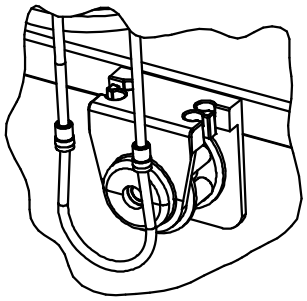


- Press START STOP in order to start the pump calibration.

- At the end of the calibration procedure done appears for a few seconds and then the meter automatically returns to measurement mode.

PUMP TUBE REPLACEMENT

To remove the tube of the peristaltic pump follow next steps:



- Detach the old tube system from the reagent bottle.
- Grasp one fixing ring of the peristaltic pump tube.
- Pull the tube until it's taken out from its location.
- Remove the other side of the tube.

To mount the new peristaltic pump tube follow next steps:

- Position one peristaltic pump fixing ring on its location.
- Stretch the tube over the peristaltic pump cylinders.
- Fix the second pump fixing ring on its location.
- Attach the tube to the reagent bottle.

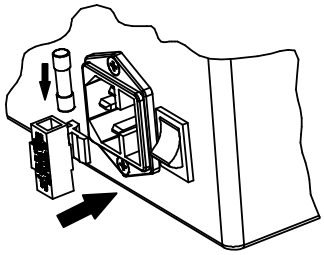
Note: Purge the peristaltic pump until drops of reagent appears on the dosing tip by pressing the PURGE button.

Dismount the tube if the titrator is not used several days.

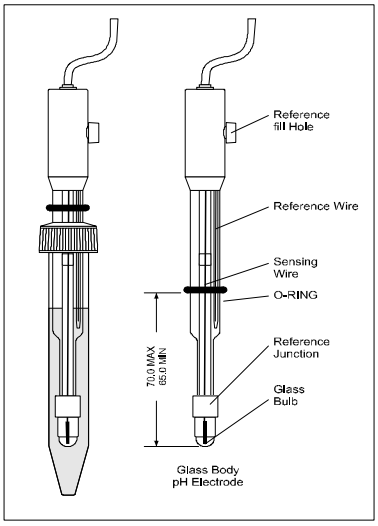
FUSE REPLACEMENT

To change the fuse follow next steps:

- Disconnect the power cord from the rear panel of the instrument.
- Pull out the fuse holder located near the power cord connector.
- Replace the fuse with a similar one.
- Push the fuse holder with the fuse in the appropriate place.



ELECTRODE CONDITIONING & MAINTENANCE



PREPARATION PROCEDURE

Remove the protective cap of the pH electrode (**HI 1048B**).

DO NOT BE ALARMED IF SALT DEPOSITS ARE PRESENT. This is normal with electrodes. They will disappear when rinsed with water.

During transport, tiny bubbles of air may form inside the glass bulb affecting proper functioning of the electrode. These bubbles can be removed by "shaking down" the electrode as you would do with a glass thermometer.

If the bulb and/or junction is dry, soak the electrode in **HI 70300** Storage Solution for at least one hour.

If the filling solution (electrolyte) is more than 2½ cm (1") below the fill hole, add **HI 7082** 3.5M KCl Electrolyte Solution.

For faster response, unscrew the fill hole screw during measurements.

STORAGE PROCEDURE

To minimize clogging and assure a quick response time, the glass bulb and the junction of the electrode should be kept moist and not allowed to dry out.

Replace the solution in the protective cap with a few drops of **HI 70300** Storage Solution or, in its absence, Filling Solution (**HI 7082**). Follow the Preparation Procedure before taking measurements.

Note: NEVER STORE THE ELECTRODE IN DISTILLED OR DEIONIZED WATER.

PERIODIC MAINTENANCE

Inspect the electrode and the cable. The cable used for connection to the instrument must be intact and there must be no points of broken insulation on the cable or cracks on the electrode stem or bulb. Connectors must be perfectly clean and dry. If any scratches or cracks are present, replace the electrode. Rinse off any salt deposits with water.

Probe Maintenance

Refill the reference chamber with fresh electrolyte (**HI 7082**). Allow the electrode to stand upright for 1 hour. Follow the Storage Procedure above.

CLEANING PROCEDURE

- *Wine deposits* Soak in Hanna **HI 70635** cleaning solution for 15 minutes
- *Wine stains* Soak in Hanna **HI 70636** cleaning solution for 15 minutes

IMPORTANT: After performing any of the cleaning procedures, rinse the electrode thoroughly with distilled water, refill the reference chamber with fresh electrolyte and soak the electrode in **HI 70300** Storage Solution for at least 1 hour before taking measurements.

ACCESSORIES

REAGENT SETS

HI 70300L Electrode storage solution (500mL)
HI 70635L Cleaning solution for wine deposits (500mL)
HI 70636L Cleaning solution for wine stains (500 mL)
HI 7082 Electrode filling solution (4 X 30 mL)
HI 84102-50 Titrant solution (110mL)
HI 84102-55 Calibration standard (100mL)
HI 84102-60 Buffer solution 1 pH 7.00 (500 mL)
HI 84102-61 Buffer solution 2 pH 8.20 (500mL)

OTHER ACCESSORIES

HI 1048B pH probe with shorter cable
HI 70483T Tube set with cap for titrant bottle and tip
HI 731316 Stir bar (5pcs.)
HI 731342 Automatic pipet 2000µL
HI 731352 Tips for 2000µL automatic pipet (4pcs.)
HI 740036P Beaker 50mL (10pcs.)
HI 740198 Power cable
HI 7662-T Temperature probe

Recommendations for Users

Before using this product, make sure that it is entirely suitable for your specific application and for the environment in which it is used.

Operation of this instrument may cause unacceptable interferences to other electronic equipments, this requiring the operator to take all necessary steps to correct interferences.

Any variation introduced by the user to the supplied equipment may degrade the instrument EMC performance.

To avoid damages or burns, do not put the instrument in microwave ovens. For yours and the instrument safety do not use or store the instrument in hazardous environments.

WARRANTY

HI 84102 is warranted for two years against defects in workmanship and materials when used for its intended purpose and maintained according to the instructions.

This warranty is limited to repair or replacement free of charge.

Damage due to accident, misuse, tampering or lack of prescribed maintenance is not covered.

If service is required, contact your dealer. If under warranty, report the model number, date of purchase, serial number and the nature of the failure. If the repair is not covered by the warranty, you will be notified of the charges incurred.

If the instrument is to be returned to Hanna Instruments, first obtain a Returned Goods Authorization Number from the Customer Service Department and then send it with shipment costs prepaid. When shipping any instrument, make sure it is properly packaged for complete protection.

To validate your warranty, fill out and return the enclosed warranty card within 14 days from the date of purchase.

SALES AND TECHNICAL SERVICE CONTACTS

Australia:
Tel. (03) 9769.0666 • Fax (03) 9769.0699

China:
Tel. (10) 88570068 • Fax (10) 88570060

Egypt:
Tel. & Fax (02) 2758.683

Germany:
Tel. (07851) 9129-0 • Fax (07851) 9129-99

Greece:
Tel. (210) 823.5192 • Fax (210) 884.0210

Indonesia:
Tel. (21) 4584.2941 • Fax (21) 4584.2942

Japan:
Tel. (03) 3258.9565 • Fax (03) 3258.9567

Korea:
Tel. (02) 2278.5147 • Fax (02) 2264.1729

Malaysia:
Tel. (603) 5638.9940 • Fax (603) 5638.9829

Singapore:
Tel. 6296.7118 • Fax 6291.6906

South Africa:
Tel. (011) 615.6076 • Fax (011) 615.8582

Taiwan:
Tel. 886.2.2739.3014 • Fax 886.2.2739.2983

Thailand:
Tel. 66.2619.0708 • Fax 66.2619.0061

United Kingdom:
Tel. (01525) 850.855 • Fax (01525) 853.668

USA:
Tel. (401) 765.7500 • Fax (401) 765.7575

For e-mail contacts and a complete list of Sales and Technical offices, please see ***www.hannainst.com***.

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09/05