OM-SQ2020/2040 SERIES
Portable Data Loggers
Including Wi-Fi Models

omega.com®
ΩEOMEGA®

Contents

After reading this guide please refer to the Help contents within OMEGALOG® (press F1) for further details on your logger and how to use it with the software.
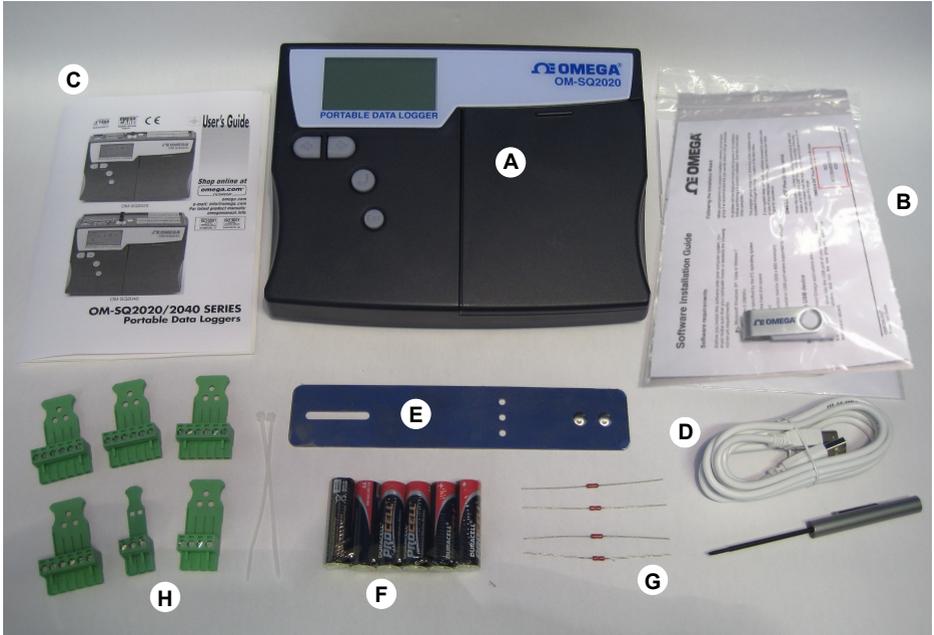
A) OM-SQ2020/2040 Logger
B) USB drive containing software
C) User's Guide (this booklet)
D) USB Cable (OM-SQ-USB-CABLE)
E) Mounting bracket/stand for logger
F) Batteries, 6 x AA
G) Current shunt resistors for 4 to 20mA inputs, 10R x 4 (OM-SQ-CS)
H) Connectors: 6 way x 4 (OM-SQ-TB6), 4 way (OM-SQ-TB4), 3 way (OM-SQ-TB3), with cable ties

Note: OM-SQ2040 Logger is supplied with 4 extra 6 way connectors as above (OM-SQ-TB6).

2.1   Installing the batteries

The OM-SQ2020/2040 uses six AA size alkaline batteries located under the removable cover shown below. To insert new or change the existing batteries:

1. Open the battery cover by pushing down and sliding as shown.
2. Insert six AA* batteries, ensuring the correct polarity.
3. Refit the battery cover

* It is recommended that all replacement batteries are of the same manufacturer, type and condition.
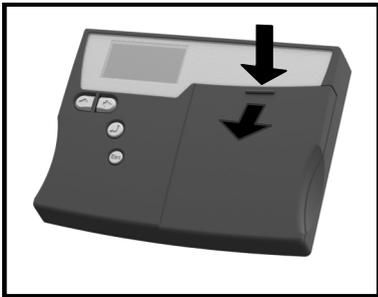
⚠ **Important: Remove the batteries when the logger is not used for long periods of time or is being transported.**

2.2   Power indicator

Battery indicator
When logging please ensure that the batteries in the unit have sufficient capacity to complete the logging task. This can be checked via the battery indicator located in the top right of the display.

HIGH
CAPACITY

LOW
CAPACITY

External power indicator
The logger may be powered from an external source (10-18V DC)

⚠ **Important: To ensure data protection in the case of an unexpected power loss, please ensure that batteries are fitted whilst the unit is operational.**

3. Communicating with your Logger

3.1   Installing the Software

For detailed installation instructions please see the supplied 'Software Installation Guide' supplement. For quick installation please see the steps below;

1. Ensure you have administration rights on the PC you wish to install software on
2. Ensure any current OMEGA applications are closed
3. Insert the USB drive into the USB port of your computer, open the USB drive window and run the .exe program.
4. Follow the on screen installation wizard

⚠ **Important: Please ensure the software is installed before connecting the OM-SQ2020/2040 data logger.**

3.2   Connecting your OM-SQ2020/2040 Data Logger

You can connect to your logger by using one of the following methods;

1. Serial (RS232), including serial adaptors
2. USB
3. Ethernet (where fitted)

Please see below for more information.

Serial (RS232)
For information on using serial adaptors please see the OMEGALOG® help file. If using a straight serial (RS232) cable, connect one end to the serial port on the logger and the other end to the PC's serial port. Once connected you are ready to begin communications.
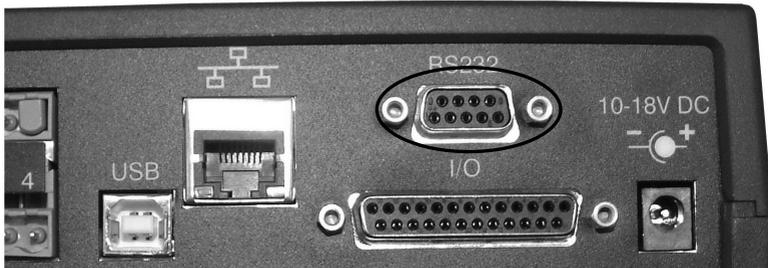
USB

Connect one end of the supplied USB lead to the USB port on the logger and the other end to a USB port on the PC.
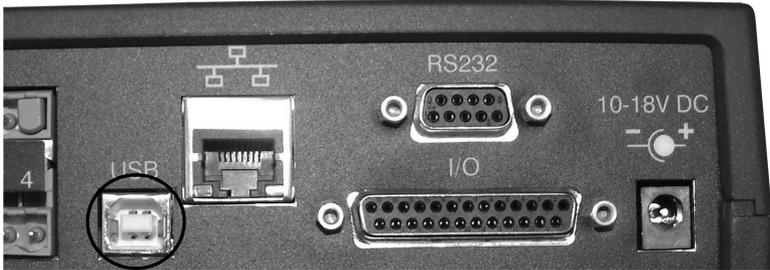
On detection of the logger the PC will install the OM-SQ20XX USB device drivers

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Win 7/Vista - USB Device Drivers are automatically installed and no further action is required

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Win XP - During the installation the USB drivers were pre-installed so the wizard will automatically locate the driver. On the 'Found New Hardware Wizard' select 'No, not this time' and for all the other screens select 'Next' to complete the installation.

If you experience any problems refer to Troubleshooting->20XX USB Drivers in OMEGA-LOG® help.

Ethernet
Before using the Ethernet connection please read the configuration manual which can be found under '~\OMEGALOG\Manuals\OM-SQ20XX Inbuilt Ethernet Configuration.pdf' where '~\OMEGALOG' is the installation directory of OMEGALOG®. Connect your Ethernet network to the Ethernet port on the logger with a screened ethernet cable.
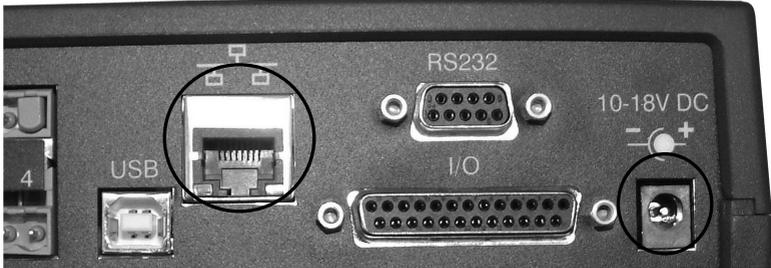
⚠ **Ethernet is only available when the logger is connected via an external power supply.**

Wi-fi

Before using the Wi-fi connection it is necessary to assemble the antenna to the logger as shown below.

1. Screw the antenna onto the threaded socket and orient it in the same direction as the antenna on the receiver connected to the PC (usually vertical).
2. Attach an external power supply to the logger.
3. Turning on the power will cause the yellow and green lights on the module to start flashing. A connection has been established when the yellow light stays on permanently.

To complete the installation please refer to the configuration manual which can be found under '~\OMEGALOG\Manuals\SQ20xx Inbuilt Ethernet Configuration.pdf' where '~\OMEGALOG' is the installation directory of OMEGALOG.

⚠ **Wi-fi is only available when the logger is connected to an external power supply.**

Radio Frequency Interference

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"

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
—Reorient or relocate the receiving antenna.
—Increase the separation between the equipment and receiver.
—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
—Consult the dealer or an experienced radio/TV technician for help."

After installing OMEGALOG® an example setfile will be installed within the OMEGALOG® installation directory. The example file will log the internal temperature of the logger. In order to familiarise yourself with the logger the novice user may find this example Setup useful.

4.1 Startup OMEGALOG® and Select Logger Type

Click on the shortcut icon on your desktop to launch OMEGALOG® or select it from your start menu. When the OMEGALOG® Assistant is loaded, ensure the correct logger Type and communication method is selected.

Logger type can be viewed from the OMEGALOG® Assistant, if you need to make any changes select Logger Selection from the toolbar or run the Communication Wizard. (Note: the default communication method is USB and you will need to change this via the Communication Wizard if you are using any of the other communication methods).

4.2 Synchronise Logger & PC

It is advisable to start by synchronising the Logger clock with the PC clock. See step 1 and 2 below:

Synchronise clocks:

❶ From OMEGALOG® Assistant click on Logger Setup.

Logger Setup

❷ From the Logger Setup screen select the Logger Control tab.

Click on Set Logger Time to PC Time, click OK on the confirmation screen.

4.3   Running Quick Start Demo

❶ In the OMEGALOG®
Assistant click 'Logger
Setup' to enter the Logger Setup
screen. From here open the
demo setfile using **File -> Open**
and select the appropriate file for
your logger type.
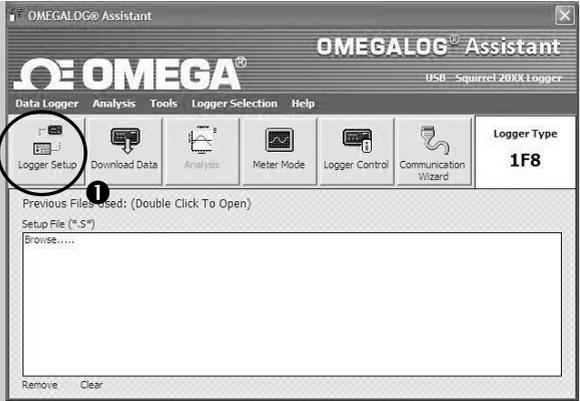
❷ The Logger
Setup screen
is now visible,
from here you
will be able to
set up your
logging
requirements.

Within the
Actual
Channels tab
scroll down the
Sensor Type
column to Ref.
Junction 1.
This is the
input you will
be reading in
this example.
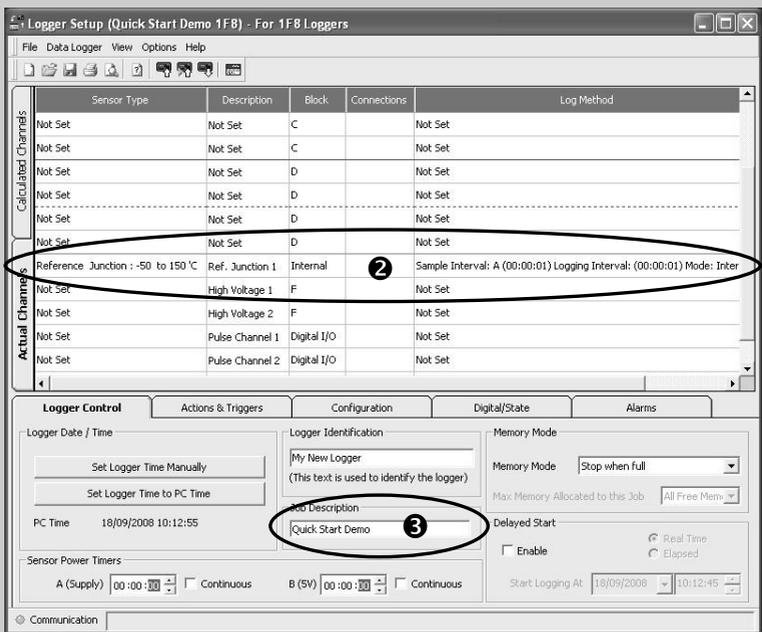
❸ The Job
Description
can be used to
describe your
setup.

❹ Click to send setup to logger and start logging. Let the unit log for a few minutes.

❺ Click for **OMEGA-LOG® Assistant.**

❻ Click if you wish to meter the input in Real Time.

❼ Click on Logger Control icon to pause or stop the logging process.

❽ In the Logger Control window you can view relevant information on the state of the logger. To stop logging click on the stop button.

Logger Control

Data Logger   View

Logger Information

Logger ID	Default text
Serial Number	KS0838015
Logger Type	2F8
Logger State	Disarmed

Memory

Internal Memory Total	15616 KB
Internal Memory Used	0 KB
Internal Memory Free	15616 KB

Date and Time

Logger Time	01/01/2001 00:48:22
Status Last Updated	18/09/2008 10:16:38
PC Time	18/09/2008 10:16:38

Power Supply

Internal Supply	9.6 V
External Supply	0.0 V

❾ To Download the logger click on the 'Download Data' icon from the OMEGALOG® Assistant.

Download Data
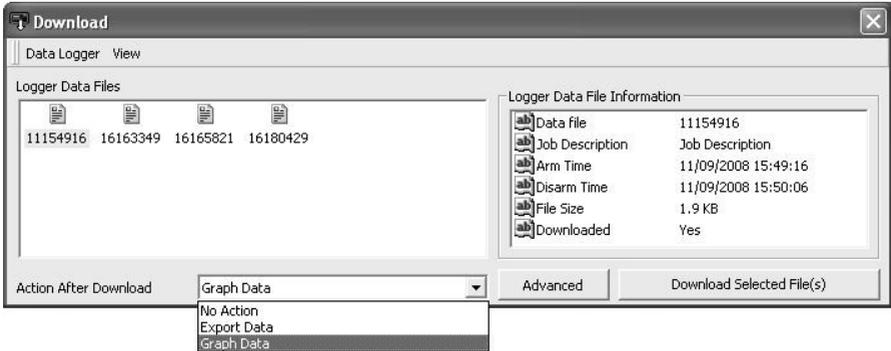
⑩ In this screen you can now download the Data File and invoke the Export Wizard or download the Data File via Analysis* (See page 10 for further information).

The data File is given a unique name (e.g. 28162735.D20). An explanation of the file name is shown on the right; this shows the date and start time
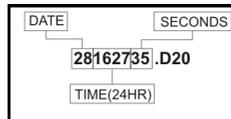
In this example you will download and view the Data in the Analysis* window. Start by selecting the Data File and Graph Data action, then click Download Selected File(s). You will be prompted to save the Data file, then the data will be converted for viewing.

⑪ Once the decoding has taken place the Analysis File Description window will be presented, click OK to view your Data.
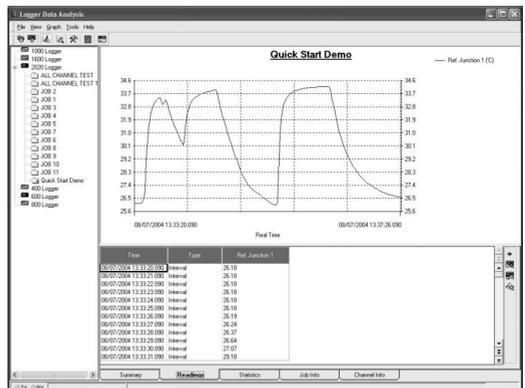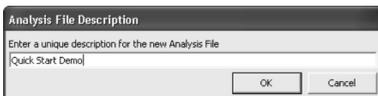
*Available with OMEGALOG® Plus only.
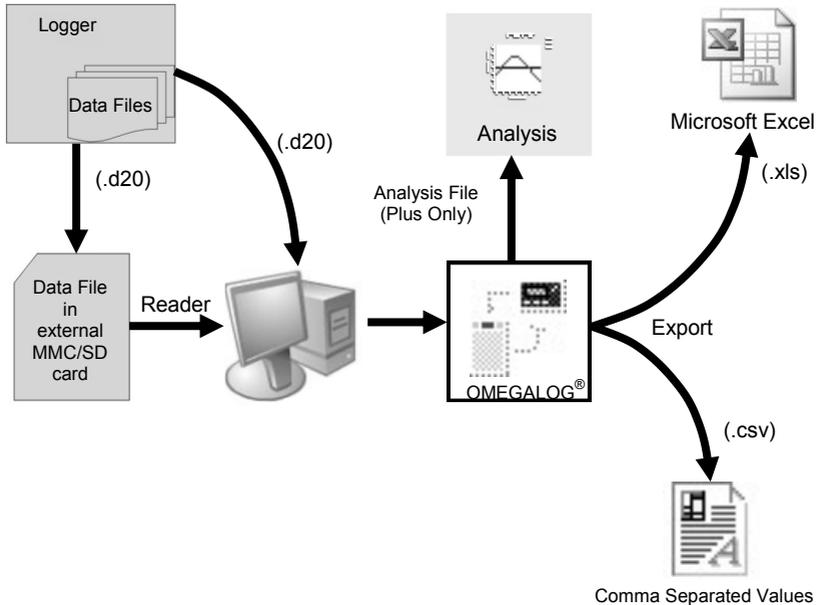
The Diagram above shows the download process. Data in the logger is written to the internal memory and may be downloaded by OMEGALOG®.

Before the data can be viewed it must be converted by OMEGALOG® for Analysis or exported to .csv or .xls format depending on the PC software being used.

The conversion process can be performed in one of three ways within OMEGALOG®:

- from OMEGALOG® Assistant->Analysis->Export Data File
- automatically when using the download Data button from OMEGALOG®*
- or from the Logger Data Analysis screen by selecting File->Import Data menu*

Once the file has been downloaded it can be double clicked to open it with the program specified under 'Tools', 'Preferences', 'File Association Action'.

*Available with OMEGALOG® Plus only.

6.1 Control Panel

The illustration below shows the navigation controls in more detail.

LEFT/UP NAVIGATION

RIGHT/DOWN NAVIGATION

ENTER/CONFIRM & POWER ON

ESCAPE/BACK (reverts to previous Menu)

To use the OM-SQ2020/2040 control panel press ⏎, the opening display will be shown (see right). The display timeout is preset to 10 seconds, however this can be changed by selecting the Configuration tab within the Logger Setup window of OMEGALOG®.

```
--Main Menu-------
▶▮▮  ⩗  i  ▦  ▭
Ṯḟ
Log Control
```

6.2 Control panel menu

Detailed below is a basic explanation of the top menu structure. For more information on the whole menu structure please refer to the Help->Help Content->Loggers within OMEGALOG®.

6.2.1 Log Control
In this menu you can Arm (activate) or Disarm (deactivate) the logger.

6.2.2 Meter
Here you can view each channel in Real Time (at 1-2Hz). Use the enter key for a graphical view of a channel.
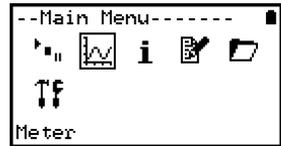
6.2.3 Status
The Status menu gives you access to information relating to the logger such as memory and power supply voltage. You can also override the alarm outputs in here.

6.2.4 Setup
This contains menus for setting the Language, Time, Date, basic Channel Set-up, storing and recalling setups and Delayed start.

See 6.3 for more details on basic setup

6.2.5 Data Files
This menu allows you to copy data files to an external memory card (if fitted) and delete the data files held within the loggers memory.

6.2.6 Tools
The Tools menu contains maintenance type functions such as querying the software version of the logger, performing a self test and resetting the logger.

6.3   Creating a basic Setup

The OM-SQ2020/2040 allows for the creation of a basic channel setup including logging interval, sensor type and sensor power (excitation) if required via the graphical interface, A full setup including more advanced features can be performed using the OMEGALOG® software included. Below is a brief explanation of how to create a basic channel using the graphical interface

6.3.1   Channel Setup
From the 'Main Menu' choose the option 'Setup' then the option 'Channel Setup'.

```
--Setup----------      ▮
Sensor Power
Intervals
Channel Setup
Stored Setups
Delayed-Start
Date/Time
Configuration
```

6.3.2   Adding or Editing a Channel
Once in 'Channel Setup' you can clear all channels, add/edit a channel, view channel details or delete a channel. Select 'Add/Edit Channel'.

```
--Channel Setup---     ▮
Clear Channels
Add/Edit Channel
View Channel
Delete Channel
```

6.3.3   Adding a New Channel
The 'Add/Edit Channel' menu shows channels currently set as well as giving you the option to add others. Select 'Add Channel'

```
--Add/Edit-------      ▮
Add Channel
```

6.3.4   Channel Setup
Select the channel Sensor Type, Range and, if required, which Sensor Power (excitation) time is to be used .

```
--Channel Setup---     ▮
Sensor Type
Range
Sensor Power Timer
```
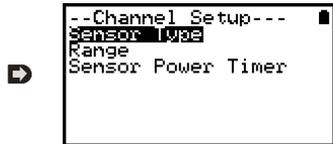
6.3.5   Viewing Channels Setup
Once you have finished adding your required channels and details the wiring configuration can be viewed using the 'View Channels' option.

```
--View Channel----     ▮
X Thermo-DiffA1
Ref Junction 1
```
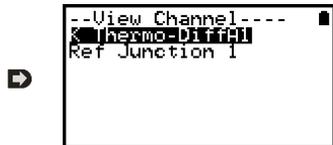
Note that Channel Descriptions are automatically assigned based upon the Sensor Type of the channel. This description can be modified using OMEGALOG®if required.

```
--View Channel----     ▮
Sensor Power
•Not Used
Block:A
  1  2  3  4  5  ⊥
```
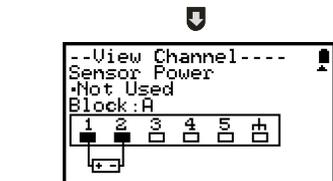
6.3.6   Interval Setup
       A setup created from the control panel will assign all channels to the same logging interval. To change or view this interval choose 'Intervals' from the main 'Setup' menu.

```
--Intervals-------  ▮
Interval A
View All
```

6.3.6   Sensor Power Setup
       The sensor power setup can be changed by going to 'Sensor Power' from within the main 'Setup' menu.

```
--Sensor Timer A--  ▮
Set
Off
Continuous
Wiring
```

⚠ **Important Notes on Setup using the Control Panel**

Full setup capabilities of the OM-SQ2020/2040 are provide using the OMEGALOG® software provide. When using the control panel a few important points should noted:-

- Whilst all channels are assigned to the same interval, Interval A, all intervals can be viewed in the case of a more complex setup from OMEGALOG®

- To avoid problems with wiring configuration, sensor types are not editable once set but their range and sensor power requirements can be. Delete a channel if you require to change its Sensor Type

- If the number of sensors is exceeded when adding new channels, the message "Invalid Setup" will be displayed

- Calculated channels setup from OMEGALOG® will not be shown on the view channels option

- The reference junction can not be deleted while a sensor type that requires it for correct operation is set up, e.g. A thermocouple

- You cannot change a setup whilst the logger is armed

- The message "Sub-Second rate" will be displayed when attempting to view or edit a Sample Intervals that have been set to less than 1 second. Use OMEGALOG® Logger Setup to view or edit the sub-second Intervals

7. Connections

Analog Inputs

Rear view of ANALOG connectors

Rear view of ANALOG connectors
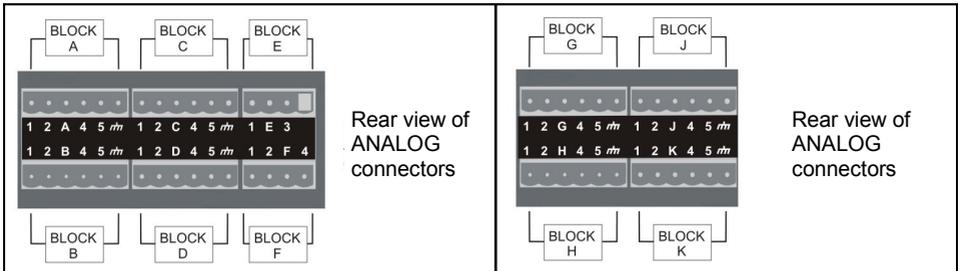
NOTE: Blocks G to K as shown above are only available on OM-SQ2040 loggers.

As the wiring configuration is dependant upon the sensor type used, it is displayed in OMEGALOG® during the setup. Follow the wiring diagram to attach the required sensor. If you would like to print the diagrams in more detail or view at a later stage select 'File > Print from Logger Setup'.

The example below shows the actual K type differential thermocouple sensor connected to the OM-SQ20XX logger from the wiring diagram to the left.

Sensor Power Wiring

Block E

Unregulated Logger Supply Output

Negative

Regulated 5V Output

High Voltage Input

Block F

V1(+ve)

V2(-ve)

V1(-ve)

V2(+ve)

I/O Socket Wiring

ALARM O/P

EVENT/STATE I/P 1-8

PIN 1

I/O

SLOW PULSE I/P 1-2

FAST PULSE I/P 1-2

-ve   +ve

Auxiliary Output Max. 500mA
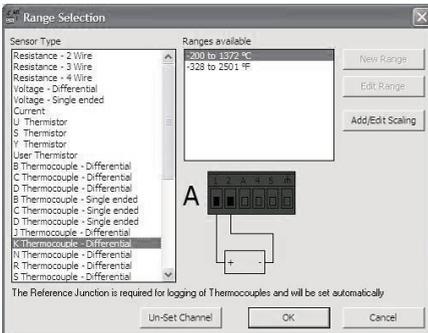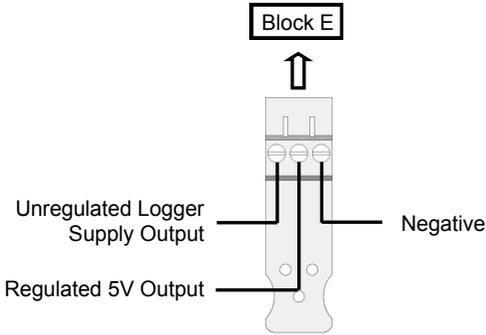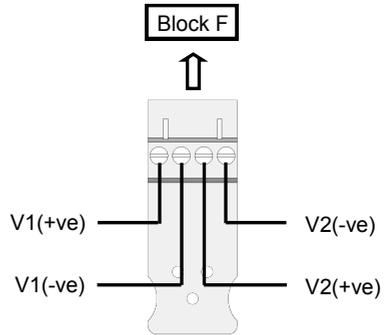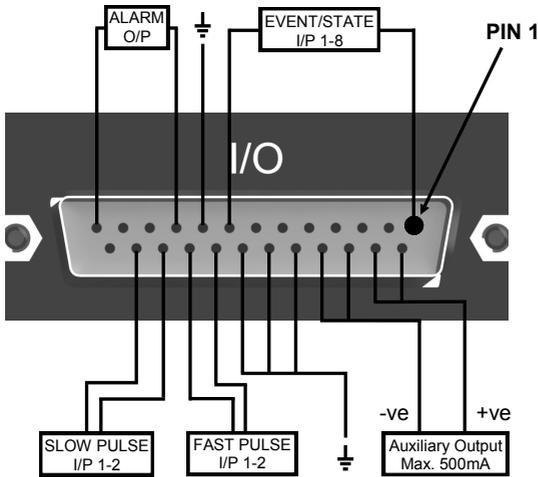
Pin	Connection
1	Event/State Input 1
2	Event/State Input 2
3	Event/State Input 3
4	Event/State Input 4
5	Event/State Input 5
6	Event/State Input 6
7	Event/State Input 7
8	Event/State Input 8
9	Ground
10	Alarm Output A
11	Alarm Output B
12	Alarm Output C
13	Alarm Output D
14	Auxiliary Output +ve
15	Auxiliary Output +ve
16	Auxiliary Output -ve
17	Auxiliary Output -ve
18	Ground
19	Ground
20	Ground
21	Fast Pulse Input 1
22	Fast Pulse Input 2
23	Slow Pulse Input 1
24	Slow Pulse Input 2
25	No Connection

External Memory Card Reader

The external MMC/SD card slot is located inside the battery compartment.

OMEGA Engineering supplies a wide range of accessories to compliment the range of OM-SQ2020\2040 data loggers. These include GSM Modem and Ethernet converters and wireless adapter as shown below, all of which allow you to contact any OM-SQ2010 data logger remotely or where no land line exists. All are very easy to install and connect directly to the logger via RS232. If you need any further details or wish to make a purchase please contact OMEGA Engineering.

GPRS

Wireless
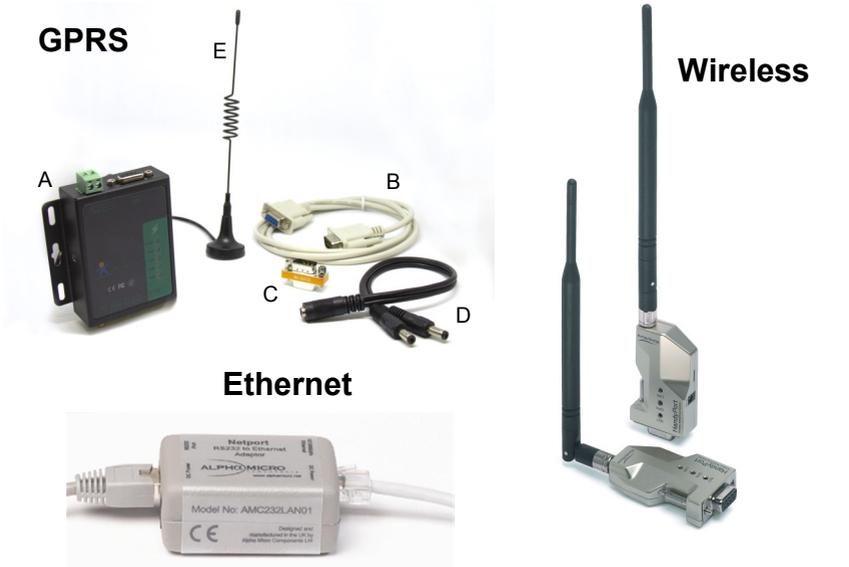
Ethernet

RS232 to Ethernet Converter consisting of adaptor box and modem setup Cable. Ethernet configuration software is suitable for Windows 2000 and XP only.

Part No:

OM-SQ-NET-ADAP

GPRS Modem kit comprising of modem, data logger connection cable, power lead and antenna with 3m lead. A data-enabled SIM card will also be required from your network service provider.

OM-SQ-GSM-KIT

Wireless Adaptor comprising of an RS232 adaptor for connecting the logger to the PC at baud rates up to 115K2 with a range of up to 200 metres using the 2.4GHz frequency band. The kit is supplied with all connecting leads.

OM-SQ-RF-ADAP

Note: Power supplies (OM-SQ-UNIV-ADAP) need to be ordered separately

	Part No:

Software packages for set-up, transfer and data analysis:
OMEGALOG® Plus
Provides full data analysis, on-line graphing, meter to Excel and
export to Excel   OM-SQ-SOFT-PLUS
OMEGALOG® Plus Multi-User License
Unlimited use of OMEGALOG® within a single organization.   OM-SQ-SOFT-PLUS-LIC

Calibration Certificates for OM-SQ2020/2040 series (all ranges)
Note: Test and Calibration Certificates are traceable to National
Standards
OM-SQ2010   OM-SQ2020-CAL
OM-SQ2040   OM-SQ2040-CAL

Power supplies
100-240V AC 50/60Hz supplied with 3-single fit mains plugs for UK,
Euro, and US   OM-SQ-UNIV-ADAP
As OM-SQ-UNIV-ADAP but supplied with 1m flying lead   OM-SQ-UNIV-ADAP-1

Current Shunts
Pack of 4 precision resistors for 4-20mA analog channels   OM-SQ-CS

Cables for connecting data loggers to computers/modems.
Data Logger to PC serial port   OM-SQ-SER-CABLE
Data Logger to PC USB port   OM-SQ-USB-CABLE

Terminal blocks
Plug-in terminal blocks with cable restraint
3-way   OM-SQ-TB3
4-way   OM-SQ-TB4
6-way   OM-SQ-TB6

9. Specifications

ANALOG INPUTS
    Basic accuracy (5-45°C): ....± (0.05% readings + 0.025% range)
    Common mode rejection: 100dB
    Input impedance: ....> 1MOHM
    Linearity: 0.0015%
    Series mode line rejection:..50/60Hz 100dB
    EM field and Conducted RF effect: ………………………………….....……....…….< 1% †
.
DIGITAL INPUTS
    Zero input voltage.. 0 to 0.5V (or shorted input)
    One input voltage...2.7 to 5V (or open circuit input)
    Input protection....................................will turn on below about -0.5V and above about 6V

ANALOG-DIGITAL CONVERSION
    Type: ....Sigma-Delta
    Resolution: 24bit
    Sampling rate: ....Up to 20/100 readings per second
                           Note: 100Hz Mode not available on 1F8 models

ALARM OUTPUTS..4 x open drain FET (18V 0.1A Max)

SENSOR POWER SUPPLY.............................Regulated 5 VDC (50mA) or supply voltage (100mA)

TIME AND DATE..In built clock in 3 formats

SCALING DATA..Displays readings in preferred engineering units

MEMORY
    Internal: ....128Mb (Up to 14,400,000 readings)
    External:.. Up to 1Gb removable MMC/SD memory card

RESOLUTION...Up to 6 significant digits

PROGRAMMING/LOGGER SET-UP.........................OMEGALOG® or OMEGALOG® Plus software

COMMUNICATION...USB 1.1 and 2.0 / RS232 / Ethernet (not 1F8)
    External options: ....GSM, Ethernet and wireless

POWER SUPPLY
    Internal:...6*x AA Alkaline batteries
    External: ....10-18VDC Reverse polarity and over-voltage protected

† This effect may be larger at 288kHz, re-orientate the input cables or add a suitable axial ferrite bead close to the logger input if required

⚠ *** Maximum operating temperature for supplied alkaline batteries is 50°C**

POWER CONSUMPTION @ 9V
    Sleep mode: ....<600µA
    Logging: ....40 - 120mA

DIMENSIONS AND WEIGHT

    2020 Logger
    Dimensions: ....W235 x D175 x H55 mm
    Weight: ....Approx 1.2kgs
    Enclosure material: .... ABS

    2040 Logger
    Dimensions: ....W235 x D175 x H92 mm
    Weight: Approx1.5kgs
    Enclosure material:..ABS

MEMORY MODES (internal only)..Stop when full or overwrite

DISPLAY AND KEYPAD
    2 line x 20 character LCD

OPERATING ENVIRONMENT ....-30°C to +65°C

Windows is a registered trademark of Microsoft
Corporation in the United States and other countries.

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*Due to our policy of continuous improvements, specifications may change
without prior notice.*

*OMEGA Engineering believe that all information declared is correct at the time of issue.
No liability is accepted for errors and omissions.*

Personal Notes:

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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