

Squirrel Portable Data Loggers

For research, quality assurance and production monitoring in industry, environmental sciences and in the laboratory











Grant Instruments (Cambridge) Ltd has been pioneering the development of universal data loggers and systems since 1981, with over 30,000 Squirrel data loggers sold worldwide. The latest range of Squirrel data loggers continues with the same design philosophies:

- » high accuracy of measurement (now with 24-bit analogue to digital converters)
- wide ranging, flexible inputs for an extensive range of sensor types
- highly reliable, with extended working lives. Standard Squirrel warranty is now 3 years
- very easy to use, via the data logger keyboard or from simple, comprehensive software
 SquirrelView
- » supported by an industry leading service and support network
- » on-going technical and application support from experienced, qualified engineers
- » traceable calibration services for all Grant products
- » manufactured under an IS09001:2000 quality system, meeting applicable CE, UL, WEEE and RoHS directives

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Complemented by a comprehensive range of software, sensors and accessories to make up a complete data collection and analysis system:

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What is data logging and what is it used for?

As science and technology have developed, so the need for data collection and analysis has grown. This is fulfilled, at least in part, by dedicated, microprocessor driven data loggers. The modern data logger is typically a hand-held battery operated device with a large memory, powered by the latest microprocessor technology and capable of acquiring, processing, storing and analysing electrical signals at high speed from a wide range of sensors – at regular intervals or in response to an event such as a threshold being crossed or a switch being activated.

Sensors can communicate with the logger through a cable or wireless link and can sense temperature, humidity, pressure, flow, wind speed, current, voltage, resistance and a host of other physical parameters that are important in monitoring and controlling processes or conducting research. Data stored by stand alone data loggers is typically downloaded into a computer for more detailed analysis and reporting, though some data loggers have sophisticated on-board processing and analysis capability and can carry out some control functions such as activating an alarm or a switch.

The advantage of using a dedicated portable data logger compared to, say, a PC, is that the logger hardware and software are specifically designed for stand alone data logging applications. This means that it is easy to connect and set up sensors and the logging system is more rugged and less power hungry, making it capable of running on batteries for longer periods of time, often in hostile environments. The advent of wireless communication and networking means that it is possible to interrogate a logger remotely which can be extremely useful for unattended or remote applications.

Data logging applications

Here are just a few examples of where and how Grant data loggers are being used. Please visit our website www.grant.co.uk for the latest application case studies.

Manufacturing

Through process monitoring of temperature for QA purposes in the paint and powder coating industries

Food processing

Monitoring cooking, pasteurization, chilling and freezing temperature within the food industry

General research

Short and long term data capture of a variety of physical parameters in scientific and industrial research projects

Monitoring in buildings

Monitoring temperature and humidity in public and commercial buildings such as museums, galleries, stately homes, warehouses, etc.

Automotive

Monitoring various physical parameters during vehicle testing

Public utilities

Monitoring river flow and discharge levels in the water and sewage treatment industries

Environmental monitoring

Monitoring temperature, humidity, wind speed and direction, solar power and other environmental parameters in ecological studies

Civil engineering

Monitoring cure temperature of poured concrete structures

Selecting the right Squirrel data logger



Summary of	SQ2010	SQ2020-1F8	SQ2020-2F8	SQ2040-2F16	SQ2040-4F16
specifications	entry level	standard	high speed	high performance	extended high performance
Analogue input channels	4 to 8	8 to 16	8 to 16	16 to 32	16 to 32
High voltage channels	x	2	2	2	2
Digital channels	8	8	8	8	8
Counter channels	2	4	4	4	4
Input types: - current	•	•	•	•	•
- voltage	•	•	•	•	•
- resistance	2-wire	2-wire	2-, 3- or 4-wire	2-wire	2-, 3- or 4-wire
– 3- or 4-wire Pt100 / Pt1000	x	X	4	x	8
- temperature	•	•	•	•	•
Max no. readings per second	10 (on 1 channel)	20 (on 1 channel)	100 (on 2 channels)	100 (on 2 channels)	100 (on 4 channels)
Accuracy	0.10%	0.05%	0.05%	0.05%	0.05%
Display	128x64 dot matrix LCD	2 x 20 character LCD	2 x 20 character LCD	2 x 20 character LCD	2 x 20 character LCD
Memory capacity	1.8 million readings	1.8 million readings	1.8 million readings	1.8 million readings	1.8 million readings
External memory (MMC/SD card, =128MB*)	X	•	•	•	•
RS232 communications	•	•	•	•	•
USB communications	•	•	•	•	•
Ethernet	•	X	•	•	•
Alarm outputs	2	4	4	4	4
Sensor power output	5VDC at 50mA	:	5VDC at 50 mA and su	pply voltage @ 100 m	A
Set-up / analysis software		Squi	rrelView / SquirrelView	Plus	

* Available mid 2007

Squirrel 2010 series

A powerful portable data logger

Overview

The Squirrel 2010 is a versatile, general purpose data logger, with 4 to 8 analogue input channels to measure current, voltage, resistance and temperature; 2 pulse count / rate inputs and 8 event inputs. All can be logged or used as triggers to automatically start or stop logging.

It is a compact, portable data logger which is also suitable for bench based and fixed installations. Easily programmed via the four integral push buttons and large graphical display and with a basic accuracy of 0.1%, the Squirrel 2010 is able to fulfil many routine data logging needs, including more demanding applications requiring up to 10 readings per second on one channel.







Key features

- Compact, portable data logger
- Powered from internal batteries, external PSU or via USB connection
- 4 to 8 universal analogue inputs (current, voltage, resistance, temperature) plus 8 event inputs
- >> 16 derived / calculated channels
- 2 alarm outputs
- 2 pulse counter inputs (1 at up to 64kHz, 1 at up to 100Hz)
- >> Configured via large easy-to-read graphical display
- 0.1% accuracy of reading, 24-bit analogue to digital conversion
- Store up to 1.8 million readings
- Supplied with SquirrelView set-up / download and export software

The Squirrel 2010 series comprises two models:

- Squirrel 2010
 - Up to 10 readings per second on 1 channel
 - RS232 communications

Analogue inputs supported

- >> Thermistors
- >> Thermocouples
- >> Voltage
- >> Current
- >> Resistance

Squirrel 2010–E*

- Up to 10 readings per second on 1 channel
- In-built Ethernet connectivity

* Available mid 2007 See page 3 for a summary specification of the Squirrel 2010 models.



>> Flexible

- >> Very easy to use
- >> Economical
- Handheld, ergonomic design
- >> USB connectivity with PC
- >> Ethernet or RS232 communications options
- Extended battery life for unattended logging



Applications





Measurement

Utilities

Capabilities

- >> Create a wide range of triggers and alarm outputs
- Review real-time data on the integral display
- Display readings in preferred engineering units e.g. Hz, Bar, Pascals, Nm etc.
- Derive up to 16 calculated (virtual) channels from real input channels using mathematical functions

Squirrel 2020 series

Powerful data loggers for standard and high speed applications

Overview

The Squirrel 2020 series are high performance universal data loggers packed with powerful features to provide great flexibility to handle a wide range of routine and demanding applications.

Hand-held and lightweight, the Squirrel 2020 models are easy, fast and convenient to use – either as stand-alone loggers or as PC-linked data acquisition systems in industrial and scientific research and quality assurance applications.

Twin processors, multiple 24-bit analogue-to-digital converters, up to 16 universal channels and a choice of communications methods ensure that the Squirrel 2020 series provides state-of-the-art data logging and communication capability for sophisticated applications needs.









Key features

- >>> Stand alone data logger or link to a PC
- >> Compact and portable
- >>> 8 to 16 universal analogue plus 8 event inputs
- >> Up to 16 derived / calculated channels
- >> 4 alarm outputs
- A pulse rate / counter inputs (2 at up to 64kHz, 2 at up to 100Hz)
- Configured via integral interface or via PC
- 0.05% basic accuracy (of reading)
- Store up to 1.8 million readings
- Removable MMC / SD card
- In-built Ethernet networking capability (SQ2020-2F8 only)
- >>> USB and RS232 connectivity

The Squirrel 2020 series comprises two models: Squirrel 2020–1F8

- Up to 20 readings per second on 1 channel

Analogue inputs supported

- >> Thermistors
- >> Thermocouples
- Pt100 / Pt1000 (maximum of four 3- or 4-wire Pt100 / Pt1000 sensors — model 2F8 only)
 - Voltage
- » Current

>>

Resistance

- Squirrel 2020–2F8 (high speed model)
 - Up to 100 readings per second on 2 channels
 - In-built Ethernet connectivity
 - Up to four 3 or 4 wire Pt 100 / Pt1000 sensor inputs



>> Up to 16 universal inputs

- >> High precision (0.05% of reading + 0.025% of range)
- >> Advanced data management to MMC/SD card or PC
- >> Flexible communications (USB, Ethernet, RS232)
- >> High speed option (100Hz)
- Various remote connection options e.g. via Ethernet, dial up modem or wireless

Power output for sensor excitation / external devices 8 to 16 universal analogue inputs for recording temperature, current, voltage and resistance Easy to use, removable connector system 2 high voltage channels (up to 60V) for automotive applications

Convenient 2 line x 20 character backlit LCD for easy access to readings and set-up information

Ref. Junction 1-27.75 °C

To operate the logger simply use the four integral push buttons and display, or use the convenient SquirrelView set-up, download and export software – free with every Squirrel logger (see pp. 10-11)





Power supply – internal alkaline batteries or external DC power supply

USB, Ethernet and RS232 connectivity for quick and easy PC and remote communication and networking (see pp. 12-13)

Up to 8 digital and 4 pulse rate / counter inputs. Can be logged or used as triggers 4 alarm outputs for triggering external devices

Robust, ergonomically designed case with easy access to all user facilities

Store up to 1.8 million readings in the Squirrel's on board memory

Store up to 6 logger configurations. Load from a removable MMC / SD card for speed and convenience, or download data files to the card



Capabilities

- Create complex schedules of logging rates, triggers and alarm outputs
- Scale and view readings in real time on the integral display or on a PC running SquirrelView
- Display readings in preferred engineering units e.g. Hz, Bar, Pascals, Nm etc.
- Select logging rates up to 100 readings per second on up to 2 channels (20Hz maximum on Squirrel model 2020-1F8)
- Derive up to 16 calculated (virtual) channels from real input channels using mathematical functions
- Concurrently sample channels at different sample speeds

Applications





Biological Sciences

Medical Research

Squirrel 2040 series

High performance data loggers for demanding applications

Overview

The Squirrel 2040 series are high performance universal data loggers packed with the same powerful features as the Squirrel 2020 series, but with additional high speed logging on up to four channels and twice as many universal input channels. This provides great flexibility to handle a wide range of complex and demanding multi-channel applications such as high-speed vehicle testing or engine monitoring.

The Squirrel 2040 series are easy, fast and convenient to use – either as portable, stand-alone loggers or as PClinked data acquisition systems in industrial testing and research, scientific and environmental research and quality assurance applications.

Twin processors, multiple 24-bit analogue to digital converters, up to 32 universal channels, removable Multi Media (MMC) or SD card memory and a choice of communications methods ensure that the Squirrel 2040 series provides state-of-the-art data logging and communication capability for sophisticated application needs.





- >> Stand alone data logger or link to a PC
- >> Compact and portable
- >> 16 to 32 universal analogue plus 8 event inputs
- >>> Up to 16 derived / calculated channels
- >> 4 alarm outputs
- Configured via integral interface or via PC
- 0.05% basic accuracy (of reading)
- Store up to 1.8 million readings
- In-built Ethernet networking capability
- USB and RS232 connectivity

The Squirrel 2040 series comprises two models:

- Squirrel 2040–2F16
 - Up to 100 readings per second on 2 channels
 - Two 24-bit analogue to digital converters





Analogue inputs supported

- >> Thermistors
- >>> Thermocouples
- Pt100 / Pt1000 (maximum of eight 3- or 4-wire
- Pt100 / Pt1000 sensors model 4F16 only)
- >> Voltage
- Current
- Resistance
- Squirrel 2040–4F16 (high speed model)
 - Up to 100 readings per second on 4 channels
 - Four 24-bit analogue to digital converters
 - 4 pulse rate / counter inputs (4 at up to 64kHz, 2 at up to 100Hz)
 - Eight 3- or 4-wire Pt100 / Pt1000

See page 3 for a summary specification of the Squirrel 2040 models.



>> Up to 32 universal inputs

- High precision (0.05% of reading + 0.025% of range)
- >> Advanced data management, to MMC / SD or PC
- >> Flexible communications (USB, Ethernet, RS232)
- >> High speed option (100Hz on 4 channels)

Grant

Various remote connection options e.g. via Ethernet, dial up modem or wireless

Power output for sensor excitation / external devices

16 to 32 universal analogue inputs for recording temperature, current, voltage and resistance

Easy to use, removable connector system

2 high voltage channels (20, 40 or 60V) for automotive applications

Convenient 2 line x 20 character backlit LCD for easy access to readings and set-up information

Ref. Junction 1 27.75 °C

To operate the logger simply use the four integral push buttons and display, or use the convenient SquirrelView set-up, download and export software – free with every Squirrel logger (see pp. 10-11)





Power supply – internal alkaline batteries or external DC power supply

USB, Ethernet and RS232 connectivity for quick and easy PC and remote communication and networking (see pp. 12-13)

Range of trigger functions via 8 digital inputs; 4 pulse rate / counter inputs 4 alarm outputs for triggering external devices

Robust, ergonomically designed case with easy access to all user facilities

Store up to 1.8 million readings in the Squirrel's on board memory

Store up to 6 logger configurations. Load from a removable MMC / SD card for speed and convenience, or download data files to the card



Capabilities

- Create complex schedules of logging rates, triggers and alarm outputs
- Scale and view readings in real time on the integral display or on a PC running SquirrelView
- Display readings in preferred engineering units e.g. Hz, Bar, Pascals, Nm etc.
- Select logging rates up to 100 readings per second on up to 4 channels (2 channels on Squirrel model 2040-2F16) or a combination of different logging rates

Derive up to 16 calculated (virtual) channels from real input channels using mathematical functions

Concurrently sample channels at different sample speeds, e.g. 100Hz, 20Hz, and 10 Hz etc.

Applications





Engineering

Quality assurance

Set-up and download software for Squirrel data loggers

SquirrelView - supplied with every Squirrel

SquirrelView is a universal software package that is included with every new Grant Squirrel data logger.

Its intuitive, user friendly, spreadsheet style interface allows quick set-up of the data logger for any application, speedy download of data and direct export to Excel[™].

Minimum PC specification: – Windows® 2000, XP; Pentium II 266MHz; 60Gb HDD, colour SVGA screen, at least one RS232 or one USB port.

Key features

- ➢ Export data into Excel™ or as a CSV file for customisable data analysis
- Easily view and control the logger status from one single screen
- Use the simple communication wizard for hassle free working with modems, Ethernet, GSM, etc.
- Download data by date, time or events, saving time when working via modem or looking for specific data
- Save settings on the PC for efficient re-use
- Protect your data and set-up configurations with the security function

	SquirrelView	SquirrelView Plus
	Supplied as standard with every new Squirrel logger	See page 11 Available at extra cost*
Logger set-up	•	•
Display channels in real time	•	•
Export wizard for data export	•	•
Export data as CSV file	•	•
Download by date & time (SQ2010, 2020 & 2040 only)	•	•
Communication wizard for set-up of USB, RS232, Ethernet & modem	•	•
Password protection	•	•
Logger diagnostics	•	•
Display data as line graphs, gauges or dials	X	•
Value read-out at cursor position	X	•
Fully configurable data views	X	•
Set & view low / high thresholds	X	•
Download straight to a graph	X	•
Report generation	X	•
Special calculations and displays for through-process monitoring	X	•
Downloader application	X	•
*A free 20 day trial of Sauitrollion Plus is included with Sauitrallion		

*A free 30-day trial of SquirrelView Plus is included with SquirrelView

Set-up and analysis software

SquirrelView Plus - optional upgrade

SquirrelView Plus has all the features of SquirrelView with the additional benefits of allowing graphical analysis of historical and on-line data, whilst providing advanced reporting options.

SquirrelView Plus allows quick and easy analysis of the Squirrel data in a familiar Explorer[™] navigation-style interface. Data can be displayed with two different auto scaling Y-axes – essential for displaying widely varying data from different sensors on one graph. Particular data of interest can be zoomed into whilst an on screen cursor can pick out exact values. Data can be shown in a statistical summary with set high and low alarm thresholds. The powerful calculation function allows the creation of "virtual" new channels from existing channels.

SquirrelView Plus also incorporates a flexible report generation facility which allows the creation of custom reports consisting of a title page with descriptive text, headers and footers, graphs, tabular lists of data, statistics and Squirrel logger set-up information. These can be saved as templates with any of these combinations saving time when preparing similar presentations of data.

Key features

- Flexible data presentation allows you to quickly display and analyse real time or historical data as a line graph, bar chart or analogue gauge
- Graphical alarm and event identification lets you easily identify occurrences around specific analogue or digital events, e.g. a pump switching on
- Quick Graph function lets you quickly and easily view large data files
- Wizards for easy set up of communications and data export
- Ability to send real time metered data from the Squirrel directly into Excel[™]
- Downloader for automating data download using Microsoft's Scheduler[™] (Squirrel 2010, 2020 and 2040 only). See page 12
- >> Fully configurable data views
- Flexible zoom feature including X and Y axes
 Customisable report facility: print out graphs,
- readings, etc.
- Tolerance curve
- Calculated channels
- Product cure calculations
- Display oven profiles and oven zones

						Sensor Power
Thermocouple - Differential + -200 to 1200 °C	Terperature 1	4	1(++e) to 2(-+e)	Sample Interval: A (00:00:011 Logging Interval: (00:00:011) Mode: Interval	1.0	Not Used
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Thermocouple - Differential : -200 to 1200 C	Temperature 2	4	3(+ve) to +(-ve)	Sample Interval A (00.00.01) Logging Interval: (00.00.01) Mode: Interval		Not Used
Nat Set	Not Set	A		Net Set	14	Net Set
3 Thermocouple - Differential (-200 to 1200 °C	Temperature 3	B	1(+ve) to 2(-ve)	Sample Interval # (00:00:01) Logging Interval: (00:00:01) Model Interval		Not Used
Net Set	Not Set	5		Net Set	12	Not Set
Volcage - Differential : -6 to 25 V	Larvel service 1	B	3(+ve) to +(-ve)	Sample Interval & (00:00:011 Logging Interval: (00:00:01) Moder Interval		Not Lised
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Current 14 to 20 mA	Flow server 1	c	1(+++) to 2(-++)	Sample (Interval: A (00:00:01) Logging (Interval: (00:00:01) Mode: Interval	10	Not Used
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Not Set	Not Set	c		Next Set:		Not Set
Not See	Not Set	C		Not Set	1	Not Set
Nati Set	Not Set	D		Not Sec		Net Set
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Graphical data display screen

Squirrel connectivity and communications



Data Downloader application

The Grant Downloader software application (supplied with SquirrelView Plus) is designed for operation with the SQ2010, SQ2020 and SQ2040 series. It allows the user to easily download data from multiple Squirrel data

loggers either by the click of an icon on the PC desktop, or via Microsoft's Windows[™] Scheduler, making the whole operation fully automated.

Features

- » Address each logger individually
- >> Download data into a specified folder / location
- Select whether to download all data or latest data files
- Set an action after download, e.g. start new job
- Integrate with Microsoft's Scheduler™ to completely automate the process no user input is then required
- Set up a series of desktop icons for each Squirrel and download data with one click of the mouse

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File Scheduled Tasks Pro	file Help	
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Top level navigation screen

Communication Type	
Select the download communication type for the	is profile
USB	
RS232	
Ethernet (UDP/IP)	
ommunications screen	

- >> for remote and mobile applications
- >> easily accessible data on demand across a network
- » wireless data transfer to a PC

Communications accessories for Squirrel data loggers

GSM modem kit

- Allows connection to any Squirrel data logger remotely
- >> Uses GSM cellular network, ideal where no land lines are available
- Operates on dual band versions 900 MHz and 1800 MHz
- Suitable for most applications including use at urban sites, remote sites or in mobile applications
- Collects data at speeds up to 9600 baud
- Supplied with connecting cable, power lead and antenna



*Grant software and data cable required (along with data enabled SIM card from mobile phone service provider)

RS232 to Ethernet converter

- Converts a Squirrel data logger's RS232 output into Ethernet for remote or distributed monitoring
- Allows the logger to plug in at any point on an existing Ethernet network making data easily accessible to anyone
- » No modification to logger required
- Requires an existing Ethernet network for connection

RS232 to Ethernet converter »specification

Power requirements	7.5 to 2	24 VDC
(external adapter cable included, powered from optional SQ mains a	dapter – MPU12) 240 mA	۹@7.5
Environmental operating temperature	+5 to +	-50°C
Dimensions	28 × 40	v 65 n

Wireless RS232 converter

- >> Transmits the Squirrel data logger's RS232 output wirelessly to a PC running SquirrelView
- Maximum range is 500m using an external antenna (100m as standard)
- Baud rates of up to 116 K; 2.4GHz frequency
- Plug and play configuration and via the in-built communications wizard in SquirrelView
- Low power consumption



240 mA @ 7.5V, 75 mA @24V +5 to +50°C 28 x 42 x 65 mm

Temperature probes for Squirrel data loggers

Grant supplies a comprehensive range of robust, high quality temperature probes with a choice of sensor and in a variety of physical styles for use with Squirrel data loggers.

In addition to the standard range of temperature probes (see table opposite) Grant is able to supply customised probes for special applications.

Grant also supplies humidity probes and current transducers and can provide guidance on suitable sensors for measuring a wide variety of other physical parameters.

Grant temperature probes

- Choice of thermistors, thermocouple and platinum resistance sensors
- Wide range of physical styles
- High quality robust construction for long life
- Test and calibration traceable to national standards
- Optional NAMAS certification
- >> Choice of cables and connectors for different applications

Thermistors

Thermocouples

- Larger electrical signal for a given temperature change than other sensors
- >> Fast response time
- >> High accuracy (± 0.1°C)
- Preferred sensor over the operating range -50 to +120°C
- Long cable lengths possible without significant errors
- Mini thermistors available for miniature / needle probes

Please contact us with your requirements e-mail acquisitionsales@grant.co.uk phone +44 (0) 1763 260 811

Suitable for temperatures from -25°C up to +250°C

- >> Fast response time
- Moderate accuracy (± 0.5°C)
- Suitable for a wide range of applications from delicate to heavy industrial

Platinum resistance

- Suitable for temperatures from -50°C up to +250°C
- Good accuracy (± 0.3°C)
- Good long term stability
- Choice of Pt100 and Pt1000 sensors
- Choice of 2- and 4-wire where compensation of cable resistance required



14

120°C max

Grant temperatu	ire probes: summary of spec	ifications	Therr	nistor	3	Therr	ποςοι	uples	Platir	num F	Resista	ince
Typical application	Probe	Probe ref.	standard (U)	high precision (UU)	mini (SU)	type J	type K	type T	Pt100 2-wire (P2)	Pt100 4-wire (P4)	Pt1000 2-wire (P6)	Pt1000 4-wire (P8)
General purpose: F	Robust, stainless steel with rounde	d end, fast	response									
Monitoring temperature of air,	125mm Ø4.8mm	CS	VL, F, A	VL, F, A		N,M,Q, FG	N,M,Q, FG	N,M,Q, FG	VL, F, A	C, D	VL, F, A	C, D
vapours, liquids, powders, fridges, freezers, food, etc.	50mm 04.8mm	ст	VL, F, A	VL, F, A		N,M,Q, FG	N,M,Q, FG	N,M,Q, FG	VL, F, A	C, D	VL, F, A	C, D
	50mm 03.2mm	СМ	VS, F	VS, F		N, M, Q	N, M, Q	N, M, Q	VS, F		VS, F	
Delrin handle	50mm 03.2mm	СН	VS, F	VS, F		N, M, Q	N, M, Q	N, M, Q	VS, F		VS, F	
General purpose: E	exposed junction thermocouples (o	onductors	exposed ar	nd welded a	t tip), fast	response, lo	ow cost					
Air, vapours, liquids, powders, fridges, freezers, food, etc.	RECEIPT	тн				N, M	Ν, Μ	Ν, Μ				
Surface temperatu	re: Sensor mounted on either cop	per (EU) or	stainless st	eel base (E	US)							
Monitoring temperature of	length 18 mm max. width 8.5mm	EU	VS, VL, F	VS, VL, F		N, M, Q	N, M, Q	N, M, Q	VS, VL, F			
pumps, motors, etc.	front	EUS	VS, VL, F	VS, VL, F		N, M, Q	N, M, Q	N, M, Q	VS, VL, F			
Room temperature	: Sensor assembly mounted on al	uminium br	acket. Rem	ovable plas	tic globe t	allow for the	he effect of	radiant hea	ıt			
Monitoring radiant and air temperature	Ø36 mm (globe)	AG	VS, VL, F	VS, VL, F		N, M, Q	N, M, Q	N, M, Q				
Specialised miniate	ure – hypodermic and catheter pro	bes									_	_
Hypodermic probe with handle – used	40mm Ø1.0mm	DS			VS, VL, F	N, M, Q	N, M, Q	N, M, Q				
veterinary, botanical, entomology, micro- climate research	35mm 00.75mm	DM			VS, VL, F	N, M, Q	N, M, Q	N, M, Q				
Catheter probe (sensor at end of flexible nylon tubing) – used in incubation, crystallisation etc.	100mm 82.0mm	FF	VS, VL, F, A	VS, VL, F, A		N, M, Q	N, M, Q	N, M, Q				
Insertion (solid): St	ainless steel sheath with pointed e	nd for easy	insertion i	nto / withdr	awal from	solid materia	al					
For soil, frozen food, ice, etc.	125mm 04.8mm	HS	VL, F, A	VL, F, A		N,M,Q, FG	N,M,Q, FG	N,M,Q, FG	VL, F, A	C, D	VL, F, A	C, D
	50mm Ø3.2mm	СМР	VS, F	VS, F		N, M, Q	N, M, Q	N, M, Q	VS, F		VS, F	
Insertion (soft): Ser	nsor sealed into smooth, flexible, t	ranslucent	PVC tubing	smoothly f	used onto	cable						
Delicate applications	100mm Ø5.0mm	REC	VL	VL								
requiring flexible soft insertion	50mm Ø3.0mm	REC- small	VS	VS					X			
For ear	23mm Ø16mm max	EAR	VS	VS								
Accuracy			±0.2°C	±0.1°C	±0.2°C	±1.5°C	±1.5°C	±0.5°C	±0.3°C	±0.3°C	±0.3°C	±0.3°C
Operating range)		-50 to	-50 to	-50 to	-25 to	-25 to	-25 to	-50 to	-50 to	-50 to	-50 to

Cables for Grant temperature probes	Cable operating range (°C)	Max. Ø (mm)	Max length (m)	Connector supplied	
				bare-ended	thermocouple plug
Cable for thermistors and 2-wire Pt100 and 2-wire Pt1000					
VL PVC large coaxial, general purpose, water resistant, flexible	-10 to +105	3.1	500	•	x
VS PVC small coaxial, lightweight, waterproof, flexible	-10 to +105	2.0	5	•	x
F PTFE coaxial, good mechanical strength & flexibility, resistant to oils, acids, etc	-50 to +250	2.4	500	•	x
A Polyethylene 2-core, low temperature, heavy duty waterproof	-20 to +80	4.0	300	•	x
Cable for 4-wire Pt100 and 4-wire Pt1000					
C PVC 4-core insulated, general purpose, water resistant, flexible	-10 to +105	3.5	100	•	x
D PTFE 4-core insulated, good mechanical strength & flexibility, resistant to oils, acids etc	-50 to +250	3.8	100	•	x
Cable for thermocouples					
N PTFE flat 2-core, good mechanical strength & flexibility, resistant to oils, acids, etc.	-50 to +250	2.1	50	•	optional
M PTFE twisted 2-core, good mechanical strength & flexibility, resistant to oils, acids, etc	-50 to +250	2.0	15	•	optional
Q PTFE round 2-core, good mechanical strength & flexibility, resistant to oils, acids, etc	-50 to +250	2.25	50	•	optional
FG High temperature	to +400°C max	3.0	-	•	optional

Humidity probes and AC current transducers

Capacitive humidity and temperature probes

Rotronic HYGROMER™ with Pt100 sensor

Operating range -40 to +85°C (-0.4 to +0.85V); 0 to 100% r.h. (0 to 1V)

- >> Sensors protected against dust and pollution inside a polycarbonate housing
- * Fast response time: <0.7s (start-up 3s)
- >> Accuracy (at +23°C): humidity ±1.5% r.h.: temperature ±0.3°C
- >> Good long term stability: <1% r.h. / year

AC current transducers

These current transducers are used primarily in the building services industry for monitoring AC current. All transducers have a 0 to 1 VDC output.

Miniature clip-on AC current transducers

- Accommodates 15mm diameter cable or 15x17mm >> bus-bar
- Choice of two models: 0 to 25A, 0 to 100A
- **Clamp-on AC current transducers**
- >> Accommodates 43mm diameter cable
- >> Three switch-selectable ranges: 0 to 250A, 0 to 500A, 0 to 1000A
- >> Basic accuracy of ±0.25 to ±3%

Connecting your signals

Differential or single ended inputs?

All Grant Squirrel data loggers in this catalogue are shown with a range of channel options, e.g. 8 to 16 inputs. This refers to their ability to accept either single ended or true differential signals.

Single-ended inputs - each input signal has two connection wires. One is connected to a common terminal on the logger (see diagram). This increases the number of inputs possible to the logger, but results in all the connected sensors having an input at a common potential. However, unlike many loggers, the Grant Squirrels allow these common terminals to be at different potentials (on separate connector blocks), optimising the overall system accuracy.

Differential inputs - each input signal has two connection wires and the logger measures the difference between them. One wire goes to a positive input and one to a negative input (see diagram). In this case none of the inputs needs to be at the same potential as any of the others.





connection

Making a choice between single-ended and differential inputs:

Signal leads over a few metres in length?	Choose differential to reduce noise.
Small signals under around 100 mV?	Choose differential to reduce ground and noise errors.
Signals with different grounds, e.g. when signals are remote from each other?	Choose differential to remove ground errors.
Sensors with high resistance such as strain gauges?	Choose differential to remove common mode voltage. High resistance gives greater pick up and thus higher common mode voltage.
Need twice as many inputs and have none of the above problems?	Choose single ended.







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Protective enclosures for Squirrel data loggers

Weatherproof enclosures and thermal barriers

- Robust plastic or stainless steel construction
- Maximum protection for harsh conditions

Weatherproof enclosures

- A range of enclosures and carrying cases to suit all Squirrel data loggers
- Robust, plastic, weatherproof cases (which can be padlocked) for IP68 protection and security in harsh outdoor environments
- Standard enclosures with protection rating up to IP67
- Customisable to suit specific applications

Thermal barriers

- Provides protection to Squirrel data loggers when used in high temperature oven profiling applications (static or conveyor)
- A range of standard and customised models with different performance characteristics
- >> Made from stainless steel, for years of use
- Barriers available for very high temperature applications
 manufactured to order
- Suitable for applications in food, powder coating, stove enamelling, ceramic, kiln and furnace
- Can be constructed using special phase change material for added protection for very high temperature applications





Squirrel 2010 in weatherproof case



Squirrel 2020 in an electrical enclosure



Squirrel OQ610 in thermal barrier

Squirrel OQ610 series temperature data logger

Dedicated data logger for temperature and through process monitoring

Overview

The OQ610 temperature data logger is suitable for a wide range of temperature recording applications in industry, research and development. It is available as a stand alone temperature data logger or as part of a complete system for through process monitoring in the food and paint industries.

With the addition of a thermal barrier the Grant OQ610 is suitable for use in through process applications where heat treatment is being used to produce a product. To ensure consistent quality of heat treated products, it is important to have proof that they have passed through the manufacturing process at the right temperature for the right amount of time. By passing the Grant OQ610 oven logger through the process along with the products, a temperature profile can be produced to show exactly what is happening to the products and the process. Benefits include improved quality of your product and increased efficiency, reduced energy costs, quality assurance reports for compliance and traceability and complete quality control for your process.







Key features

- >> 6 channels for use with a wide range of K or T type thermocouple probes
- >> Battery operated and easily portable
- >> Simple 3 button operation via built in display or from PC
- >> Can be configured to automatically start and stop logging on time or temperature levels
- >> Fast sample rates for fast process times: up to 8 samples / second
- >> Can provide automatic cure calculation in through process applications
- » Non-volatile memory provides up to 260,000 readings of secure data
- >> Time and date reported with each reading
- » USB "On The Go" communication port enables direct printout without the need to connect to a PC

The Squirrel OQ610 series comprises two models:

OQ610-S

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OQ610

- Supplied complete with SquirrelView for through process applications
- Supplied complete with PaintView for paint oven monitoring applications

- >> 6 channels for type K or T thermocouples
- >> Compact and simple to use
- >> USB connectivity for direct data print-out
- >> High accuracy
- >> Extended battery life



Through process applications

- Surface Coatings; powder coating & stove enamelling (see dedicated OMK610 temperature profiling system, on page 20)
- Food Manufacturing including cakes, bread, confectionery, meat, fish, poultry, beverages, dairy products, pizza, pasta and ready made meals
- Furnaces, kilns and any form of oven or conveyor system

Applications



Food production



Pharmaceuticals

Oven logging

Capabilities

- >> Flexible start / stop
- Print out pre-configured reports directly from the logger
- Scale and review readings in real-time on the integral display or on a PC running SquirrelView or PaintView

Squirrel OMK610 paint oven profiling system

A comprehensive temperature profiling system designed exclusively for the paint and finishing industry

Overview

Everything you need for paint oven profiling and paint cure calculation in one convenient package. At the heart of the system is the Squirrel OQ610 temperature logger, capable of taking up to 8 readings per second and storing over 260,000 readings. The logger is protected by the Cl606-Q thermal barrier specifically designed for use in paint and finishing ovens.



Key features

- >> Clear LCD screen indicates cure % at the end of the cycle
- USB "On The Go" communication port enables printing of a cure report and graph directly from the logger – no PC required on the shop floor
- >> Oven / process tolerance bands easily configured
- PaintView software configures, stores and allows detailed cure cycle analysis
- The comprehensive report generator allows fully customisable reports to be created, including company logos or digital image incorporation
- Multi-zone ovens can be easily configured
- Easy data storage and archiving within PaintView allows inclusion in audited and approved quality controlled processes

- Direct report print out no PC required
- Thermocouple temperature probes for recording air and surface temperatures
- Thermal barrier to protect the Squirrel data logger during its passage through the oven
- >> PaintView software for data analysis and reporting
- >> 6 channels for type K thermocouples

The Squirrel OQ610 can record up to eight readings per second from each sensor and store over 260,000 readings in its memory

Small, light and robust thermal enclosure Cl606-Q provides protection for the logger at 250°C for 50 minutes – long enough for most conveyor processes

At the end of the recording run, data is downloaded directly to printer or to PC for analysis and reporting using PaintView software

At the touch of a button, the OQ610 can directly print user-configurable, concise reports to simplify record keeping and provide ISO9000 quality records

Four robust, fast response type K thermocouple probes with clamp and magnet fastener can be used for both surface and air temperature measurement

	OQ610-S^	OMK610 system	
	General purpose temperature logger	Temperature profiling system for paint & finishing ovens	
Analogue input channels	6	6	
Input types: - temperature, K Thermocouple			
- temperature, T Thermocouple		•	
Max number of readings per second per channel	8	8	
Basic accuracy	0.5 °C	0.5 °C	
Memory size / number of readings stored	260,000	260,000	
USB communications		•	
Set-up / analysis software	SquirrelView or SquirrelView Plus**	PaintView	
Temperature probes (TC-K-X1.5-3)	optional	4 x K thermocouple probes supplied as standard	
TB series thermal barrier for 'through process; monitoring in the food industry	optional	n/a	
CI606-Q thermal barrier for use in paint and finishing ovens	optional	supplied as standard	

* For applications outside the paint and finishing industry SquirrelView software is used with the OQ610, and probes and thermal barrier (if required) can be selected from the relevant sections of this catalogue (see pages 14-17)

** Squirrel/View supplied as standard with every new Squirrel. Squirrel/View Plus available at extra cost. See pp. 10-11 for more information.

Other products and services from Grant Instruments

dataTaker industrial data acquisition systems

dataTaker, a wholly owned Grant subsidiary based in Melbourne, Australia, specialises in the design

and manufacture of a comprehensive range of expandable rugged data logging systems for complex applications. Based on the renowned dataTaker loggers and accepting all common sensors without the need for extra modules, these rugged instruments offer systems designers, engineers and scientists an easily integrated solution using Ethernet, wireless and modem communication with up to 42 sensor inputs.

Please visit www.datataker.com for more information.

Eltek telemetry based data logging systems

Grant affiliate Eltek, part owned by Grant Instruments and also based near Cambridge, specialises in the design and manufacture of wireless data logging systems based on the Squirrel data logger. The Eltek Genll radio data logging system enables sensors to be connected to the Receiver Logger by means of a radio link, ideal where communications across a river, road or simply a large site need to be established quickly and effectively. Typical applications include monitoring of buildings (homes, cold stores, warehouses, museums, galleries, etc.), ground water monitoring and 'through process' monitoring in food production.

Please visit www.eltekdataloggers.co.uk for more information.





Grant equipment for the laboratory

The Grant Scientific Group designs and manufactures a wide range of high quality laboratory equipment used in routine laboratory applications for analytical, diagnostic and research purposes. Key product groups include temperature controlled baths and circulators for heating and refrigerating, dry block heaters for incubating samples, shaking baths for agitating samples, and ultrasonic baths for cleaning.

Grant affiliate Biosan, part owned by Grant Instruments, designs and manufactures Grant bio equipment, an innovative and cost-effective range of products designed primarily for life science applications. These include mixers, thermoshakers, rockers, rotators, centrifuges, heating / cooling dry blocks and microplate apparatus.

To find out more about Grant products for the laboratory, please visit **www.grant.co.uk** or call +44 (0) 1763 260 811.

Bespoke scientific systems for industry

The Grant Technologies Group supplies bespoke scientific and industrial equipment based on Grant's proven core competencies. It has both the capability and the resources to act as an independent outsourcing partner for product design and manufacture. With hundreds of products successfully developed and marketed to date, Grant Technologies has extensive experience of applying a variety of enabling technologies to projects in diverse industry sectors. Examples of applications addressed with Grant bespoke systems include:

- >> Accurate temperature control in industrial processes
- Sample handling and preparation
- Material testing and quality control in the production environment
- Medical analysis and diagnostic processes
- >> Chemical and pharmaceutical evaluation

To find out more about Grant Technologies services please visit **www.grant.co.uk** or call +44 (0) 1763 260 811.



Squirrels on the internet - www.grant.co.uk

Please visit our web site to access all current product information and support materials. These have been produced to assist our customers with the installation, configuration and deployment of their Squirrel data logging applications. The site includes downloadable information covering the following topics:

- Technical specification data sheets for all Squirrels
- Training videos
- Application stories and notes
- FAQ's
- >> Technical hints and tips
- Squirrel instructions and quick start guides

Calibration services



All Squirrel data loggers manufactured by Grant Instruments Ltd are checked for accuracy using equipment with calibrations traceable to UK National Standards. Grant also provides an additional calibration service, with traceable certification, at extra cost. This service is carried out by an independent calibration laboratory certified by the British National Measurement Accreditation Service (NAMAS).

Please contact us for further information on +44 (0) 1763 260 811

Warranty

All Squirrel data loggers are warranted against faulty materials and workmanship for three years. For repairs carried out inside this warranty period, no charge is made for labour, materials or return carriage.

In the event that repairs are required, they are normally carried out within 5 working days of receipt at our UK factory. All warranty repairs require a Return Materials Authorisation document (RMA) to be issued before works can begin. Full details of this service and the process are explained on the Grant Instruments web site **www.grant.co.uk**



Please call +44 (0) 1763 260 811 for the RMA to be logged and issued.

After sales support

Both Grant Instruments Ltd and its appointed distributors provide technical assistance over the phone and via email to support customer needs.

This support is offered for both the operation and configuration of the data loggers and associated software as well as application specific advice.

Full details including a customer support web enquiry form are available on the Grant Instruments web site **www.grant.co.uk**



Founded in 1951, Grant Instruments (Cambridge) Ltd is an independent, privately owned company specialising in the design and manufacture of high quality scientific equipment, including the renowned Grant water baths and Grant Squirrel data loggers.

Designed and manufactured at Grant's plant in Cambridgeshire, UK, and combining thoughtful design with robust engineering, Grant products are synonymous with accuracy, longevity and ease of operation. They are used in laboratory and industrial processes across the world by prestigious scientific institutions as well as industrial research and quality assurance laboratories.

Other, integrated industrial data loggers are available from dataTaker – a wholly owned Grant subsidiary based in Melbourne, Australia – making the Grant data logger range one of the most comprehensive on the market.



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World wide availability and support for Grant data loggers

Grant data loggers and specialist technical support is available world-wide. Please visit www.grant.co.uk to locate our regional offices and to download technical support materials. You will also find your locally appointed distributor and support centre.

CE mark

Grant data logging systems bear a CE mark and meet relevant European directives.

Quality statement

Grant Instruments operates a Quality Management System complying with ISO9001:2000. It is Grant's policy to supply customers with products which are fit for their intended purpose, safe in use, perform reliably to published specification and are backed by a fast and efficient customer service.

All specifications are subject to continuous development and Grant Instruments (Cambridge) Ltd reserves the right to alter them without prior notice.

All trademarks acknowledged.

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