



2011 New Spec.

Squirrel 2040 series

High performance data loggers for demanding applications



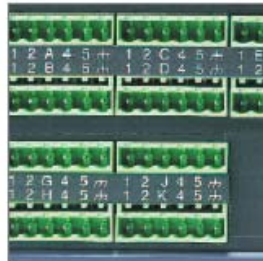
Overview

The Squirrel 2040 series combines a higher channel count with the same high performance, comprehensive features and universal inputs as the 2020 in a neat compact and portable instrument.

Using multiple 24-bit analogue to digital converters, twin processors and removable memory options provides great flexibility to handle a wide range of complex and demanding multi-channel applications.

The Squirrel 2040 series are the ideal data loggers for industrial, scientific research and quality assurance applications and more!

The 2040 provides standalone data acquisition, advances networked solutions and data analysis straight out-of-the box.



Key features

- » Fully configurable via the integrated keypad
- » 16 true differential or 32 single ended universal analogue inputs for voltage, current or resistance measurements plus 2 high voltage, 4 pulse and 8 digital event/state inputs
- » Analogue inputs can be used with thermistors, thermocouples, 2,3 or 4 wire RTD temperature sensors and 4-20mA signals
- » Logging rates of up to 100Hz on up to 4 channels
- » Ethernet, USB and RS232 communication ports
- » Internal memory storage for up to 14 million readings
- » Download of internal data to removable MMC / SD card

- » Sensor power and FET outputs for use with external devices
- » Calculated channels derived from real channels using advanced mathematical functions e.g. $\log(x)$; $\ln(x)$; \sqrt{x}

Analogue inputs supported

- » Thermistors
- » Thermocouples
- » Pt100 / Pt1000 (maximum of eight 3- or 4-wire Pt100 / Pt1000 sensors)
- » Voltage
- » Current
- » Resistance

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
- » **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



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

Power output for sensor excitation / external devices

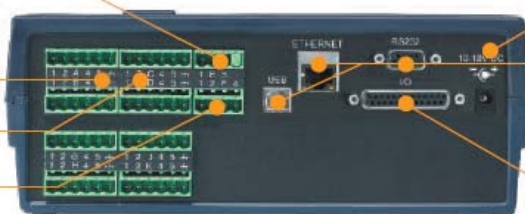
16 to 32 universal analogue inputs for recording temperature, current, voltage and resistance

Easy to use, removable connector system

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

Large, clear 128 * 64 dot graphical LCD display

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



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

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 14 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



Communications

Ethernet, USB and RS232 serial ports are inbuilt. This allows simple connection to either a PC based TCP/IP network, a wireless to PC connection or to a GSM modem for remote data downloading. This flexibility enables global data access and retrieval as well as complete system integration of the SQ2040 series into complex and critical applications

Multiple configurations stored in the logger:

Up to six logger configurations (channel type, names, logging speeds, triggers etc.) together with the current configuration can be held in the logger's internal memory. Additional configuration settings can also be loaded from the external MMC/SD memory card. This allows the operator to quickly and easily switch between logger configurations without the need for a PC.

Software configuration via SquirrelView:

The SquirrelView software (supplied with the SQ2040 series data logger) allows logger configuration, data download and export whilst giving the user full control over SQ2040. The optional SquirrelView Plus gives the user access to many advanced data analyses and archiving/transfer features. Refer to SquirrelView data sheet for specifications.

Concurrent sampling:

The SQ2040 series uses multiple analogue and digital converters that enables true concurrent sampling and logging. It Allows the user to configure a channel to log at a rate of 100Hz whilst retaining different sample speeds on the other channels. Ideal for measuring dynamic parameters that change at different rates such as temperature and pressure.

Applications



R&D



Engineering



Quality assurance

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
- » 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



Squirrel SQ2040 Technical Specifications

	SQ2040-2F16	SQ2040-4F16
Analogue input channel options	Analogue to digital converters: 2 Differential: 16 Single Ended*: 32 3 or 4 wire: 0	Analogue to digital converters: 4 Differential: 16 Single Ended*: 32 3 or 4 wire: 8
Logging speed	Up to 100 readings per second on 2 channels	Up to 100 readings on 4 channels
Additional channels * Please refer to our Technical Note for the configuration of these inputs	Pulse: (2 x fast - 64kHz)& (2 x slow - 100Hz) Event/digital: 8 state inputs or 1 x 8 bit binary Single Ended*: 2 3 or 4 wire: 2 temperature Logging speeds: 1 sec to 1 day in 1 sec increments 2.5, 10, 20 or 100Hz (20Hz or 100Hz only on 2 channels)	Pulse: (2 x fast - 64kHz)& (2 x slow - 100Hz) Event/digital: 8 state inputs or 1 x 8 bit binary Single Ended*: 2 3 or 4 wire: 2 temperature Logging speeds: 1 sec to 1 day in 1 sec increments 2.5, 10, 20 or 100Hz (20Hz or 100Hz only on 2 channels)
Analogue inputs	Accuracy: (at 25°C) voltage and resistance ($\pm 0.05\%$ readings + 0.025% range) Common mode rejection: 100dB Linearity: 0.015% Input impedance: > 1M Ω Series mode line rejection: 50/60Hz 100dB	
Analogue - digital conversion	Type: Sigma - Delta Resolution: 24bit Sampling rate: up to 10, 20* or 100* readings per sec. per ADC. No 100Hz on 1F8 (* with mains rejection off)	
Thermistor Ranges	Y & U-type: - 50 to 150°C Pt100/ Pt1000: - 200 to - 850°C (2 wire only on 2F16, 3 or 4 wire on 4F16) Customer specific thermistor range	
Thermocouple Ranges; Differential and Single Ended	K-type: - 200 to 1372°C T-type: - 200 to 400°C N-type: - 200 to 1300°C	R-type: - 50 to 1768°C S-type: - 50 to 1768°C J-type: - 200 to 1200°C B-type: 250 to 1820°C C-type: 0 to 2320°C D-type: 0 to 2320°C
Working environment	- 30 to 65°C, RH up to 95% (non-condensing)	
Voltage Ranges; Differential and Single Ended	- 0.075 to 0.075V, - 0.15 to 0.15V, - 0.3 to 0.3V, - 0.6 to 0.6V, 0.6 to 1.2V, 0.6 to 2.4V, - 3.0 to 3.0V, - 6.0 to 6.0 V, - 6.0 to 12.0V, - 6.0 to 25.0V	
High voltage input range	4.0 to 20.0V, 4.0 to 40.0V, 4.0 to 60.0 (max 2 may be selected)	
Current Ranges, Differential (Requires external 10 Ω shunt)	-30.0 to 30.0mA, 4 to 20mA	
Resistance Ranges, all 2 wire	0.0 to 1250 Ω , 0.0 to 5000 Ω , 0.0 to 20000 Ω , 0.0 to 300000 Ω	
Resistance range 3 and 4 wire (2F8)	0.0 to 500 Ω , 0.0 to 4000 Ω	
Digital/Alarm Outputs	4 open drain FET (18V 0.1A)	
Memory	Internal: up to 128M (up to 14 million readings) External: up to 1Gb - removable MMC/ SD (for transferring internal memory and storing setups only)	
Internal memory modes	Stop when full or overwrite	
Calculated channels	Up to 16 virtual channels derived from physical input channels	
Resolution	Up to 6 significant digits	
Display/Keypad	128*64 dot graphical display, 4 button keypad	
Power supply	Internal: 6 x AA alkaline batteries External: 10-18VDC. Reverse and polarity and over-voltage protected	
Power consumption@ 9V	Sleep mode: 600 μ A Logging: 40 - 80 mA	
Power output for external device	Regulated 5VDC at 50mA or logger supply voltage at 100mA	
Time and Date	In-built clock in 3 formats	
Communication	Standard: RS232 (Auto bauding to 115200 baud) USB 1.1 & 2.0 compatible Ethernet 10/100 base TCP/IP. Requires external power supply. External options: GSM, Wifi and PSTN Modems	
Programming / logger setup	Squirrelview or Squirrelview Plus Software	
Dimensions (w x d x h), weight	235 mm x 175 mm x 95 mm, 1.2 kg, enclosure material ABS	

Please note: SQ2040 is supplied with software, manual, USB cable, wall bracket, batteries and 4 current shunt resistors.

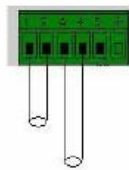


DATA ACQUISITION Technical Information

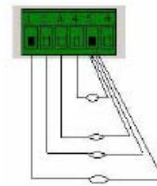


SQ2040 2F16 channel inputs

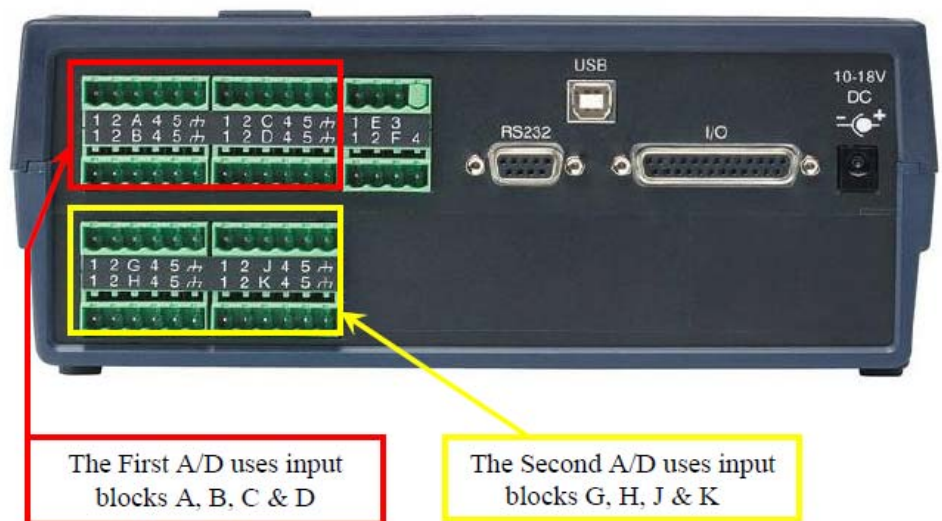
The SQ2040 2F16 Squirrel data logger has two analogue to digital converters (A/D's) which increases logging flexibility over the 1F8 model. The first corresponds to inputs on blocks A, B, C and D and the second corresponds to inputs on blocks G, H, J and K (see below). Each connection block will accept up to 2 differential inputs or up to 4 single ended inputs (it is *not* possible to mix single ended and differential inputs on a block).



Differential Inputs



Single Ended Inputs



The First A/D uses input blocks A, B, C & D

The Second A/D uses input blocks G, H, J & K

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Reference No: 29/07 V1.0

Mains rejection – what is it?

With mains rejection activated, the Squirrel data logger compensates for any interference from the local mains electricity supply (at either 50 or 60 Hz). This can be set in the logger setup screen in SquirrelView.

For higher logging speeds, the mains rejection can be turned off. However, this will have the effect of reducing the reading accuracy dependant upon the level of interference then experienced by the Squirrel data logger.



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With Mains Rejection turned on (default setting)

The SQ2040 2F16 can take up to 10 readings per second on blocks A, B, C and D, and 10 readings per second on blocks G, H, J and K. This can be 10 readings on a single channel or 10 readings spread across multiple channels across blocks A, B, C and D, and 10 readings on a single channel or 10 readings spread across multiple channels across blocks G, H, J and K.

When wanting to log once a second or faster with mains rejection turned on the SQ2040 2F16 can have any **ONE** of the following configurations across blocks A, B, C and D, and **ONE** of the following configurations across blocks G, H, J and K.

Per A/D	Samples per Second			
	10	5	2	1
Configuration 1	1			
Configuration 2		2		
Configuration 3			5	
Configuration 4				10
Configuration 5		1	2	1
Configuration 6		1	1	3
Configuration 7		1		5
Configuration 8			4	2
Configuration 9			3	4
Configuration 10			2	6
Configuration 11			1	8

Note: Each configuration refers to the maximum number of inputs possible with the selected sample speed.

For example: Configuration 5 has 1 input at 5 samples per second, 2 inputs at 2 samples per second and 1 input at 1 sample per second. Therefore the maximum number of channels that can be logging on a single A/D in this configuration is 4.



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With Mains Rejection turn off

The SQ2040 2F16 can take up to 100 readings per second on blocks A, B, C and D, and up to 100 readings per second on blocks G, H, J and K. This can be 100 readings per second on a single channel or 20 readings per second spread across multiple channels across blocks A, B, C and D, and 100 readings per second on a single channel or 20 readings per second spread across multiple channels across blocks G, H, J and K.

Note: 100 readings per second is not available when reading thermocouple inputs.

When wanting to log once a second or faster with mains rejection turned off the SQ2040 2F16 can have any **ONE** of the following configurations across blocks A, B, C and D, and **ONE** of the following configurations across blocks G, H, J and K.

Per A/D	Samples per Second					
	100	20	10	5	2	1
Configuration 1	1					
Configuration 2		1				
Configuration 3			2			
Configuration 4				4		
Configuration 5					10	
Configuration 6						16
Configuration 7			1	2		
Configuration 8			1	1	2	1
Configuration 9			1	1		5
Configuration 10			1		5	
Configuration 11			1		4	2
Configuration 12			1		3	4
Configuration 13			1		2	6
Configuration 14			1		1	8
Configuration 15			1			10
Configuration 16				3	2	1
Configuration 17				3		5
Configuration 18				2	5	
Configuration 19				2	4	2
Configuration 20				2	3	4
Configuration 21				2	2	6
Configuration 22				2	1	8
Configuration 23				2		10
Configuration 24					9	2
Configuration 25					8	4
Configuration 26					7	6
Configuration 27					6	8
Configuration 28					5	10
Configuration 29					4	12
Configuration 30					3	13
Configuration 31					2	14
Configuration 32					1	15



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Note: Each configuration refers to the number of inputs possible with the selected sample speed.

For example: Configuration 19 has 2 inputs at 5 samples per second, 4 inputs at 2 samples per second and 2 inputs at 1 sample per second. Therefore the maximum number of channels that can be logging on a single A/D in this configuration is 8.

Setting up Channels Squirrelview

When setting the channels in Squirrelview where you are not able to use every channel because of the sample rates, you need to make sure the setup is correct. In the diagram below you can see the red line denotes the divider between the 2 A/D's and in the case below there is one channel at 100 Hz on the first A/D and one channel at 20 Hz on the second A/D.

Sensor Type	Description	Block	Connections	Log Method
Not Set	Not Set	C		Not Set
Not Set	Not Set	C		Not Set
Not Set	Not Set	C		Not Set
Voltage - Differential : -6 to 25 V	Channel 1	D	1(+ve) to 2(-ve)	Sample Interval: A (100 Readings Per Second) Logging Interval: (00:00:00)
Not Set	Not Set	D		Not Set
Not Set	Not Set	D		Not Set
Not Set	Not Set	D		Not Set
Voltage - Differential : -6 to 25 V	Channel 2	G	1(+ve) to 2(-ve)	Sample Interval: B (20 Readings Per Second) Logging Interval: (00:00:00)
Not Set	Not Set	G		Not Set
Not Set	Not Set	G		Not Set
Not Set	Not Set	G		Not Set

Logger Control

Logger Date / Time: 11/09/2006 13:59:55

Logger Identification: Logger ID (This text is used to identify the logger)

Job Description: Job Description

Memory Mode: Stop when full

Max Memory Allocated to this Job: All Free Mem

Delayed Start: ☐ Enable ☒ Real Time ☐ Elapsed

Start Logging At: 11/09/2006 13:55:36

Sensor Power Timers: A (Supply) 00:00:00 ☐ Continuous B (SV) 00:00:00 ☐ Continuous

Communication

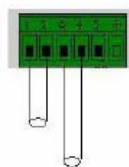


DATA ACQUISITION Technical Information

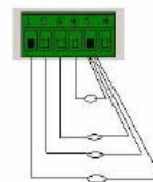


SQ2040 4F16 channel inputs

The SQ2040 4F16 Squirrel data logger has four analogue to digital converters (A/D's) which increases logging flexibility over the other SQ2020 and SQ2040 models. The first corresponds to inputs on blocks A and B, the second corresponds to inputs on blocks C and D, the third corresponds to inputs on blocks G and H and the fourth corresponds to inputs on blocks J and K (see below). Each connection block will accept up to 2 differential inputs or up to 4 single ended inputs (it is *not* possible to mix single ended and differential inputs on a block).



Differential Inputs

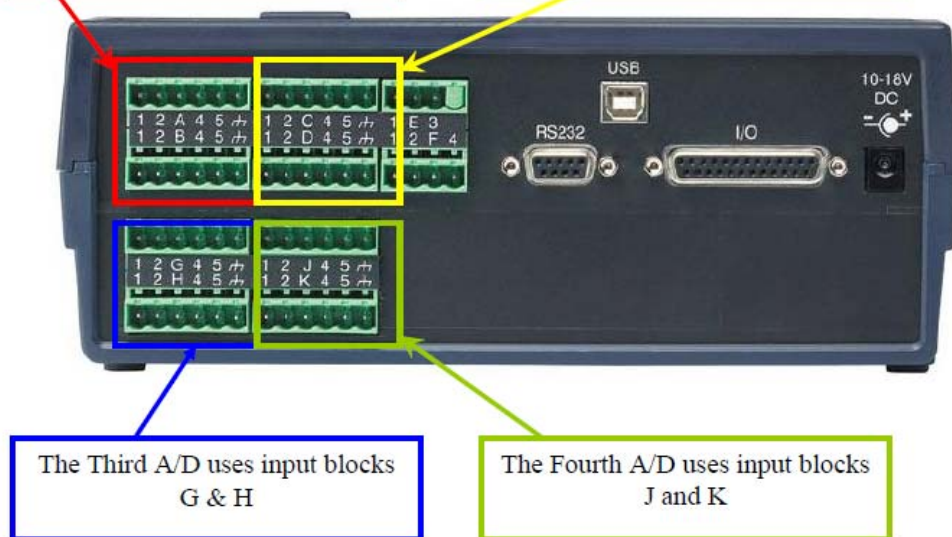


Single Ended Inputs



The First A/D uses input blocks A & B

The Second A/D uses input blocks C and D



The Third A/D uses input blocks G & H

The Fourth A/D uses input blocks J and K



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Mains rejection – what is it?

With mains rejection activated, the Squirrel data logger compensates for any interference from the local mains electricity supply (at either 50 or 60 Hz). This can be set in the logger setup screen in SquirrelView.

For higher logging speeds, the mains rejection can be turned off. However, this will have the effect of reducing the reading accuracy dependant upon the level of interference then experienced by the Squirrel data logger

With Mains Rejection turned on (default setting)

The SQ2040 4F16 can take up to 10 readings per second on blocks A and B, 10 readings per second on blocks C and D, 10 readings per second on blocks G and H and 10 readings per second on blocks J and K. This can be 10 readings on a single channel or 10 readings spread across multiple channels across blocks A and B, 10 readings on a single channel or 10 readings spread across multiple channels across blocks B and C, 10 readings on a single channel or 10 readings spread across multiple channels across blocks G and H and 10 readings on a single channel or 10 readings spread across multiple channels across blocks J and K.

When wanting to log once a second or faster with mains rejection turned on the SQ2040 4F16 can have any **ONE** of the following configurations across blocks A and B, **ONE** of the following configurations across blocks C and D, **ONE** of the following configurations across blocks G and H and **ONE** of the following configurations across blocks J and K.

Per A/D	Samples per Second			
	10	5	2	1
Configuration 1	1			
Configuration 2		2		
Configuration 3			5	
Configuration 4				8
Configuration 5		1	2	1
Configuration 6		1	1	3
Configuration 7		1		5
Configuration 8			4	2
Configuration 9			3	4
Configuration 10			2	6

Note: Each configuration refers to the maximum number of inputs possible with the selected sample speed.

For example: Configuration 5 has 1 input at 5 samples per second, 2 inputs at 2 samples per second and 1 input at 1 sample per second. Therefore the maximum number of channels that can be logging on a single A/D in this configuration is 4.



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With Mains Rejection turn off

The SQ2040 4F16 can take up to 100 readings per second on blocks A and B, up to 100 readings per second on blocks B and C, up to 100 readings per second on blocks G and H and up to 100 readings per second on blocks J and K. This can be 100 readings per second on a single channel or 20 readings per second spread across multiple channels across blocks A and B, 100 readings per second on a single channel or 20 readings per second spread across multiple channels across blocks C and D, 100 readings per second on a single channel or 20 readings per second spread across multiple channels across blocks G and H, and 100 readings per second on a single channel or 20 readings per second spread across multiple channels across blocks J and K.

Note: 100 readings per second is not available when reading thermocouple inputs.

When wanting to log once a second or faster with mains rejection turned off the SQ2040 4F16 can have any **ONE** of the following configurations across blocks A and B, **ONE** of the following configurations across blocks C and D, **ONE** of the following configurations across blocks G and H and **ONE** of the following configurations across blocks J and K.

Per A/D	Samples per Second					
	100	20	10	5	2	1
Configuration 1	1					
Configuration 2		1				
Configuration 3			2			
Configuration 4				4		
Configuration 5					8	
Configuration 6						8
Configuration 7			1	2		
Configuration 8			1	1	2	1
Configuration 9			1	1		5
Configuration 10			1		5	
Configuration 11			1		4	2
Configuration 12			1		3	4
Configuration 13			1		2	5
Configuration 14			1		1	6
Configuration 15			1			7
Configuration 16				3	2	1
Configuration 17				3		5
Configuration 18				2	5	
Configuration 19				2	4	2
Configuration 20				2	3	3
Configuration 21				2	2	4
Configuration 22				2	1	5
Configuration 23				2		6
Configuration 24					7	1
Configuration 25					6	2
Configuration 26					5	3
Configuration 27					4	4
Configuration 28					3	5

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DATA ACQUISITION Technical Information



Note: Each configuration refers to the number of inputs possible with the selected sample speed.

For example: Configuration 19 has 2 inputs at 5 samples per second, 4 inputs at 2 samples per second and 2 inputs at 1 sample per second. Therefore the maximum number of channels that can be logging on a single A/D in this configuration is 8.

Setting up Channels Squirrelview

When setting the channels in Squirrelview where you are not able to use every channel because of the sample rates, you need to make sure the setup is correct. In the diagram below you can see the red lines denotes the divider between A/D's and in the case below there is one channel at 100 Hz on the first A/D, one channel at 20 Hz on the second A/D and two channels at 10 Hz on the third A/D.

Logger Setup (Untitled) - For 4F16 Loggers

Sensor Type	Description	Block	Connections	Log Method
Voltage - Single ended : -6 to 25 V	Channel 1	B	4(+ve) to 5(-ve)	Sample Interval: A (100 Readings Per Second) Logging Interval: (00:00:00)
Not Set	Not Set	C		Not Set
Not Set	Not Set	C		Not Set
Not Set	Not Set	C		Not Set
Voltage - Single ended : -6 to 25 V	Channel 2	C	4(+ve) to 5(-ve)	Sample Interval: B (20 Readings Per Second) Logging Interval: (00:00:00)
Not Set	Not Set	D		Not Set
Not Set	Not Set	D		Not Set
Not Set	Not Set	D		Not Set
Voltage - Single ended : -6 to 25 V	Channel 3	G	1(+ve) to 5(-ve)	Sample Interval: C (10 Readings Per Second) Logging Interval: (00:00:00)
Voltage - Single ended : -6 to 25 V	Channel 4	G	2(+ve) to 5(-ve)	Sample Interval: C (10 Readings Per Second) Logging Interval: (00:00:00)

Logger Control | Actions & Triggers | Configuration | Digital/State | Alarms

Logger Date / Time: 11/09/2006 14:58:47

Set Logger Time Manually | Set Logger Time to PC Time

PC Time: 11/09/2006 14:58:47

Logger Identification: Logger ID (This text is used to identify the logger)

Job Description: Job Description

Memory Mode: Stop when full

Max Memory Allocated to this Job: All Free Mem

Delayed Start: ☐ Enable ☒ Real Time ☒ Gapped

Start Logging At: 11/09/2006 14:56:12

Sensor Power Timers: A (Supply) 00:00:00 ☐ Continuous B (SV) 00:00:00 ☐ Continuous

Communication