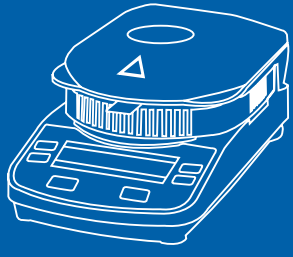
LABORATORY WEIGHING SOLUTION™

CMB25 SERIES

Moisture Analyzer



www.globalcas.com

OWNER'S MANUAL

CAS

CONTENTS

1. INTRODUCTION

Safety Precautions

For safe and dependable operation of this moisture Analyzer, please comply with the following safety precautions:

- ► Use the Analyzer exclusively for determination of moisture in samples. Improper operation of the Analyzer can endanger personnel and cause property damage.
- ► Verify that the input voltage printed on the voltage identification label information and the plug type matches the local AC power supply.
- ► The Analyzer has a 3-pin power cable that includes a ground connection. Intentionally disabling the equipment grounding connection is prohibited.
- ► Make sure that the power cord does not pose any obstacle or tripping hazard.
- ► Do not operate the Analyzer in hazardous, wet or unstable environments.
- ► Disconnect the Analyzer from the power supply when cleaning the Analyzer.
- ► Ensure sufficient free space around the Analyzer as a safety zone. Allow at least 1 meter of free space above the Analyzer.
- ► The Analyzer must be operated only by trained personnel who are familiar with the properties of the samples being tested and with the equipment operation.
- ► Use appropriate personal safety equipment such as safety glasses, gloves, protective clothing and respirators.
- ► Do not make any modifications to the Analyzer.
- ► Service should be performed only by authorized

The Moisture Analyzer works with heat!

- ► Never place flammable materials on, below or next to the Analyzer.
- ► Use caution when removing a test sample. The sample, the sample chamber, the heating element and the surrounding areas may be very hot and can cause burns.

Some samples require special care!

- ► Should there be any uncertainty regarding the safety of a substance, perform a careful risk analysis. In such cases, never leave the Analyzer unattended.
- ► Fire or explosion: Substances which contain solvents or release flammable or explosive vapors when heated. With such samples, work at drying temperatures low enough to prevent the formation of flames or an explosion.
- ► Poisoning or burning: Substances which contain toxic or caustic components should only be dried in a fume hood.
- ► Corrosive: Substances which release corrosive vapors when heated should be tested in small amounts.
- ► The user assumes responsibility for any damage caused by the use of these types of samples.

2. INSTALLATION

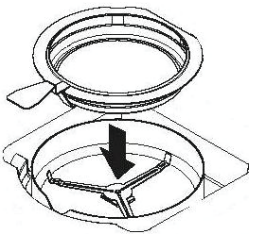
Package Contents

- Moisture Analyzer
- Draft Shield
- Pan Support (CMB25 only)
- Power Cable
- 50 Sample Pans
- Glass Fiber Pad
- Instruction Manual
- In-Use Cover

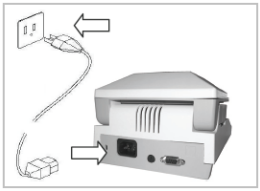
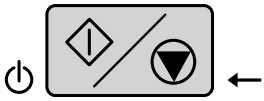
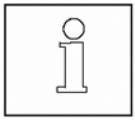
Selecting the Location

- Operate the Analyzer on a firm, level surface.
- Select a location that is safe and with adequate ventilation. Fire, corrosive or toxic fumes and other hazards associated with the test samples will require specially prepared locations.
- Avoid locations with rapid temperature changes, excessive humidity, air currents, vibrations, electromagnetic fields, heat or direct sunlight.

Installing Components

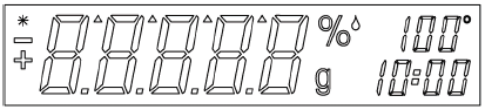
(1) Install and position Draft Shield	(2) Install Pan Support, turn until it engages into position	Optional Pan Support - Slide an empty sample pan under the pan handler, then place over the pan support.
		

Connecting Power

	Verify that the input voltage printed on the voltage identification label information and the plug type matches the locations AC power supply. Connect the supplied power cable to the power input receptacle at the rear of the Analyzer and into a properly grounded power outlet.
	Power: On (short press) / Off / Standby Mode (long press) When powered on from standby mode, the Analyzer is ready for immediate use.
	See also Section1. INTRODUCTION-Safety Precautions
	After connecting the Analyzer to the AC supply (standby mode), allow the Analyzer to warm up for at least 15 minutes for best results.

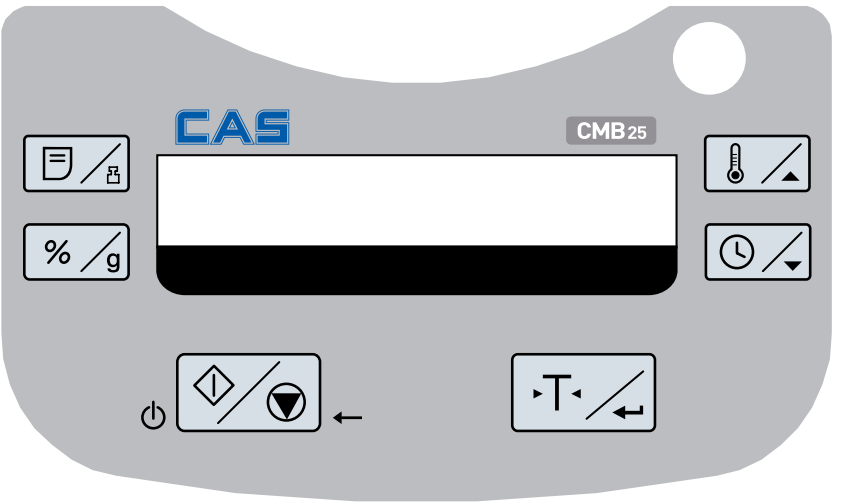
3. OPERATION

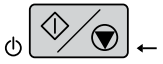
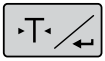
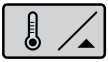
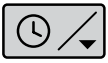
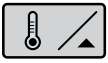
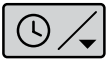
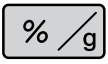
Display



*	Stable indicator
%	Percent solids
%	Percent moisture
g	grams
100°	Temperature setting or current chamber temperature (Celsius)
10:00	Time setting (minutes : seconds)

Controls



Button	Name	Quick Functions
	Start / Stop	On (short press) / Off (long press) Start/Stop (short press) Back (short press)
	Tare	Tare (short press) Enter / Accept value (short press)
	Temp	Temperature Setting (short press)
	Time	Time Setting (short press)
	Set ▲	Increase value (short or long press)
	Set ▼	Decrease value (short or long press)
	Print / Cal	Print (short press) Calibrate (long press)
	%g	Result Unit (short press)

There are also several modes of operation which affect how each button operates. Please refer to the following section.

Operating Modes

Standby Mode

When the Analyzer is connected to AC power and the display is off, the unit is in Standby mode.

Start	(Short press) Turns on the display and enters Weigh mode.
Print	(Long press) Displays the RS232 settings (see Section 6. TECHNICAL DATA - Communication). Thereafter, (Short press) Re-enters Standby mode (off).

Weigh Mode

The display shows the weight of items placed on the pan support.

Tare	(Short press) Sets the displayed weight value to zero
Start	(Long press) Enters Standby mode (Off)
The following operations can be initiated:	
Temp	(Short press) Enters Edit mode for the temperature setting, the value will blink (see Section 3. OPERATION – Temp/Time Edit mode)
Time	(Short press) Enters Edit mode for the time setting, the value will blink (see Section 3. OPERATION – Temp/Time Edit mode)
Start	(Short press) Activates Run mode, initiates test with a sample greater than 0.5 g (see Section 3. OPERATION – Run mode)
Cal	(Long press) Initiates weight or temperature Calibration (see Section 5. MAINTENANCE)

Temperature / Time Edit Mode (Preparing a Test)

Temperature editing: (50° to 160°C in 5° steps)

Temp	(Short press) Enters Edit mode for the temperature setting, the value will blink.
Set ▲	(Short or long press) Increases the value of the temperature setting.
Set ▼	(Short or long press) Decreases the value of the temperature setting.
Tare	(Short press) Accepts the blinking value and returns to Weigh mode.
Start	(Short press) Exits Edit mode without saving changes.

Note: After 5 seconds of no activity the blinking setting is automatically saved and the mode returns to Weigh.

Time editing: (1 to 60 minutes in 30 second steps, 61 to 99 minutes in 1 minute steps)
The time parameter can be set to timed duration or AUTO (the test ends when the Analyzer detects the weight loss has ended).
Selecting AUTO or timed duration:

Time	(Short press) Enters Edit mode for the time setting, the value will blink.
Time	(Short press) While the time setting is blinking, toggles between AUTO and a time value.
Tare	Accepts the blinking setting.

If AUTO is selected Weigh mode is entered.
If time duration is selected:

Set ▲	(Short or long press) Increases the value of the time setting.
Set ▼	(Short or long press) Decreases the value of the time setting.
Tare	(Short press) Accepts the blinking value and returns to Weigh mode.
Start	(Short press) Exits Edit mode without saving changes.

Note: After 5 seconds of no activity the blinking setting is automatically saved and the mode returns to Weigh.

Run Mode (Performing a Test)

A moisture determination test is initiated. The results in progress are displayed.

Start	(Short press) Activates Run mode, initiates test with a sample greater than 0.5 g.
%g	Changes the unit of the displayed result: weight (grams) > % Moisture > % Solids.
Stop	(Short press) Manually stops the test in progress.
Print	Sends the current displayed value to the RS232.

Result Mode

At the end of the test (Run Mode), the display blinks the test result.

%g	Changes the unit of the displayed result: weight (grams) > % Moisture > % Solids.
Tare	Exits to Weigh mode.
Print	Sends the current displayed value to the RS232.

How to Prepare a Test

Moisture determinations can be made very simply. The three steps are:

(1) Setting the drying temperature (see Section 3. OPERATION – Temp/Time Edit mode).
(2) Setting the drying time, and (see Section 3. OPERATION – Temp/Time Edit mode).
(3) Preparing the sample to be tested:

- Place the Pan Handler with empty test pan on the Pan Support (see Section 2. INSTALLATION - Installing components).
- Press Tare to zero out the pan weight.
- Remove the test pan and place the test sample onto the test pan. The sample must be greater than 0.5g.
- Spread the sample evenly across the test pan.
- Place the test pan with the sample on the Pan Support. The weight value of the sample will be displayed.

Section 4. Test Optimization gives hints on determining optimal drying temperatures and times, sample sizes, and proper preparation of samples.

How to Perform a Test

(1) Close the Heater Cover.
(2) Press Start to begin the test (press Start again to stop the test in progress).
(3) When the test is over the display will blink showing the final result.
(4) To change the displayed units, press %g.
(5) To print the current displayed value, press Print.
(6) Press Tare to exit to Weigh mode.

Performing a Trial Test

Prior to actual testing, a test run can be performed with these suggested settings:

(1) Temperature = 120
(2) Time = AUTO
(3) Sample = 3g of water. Place a glass fiber pad (included with the Analyzer) on the test pan, place on Pan Support. Press Tare to zero the pan weight. Add 3g of water to the fiber pad.
(4) Press Start to initiate the test. A perfect result on the trial test would be: 0g, 100% moisture or 0%solids.

Results may vary slightly due to weighing errors involved with a small sample, or other experimental errors. See also Section 4. Test Optimization.

4. TEST OPTIMIZATION

Moisture is determined from the weight loss of a sample dried by heating.

The speed and quality of the measurement process will rely on the following parameters. Experimentation will also help ascertain the optimal setup of these parameters:

- Drying temperature
- Drying time
- Sample weight
- Sample preparation
- Type of sample

Drying Temperature

- The drying temperature exerts a controlling influence on the drying time (e.g., a low temperature can prolong the drying time unnecessarily).
- Select a drying temperature that neither decomposes nor changes the chemical structure of the sample.
- Some samples can give off different amounts of moisture at different drying temperatures. In these cases, deviations can be compensated by changing the drying temperature.

Drying Time

This analyzer has three methods to establish the drying time.

Manual	where the user stops the test in progress by pressing the Stop button. The test must be longer than 30 seconds to be a valid test.
Automatic	which ends the drying process when detecting less than 1mg loss in 60 seconds. To keep the drying time short, select a small sample weight that still maintains the required measurement accuracy.
Timed duration	where the test ends when the pre - set drying time elapses.

Sample Weight

The weight of a sample influences the measurement time and repeatability of the results. With large amounts of samples, more moisture must be vaporized and the process takes longer. Generally, the sample weight should be between 3g and 20g. 3g samples give fast results with some sacrifice in accuracy. 20g samples generally give more consistent results but require a longer test time.

Another way to determine the sample weight is to use the relation between sample weight and repeatability, as shown in the following table. If requiring repeatability

results better than ±0.3%, for example, the table indicates that a sample weight of at least 2g will be needed.

Sample Weight	Repeatability
0.5g	±1.0%
1g	±0.6%
2g	±0.3%
5g	±0.12%
10	±0.06%

Sample Preparation

Samples must always be uniform and representative of the total amount to obtain accurate and reproducible results. When preparing samples, it is essential to ensure thin and uniform distribution of the sample on the test pan (i.e., avoid piling and excessive amounts).

Types of Samples

Pasty, fat containing and melting substances

Use a glass fiber filter to increase the surface area of these types of samples (e.g., butter). The moisture in these substances is more uniformly distributed through the filter. The increased surface area results in faster and more complete vaporization of the moisture.

Liquid substances

Liquids (e.g., dispersions) tend to form drops on the test pan, which prevents rapid drying. Use of a glass fiber filter shortens the drying time significantly as the filter distributes the liquid sample over a larger surface area.

Skin-forming and temperature sensitive substances

Formation of a film on the surface of these samples can prevent complete determination of moisture. Using a glass fiber filter to cover the sample allow gentler and more beneficial heating, improving reproducibility.

Sugar-containing substances

Samples containing large amounts of sugar tend to caramelize. Ensure that a thin and uniform layer is applied and a moderate temperature selected. The sample can also be covered with a glass fiber filter that improves reproducibility.

The following substances present risk of fire, explosion, damage or injury. Should there be any uncertainty regarding the safety of a substance, always perform a careful risk analysis. In such cases, never leave the Analyzer unattended.

Volatile substances

With volatile samples, rapid application of the sample on the test pan is advisable, to limit the moisture from escaping before the initial weight is recorded. These substances also include samples treated with solvents, and substances which contain solvents or release flammable or explosive vapors. Work at drying temperatures low enough to prevent the formation of flames or an explosion. Always work with small samples (maximum 1g).

Poisonous and toxic substances

Substances which contain toxic or caustic components should only be dried in a fume hood.

Corrosive substances

Substances which release corrosive vapors when heated (e.g. acids) should be tested in small amounts. The vapors can condense on the Analyzer parts causing corrosion.

5. MAINTENANCE

Weight Calibration

Weight calibration is rarely required. Moisture analyzers use relative weight values to determine the results, so a minor offset from the absolute weight has little effect on accuracy. CAS moisture analyzers have rugged, high quality temperature stabilized weighing modules that retain their calibration over long periods of time.

(1) Remove any load on the Pan Support including the sample pan.
(2) Press and hold Cal while in the Weigh mode. “CAL” will appear followed by “50.00g”.
(3) Place a 50g calibration mass on the Pan Support. The display will show “-----”.
(4) Remove the mass when “--0--” is shown on the display. The display will show “-----”.
(5) The Analyzer will return to Weigh mode when calibration is complete.

Note: Pressing START will cancel the calibration without saving the changes.

Temperature Calibration

Temperature calibration is rarely required under normal use. If the heating elements become dirty, the usual setting may no longer produce the same results. A temperature calibration can correct for these changes.

Use only the Temperature Calibration Kit (accessory) to perform temperature calibration. Damage to the Analyzer can occur if using other methods.

(1) Remove the Pan Support. “Err8.4” must be shown on the display for the temperature calibration to start.
(2) Place the Temperature Calibration Kit into the temperature chamber (see Kit Instructions). Close Cover.
(3) Press and hold Cal until “Cal” is displayed. When Cal is released “TC100” will appear on the display and the heater turns on.
(4) After 15 minutes, the unit will beep and blink “100” on the display.
(5) Read the thermometer on the Temperature Calibration Kit and press Set to change and match the displayed value to the thermometer reading.
(6) Press Tare to enter the value. The display will show “TC160” as the heater turns on again.
(7) After 15 minutes, the unit will beep and blink “160” on the display.
(8) Read the thermometer on the Temperature Calibration Kit and press Set to change and match the displayed value to the thermometer reading.
(9) Press Tare to enter the value. The Analyzer returns to Weigh mode.
(10) Temperature calibration is now complete.

Note: If Tare is not pressed within 10 minutes the calibration will be aborted.

Cleaning

<table>
<tr>
<td>  </td>
<td>► Disconnect the Analyzer from the power supply before cleaning the Analyzer.
► Make sure that no liquid enters the interior of the Analyzer.
► Make sure the Analyzer is cooled down before cleaning.</td>
</tr>
<tr>
<td>  </td>
<td rowspan="2">► Clean the Analyzer at regular intervals.
► Housing surfaces and the temperature sensor may be cleaned with a lint-free cloth slightly dampened with water or a mild cleaning agent.
► Glass surfaces may be cleaned with a commercial glass cleaner.
► Do not use solvents, harsh chemicals, ammonia or abrasive cleaning agents.</td>
</tr>
<tr>
<td> 
</td>
</tr>
</table>

Troubleshooting

Symptom / Display	Possible Cause	Remedy
Cannot turn on	No power to Analyzer	Verify connections and voltage
Weight value blinking	Sample weight less than 0.5g	Increase samle size
“Tare” shown	Pan weight needs set to zero	Press Tare
“Close Cover” shown	Cover needs to be closed before starting test	Close Cover
Poor accuracy	Improper calibration	Perform calibration
Cannot calibrate	Unstable environment	Move the Analyzer to suitable location
Err 7.0	Unstable environment	Move the Analyzer to suitable location
Err 8.1	Incorrect calibration masses	Use correct calibration masses
Err 8.2	Time out	
Err 8.3	Pan Support has load during power on	Remove weight from pan support
Err 8.4	Pan Support was removed prior to power on	Install Pan Support
Err 9.5	Weight on Pan Support exceeds capacity	Remove weight from the Pan Support
Err 53	Pan Support was removed during weighing	Re-install Pan Support

Service Information

If the troubleshooting section does not resolve or describe your problem, contact your authorized CAS service agent.

Accessories

Description	Part No.
Security Locking Cable	76288-01
Security Lock (Kensingtons® type)	470004-010
Temperature Calibration Kit	11113857
Sample Pans (50/Box)	80850086
Pads, Glass Fiber (200/Box)	80850087
Reusable Sample Pans (3/pk)	80850088
Reusable Deep Sample Pans (3/pk)	80252479
Reusable Wire Cage	80252477
Sample Pan Handler	80252476
50g Calibration Weight	51054-16
STP103 Thermal Printer, US	80251992
STP103 Thermal Printer, EU	80251993
STP103 Thermal Printer, UK	80251994
CBM910 Thermal Printer, JP	80252041
CBM910 Thermal Printer, US	80252042
CBM910 Thermal Printer, EU	80252043
Cable, STP103	80252581
Cable, CBM910	80252571
Data collection Software	SW12

6. TECHNICAL DATA

Ambient conditions

The technical data is valid under the following ambient conditions:

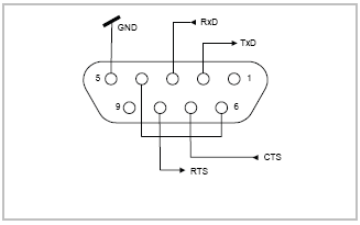
Ambient temperature	10°C to 40°C
Relative humidity	15 % to 80 % at 30°C non-condensing
Warm up time	At least 15 minutes after connecting the Analyzer to the AC supply; when switched from standby mode the Analyzer is ready for immediate use.
Height above sea level	Up to 2000 m
Power	Input: 100VAC - 120VAC, 3A, 50/60Hz or 200VAC -240VAC, 3A, 50/60Hz
Voltage fluctuations	-15% +10%
Power load	CMB25: 250W
Protection	Protected against dust and water, Pollution degree: 2,
Installation category	Class II

Specifications

MODEL	CMB25
Capacity	110g
Readability (% requires >10g sample)	0.005g ; 0.05%
Temperature Settings	50°C to 160°C (5° increments)
Heat Source	Halogen
Calibration - Weight	50g
Calibration - Temperature	Temperature Calibration Kit
Pan Size	90mm diameter
Unit Dimensions (DxWxH)	11.0 x 6.5 x 5.0 in / 28.0 x 16.5 x 12.7 cm
Unit Weight	4.6 lb / 2.1 kg
Shipping Dimensions (LxWxH)	20.2 x 15.5 x 13.5 in / 51 x 40 x 35 cm
Shipping Weight	10 lb / 4.5 kg

Communication

RS232 Pin Connections



Female DB9 connector

Pin 2: Analyzer transmit line (TxD)
Pin 3: Analyzer receive line (RxD)
Pin 5: Ground signal (GND)
Pin 7: Clear to send (hardware handshake) (CTS)
Pin 8: Request to send (hardware handshake) (RTS)

RS232 Data Settings (default)

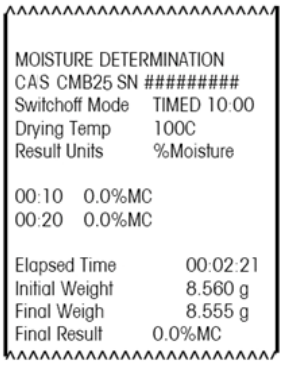
Baud Rate: 2400 Data Bits: 7 Parity: N Stop Bits: 2 Flow Control: Xon/Xoff

RS232 Commands

The RS232 Interface allows a computer to control the Analyzer, as well as to receive data such as displayed weight.

Command	Function
ON	Turns Analyzer ON
OFF	Turns Analyzer OFF
T	Same as pressing Tare
U	Same as pressing %g
START	begins a test
STOP	ends a test
P	Same as pressing Print
xP	Interval Print x = Print Interval (1-3600 sec)
PSN	Print Serial Number
PV	Print software version
?	Print Header
H	Header on or off
RS	Print current RS232 settings
RS:2400,7,N,2,X	Change RS232 setting (The current RS232 setting can be displayed on the LCD by pressing Print for 2 seconds while in standby mode.) Baud:1200,2400,4800,9600,19200 Data Bits: 7 or 8 Parity: N = none, O = odd, E = even Stop Bits: 1 or 2 Handshake: X = xon/xoff (software), R = RTS-CTS (hardware), N = none
	The Analyzer will return “ES” for invalid commands. All communication uses standard ASCII format. Sent commands must terminate with a Line Feed or Carriage Return Line Feed (CRLF).

RS232 Output



Header on
Header on
Header on
Header on
Header on

If Print pressed or print interval set.
If Print pressed or print interval set.

Printed at successful end of test.
Printed at successful end of test.
Printed at successful end of test.
Printed at successful end of test.

Compliance

Compliance to the following standards is indicated by the corresponding mark on the product.

Marking	Standard
CE	This product conforms to the EMC directive 2004/108/EC, the Low Voltage Directive 2006/95/EC and the Non-automatic Weighing Instruments Directive 90/384/EEC.
C	AS/NZS4251.1 Emission, AS/NZS4252.1 Immunity
C US	CAN/CSA-C22.2 No. 1010.1-92; UL Std. No. 3101-1
	**Disposal** In conformance with the European Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE) this device may not be disposed of in domestic waste. This also applies to countries outside the EU, per their specific requirements. Please dispose of this product in accordance with local regulations at the collecting point specified for electrical and electronic equipment. If you have any questions, please contact the responsible authority or the distributor from which you purchased this device. Should this device be passed on to other parties (for private or professional use), the content of this regulation must also be related. Thank you for your contribution to environmental protection..

FCC Note

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.

Industry Canada Note

This Class A digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

MEMO

CMB25 SERIES

Moisture Analyzer

CAS BLDG., # 440-1, SUNGNAE-DONG,
GANGDONG-GU, SEOUL, KOREA
TEL_ 82 2 2225 3500
FAX_ 82 2 475 4668
www.globalcas.com

2008.10