

# METER ATMOS 41 RAIN FUNNEL AND PYRANOMETER REPLACEMENT

Tool	ls N	leed	led

- Preparation
- Install New Rain Funnel
- **Update PYR Calibration Factor** 
  - Update with a ZSC Bluetooth® Sensor Interface
  - Update with a ZL6 or EM60 Data Logger
  - Update with a PROCHECK Handheld Reader
  - Update with a Campbell Scientific Data Logger
- **Verify Rain Funnel Installation**

### **Customer Support**

Use the following instructions to install a replacement funnel and pyranometer for the ATMOS 41 All-in-One Weather Station. Please contact Customer Support to order the ATMOS 41 funnel with pyranometer solar sensor.

# **TOOLS NEEDED**

Data logger or	METER ZSC, ZL6, EM60, PROCHECK, Campbell Scientific, Inc. (CSI)
handheld reader	Must be capable of issuing SDI-12 extended commands
Cable	
Micro-USB	Connect from laptop to ZL6 or EM60
USB-to-RS232	Connect from laptop to PROCHECK or CSI data logger
NOTE: ZSC does not require cables.	
Software	USB cable adapter driver (if applicable)
METER ZSC	ZENTRA Utility Mobile
METER ZL6, or EM60	ZENTRA Utility software
METER PROCHECK	TeraTerm software
CSI data logger	LoggerNet software
Sharp-pointed object	Use to push tabs in when disconnecting pyranometer connector (e.g., ball-point pen)
Rain funnel (PN 20269)	Has the new pyranometer (PYR) solar sensor installed
	NOTE: Part number 20269 is for the rain funnel model with waterproof connector and strain relief cable (serial number newer than ATM-410002462). If an older model is needed, please request the older style from Customer Support.

## PREPARATION

- 1. Download the software needed to connect the ATMOS 41 with the new rain funnel to a laptop or smart device (phone, tablet).
- 2. Carefully read this document all the way through.

Figure 1 shows an image of the new model with waterproof connector and cable strain relief and the old model.



Figure 1 Rain funnel and pyranometer connector

## **INSTALL NEW RAIN FUNNEL**

The instructions below explain how to remove the old rain funnel and install the new rain funnel with a waterproof connector and cable strain relief.

- 1. Unplug the ATMOS 41 from the data logger or reader.
- 2. Touch any conductive material connected to the ground to discharge static electricity from the body (e.g., metal pole). CAUTION: Electrostatic discharge (ESD) can damage ATMOS 41 electronics.
- 3. Press and hold the rain funnel down to compress the internal spring.
- Twist counter-clockwise to unlock from the ATMOS 41 base (Figure 2). 4.
- 5. Carefully lift the funnel just enought to reach the pyranometer connector.
- 6. Press in the tabs on both sides of the connector locking mechanism with an object with a sharp point (e.g., a ballpoint pen, Figure 3).

NOTE: If the rain funnel pyranometer connect does not look like the one in Figure 3, just pull the connectors apart.



Figure 2 Removing ATMOS 41 rain funnel

Figure 3 **Disconnect pyranometer connector** 

7. After the tabs are released, pull the connectors apart and remove the funnel.

The funnel just removed may be discarded.

- 8. Write down the calibration factor (CAL Factor) for the new pyranometer, located on the inside of the new funnel (Figure 4).
- 9. Connect the new rain funnel pyranometer cable connector to the ATMOS 41 connector (Figure 5).

Make sure the cable does not get pinched by the spring or interfere with the raindrop path to the gold electrodes.

NOTE: The connector is keyed and will only connect if oriented correctly.



Figure 4 CAL Factor for new pyranometer sensor



Figure 5 Pyranometer cable connector

- 10. Line up the pegs on the inside of the funnel with the notches on the ATMOS 41 (Figure 6).
- 11. Press down and turn the rain funnel clockwise.

On newer ATMOS 41 designs, the gray lock symbol on the rain funnel should be lined up with the lock symbol molded into the ATMOS 41 base (Figure 5).



# **UPDATE PYR CALIBRATION FACTOR**

This section describes how to connect to an ATMOS 41 and update the pyranometer CAL Factor using various data acquisition devices. The CAL Factor is located inside the rain funnel and should have been written down before attaching the new rain funnel.

GO TO-

Update with a ZSC Bluetooth® Sensor Interface

Update with a ZL6 or EM60 Data Logger

Update with a PROCHECK Handheld Reader

Update with a Campbell Scientific Data Logger

## UPDATE WITH A ZSC BLUETOOTH® SENSOR INTERFACE

The following instructions explain how to connect to an ATMOS 41 and update the pyranometer CAL Factor using a ZSC and ZENTRA Utility Mobile.

1. Download ZENTRA Utility for iOS or Android mobile device.

Either scan the QR code shown in Figure 7 to access the ZENTRA Apps website or search for ZENTRA Utility in the appropriate app store (Figure 8).

Skip this step if ZENTRA Utility is already loaded.



Figure 7 QR code to ZENTRA Apps website

- 2. Plug the sensor stereo connector into the ZSC stereo port (Figure 9).
- 3. Press the button on the ZSC.
- 4. Confirm that the LED on the ZSC begins blinking blue.

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Figure 8 ZENTRA Utility in mobile app



Figure 9 Plug sensor stereo connector into ZSC

5. Open ZENTRA Utility on mobile device.

Figure 10 shows the Connect screen on a mobile device. ZENTRA Utility Mobile will search for and display nearby Bluetooth-enabled ZENTRA devices.

6. Press the ZSC (Figure 11) to establish a Bluetooth connection.

Figure 12 shows the ZSC making a connection with the ATMOS 41.

Once a connection is made, the ZSC Device screen will appear (Figure 13). The ZSC is now connected to the ATMOS 41 and ready to update the pyranometer CAL Factor.



Figure 10 Connect screen

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Devices Found		
ZSC ZSC ZSC03108		<u>@</u>
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Figure 11 ZENTRA Utility window





- 7. Press the menu dots located in the lower right-hand corner of the Device screen (Figure 13) to open the More screen.
- 8. Select Sensor Tools on the More screen (Figure 14) to open the Sensor Tools screen.
- In the Sensor Tools screen, press on the Pyranometer Calibration button (Figure 15). This will bring up the Pyranometer Calibration screen.

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ATMOS 41			>
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Lightning Activity 0	Lightning 0 km	Distance	
Wind Direction 112°	Wind Spe 0.11 m/s	ed	
Gust Speed 0.11 m/s	Air Tempe 21.5 °C	erature	>
Relative Humidity 0.386 RH	Atmosphe 93.40 kF	eric Press Pa	ure
X-axis Level 87.7°	Y-axis Lev 88.0°	/el	
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zsc			ZSC
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Figure 13 Open More screen

Figure 14 Open Sensor Tools screen



Figure 15 Sensor Tools screen

- 10. Confirm that the ZSC ATMOS 41 All-in-one Weather Station is the sensor listed (Figure 16).
- 11. In the text box below the label Pyranometer Calibration Factor: W · m<sup>-2</sup> (Figure 16), enter the new pyranometer CAL Factor printed on a label inside the ATMOS 41 replacement funnel (Figure 6).
- 12. Press the **Update** button.
- 13. Verify the Pyranometer Calibration screen returns the following message (Figure 17):

#### Calibration Successful

14. Proceed to Verify Rain Funnel Installation to complete the process and put the ATMOS 41 back in service.

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<	Pyranomete	er Calibration	i	
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Sensor				
ZSC	ATMOS 41 All-	in-one Weat	ther 🗸 🥤	-
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Device	Preferences	Cloud Sync	More	

Figure 16 Enter CAL Factor value

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	Update	
	Close	
1	2 ABC	3 Def
4 6ні	5 JKL	6 MN 0
7 PORS	8 TUV	9 wx yz
. Cal	ibration Success	sful 🛛

Figure 17 Verify CAL Factor value

## UPDATE WITH A ZL6 OR EM60 DATA LOGGER

The following instructions explain how to connect to an ATMOS 41 and update the pyranometer CAL Factor using a METER ZL6 or EM60 data logger. Please go to metergroup.com/downloads and download the most current data logger firmware before beginning.

- 1. Connect the ATMOS 41 to the data logger using the stereo plug connector.
- 2. Connect the data logger to a computer with a micro-USB cable.
- 3. Open ZENTRA Utility and click on Connect to connect to the ZL6 or EM60 data logger (Figure 18).
- 4. Select the correct logger from the COM dropdown (Figure 18).

The data logger should show up with every connected sensor. Push **Scan** if the newly connected ATMOS 41 does not show up immediately.

 On the Menu bar (Figure 18), select Actions > Digital Sensor Terminal.

The Digital Sensor Terminal window will appear (Figure 19).

- 6. Select the correct sensor port from the Sensor Port dropdown list.
- Enter the ?I! command in the prompt field (Figure 20).
   NOTE: Erase previous command from the prompt field first, if one appears.
- 8. Click the **Send** button to return sensor information (Figure 21).

When SDI-12 address is 0, the returned output should be similar to **013METER ATM41 XXXATM-41000XXXX** (Figure 21).

 Enter the ?Xc Y.YY! command in the prompt field where Y.YY is the new pyranometer CAL Factor (Figure 22).

NOTE: Erase previous command from the prompt field first, if one appears.

The new pyranometer CAL Factor is printed on a label inside the ATMOS 41 replacement funnel (Figure 6).

ZENTRA Utility File Data Edit Actions Window He	Ip			-	o ×
EM60: COM4 EM60 Logger	✓ Connect	Scan O	Download	Settings	Cellular ail
		You a	re not connected to a	device.	
Paadu					

Figure 18 Connect to ZL6 or EM60

Digital Sensor Commands		
		~
	Send	
		^
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	llose	Send



Digital Sensor Terminal		?	Х
Sensor Port	Digital Sensor Commands		
P1: ATMOS 41 All-in-one Weather Station $  imes $			$\sim$
?!! 🔶		Send	
			~
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#### Figure 20 ?I! command entered

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Digital Sensor Commands	- E	
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	Send	
		^
		~
	Digital Sensor Commands n ∨	Digital Sensor Commands

Figure 21 ?I! command response

r x		Digital Sensor Terminal
	Digital Sensor Commands	Sensor Port
`		P1: ATMOS 41 All-in-one Weather Station $ \smallsetminus $
Send		?Xc 5.86!
1		
		·

Figure 22 ?Xc Y.YY! command entered

10. Click the Send button to enter the new CAL Factor.

The returned output should be **00K** (zero, capital o, capital k) (Figure 23).

- Enter the ?Xc! command in the prompt field to verify the CAL Factor value was entered correctly (Figure 24).
   NOTE: Erase previous command from the prompt field first, if one appears.
- 12. Click on the Send button.

The response should be the new CAL Factor value entered in step 9. Figure 25 shows the ATMOS 41 returning a CAL Factor of 5.86.

13. Proceed to Verify Rain Funnel Installation to complete the process and put the ATMOS 41 back in service.

Digital Sensor Terminal		?	Х
Sensor Port	Digital Sensor Commands		
P1: ATMOS 41 All-in-one Weather Station $ \smallsetminus $		-	~
?Xc 5.86!		Send	I
sdicmd 1 ?Xc 5.86! OOK			Â
Ch	ose		

Figure 23 ?Xc Y.YY! command response

Digital Sensor Terminal		?	×
Sensor Port	Digital Sensor Commands		
P1: ATMOS 41 All-in-one Weather Station $ \smallsetminus $			$\sim$
?Xc!		Send	
			^
			~
CI	ose		

Figure 24 ?Xc! command to verify CAL Factor, entered

Digital Sensor Terminal		?	×
Sensor Port	Digital Sensor Commands	1	
P1: ATMOS 41 All-in-one Weather Station $ \smallsetminus $		-	~
?Xc!		Sen	d
sdicmd 1 ?Xc! 0 5.860000			^
			~
C	ose		

Figure 25 ?Xc! command verified CAL Factor, response

## UPDATE WITH A PROCHECK HANDHELD READER

The following instructions explain how to connect to an ATMOS 41 and update the pyranometer CAL Factor using a PROCHECK handheld reader.

- 1. Connect the ATMOS 41 stereo plug connector into the PROCHECK stereo port.
- 2. Connect the PROCHECK to a computer with a USB-to-RS232 cable adapter.
- 3. Open Tera Term (Figure 26).
- 4. Select the radio button next to Serial in the New Connection window.
- 5. Select the correct COM Port from the dropdown list next to Port.
- 6. Click on the **OK** button.

fera Term: New con	nection		×
⊖ TCP/IP	Host: myhost.exa	imple.com	~
	✓ History	TCD port# 22	
	Service: O Telnet	TOP POTUR. 22	
	SSH	SSH version: SSH2	
<b>↓</b>	○ 0ther	Protocol: UNSPEC	> ~
Serial	Port: COM5: Silie	con Labs CP210x USB to	U ~
-	OK Cancel	Help	

Figure 26 New connection

7. Click on the Setup menu item at the top of the window and select Terminal.

This opens the Tera Term Terminal setup window shown in Figure 27.

- 8. In the New-line area of the Terminal setup dialog box do the following:
  - a. Select CR+LF from the Receive: dropdown list.
  - b. Leave Transmit: set to CR.
  - c. Click the Local echo checkbox to select.
  - d. Click the **OK** button (upper right corner).
- 9. Type [ in the COM window (Figure 28) to enter the direct communications mode on the PROCHECK when connected to the ATMOS 41.

When the sensor address is 0, the returned DDI string will look like a random string of characters (e.g., {UEy}ek) after entering the direct communications mode (Figure 28).

10. Enter **?I!** to view sensor information.

When SDI-12 address is 0, the returned output should be similar to **013METER ATM41 XXXATM-41000XXXX** (Figure 29).

11. Enter **?Xc Y**.**YY**!, where **Y**.**YY** is the new pyranometer CAL Factor.

The new CAL Factor is printed on a label inside the ATMOS 41 replacement funnel (Figure 6).

The returned output should be **00K** (zero, capital o, capital k) (Figure 30).

12. Enter the **?Xc!** command (Figure 31) to verify the new CAL Factor that was entered in step 11.

If the value returned is not correct, repeat step 11 and step 12.

13. Proceed to Verify Rain Funnel Installation to complete the process and put the ATMOS 41 back in service.



Figure 27 Terminal setup



Figure 28 View sensor information

VT	COM5	- Tera Te	erm VT			_		×
File	Edit	Setup	Control	Window	Help			
>[ {VEy	ı)ek?	I <u>9</u> 0131	1ET ER	ATM41 !	527ATM	-41000	2553	^

Figure 29 Enter direct communication mode



Figure 30 Enter CAL Factor value for replacement funnel

VT	COM5	i - Tera T	erm VT			_	$\times$
<u>F</u> ile	<u>E</u> dit	<u>S</u> etup	C <u>o</u> ntrol	<u>W</u> indow	<u>H</u> elp		
							^
?Xc!	05.	86000	9				

Figure 31 Verify CAL Factor value

## UPDATE WITH A CAMPBELL SCIENTIFIC DATA LOGGER

The following instructions explain how to connect to an ATMOS 41 and update the pyranometer CAL Factor using a Campbell Scientific data logger (this example uses a CR850).

- 1. Attach a Probe Adapter Pigtail to the ATMOS 41 stereo plug connector.
- 2. Connect the pigtail wires to the CR850 (or other CSI data logger) according to the user manual.
- 3. Connect the CR850 (or other CSI data logger) to a computer with a USB-to-RS232 cable adapter.
- 4. Update the data logger firmware at campbellsci.com, if needed.

Go to product page and downloads (e.g., campbellsci. com/cr850 in this example) and follow CSI instructions.

- 5. Download the LoggerNet software to the computer if it is not already on the computer from campbellsci.com/ loggernet-admin.
- 6. Open LoggerNet.
- 7. Select Connect from the Main menu (Figure 32) to enter the Connect Screen (Figure 33).
- 8. Select the desired data logger listed in the Station section of the Connection window (CR850 for this example; Figure 33).
- 9. Click on the **Connect** button on the Connect Screen (Figure 33).
- 10. From the top menu bar click on Data Logger > Terminal Emulator (Figure 34).

The Terminal Emulator window will open in a Closed (not active) state (Figure 35).



Figure 32 LoggerNet Connect screen

onnect Collect Now	Custom Station	Status File Control	Num Display	Graphs Ports 8	St Flags
tations CR850	Table Monitor: P	assive Monitoring		Show Units	Clocks Adjusted Server Date/Time
•	Field	Value			Station Date/Time Check Set Pause Clock Update Current Program CTDGen2Program.CR8 Send New Retrieve
List Alphabetically	Stop		Interval	00 m 01 s 🗢	Notes

Figure 33 Select and connect data logger

sconnect	Send Program Retrieve Program	File Control Num Display Graphs Ports & Flags	
Stations CR850	File Control	• Monitoring	Clocks Adjusted Server Date/Time
	Station Status Terminal Emulator	Value	12/27/2019 4:21:21 PM Station Date/Time
	Calibration Wizard		12/27/2019 5:21:25 PM
	Settings Editor Update Table Definitions Manually Set Datalogger Clock		Check Set
			Current Program CTDGen2Program.CR8
			Send New Retrieve
			Notes
List Alphabe	tically		
<u></u>	Stop	Interval 00 m 01 s	0

Figure 34 Open terminal emulator window

🖉 Terminal Em	iulator						×
Edit							
Not Active							
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							_
Select Device	CR850	-	All Caps Mode	Pause	Font Size	9	~
Baud Rate	115200		Open Terminal	Clear	<u>H</u> elp		
Start Export				ppend Line Fee	d		



- 11. Uncheck the All Caps Mode checkbox if it is checked (Figure 36).
- 12. Click on the Open Terminal button (Figure 36).

NOTE: The Closed Terminal and Open Terminal button toggles between Open Terminal and Close Terminal.

- 13. Place the cursor in the Open Terminal Emulator window (Figure 37).
- 14. Press the Enter key a few times.

A **CR800>** prompt should appear (or the series name of the data logger being used).

15. Type SDI12 next to the CR800> prompt and press Enter.

NOTE: The data logger will exit this mode relatively quickly, so if a response is not received, repeat step 13 and step 15.

The data logger will respond with available ports such as Enter Cx Port 1, 3, 5, or 7 or something similar (Figure 38).

16. Enter the control port number that the ATMOS 41 sensor is connected to, and press **Enter**.

The data logger will respond with **Entering SDI12 Terminal** (Figure 39).

NOTE: Sensors must be updated individually, so only one sensor may be connected to the communications port at a time.

🖌 Terminal Em	nulator			
Edit				
Not Active				
Select Device	CR850	All Caps Mode	Pause	Font Size
Baud Rate	115200	Open Terminal	Clear	<u>H</u> elp
Start Export			Append Line Fee	d

Figure 36 Closed Terminal Window

🖉 Terminal Em	ulator		
Edit			
Terminal Op	en		
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Baud Rate	115200	Close Terminal	Clear
Start Export		A	ppend Line Feed

Figure 37 Open Terminal window

🖉 Terminal Em	ulator				×
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Terminal Ope	en				
CR800>					^
CR800> CR800>SDI12 Enter Cx Port	1 or 3				v
Select Device	CR850	$\sim$	All Caps Mode	Pause	Font Size
Baud Rate	115200	$\sim$	Close Terminal	Clear	<u>H</u> elp
Start Export			A	opend Line Fee	d

Figure 38 Enter SDI12

🖉 Terminal En	nulator				×
Edit					
Terminal Op	pen				
CR800> CR800>SDI12 Enter Cx Port 1	t 1 or 3				^
Entering SDI1	12 Terminal				
					~
Select Device	CR850	$\sim$	All Caps Mode	Pause	Font Size
Select Device Baud Rate	CR850 115200	~	All Caps Mode	Pause Clear	Font Size

Figure 39 Set control port

17. Enter the **?I**! sensor information command and press **Enter**.

When SDI-12 address is 0, the returned output should be similar to 013METER ATM41 XXXATM-41000XXXX (Figure 40).

18. Enter **?Xc Y**.**YY**!, where **Y**.**YY** is the new pyranometer CAL Factor.

The new CAL Factor is printed on a label inside the ATMOS 41 replacement funnel (Figure 6).

19. Press Enter.

The data logger will respond with **OOK** (zero, capital o, capital k), **No answer from sensor**, or **SDI12 Failed** from the Terminal Emulator screen.

- No answer from sensor—Check to see if the calibration was successful by entering ?Xc!. If the CAL Factor returned is the correct (new) one, command was successful. Otherwise, try entering ?Xc Y.YY! again.
- **SDI12 Failed**—Close the terminal and disconnect the data logger. Then repeat step 8 through step 18.
- 20. Enter the ?Xc! command and press Enter.

The new CAL Factor entered in step 18 should be returned (Figure 42). If the value returned is different from the value entered, repeat step 18 through step 20.

21. Proceed to Verify Rain Funnel Installation to complete the process and put the ATMOS 41 back in service.

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CR800>SDI12					^
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					¥
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Baud Rate	115200	~	Close Terminal	Clear	Font Size

Figure 40 Sensor information

Terminal Em	ulator				×
Edit					
Terminal Ope	en				
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00K					~
Select Device	CR850	$\sim$	All Caps Mode	Pause	Font Size
Baud Rate	115200	$\sim$	Close Terminal	Clear	Help
Start Export				opend Line Fee	d

### Figure 41 CAL Factor value

Terminal Em Edit	ulator				×
Terminal Op	en				
CR800> CR800>SDI12					^
Enter Cx Port 1 Entering SDI1 7I! 013METER AT 7Xc 5.86! 00K 7Xc! 0 5.860000	: 1 or 3 2 Terminal M41 527AIM-410002	553			~
Select Device	CR850	$\sim$	All Caps Mode	Pause	Font Size
Baud Rate	115200	$\sim$	Close Terminal	Clear	Help
Start Export			Ap	opend Line Fee	d

Figure 42 Verify CAL Factor value

## **VERIFY RAIN FUNNEL INSTALLATION**

To verify that the ATMOS 41 pyranometer is working properly, follow the steps listed below.

- 1. Reconnect ATMOS 41 to the correct data logger and port.
- 2. Check the data and verify that the PYR is providing reasonable data.
- 3. Ensure that the engraved N is pointing toward True North.
- 4. Ensure the ATMOS 41 is level (±2 degrees from [0,0]).

This completes the process of replacing the ATMOS 41 rain funnel. Please contact Customer Support if you have any problems any part of these instructions.

# **CUSTOMER SUPPORT**

### NORTH AMERICA

Customer service representatives are available for questions, problems, or feedback Monday through Friday, 7:00 am to 5:00 pm Pacific time.

Email:	support.environment@metergroup.com sales.environment@metergroup.com
Phone:	+1.509.332.5600

**Fax:** +1.509.332.5158

Website: metergroup.com

### EUROPE

Customer service representatives are available for questions, problems, or feedback Monday through Friday, 8:00 to 17:00 Central European time.

Email:	support.europe@metergroup.com sales.europe@metergroup.com
Phone:	+49 89 12 66 52 0
Fax:	+49 89 12 66 52 20

Website: metergroup.de

If contacting METER by email, please include the following information:

Name	Email address
Address	Instrument serial number
Phone number	Description of problem

NOTE: For products purchased through a distributor, please contact the distributor directly for assistance.