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GenComm standard for use with generating set control equipment

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1. Changes from previous version

Version 2.0
This is a heavily revised version that includes many pages that were not previously in the public domain.

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In page 153: register numbers for 2131 and 2133 corrected.

Version 2.2
In page 170: separate register allocation table for 332,334 created (registers 0 to 21 only)

Version 2.3
In page 153: For 8xxx the reserved registers are now unimplemented and the number of alarms has been corrected.

Version 2.4
In page 4: added 2 new registers (193 and 194) for S1 and S2 phase rotation.

Version 2.5
In page 180: added register mapping for 335 transfer switch
In page 190: added register mapping for 335 transfer switch

Version 2.6
In pages 3, 16, 153, 154, 160, 170, 190, 200-249: Registers and tables added/amended for 335 transfer switch
In pages 180,181: Common family register allocation (registers 64 to 255 as detailed in notes) documented in separate table

Version 2.7
In page 2: removed redundant ‘Modem dial back string’ and shifted up the remaining strings for consistency with module implementations

Version 2.8
In page 152: Indication of numbers and types of expansion modules for 335
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In page 160,170: Clarification of expansion digital/analogue inputs
In page 180: Digital outputs and LED colours added for 335; Corrections to 334/335 register order
In page 190: Common family register table (as detailed in notes) re-labelled

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Version 2.9
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In page 152: Numbers of expansion modules for 335 amended
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In page 181: Matrix added to common family register table to identify implemented registers for each family/module;
In page 190: 330,331, and 333 modules documented; Matrix added to common family register table to identify implemented registers for each family/module; unimplemented/reserved registers corrected for 3xx
In pages 200-239: 330,331 and 333 modules documented;334 and 335 module tables separated; 335 table amended

Version 2.10
In Page 153: Tables amended to show details of registers and layout required for first expansion module for each set and summaries for subsequent modules of the same type; PLC functions numbered 1 to 20 and referred to as functions instead of alarms; Corrections to 3xx tables.
In Pages 158: Corrections to 335 tables.
In Page 160: PLC functions numbered 1 to 20 and referred to as functions instead of alarms; Registers reserved for 2130 expansion modules 4-9 added to 3xx table.
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In Page 180: Correction to 330/331/334, 335, and 332/333 tables.
In Page 190: Corrections to 335 tables.
In Pages 200-239: Correction to 7xxx reserved page numbers; Modification to 8xxx pages 208-213 for clarity; Corrections to 335 page 201 and 226 tables; PLC functions numbered 1 to 20 and referred to as functions strings for consistent terminology.
In Pages 240-246: Corrections to 335 pages 241-246 tables.
In Page 2:Re-instated modem dial back string

Version 2.11
In Page 6: Added derived instrumentation for 335

Version 2.12
Throughout: - all relevant descriptions changed from “7xxx” to "72xx/73xx" and from “8xxx” to "74xx/8xxx" to differentiate between 72xx/73xx and 74xx.

Version 2.13
Added Page 9 – Total Harmonic Distortion measurements (on 88xx/84xx only)

Version 2.14
Added notes 7 to section 8.2 - stating maximum allowable write frequency

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2. Introduction

The purpose of this standard is to provide a uniform protocol for communicating with any generating set control equipment. It allows all telemetry information relevant to a generating set to be read from the control equipment, regardless of manufacturer or specification, and allows basic operations such as starting and stopping the engine, transferring the load etc. to be performed remotely.

This standard does not define how to program the control equipment, or transfer manufacturer specific information such as configurations to or from the equipment.

This standard does not define the physical link, but is compatible with RS232, RS423, RS485, modem links or any similar system.

This standard uses the Modbus protocol, complete details of which can be found on the Modbus-IDA web site http://www.modbus-ida.org

3. General Definitions and Requirements

Notes

1. A single piece of generating set control equipment is referred to as a 'control unit'.
2. A control unit is always a slave device as defined in the Modbus protocol.
3. A PC, building management system or similar system is referred to as a 'master device' as defined in the Modbus protocol.
4. A hub is a device which connects a master device to one or more control units, to a master it appears as a slave and to a control unit it appears as a master.
5. A control unit connected to a hub is referred to as a satellite device of the hub.
6. The term 'slave device' refers either to a control unit or to a hub when it is viewed from a masters point of view.
7. The transmission mode used shall be RTU not ASCII.
8. The byte format over an RS485 link shall be 1 start bit, 8 data bits, no parity bit and 2 stop bits as defined by the Modbus protocol.
9. The byte format over an RS232 link to a modem or direct to a PC shall be 1 start bit, 8 data bits, no parity bit and 1 stop bit which is the de-facto standard for modems.
10. The baud rate used will be one of those listed in Page 1 - Communications Configuration.
11. Bus time-outs must be detected by the master, as defined in the Modbus protocol.
12. For details of the Unicode character representation refer to the Unicode standard version 2.0 published by the Unicode Consortium.
13. Unicode strings may contain the control code 0x000A which shall be interpreted as "move to the beginning of the next line down".
14. Any software that reads a Unicode string may either use the control code 0x000A to split the string into separate lines or may replace it with 0x0020 if it is desired to display the string on a single line, it must not be ignored as this may lead to the concatenation of words.
15. In this standard the term 'ASCII character' refers to an 8 bit character following the sub-set of Unicode from 0 to 255, it does not refer to any other published standard of character representation to avoid the ambiguities in such standards.
16. The form 0x12AB refers to a hexadecimal number, all other numbers are in decimal.
17. This document describes GenComm version 1, future upgrades of this standard will increase this version number by 1 and must be fully backwards compatible with all previous versions.
18. Any software written to interface with a GenComm version *n* slave device will be able to interface with a GenComm version *n*+1, *n*+2 etc. slave device without modification, and will be able to perform any operation defined in version *n*, but will not, of course, be able to perform functions added in later versions.
19. Any software written to interface with a GenComm version *n* slave devices will recognise a GenComm version *n*-1 slave device (from the 'Communications Status Information' page) and perform all operations defined in version *n*-1 on that slave device, it will not attempt to perform any operations added in later versions of GenComm on that slave device.

4. Hubs and Protocol Conversions

A hub may be designed to connect to satellite devices of one of 3 types, ones that recognise the GenComm protocol directly, ones that recognise another Modbus based protocol, or ones that use an entirely unrelated protocol. In the second and third cases the hub must provide protocol conversion which is not defined in this standard.

Notes

1. A hub recognises queries from a master device for a range of slave addresses, e.g. a hub with its own slave address set to 20 and 8 satellite sockets will recognise slave addresses 20 to 28. Address 20 corresponds to the hub itself, 21 to its first satellite socket, 22 to its second satellite socket, etc. The hub will respond to all these slave addresses even if there is no satellite connected to a particular satellite socket.
2. A hub will accept queries to its own slave address where appropriate, for example a hub may have some auxiliary digital inputs and outputs.
3. A valid password must be entered into a hub (at its own slave address) before any of its satellite devices or its own registers can be accessed in any way, thus the hub provides security for the entire installation via a single password.
4. A hub designed for GenComm satellites recognises a query from a master that has a slave address corresponding to one of its satellites, checks that the password privilege level is adequate for the specified operation, passes this query on to the satellite, and then returns any response back to the master.
5. A hub designed for other Modbus satellites recognises a query from a master that has a slave address corresponding to one of its satellites, checks that the password privilege level is adequate for the specified operation, converts the protocol as necessary, passes the query on to the satellite, and then returns any response with appropriate conversion. Note that such a hub may not be able to provide security for the satellite as it may not fully understand the satellites protocol, in which case it simply passes the message on regardless of password levels and delegates security to the satellite.
6. A hub designed for non-Modbus satellites must provide complete protocol conversion and must emulate the GenComm registers so that it appears to the master as a GenComm satellite. All security will also appear to work in exactly the same way as for a GenComm satellite.
7. For a description of password privilege levels refer to the Password status register in Page 1 - Communications configuration and status.
8. A hub designed for GenComm satellites will set the slave addresses of all satellites when it initialises, or of a particular satellite when it does not respond. For example a hub with slave address 20 will set its satellites to slave addresses 21, 22 etc. This is achieved without knowing the satellites current slave address by sending broadcast messages (slave address 0) to the satellite to set its slave address. This ensures that the hub will not have to convert the slave addresses in queries from a master or in responses from a satellite. This process can only function if the satellites passwords are completely disabled, which is normally the case for a satellite.
9. A hub designed for Modbus satellites may not be able to set the satellites slave address in this way, the addresses may have to be set manually on each satellite or the hub may have to convert the addresses in each query and response.
10. Although this standard talks about 'satellite sockets' the connection between a hub and satellite may be of any form, a single socket for each satellite, an RS485 bus with the hub as the master, or some other method.

5. Multiple Masters

GenComm is based on Modbus which is a protocol that is only intended for a simple single master network, therefore it does not support multiple masters accessing a slave simultaneously.

If a slave device has more than one interface that can act as a master, it must only serve one master at once. Whenever it changes masters it must completely re-initialise the status of the port, in particular it must clear the password status to 0 (Invalid) and the extended exception information to 0 (No error), thus ensuring that there can be no interaction between masters of any kind. Any master that makes a query while its port is not being served must either be answered by exception 6 (Slave device busy) whatever the query was, or not answered at all.

The mechanism used by a slave device to decide which master to serve is not defined in this standard, it may be a physical switch, a configuration option or an automatic switch using some mechanism to decide which master to serve. An example of an automatic switch would be a slave device that had an RS485 port to a building management system and an RS232 port to a modem, in this case it might be decided that whenever a modem link is established the RS485 port will be disabled and when the modem link was broken the RS485 port was re-enabled. In such a case it would have to be accepted that the RS485 port would be unavailable whenever the modem link was in use.

GenComm does not support multiple communications configurations for multiple master ports.

6. Exception Responses

Any function may return an exception response if it does not complete successfully, as define in the Modbus protocol.

Notes

1. The Modbus Protocol Reference Guide defines the meanings of exception codes 1 to 8 and the Open Modbus/TCP Specification defines error codes 10 and 11, but unfortunately these meanings are ambiguous, so cannot convey accurate information about the error. This standard, therefore, defines an extended exception code and exception address which can be read from the slave device at registers 0 and 1 respectively.
2. A slave device will only return exception code 1, 2 or 6 if a function fails, in the case of exceptions 1 and 2 the extended exception code and address should then be read to find more information about the exception.
3. The extended exception code will be set to the result of the last message, which implies that a successful read of this register will clear it, this occurs after the read has been performed.
4. The extended exception address will be set to the address of the register that caused the exception, or to 0 if inappropriate. This allows precise identification of the cause when reading or writing multiple registers.
5. The extended exception code and address must both be read by a single message, reading them individually would meaningless as they would each refer to different messages.
6. Extended exception codes 1-255 can be generated by any slave device but codes above 256 can only be generated by a hub.
7. Exception code 6 (Slave device busy) will be returned whenever a slave device is completely unable to reply to a query because it is occupied, in this case the extended exception codes cannot necessarily be read. An example of this is when a slave device is serving a master of a higher priority than the one that made the query.
8. In the case of a hub the extended exception registers contain the result of a query to the hub, they are not changed by a query to a satellite. The corresponding registers in the satellite must be read to obtain the result of such a query.

Exception response message

Byte	Field name	Notes
0	Slave address	
1	Function code +128	Top bit is set
2	Exception code	1 - Illegal function code 2 - Illegal data address 6 - Slave device busy
3-4	Error check CRC	

Extended exception codes

Exception code	Extended exception code	Extended exception name	Notes
Not applicable	0	No error	The last function completed successfully.
1	1	Function not defined	The function requested is not defined in this standard and is not recognised as a manufacturer specific function, no actions were taken
1	2	Function not implemented	The function is defined in this standard but not implemented on this slave device, no actions were taken. This will currently never be returned as both functions 3 and 16 must be implemented.
2	3	Register not defined	The register specified is not defined in this standard and is not recognised as a manufacturer specific register, no actions were taken
2	4	Register not implemented	The register specified is defined in this standard but not implemented on this slave device, no actions were taken. This will never be returned by function 3 as all defined registers must return an 'unimplemented' value, see the description of function 3 below. It may be returned by function 16 if a defined register is not implemented.
2	5	Read from a write only register	An attempt was made to read a write only register, no actions were taken..
2	6	Write to a read only register	An attempt was made to write to a read only register, the register was not changed and no actions were taken. If this occurred due to insufficient privilege then the 'insufficient privilege' exception will be returned instead
2	7	Illegal value written to register	An attempt was made to write a value that is not within the allowable range, the register was not changed and no actions were taken
1	8	Inappropriate circumstances	An operation was requested that is not appropriate in the present circumstances, for example a start attempt when a shutdown alarm is present.
1	9	Insufficient privilege	An operation was attempted without sufficient privilege, such as writing when the read only password has been entered.
6	10	Slave device too busy	The slave device was too busy to perform the operation, try it again later if it is still required. Note that it may not be possible to read the extended exception code in this situation.
1	11	Unsupported language	The selected language is not supported, the language has not been changed.
1	12	Reserved register	The specified register is defined as reserved in this standard
2	13	Block violation	The specified range of registers in invalid, no actions were taken. An attempt to read part of a state string would cause this error for example.
	14-255	Reserved	Reserved for future use in this standard
1	256	No satellite socket	Returned by a hub only. The specified satellite state is 'No socket'.
1	257	Satellite disabled	Returned by a hub only. The specified satellite state is 'Disabled'.
1	258	Satellite error	Returned by a hub only. The specified satellite state is 'Error'.
	259-32767	Reserved	Reserved for future use in this standard
1/2	32767-65535	Manufacturer specific error	An error occurred in a manufacturer specific operation either using register pages 128-255 or functions other than 3 and 16. The meaning of these exception codes is manufacturer specific, any software not knowing the meaning for a particular slave must print the message 'Manufacturer specific error n' where n is the exception code.

7. Modbus Functions Used

This standard only uses Modbus functions 3 and 16 as recommended in the Open Modbus/TCP Specification draft 2.

Notes:

1. Any other functions may be implemented if required, for example for configuration of the slave device, but are not defined in this standard.
2. Any device which requires other functions to be implemented in order to perform a task which can be performed by function 3 or 16 is deemed to be non-compliant with this standard.

Functions used

Function number	Function name	Defined by Modicon	Notes
03	Read multiple registers	Yes	Reads one or more registers.
16	Write multiple registers	Yes	Writes one or more registers.

8. Description of Each Function

8.1 Function 3 - Read Multiple Registers

Reads one or more 16 bit registers from the slave device.

Notes:

1. The limit of 125 registers is to comply with the Modbus specification which requires that a message must not exceed 256 bytes including all fields.
2. Any request for a register that is defined in this standard must return a normal response, if the register is not implemented by a particular product it must return the unimplemented value from the table below to indicate this fact, it must not return an exception.
3. A request for a register that is defined in this standard as contain some unimplemented bits must return a normal response, the unimplemented bits will contain the unimplemented value from the table below.
4. A request for a register that is defined in this standard as unimplemented will return the unimplemented value from the table below.
5. A request for a register that is defined as reserved in this standard will return extended exception code 12 (Reserved register).
6. A read from a multi-register value such as a 32 bit value or a string must be performed by a single message, not by multiple ones. This avoids the possibility of a value being partly current and partly old data.
7. The instrumentation values can return the sentinel values described in the table below to indicate a value that is over or under the measurable range, that a transducer is faulty, that the data is bad for some other reason or that the transducer is actually a digital type.
8. The sentinel value ‘high digital input’ means that the instrumentation value is high (high oil pressure, high temp, etc), similarly 'Low digital input' means the instrumentation value is low. They do not refer to voltage levels on the inputs.

Query message

Byte	Field name	Notes
0	Slave address	
1	Function code (3)	
2	First register address - high byte	16 bit register address
3	First register address - low byte	
4	Number of registers to read - high byte	16 bit number of registers, must be in the range 1 to 125
5	Number of registers to read - low byte	
6/7	Error check CRC	

Normal response message

Byte	Field name	Notes
0	Slave address	
1	Function code (3)	
2	Byte count (n)	8 bit even number in the range 2 to 250 (number of registers *2)
3	First register - high byte	16 bit register
4	First register - low byte	
…		
1+n	Last register - high byte	16 bit register
2+n	Last register - low byte	
3+n/4+n	Error check CRC	

Exception response message

Byte	Field name	Notes
0	Slave address	
1	Function code +128 (131)	Top bit is set
2	Exception code	1 - Illegal function code 2 - Illegal data address 6 - Slave device busy
¾	Error check CRC	

Unimplemented register and field values

Size of register	Value returned	Notes
1 bit flag within a register	0	No third state exists for a flag to indicate it is not valid
2 bit named digital input/output code	3	Unimplemented input/output
4 bit alarm condition codes	0xF	Unimplemented alarm
4 bit LED colour code	0xF	Unimplemented LED
16 bit unsigned, any scale	0xFFFF	The largest number
16 bit signed, any scale	0x7FFF	The largest positive number
32 bit unsigned, any scale	0xFFFFFFFF	The largest number
32 bit signed, any scale	0x7FFFFFFF	The largest positive number
ASCII strings	“ ”	A string of spaces (Unicode 0x0020), NULL terminators are not used
Unicode strings	“ ”	A string of spaces (Unicode 0x0020), NULL terminators are not used

Sentinel values for instrumentation

Size of register	Sentinel values	Notes
16 bit unsigned, any scale	0xFFFF	Unimplemented
	0xFFFE	Over measurable range
	0xFFFD	Under measurable range
	0xFFFC	Transducer fault
	0xFFFB	Bad data
	0xFFFA	High digital input
	0xFFF9	Low digital input
	0xFFF8	Reserved
16 bit signed, any scale	0x7FFF	Unimplemented
	0x7FFE	Over measurable range
	0x7FFD	Under measurable range
	0x7FFC	Transducer fault
	0x7FFB	Bad data
	0x7FFA	High digital input
	0x7FF9	Low digital input
	0x7FF8	Reserved
32 bit unsigned, any scale	0xFFFFFFFF	Unimplemented
	0xFFFFFFFE	Over measurable range
	0xFFFFFFFD	Under measurable range
	0xFFFFFFFC	Transducer fault
	0xFFFFFFFB	Bad data
	0xFFFFFFFA	High digital input
	0xFFFFFFF9	Low digital input
	0xFFFFFFF8	Reserved
32 bit signed, any scale	0x7FFFFFFF	Unimplemented
	0x7FFFFFFE	Over measurable range
	0x7FFFFFFD	Under measurable range
	0x7FFFFFFC	Transducer fault
	0x7FFFFFFB	Bad data
	0x7FFFFFFA	High digital input
	0x7FFFFFF9	Low digital input
	0x7FFFFFF8	Reserved

8.2 Function 16 - Write Multiple Registers

Writes one or more 16 bit registers to the slave device.

Notes:

1. The limit of 123 registers is to comply with the Modbus specification which requires that a message must not exceed 256 bytes including all fields.
2. A write to a register that is defined in this standard but not implemented on this slave device will return extended exception 4 (Register not implemented) and have no other affect.
3. A write to a register that is defined in this standard as unimplemented will return extended exception 4 (Register not implemented) and have no other affect.
4. A write to a register that is defined in this standard as containing some unimplemented bits will only affect the implemented bits, the state of the unimplemented bits is irrelevant.
5. An attempt to write to a register that is defined as reserved in this standard will return extended exception code 12 (Reserved register) and have no other affect.
6. A write to a multi-register value such as a 32 bit value, a password or a string must be performed by a single message, not by multiple ones. This avoids the possibility of a value being partly current and partly old data.
7. The maximum allowable writing frequency to modbus registers should be limited to 10 times per second, to prolong the life of the module it is recommended that registers are only written to when their value needs to be changed (avoid writing the same data repeatedly).

Query message

Byte	Field name	Notes
0	Slave address	
1	Function code (16)	
2	First register address - high byte	16 bit register address
3	First register address - low byte	
4	Number of registers to write - high byte	16 bit number of registers, must be in the range 1 to 123
5	Number of registers to write - low byte	
6	Byte count (n)	8 bit even number in the range 2 to 246 (number of registers *2)
7	First register - high byte	16 bit register
8	First register - low byte	
…		
5+n	Last register - high byte	16 bit register
6+n	Last register - low byte	
7+n/8+n	Error check CRC	

Normal response message

Byte	Field name	Notes
0	Slave address	
1	Function code (16)	
2	First register address - high byte	16 bit register address
3	First register address - low byte	
4	Number of registers written - high byte	16 bit number of registers, must be in the range 1 to 123
5	Number of registers written - low byte	
6/7	Error check CRC	

Exception response message

Byte	Field name	Notes
0	Slave address	
1	Function code +128 (144)	Top bit is set
2	Exception code	1 - Illegal function code 2 - Illegal data address 6 - Slave device busy
3/4	Error check CRC	

9. Language Codes

Notes:

1. Language codes follow the Windows definition, the primary language code is stored in the least significant 10 bits and the sub-language code is stored in the most significant 6 bits of the 16 bit language code.
2. Microsoft add to this list periodically but have reserved sections of the list for custom languages and sub-languages. Primary language codes 0x200-0x3FF can be used for additional languages and sub-language codes 0x20-0x3F can be used for additional dialects of a primary languages but these should only be used where none of the defined codes is appropriate.

Language codes

Primary language	Sub-language	Primary language code	Sub-language code	Language code
Neutral	Neutral	0x00	0x00	0x0000
Arabic	Saudi Arabia	0x01	0x01	0x0401
	Iraq		0x02	0x0801
	Egypt		0x03	0x0C01
	Libya		0x04	0x1001
	Algeria		0x05	0x1401
	Morocco		0x06	0x1801
	Tunisia		0x07	0x1C01
	Oman		0x08	0x2001
	Yemen		0x09	0x2401
	Syria		0x0A	0x2801
	Jordan		0x0B	0x2C01
	Lebanon		0x0C	0x3001
	Kuwait		0x0E	0x3401
	United Arab Emerates		0x0E	0x3801
	Bahrain		0x0F	0x3C01
	Qatar		0x10	0x4001
Bulgarian	Standard	0x02	0x01	0x0402
Catalan	Standard	0x03	0x01	0x0403
Chinese	Taiwan	0x04	0x01	0x0404
	Peoples Republic		0x02	0x0804
	Hong Kong		0x03	0x0C04
	Singapore		0x04	0x1004
	Macau		0x05	0x1405
Czech	Standard	0x05	0x01	0x0405
Danish	Standard	0x06	0x01	0x0406
German	Standard	0x07	0x01	0x0407
	Swiss		0x02	0x0807
	Austrian		0x03	0x0C07
	Luxembourg		0x04	0x1007
	Liechtenstein		0x05	0x1407
Greek	Standard	0x08	0x01	0x0408

Language codes continued

Primary language	Sub-language	Primary language code	Sub-language code	Language code
English	United states	0x09	0x01	0x0409
	United kingdom		0x02	0x0809
	Australia		0x03	0x0C09
	Canada		0x04	0x1009
	New Zealand		0x05	0x1409
	Ireland		0x06	0x1809
	South Africa		0x07	0x1C09
	Jamaica		0x08	0x2009
	Caribbean		0x09	0x2409
	Belize		0x0A	0x2809
	Trinidad		0x0B	0x2C09
	Zimbabwe		0x0C	0x3009
	Philippines		0x0D	0x3409
Spanish	Traditional	0x0A	0x01	0x040A
	Mexican		0x02	0x080A
	Modern		0x03	0x0C0A
	Guatemala		0x04	0x100A
	Costa Rica		0x05	0x140A
	Panama		0x06	0x180A
	Dominican Republic		0x07	0x1C0A
	Venezuela		0x08	0x200A
	Colombia		0x09	0x240A
	Peru		0x0A	0x280A
	Argentina		0x0B	0x2C0A
	Ecuador		0x0C	0x300A
	Chile		0x0D	0x340A
	Uruguay		0x0E	0x380A
	Paraguay		0x0F	0x3C0A
	Bolivia		0x10	0x400A
	El Salvador		0x11	0x440A
	Honduras		0x12	0x480A
	Nicaragua		0x13	0x4C0A
	Puerto Rico		0x14	0x500A
Finnish	Standard	0x0B	0x01	0x040B
French	Standard	0x0C	0x01	0x040C
	Belgian		0x02	0x080C
	Canadian		0x03	0x0C0C
	Swiss		0x04	0x100C
	Luxembourg		0x05	0x140C
	Monaco		0x06	0x180C
Hebrew	Standard	0x0D	0x01	0x040D
Hungarian	Standard	0x0E	0x01	0x040E
Icelandic	Standard	0x0F	0x01	0x040F
Italian	Standard	0x10	0x01	0x0410
	Swiss		0x02	0x0810
Japanese	Standard	0x11	0x01	0x0411
Korean	Extended Wansung	0x12	0x01	0x0412
	Johab		0x02	0x0812
Dutch	Standard	0x13	0x01	0x0413
	Belgian		0x02	0x0813
Norwegian	Bokmal	0x14	0x01	0x0414
	Nynorsk		0x02	0x0814

Language codes continued

Primary language	Sub-language	Primary language code	Sub-language code	Language code
Polish	Standard	0x15	0x01	0x0415
Portuguese	Brazilian	0x16	0x01	0x0416
	Standard		0x02	0x0816
Rhaeto-romanic	Standard	0x17	0x01	0x0417
Romanian	Standard	0x18	0x01	0x0418
	Moldavia		0x02	0x0818
Russian	Standard	0x19	0x01	0x0419
	Moldavia		0x02	0x0819
Croatian	Standard	0x1A	0x01	0x041A
Serbian	Latin	0x1A	0x02	0x081A
	Cyrillic		0x03	0x0C1A
Slovak	Standard	0x1B	0x01	0x041B
Albanian	Standard	0x1C	0x01	0x041C
Swedish	Standard	0x1D	0x01	0x041D
	Finland		0x02	0x081D
Thai	Standard	0x1E	0x01	0x041E
Turkish	Standard	0x1F	0x01	0x041F
Urdu	Standard	0x20	0x01	0x0420
Indonesian	Standard	0x21	0x01	0x0421
Ukrainian	Standard	0x22	0x01	0x0422
Byelorusian	Standard	0x23	0x01	0x0423
Slovenian	Standard	0x24	0x01	0x0424
Estonian	Standard	0x25	0x01	0x0425
Latvian	Standard	0x26	0x01	0x0426
Lithuanian	Standard	0x27	0x01	0x0427
	Classic		0x02	0x0827
Reserved		0x28		0x0428
Farsi	Standard	0x29	0x01	0x0429
Vietnamese	Standard	0x2A	0x01	0x042A
Reserved		0x2B		0x042B
Reserved		0x2C		0x042C
Basque	Standard	0x2D	0x01	0x042D
Sorbian	Standard	0x2E	0x01	0x042E
Macedonian	Standard	0x2F	0x01	0x042F
Sutu	Standard	0x30	0x01	0x0430
Tsonga	Standard	0x31	0x01	0x0431
Tswana	Standard	0x32	0x01	0x0432
Venda	Standard	0x33	0x01	0x0433
Xhosa	Standard	0x34	0x01	0x0434
Zulu	Standard	0x35	0x01	0x0435
Afrikaans	Standard	0x36	0x01	0x0436
Reserved		0x37		0x3700
Faeroese	Standard	0x38	0x01	0x0438
Hindi	Standard	0x39	0x01	0x0439
Maltese	Standard	0x3A	0x01	0x043A

Language codes continued

Primary language	Sub-language	Primary language code	Sub-language code	Language code
Sami (Lapland)	Standard	0x3B	0x01	0x043B
Scots Gaelic	Standard	0x3C	0x01	0x043C
Reserved		0x3D		0x043D
Malay	Standard	0x3E	0x01	0x043E
	Brunei Darussalam		0x02	0x083E
Reserved		0x3F		0x043F
Reserved		0x40		0x0440
Swahili	Standard	0x41	0x01	0x0441
Reserved		0x42-0x1FF		
Custom languages		0x200-0x3FF		0x0200-0x03FF
Custom language	English for pumps	0x20	0x00	0x0200

10. Modbus Registers Defined

Notes:

1. The register array is divided into 256 pages each containing up to 256 registers, the actual register address is obtained from the formula: register_address=page_number*256+register_offset.
2. All unused parts of pages 0-127 are defined as reserved for expansion of this standard, any attempt to access them will result in an exception response with extended exception code 12 (Reserved register).
3. Pages 128-255 are available for manufacturer specific applications such as configuration of the control equipment, these are not defined by this standard.
4. Any device which requires registers in pages 128-255 to be implemented in order to perform a task which can be performed by registers defined in this standard is deemed to be non-compliant with this standard.
5. This document always refers to register addresses which start at 0 as defined in the Modbus protocol. Register numbers, which start at 1, are not used in this document in order to avoid confusion.
6. The additional instrumentation pages are to be defined.
7. S.M. means state machine.
8. A letter S in the bits/sign column indicates a signed value using two's compliment arithmetic, all others are unsigned.
9. A double number in the bits/sign column indicates a bit within a register of a specific size e.g. 16/16 is the most significant bit and 1/16 is the least significant bit of a 16 bit register.
10. Bits within registers are numbered from 1 not 0 to avoid the confusion that would be caused if the sixteenth bit of a 16 bit register were labelled 15/16.
11. For an integer type register the register contents should be multiplied by the scaling factor to obtain the actual value.
12. For a flag type register (1 bit) the minimum value column indicates the meaning if the flag is 0, the maximum column indicates the meaning if the flag is 1.
13. For an integer type register the minimum and maximum value columns indicate the minimum and maximum values after multiplying by the scaling factor.
14. Any software that reads an integer type register must be able to process and display correctly over the full range specified in the minimum and maximum value columns.
15. 32 bit values are stored with the most significant bits in the register with the lowest address.
16. Where two ASCII characters are stored in a single register the first character is in the most significant bits.
17. The first register of a 32 bit number is always aligned at an even address for the benefit of some 32 bit CPUs.

10.1 Index of Register Pages

Page number	Description	Read/write
0	Communications status information	Read only
1	Communications configuration	Read/write and write only
2	Modem configuration	Read/write
3	Generating set status information	Read only
4	Basic instrumentation	Read only
5	Extended instrumentation	Read only
6	Derived Instrumentation	Read only
7	Accumulated Instrumentation	Read/write
8	Alarm conditions	Read only
9	Total Harmonic Distortion information	Read only
10	Reserved	
11	Diagnostic - general	Read only
12	Diagnostic - digital inputs	Read only
13	Diagnostic - digital outputs	Read only and read write
14	Diagnostic - LEDs	Read only and read write
15	Diagnostic - Reserved	
16	Control registers	Read only and write only
17	J1939 active diagnostic trouble codes in decoded format	Read only
18	J1939 active diagnostic trouble codes in raw format	Read only
19	Reserved	
20	Various strings	Read only
24	Identity strings	Read/write
26	State machine name strings	Read only
28	State machine state strings	Read only
29-31	Reserved	

Index of register pages continued

32-95	Alarm strings (Old alarm system)	Read only
32-36	2131 Expansion module name strings	Read only
37-40	2133 Expansion module name strings	Read only
41-43	2152 Expansion module name strings	Read only
44-48	2131 Expansion module digital alarm strings	Read only
49-58	2131 Expansion module analogue alarm strings	Read only
59-66	2133 Expansion module analogue alarm strings	Read only
142	ECU Trouble Codes	Read only
143-149	ECU Trouble Code short description string	Read only
152	User calibration of expansion module analogue inputs	Read/write
153	Unnamed alarm conditions	Read only
154	Named Alarm Conditions	Read only
156	Expansion module enable status	Read only
158	Expansion module communications status	Read only
160	Unnamed input function	Read only
166-169	User configurable pages	Read only
170	Unnamed input status	Read only
171	Unnamed input status continued	Read only
180	Unnamed output sources & polarities	Read only
181	Unnamed output sources & polarities continued	Read only
182	Virtual output sources & polarities	Read only
183	Configurable output sources & polarities	Read only
184	Analogue output sources, types and values	Read only
190	Unnamed output status	Read only
191	Virtual output status	Read only
192	Configurable output status	Read only
193	Remote control sources	Read/write
200-239	Unnamed alarm strings	Read only
240-246	Analogue Input Name Strings	Read only
250	Misc strings	Read only
251-255	Reserved	

10.2 Page 0 - Communications Status Information

Notes:

1. These are read only registers.
2. Registers 0 and 1 must both be read with a single message for them to be meaningful since they are set after each message.
3. Registers 2 and 3 contain copies of the telemetry alarm flags of all satellites so that the satellite that caused a dial out can be ascertained without reading the telemetry alarm flags from all the satellites individually. This register is not latched, clearing the telemetry alarm flag of a satellite will clear the corresponding bit in these registers when the hub updates them. The hub will not assume that sending a system control message to a satellite to clear its telemetry alarm flag will necessarily succeed, instead it builds registers 2 and 3 by reading the state of all the satellites telemetry alarm flags periodically.
4. Registers 4 and 5 contain communication error flags for all the satellites. A flag is set if, and only if, the corresponding satellite socket is fitted, it is enabled by the corresponding 'satellite socket enable flag' in page 1 - Communications Configuration, and the hub is not able to communicate successfully with the satellite for any reason.
5. If any communication error flag changes from 0 to 1 the hub's telemetry alarm flag will be set and so cause a dial out if a modem is connected with dial out enabled, the satellites telemetry alarm flag in register 2 or 3 will not be set since this would contradict its non-latching operation as described in note 3 above. A system control function must be used to clear the hub's telemetry alarm flag before the connection is broken or the dial out will be repeated.
6. The meaning of the password status is shown in the table below.
7. If the password status is 0 (no valid password) then it is not possible to read the extended exception information..
8. If the number of satellite sockets is 1-32 the unit is a hub, otherwise it is not. A hub with 8 sockets, for example, returns a value of 8 regardless of what is actually plugged into the sockets or what the satellites state is, and will always respond to 8 consecutive slave addresses starting with its own slave address +1.
9. The GenComm version number allows a master to recognise the version of GenComm supported by a slave device and act accordingly. 72xx/73xx modules are identified by the GenComm version of 2, 53xx/55xx etc modules have a GenComm version of 1.
10. Registers 10 and 11 contain flags that indicate the available baud rates, bit 1 corresponds to baud rate code 0 etc. If a bit is set the corresponding Baud rate is available.
11. The list of language codes that are available on a particular slave device can be obtained by first reading the number of languages available and then reading that number of registers from the beginning of the list of language codes available. Reading any further registers from the list will return the unimplemented register value 0xFFFF. The order of the language codes in the list has no significance and no assumptions should be made.

Registers

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ sign
0	Extended exception code	0	65535			16
1	Extended exception address	0	65535			16
2	Telemetry alarm flag for satellite 1	0	1			16/16
	Telemetry alarm flag for satellite 2	0	1			15/16
	Telemetry alarm flag for satellite 3	0	1			14/16
	Telemetry alarm flag for satellite 4	0	1			13/16
	Telemetry alarm flag for satellite 5	0	1			12/16
	Telemetry alarm flag for satellite 6	0	1			11/16
	Telemetry alarm flag for satellite 7	0	1			10/16
	Telemetry alarm flag for satellite 8	0	1			9/16
	Telemetry alarm flag for satellite 9	0	1			8/16
	Telemetry alarm flag for satellite 10	0	1			7/16
	Telemetry alarm flag for satellite 11	0	1			6/16
	Telemetry alarm flag for satellite 12	0	1			5/16
	Telemetry alarm flag for satellite 13	0	1			4/16
	Telemetry alarm flag for satellite 14	0	1			3/16
	Telemetry alarm flag for satellite 15	0	1			2/16
	Telemetry alarm flag for satellite 16	0	1			1/16
3	Telemetry alarm flag2 for satellites 17-32	0	65535			16
4	Communication error flag for satellite 1	0	1			16/16
	Communication error flag for satellite 2	0	1			15/16
	Communication error flag for satellite 3	0	1			14/16
	Communication error flag for satellite 4	0	1			13/16
	Communication error flag for satellite 5	0	1			12/16
	Communication error flag for satellite 6	0	1			11/16
	Communication error flag for satellite 7	0	1			10/16
	Communication error flag for satellite 8	0	1			9/16
	Communication error flag for satellite 9	0	1			8/16
	Communication error flag for satellite 10	0	1			7/16
	Communication error flag for satellite 11	0	1			6/16
	Communication error flag for satellite 12	0	1			5/16
	Communication error flag for satellite 13	0	1			4/16
	Communication error flag for satellite 14	0	1			3/16
	Communication error flag for satellite 15	0	1			2/16
	Communication error flag for satellite 16	0	1			1/16
5	Communication error flags for satellites 17-32	0	65535			16
6	Password status	0	3			16
7	Number of satellite sockets available	0	32			16
8	Number of languages available for telemetry	0	128			16
9	GenComm version number	1	2			16
10-11	Baud rates available	0				32
12-127	Reserved					
128-255	List of language codes available	0	65534			16

Password status

Status	Meaning
0	No valid password has been entered, no operations can be performed on the slave device except writing a password using function 16 (write multiple registers). In the case of a hub no queries will be passed to its satellites at all.
1	A valid read password has been entered, all readable registers (including manufacturer specific ones above page 127) can be read on the slave device using function 3 (read multiple registers). All write operations using function 16 (write multiple registers) and all non-GenComm functions (those other than 3 and 16) are blocked. In the case of a hub only queries using function 3 (read multiple registers) will be passed to its satellites.
2	A valid control password has been entered, as level 1 except that all registers in page 16 (control registers) can be written to in the slave device using function 16 (write multiple registers). In the case of a hub only queries using function 3 (read multiple registers), and function 16 (write multiple registers) to registers in page 16, will be passed to its satellites.
3	A valid configure password has been entered, as level 1 except that all writeable registers (including manufacturer specific ones above page 127) can be written to in the slave device, and all non-GenComm functions (those other than 3 and 16) can be used for configuration of the slave device. In the case of a hub all queries will be passed to a satellite. The configuration of units using non-GenComm functions is not defined in this standard.

10.3 Page 1 - Communications Configuration

Notes:

1. These are a mixture of read/write and write only registers (except on 72xx/73xx where registers 0-9 are read-only, not read/write).
2. The current slave address is fixed at 10 in the case of an RS232 link to a modem, or direct to a PC, since there is no point in changing a slave address on a 1 to 1 link. Address 10 was chosen so that that satellite 1 has slave address 1 etc. Register 0 specifies the current slave address in all other cases.
3. The site identity code is user definable and is used to identify a site.
4. The device identity code is user definable and is used to identify a device within a site.
5. The meaning of the baud rate is shown in the table below, a slave device may not necessarily support all baud rates, writing an unsupported value will return extended exception 7 (Illegal value written to register) and will not change the Baud rate. Some systems may not allow the Baud rate to be changed at all, it may be set by switches or from a user interface for example. The baud rates available on a particular slave can be obtained by reading a register in the communications status page.
6. The current language applies only to strings read by telemetry, it is quite separate from the language selected for any user interface on the unit. The meaning of the code is defined in the language codes section.
7. The satellite socket enable flags allow each satellite socket to be enabled or disabled, a socket that is fitted but not in use must be disabled or the hub will think that the lack of response indicates a problem and set the corresponding satellite error flag and telemetry alarm flag. The enable flag for a socket that is not fitted will always be 0, any attempt to set it will be ignored.
8. The master inactivity time-out is used to detect the loss of communication from the master, if a query is not received for this period the slave device assumes the link to the master has been lost. The link is assumed to have been established as soon as a query arrives from the master.
9. The password time-out is used to disable the password automatically, if a valid password is not written for this period the password status will be set to 0 (invalid) or the highest disabled password level.
10. The display unit connected to module indicates which type of unit is connected to the 8700. A zero value indicates there is no display unit connected and the module is locked.

Notes on passwords:

1. Passwords are intended to control access to control equipment via telemetry, they are not necessarily the same as passwords used to access the same equipment from a user interface. Such user interfaces are not defined in this standard in any way.
2. Passwords are 4 digit numbers similar to 'PIN numbers' which are widely accepted and easier to enter via a limited user interface than alphanumeric strings.
3. One of the 3 valid passwords is written into register 32 and its ones-compliment written into register 33 with a single function 16 (write multiple registers) to set the current password status.
4. The password status in the communications status information page indicates which level of access has been granted, when the password times out the status becomes 0 (invalid) or the highest disabled password level.
5. Entering a password that does not match one of the 3 valid passwords will cause the password status to be set to 0 (invalid) or the highest disabled password level and return extended exception 7 (Illegal value written to register)
6. The password status can be cleared to 0 (invalid) or the highest disabled password level either by writing a password that is known to be invalid or by writing any value to register 32 without writing to register 33.
7. If an invalid password is entered 3 times the slave device will then reject any further attempt to enter a password for a 1 minute lockout period, returning extended exception 8 (Inappropriate circumstances) at the third attempt (so it is immediately clear what has happened) and whenever a further attempt is made to enter a password during the lockout period. The password lockout period will double after every 3 unsuccessful attempts to enter a password, up to a maximum of 64 minutes, thus minimising the risk of a deliberate attack being able to find a valid password. When a valid password is entered the count of invalid entries will be reset to 0. The count of invalid entries and the current lockout timer will not be reset by loss of the communication link as it would be possible for an attacker to drop the link to reset them and then immediately re-establish the link.
8. When the link to a master is lost (a phone line is dropped or the master inactivity timer expires for example) the password status is set to 0 (invalid) or the highest disabled password level.
9. The 'read only' password is changed by writing the new value to register 34 and its ones-compliment to register 35 with a single function 16 (write multiple registers), any other operation will fail to change the password and return extended exception 7 (Illegal value written to register). The 'control' and 'configure' passwords are changed in the same way using the appropriate registers. The current 'configure' password must have been entered before any passwords can be changed.
10. If a password is changed to 0000 then that password level will be disabled, the password status will then default to the highest level that is disabled rather than 0 when an invalid password is entered, the password times out or the link to the master is lost. Even if one or more of the passwords has been changed to 0000, any attempt to write a password of 0000 to register 32 and 33 will be treated exactly as if an invalid password was entered.
11. A hub is intended to provide security for all its satellites using its own passwords, thus avoiding the complexity of managing passwords in every satellite separately, to facilitate this each satellite must have all its passwords disabled by setting them to 0000. If this is not done it is not possible to enter any password into a satellite unless the configure password is entered into the hub first, this is necessary to simplify the message filtering mechanism needed in the hub but is not a problem if the hub is used to provide security to the satellites as intended.

Registers

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ sign	Read/write
0	Current slave address	1	247			16	Read/write
1	Site identity code	0	65534			16	Read/write
2	Device identity code	0	65534			16	Read/write
3	Baud rate	0	12			16	Read/write
4	Current language code	0	65534			16	Read/write
5	Unimplemented	0xFFFF	0xFFFF			16	Read only
6	Satellite socket 1 enable flag	0	1			16/16	Read/write
	Satellite socket 2 enable flag	0	1			15/16	Read/write
	Satellite socket 3 enable flag	0	1			14/16	Read/write
	Satellite socket 4 enable flag	0	1			13/16	Read/write
	Satellite socket 5 enable flag	0	1			12/16	Read/write
	Satellite socket 6 enable flag	0	1			11/16	Read/write
	Satellite socket 7 enable flag	0	1			10/16	Read/write
	Satellite socket 8 enable flag	0	1			9/16	Read/write
	Satellite socket 9 enable flag	0	1			8/16	Read/write
	Satellite socket 10 enable flag	0	1			7/16	Read/write
	Satellite socket 11 enable flag	0	1			6/16	Read/write
	Satellite socket 12 enable flag	0	1			5/16	Read/write
	Satellite socket 13 enable flag	0	1			4/16	Read/write
	Satellite socket 14 enable flag	0	1			3/16	Read/write
	Satellite socket 15 enable flag	0	1			2/16	Read/write
	Satellite socket 16 enable flag	0	1			1/16	Read/write
7	Satellite socket 17-32 enable flags	0	65535			16	Read/write
8	Master inactivity time-out, 0 means never time-out	0	36,000	0.1	Seconds	16	Read/write
9	Password time-out, 0 means never time-out	0	36,000	0.1	Seconds	16	Read/write
10-31	Reserved						
32	Current password	0	9999	1		16	Write only
33	Compliment of current password	55536	65535	1		16	Write only
34	Set new read only password	0	9999	1		16	Write only
35	Compliment of new read only password	55536	65535	1		16	Write only
36	Set new control password	0	9999	1		16	Write only
37	Compliment of new control password	55536	65535	1		16	Write only
38	Set new configure password	0	9999	1		16	Write only
39	Compliment of new configure password	55536	65535	1		16	Write only
40	Display unit type connected to module	0	65535	1		16	Read only
41-255	Reserved						

Baud rate

Code	Rate
0	110
1	150
2	300
3	600
4	1200
5	2400
6	4800
7	9600
8	14400
9	19200
10	28800
11	38400
12	57600
13	115200
14-99	Reserved

10.4 Page 2 - Modem Configuration

Notes

1. These are read/write registers (except on 72xx/73xx where they are read-only & only updated by writing a configuration file).
2. Modem control strings can contain any ASCII characters and are padded with spaces (ASCII 0x20), NULL terminators are not used.
3. Each string is automatically suffixed with <CR><LF> so these should not be included in the string, strings are not automatically prefixed with 'AT' so these must be included when required.
4. A string may contain a meta character consisting of 3 tildes (~~~) which indicates that a pause of 1 second should be introduced before the rest of the string is sent to the modem. This meta character may be repeated if longer delays are required. The tildes will not be sent to the modem.
5. If a dialling string contains only spaces (ASCII 0x20) it will not be used in the dialling sequence.
6. The meaning of the modem's mode is described in the table below.
7. The modem dial back string can be used by a master to call the slave device, it is never used by the slave device..
8. The SMS enable flag enables the transmission of SMS messages over a GSM modem, the method of transmission, circumstances that trigger a transmission and contents of the messages are not defined in this standard.
9. The SMS message centre number and recipient number are in the same format as the other modem control strings and are only used when the SMS system is activated by the SMS enable flag, their use is not defined in this standard.

Registers

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ sign
0	Modem mode	0				16
1	Connect delay time	1	60	1	Seconds	16
2	Number of retries on each number	0	99	1		16
3	Delay between retries	0	60	1	Seconds	16
4	Delay before repeat cycle	0	3600	1	Seconds	16
5	Short message service (SMS) enabled	No	Yes			16
6-63	Reserved					
64-79	First dialling string	ASCII	ASCII			256
80-95	Second dialling string	ASCII	ASCII			256
96-111	Third dialling string	ASCII	ASCII			256
112-127	Fourth dialling string	ASCII	ASCII			256
128-143	Modem initialisation string - not auto-answer	ASCII	ASCII			256
144-159	Modem initialisation string - auto-answer	ASCII	ASCII			256
160-175	Modem hang-up string	ASCII	ASCII			256
176-191	Modem dial back string	ASCII	ASCII			256
192-207	Short message service (SMS) message center number	ASCII	ASCII			256
208-223	Short message service (SMS) recipient number 1	ASCII	ASCII			256
224-239	Short message service (SMS) recipient number 2	ASCII	ASCII			256
240-255	Short message service (SMS) recipient number 3	ASCII	ASCII			256

Modem mode

Mode	Meaning
0	No modem fitted.
1	Answer incoming calls, do not dial out.
2	Answer incoming calls and dial out when the telemetry alarm flag is set. Use the dialling strings in sequence separated by the delay between retries, then repeat the sequence for the specified number of retries. If connection has not been established wait for the delay between repeat cycles and then repeat the cycle. If connection is made and broken without clearing the telemetry alarm flag then repeat the previous sequence.
3	As mode 2 but the first dialling string will be used for the specified number of retries then the second string will be used etc.
4	As mode 2 but do not answer incoming calls.
5	As mode 3 but do not answer incoming calls

10.5 Page 3 - Generating Set Status Information

Notes:

1. These are read only registers.
2. A unique manufacturer code is assigned to each manufacturer.
3. The meaning of the model number is manufacturer specific, e.g. two manufacturers may have a model 100.
4. The manufacturer code and model number must be used together to identify a particular product unambiguously.
5. The meaning of the control mode is shown in the table below.
6. The shutdown flag on a control unit indicates that one or more of the alarm codes has been set to 'shutdown alarm', it will clear automatically when no alarm codes are set to shutdown alarm. A system control function is used to clear shutdown alarms. In some situations it may not be possible to set one of the alarm codes to indicate the type of shutdown alarm because the type is not known, in this case only the shutdown flag will be set and the master should consider it an undefined shutdown alarm.
7. The shutdown alarm flag on a hub indicate that state of the hub itself, not the state of any satellite. The state of a satellite must be read from the satellite itself.
8. The electrical trip and warning alarm flags operate in the same way as the shutdown alarm flag but for the corresponding alarm codes.
9. The telemetry alarm flag on a control unit is set when the control unit decides that a dial-out is required, the logic behind this is product specific. It can only be cleared by a system control function.
10. The telemetry alarm flag on a hub is only set if the hub itself has a problem, and can only be cleared by a system control function. It is edge triggered i.e. once it is cleared it will not be set unless the internal error is cleared and then happens again. An example of a situation that will set this flag is if the hub loses communication with a satellite.
11. The satellite telemetry alarm flag is the OR of all the satellite telemetry alarm flags in the 'telemetry status and configuration' page and indicates that one or more satellites requires servicing.
12. Whenever the telemetry alarm flag (or one of the satellite telemetry alarm flags in the case of a hub) is set it will cause continual dial outs if a modem is fitted and dial out is enabled.
13. The meaning of the state machine status is described in the table below.
14. The string checksum is the sum of every character in every fixed string in the slave device, it is used to detect the substitution of a slave device that differs only in its strings and thus check the validity of any copies of these strings held by a master. This number must not change during the normal operation of the slave device. The exact method of calculating the checksum must not be assumed and it must not be compared with a checksum generated my a master, it must only be compared with a previously read checksum to determine change.
15. The state machine state (registers 18-25) indicate the current state of each state machine, the conversion between state code and string is specific to each model and not covered in this document, refer to DSE for documentation.

Registers

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ sign
0	Manufacturer code	0	65534	1		16
1	Model number	0	65534	1		16
2-3	Serial number	0	999999999	1		32
4	Control mode	0	65535	1		16
5	Control mode selection (330/331/334/335)	0	65535	1		16
6	Control unit not configured	No	Yes			16/16
	Unimplemented	0	0			15/16
	Control unit failure	No	Yes			14/16
	Shutdown alarm active	No	Yes			13/16
	Electrical trip alarm active	No	Yes			12/16
	Warning alarm active	No	Yes			11/16
	Telemetry alarm flag	Not active	Active			10/16
	Satellite telemetry alarm flag	Not active	Active			9/16
	No font file	No	Yes			8/16
	Unimplemented	0	0			1/16-7/16
7	S.M. 1 status	0	3			16/16-15/16
	S.M. 2 status	0	3			14/16-13/16
	S.M. 3 status	0	3			12/16-11/16
	S.M. 4 status	0	3			10/16-9/16
	S.M. 5 status	0	3			8/16-7/16
	S.M. 6 status	0	3			6/16-5/16
	S.M. 7 status	0	3			4/16-3/16
	S.M. 8 status	0	3			2/16-1/16
8-9	String checksum	0	0xFFFFFFFF			32
10	S.M. 1 timer	0	65534	1	Seconds	16
11	S.M. 2 timer	0	65534	1	Seconds	16
12	S.M. 3 timer	0	65534	1	Seconds	16
13	S.M. 4 timer	0	65534	1	Seconds	16
14	S.M. 5 timer	0	65534	1	Seconds	16
15	S.M. 6 timer	0	65534	1	Seconds	16
16	S.M. 7 timer	0	65534	1	Seconds	16
17	S.M. 8 timer	0	65534	1	Seconds	16
18	S.M. 1 state	0	65535	1		16
19	S.M. 2 state	0	65535	1		16
20	S.M. 3 state	0	65535	1		16
21	S.M. 4 state	0	65535	1		16
22	S.M. 5 state	0	65535	1		16
23	S.M. 6 state	0	65535	1		16
24	S.M. 7 state	0	65535	1		16
25	S.M. 8 state	0	65535	1		16
26	Change in event log contents	No	Yes			
27-255	Reserved					

Control modes

Mode	Description
0	Stop mode
1	Auto mode
2	Manual mode
3	Test on load mode
4	Auto with manual restore mode/Prohibit Return
5	User configuration mode
6	Test off load mode
7-65534	Reserved
65535	Unimplemented

Notes on control modes:

1. 'Stop mode' means stop the engine (generator) and in the case of 'automatic mains failure units' transfer the load to the mains if possible.
2. 'Auto mode' means automatically start the engine (generator) in the event of a remote start signal or a mains-failure, and in the case of 'automatic mains failure units' transfer the load to the generator when available. When the remote start signal is removed or the mains returns, stop the engine (generator) and in the case of 'automatic mains failure units' transfer the load back to the mains.
3. 'Manual mode' means start the engine (generator) With some control units it will also be necessary to press the start button before such a manual start is initiated. In the case of 'automatic mains failure units' do not transfer the load to the generator unless the mains fails.
4. 'Test on load mode' means start the engine (generator) With some control units it will also be necessary to press the start button before such a manual start is initiated. Transfer the load to the generator when it is available, regardless of the mains condition. This mode is only provided on automatic mains failure units.
5. 'Auto with manual restore mode' means the same as 2 above but when the remote start signal is removed or the mains returns, the engine (generator) will not stop and the load will not be transferred back to the mains. This mode is only provided on automatic mains failure units.
6. 'User configuration mode' means that the unit is being configured from its user interface and is not available for normal operation, there is no method of entering or leaving this mode by telemetry, it must be done from the user interface.
7. Any control unit that does not have a control mode will return the unimplemented value.
8. Register 5 is used to select control modes for use with SCADA mimic screens on modules that have a single mode button (currently 330/331/334/335) in conjunction with page 16. System control code 35714 causes this value to scroll though the available control mode values. System control code 35715 causes the selected control mode to be applied. If neither of these two control modes are received for a period of two minutes then the value will revert to the value stored in register 4.
9. 'Test off load mode' means start the engine (generator/S2). The load will not be transferred to S2.

State machine status

Status	Description
0	Implemented but not changed since last read of state string
1	Implemented and changed since last read of state string
2	Reserved
3	Unimplemented

Notes on state machine status:

1. A state machine that is implemented (status 0 or 1) has a fixed name string in page 27 that can be used in a status display, the name strings for unimplemented state machines will contain 32 spaces (Unicode 0x0020).
2. A state machine that is implemented has a state string in page 28 which may be used in a status display. The contents of this string will change when the state machine changes state and this is indicated by the status changing from 0 to 1, when the state string is read the status will change back from 1 to 0. This means that the string only has to be read when there is a change in state, thus minimising the volume of traffic.

State machine states

State	Description
0-65534	Reserved
65535	Unimplemented

10.6 Page 4 - Basic Instrumentation

Notes:

1. These are read only registers.
2. The meaning of the mains, generator and bus phase rotation codes is given in the table below.
3. Registers 95-123 have been added to support the 8680 although not all will be implemented initially.
4. Registers 180 to 192 added to allow mimics of either S1 or S2 load/watts/lead-lag registers according to which side is on load.

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ sign
0	Oil pressure	0	10000	1	KPa	16
1	Coolant temperature	-50	200	1	Degrees C	16 S
2	Oil temperature	-50	200	1	Degrees C	16 S
3	Fuel level	0	130	1	%	16
4	Charge alternator voltage	0	40	0.1	V	16
5	Battery voltage	0	40	0.1	V	16
6	Engine speed	0	6000	1	RPM	16
7	Generator frequency	0	70	0.1	Hz	16
8-9	Generator L1-N voltage	0	18,000	0.1	V	32
10-11	Generator L2-N voltage	0	18,000	0.1	V	32
12-13	Generator L3-N voltage	0	18,000	0.1	V	32
14-15	Generator L1-L2 voltage	0	30,000	0.1	V	32
16-17	Generator L2-L3 voltage	0	30,000	0.1	V	32
18-19	Generator L3-L1 voltage	0	30,000	0.1	V	32
20-21	Generator L1 current	0	99,999.9	0.1	A	32
22-23	Generator L2 current	0	99,999.9	0.1	A	32
24-25	Generator L3 current	0	99,999.9	0.1	A	32
26-27	Generator earth current	0	99,999.9	0.1	A	32
28-29	Generator L1 watts	-99,999,999	99,999,999	1	W	32 S
30-31	Generator L2 watts	-99,999,999	99,999,999	1	W	32 S
32-33	Generator L3 watts	-99,999,999	99,999,999	1	W	32 S
34	Generator current lag/lead	-180	+180	1	degrees	16 S
35	Mains frequency	0	70	0.1	Hz	16
36-37	Mains L1-N voltage	0	18,000	0.1	V	32
38-39	Mains L2-N voltage	0	18,000	0.1	V	32
40-41	Mains L3-N voltage	0	18,000	0.1	V	32
42-43	Mains L1-L2 voltage	0	30,000	0.1	V	32
44-45	Mains L2-L3 voltage	0	30,000	0.1	V	32
46-47	Mains L3-L1 voltage	0	30,000	0.1	V	32
48	Mains voltage phase lag/lead	-180	+180	1	degrees	16 S
49	Generator phase rotation	0	3			16
50	Mains phase rotation	0	3			16
51	Mains current lag/lead	-180	+180	1	degrees	16 S
52-53	Mains L1 current	0	99,999.9	0.1	A	32
54-55	Mains L2 current	0	99,999.9	0.1	A	32
56-57	Mains L3 current	0	99,999.9	0.1	A	32
58-59	Mains earth current	0	99,999.9	0.1	A	32
60-61	Mains L1 watts	-99,999,999	99,999,999	1	W	32 S
62-63	Mains L2 watts	-99,999,999	99,999,999	1	W	32 S
64-65	Mains L3 watts	-99,999,999	99,999,999	1	W	32 S
66	Bus current lag/lead	-180	+180	1	degrees	16 S
67	Bus frequency	0	70	0.1	Hz	16
68-69	Bus L1-N voltage	0	18,000	0.1	V	32
70-71	Bus L2-N voltage	0	18,000	0.1	V	32
72-73	Bus L3-N voltage	0	18,000	0.1	V	32
74-75	Bus L1-L2 voltage	0	30,000	0.1	V	32
76-77	Bus L2-L3 voltage	0	30,000	0.1	V	32
78-79	Bus L3-L1 voltage	0	30,000	0.1	V	32

Basic instrumentation continued

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ sign
80-81	Bus L1 current	0	99,999.9	0.1	A	32
82-83	Bus L2 current	0	99,999.9	0.1	A	32
84-85	Bus L3 current	0	99,999.9	0.1	A	32
86-87	Bus earth current	0	99,999.9	0.1	A	32
88-89	Bus L1 watts	-999,999,999	999,999,999	1	W	32 S
90-91	Bus L2 watts	-999,999,999	999,999,999	1	W	32 S
92-93	Bus L3 watts	-999,999,999	999,999,999	1	W	32 S
94	Bus phase rotation	0	3			16
95	Bus 2 frequency	0	70	0.1	Hz	16
96-97	Bus 2 L1-N voltage	0	18,000	0.1	V	32
98-99	Bus 2 L2-N voltage	0	18,000	0.1	V	32
100-101	Bus 2 L3-N voltage	0	18,000	0.1	V	32
102-103	Bus 2 L1-L2 voltage	0	30,000	0.1	V	32
104-105	Bus 2 L2-L3 voltage	0	30,000	0.1	V	32
106-107	Bus 2 L3-L1 voltage	0	30,000	0.1	V	32
108-109	Bus 2 L1 current	0	99,999.9	0.1	A	32
110-111	Bus 2 L2 current	0	99,999.9	0.1	A	32
112-113	Bus 2 L3 current	0	99,999.9	0.1	A	32
114-115	Bus 2 earth current	0	99,999.9	0.1	A	32
116-117	Bus 2 L1 watts	-999,999,999	999,999,999	1	W	32 S
118-119	Bus 2 L2 watts	-999,999,999	999,999,999	1	W	32 S
120-121	Bus 2 L3 watts	-999,999,999	999,999,999	1	W	32 S
122	Bus 2 phase rotation	0	3			16
123	Bus 2 current lag/lead	-180	+180	1	degrees	16 S
124	S1 frequency	0	70	0.1	Hz	16
125-126	S1 L1-N voltage	0	18,000	0.1	V	32
127-128	S1 L2-N voltage	0	18,000	0.1	V	32
129-130	S1 L3-N voltage	0	18,000	0.1	V	32
131-132	S1 L1-L2 voltage	0	30,000	0.1	V	32
133-134	S1 L2-L3 voltage	0	30,000	0.1	V	32
135-136	S1 L3-L1 voltage	0	30,000	0.1	V	32
137-138	S1 L1 current	0	99,999.9	0.1	A	32
139-140	S1 L2 current	0	99,999.9	0.1	A	32
141-142	S1 L3 current	0	99,999.9	0.1	A	32
143-144	S1 earth current	0	99,999.9	0.1	A	32
145-146	S1 L1 watts	-99,999,999	99,999,999	1	W	32 S
147-148	S1 L2 watts	-99,999,999	99,999,999	1	W	32 S
149-150	S1 L3 watts	-99,999,999	99,999,999	1	W	32 S
151	S1 current lag/lead	-180	+180	1	degrees	16 S
152	S2 frequency	0	70	0.1	Hz	16
153-154	S2 L1-N voltage	0	18,000	0.1	V	32
155-156	S2 L2-N voltage	0	18,000	0.1	V	32
157-158	S2 L3-N voltage	0	18,000	0.1	V	32
159-160	S2 L1-L2 voltage	0	30,000	0.1	V	32
161-162	S2 L2-L3 voltage	0	30,000	0.1	V	32
163-164	S2 L3-L1 voltage	0	30,000	0.1	V	32
165-166	S2 L1 current	0	99,999.9	0.1	A	32
167-168	S2 L2 current	0	99,999.9	0.1	A	32
169-170	S2 L3 current	0	99,999.9	0.1	A	32
171-172	S2 earth current	0	99,999.9	0.1	A	32
173-174	S2 L1 watts	-99,999,999	99,999,999	1	W	32 S
175-176	S2 L2 watts	-99,999,999	99,999,999	1	W	32 S
177-178	S2 L3 watts	-99,999,999	99,999,999	1	W	32 S
179	S2 current lag/lead	-180	+180	1	degrees	16 S
180-181	Load L1 current	0	99,999.9	0.1	A	32
182-183	Load L2 current	0	99,999.9	0.1	A	32
184-185	Load L3 current	0	99,999.9	0.1	A	32
186-187	Load L1 watts	-99,999,999	99,999,999	1	W	32 S

188-189	Load L2 watts	-99,999,999	99,999,999	1	W	32 S
190-191	Load L3 watts	-99,999,999	99,999,999	1	W	32 S
192	Load current lag/lead	-180	+180	1	degrees	16 S
193	S1 phase rotation	0	3			16
194	S2 phase rotation	0	3			16
195-255	Reserved					

Phase rotation codes

Code	Meaning
0	Indeterminate - the voltage on one or more phase is insufficient to measure the rotation
1	L1 leads L2 which leads L3
2	L3 leads L2 which leads L1
3	Phase error - two or more phase inputs are in phase
4-65534	Reserved
65535	Unimplemented

10.7 Page 5 - Extended Instrumentation

Notes:

1. These are read only registers.
2. Each auxiliary sender has a register describing it's type as shown in the table below.
3. Auxiliary sender values are always signed regardless of the category.
4. An unused auxiliary sender should return the appropriate unimplemented sentinel in both the category and value registers, however, some products may return a 0 value in the category register to indicate that it is unimplemented.
5. Registers 12-15 have been added to 55xx from version 9 upwards
6. Registers 16-17 have been added to 8xxx from version 2 upwards

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ Sign
0	Coolant pressure 1	0	10000	1	KPa	16
1	Coolant pressure 2	0	10000	1	KPa	16
2	Fuel pressure 1	0	10000	1	KPa	16
3	Fuel pressure 2	0	10000	1	KPa	16
4	Turbo pressure 1	0	10000	1	KPa	16
5	Turbo pressure 2	0	10000	1	KPa	16
6	Inlet manifold temperature 1	-50	10000	1	Degrees C	16 S
7	Inlet manifold temperature 2	-50	10000	1	Degrees C	16 S
8	Exhaust temperature 1	-50	10000	1	Degrees C	16 S
9	Exhaust temperature 2	-50	10000	1	Degrees C	16 S
10-11	Fuel consumption	0	10000	0.01	L/hour	32
12	Water in Fuel					16
13	CAN BIT data					16
14	Atmospheric pressure	0	10000	1	KPa	16
15	Fuel temperature	-50	10000	1	Degrees C	16 S
16-17	Fuel level (Units) <8xxx phase 2>	0	999,999,999	1	Litre/Imp Gal/US Gal	32
18	Selected units for fuel level <8xxx phase 2>	0	2			16
19-47	Reserved					
48	Auxiliary sender 1 category	0	3			16
49	Auxiliary sender 1 value	See table below				16 S
50	Auxiliary sender 2 category	0	3			16
51	Auxiliary sender 2 value	See table below				16 S
52	Auxiliary sender 3 category	0	3			16
53	Auxiliary sender 3 value	See table below				16 S
54	Auxiliary sender 4 category	0	3			16
55	Auxiliary sender 4 value	See table below				16 S
56-63	Reserved					
64-65	Exhaust after treatment fuel used	0	2105	1	Litres	32 U
66	After treatment temperature T1	0	1734	1	Degrees C	16 S
67	After treatment temperature T3	0	1734	1	Degrees C	16 S
68-69	Engine reference torque	0	6425	1	Nm	32U
70-71	Engine percentage torque	-125	125	1	%	32S
72-73	Engine demand torque	-125	125	1	%	32S
74	Percentage load at speed	0	250	1	%	16 U
75	Accelerator position	0	100	1	%	16 U
76	Nominal friction percentage torque	-125	125	1	%	16 S
77	Oil level	0	100	1	%	16 U
78	Crank case pressure	-25000	25000	0.01	kPa	16 S
79	Coolant level	0	100	1	%	16 U
80	Injector Rail 1 pressure	0	2509	1	MPa	16 U
81	Injector Rail 2 pressure	0	2509	1	MPa	16 U
82	Engine EGR flow	0	3212	1	kg/h	16 U
83	Pre filter oil pressure	0	1000	1	kPa	16 U
84-85	Instant break power	0	3212	1	kW	32 U
86 -101	Exhaust gas port 1-16 temperature	-273	1734	1	Degrees C	16 S
102	Intercooler temperature	-40	210	1	Degrees C	16 S
103	Turbo oil temperature	-273	1734	1	Degrees C	16 S

104	ECU temperature	-273	1734	1	Degrees C	16 S
105	Fan speed	0	8031	1	rpm	16 U
106-107	Total engine revolutions	0	4211	0.001		32 U
108	Air inlet pressure	0	500	1	kPa	16 U
109	Air filter differential pressure	0	125	0.1	kPa	16 U
110	Air trap inlet pressure	0	125	1	kPa	16 U
111	Turbo pressure 3	0	8031	1	kPa	16 U
112	Turbo pressure 4	0	8031	1	kPa	16 U
113	Inlet manifold temperature 3	-40	210	1	Degrees C	16 S
114	Inlet manifold temperature 4	-40	210	1	Degrees C	16 S
115	Inlet manifold temperature 5	-40	210	1	Degrees C	16 S
116	Inlet manifold temperature 6	-40	210	1	Degrees C	16 S
117-118	Trip fuel	0	2105	1	Litres	32 U
119	Electrical potential			0.1	V	16 U
120	PGI Engine type					16 U
121	PGI Engine version number					16 U
122	DPTC filter lamp command	0	7	See table		16 U
123	Exhaust system high temperature lamp	0	7			16 U
124	DPTC Action regeneration forced	0	7	See table		16 U
125	Shutdown wait to start					16 U
126	Shutdown protection					16 U
127	Shutdown Approaching					16 U
128	Engine operating state	0	15	See table		16 U
129	Shutdown coolant override					16 U
130	Battle short override					16 U
131	Module engine hours					16 U
132	Module oil pressure					16 U
133	Module coolant temperature					16 U
134	Module engine RPM					16 U
135	Module charge alternator					16 U
136	Module speed feed					16 U
137	Frequency adjust					16 U
138	Engine operating state					16 U
139	Engine alarm warning					16 U
140	Engine alarm shutdown					16 U
141	Engine alarm electrical trip					16 U
142	CAN amber stop lamp					16 U
143	CAN amber lamp flash					16 U
144	CAN Red stop lamp					16 U
145	CAN red lamp flash					16 U
146	CAN protect lamp					16 U
147	CAN protect lamp flash					16 U
148	Malfunction Lamp					16 U
149	Malfunction lamp flash					16 U
150	Electrical potential					16 U
151	Battery potential			0.1	V	16 U
152	Charging potential			0.1	V	16 U
153	Charge alternator current			1	A	16 U
154	Battery current			1	A	16 S
155	Engine torque mode					16 U
156	Engine starter mode					16 U
157	CAN CI status					16 U
158	Demand speed					16 U
159	Speed up					16 U
160	Speed down					16 U
161	Speed fail					16 U
162	Current SD source					16 U
163	Feedback SD CAN					16 U
164	Feedback SD analogue					16 U
165	Failure codes					16 U
166	Actual droop					16 U

167	Start status					16 U
168	Protection override status					16 U
169	MTU running state					16 U
170	Cylinder cut off					16 U
171	Load gen status					16 U
172	Extended stop status					16 U
173	Current operating mode					16 U
174	MTU required torque					16 U
175	Trip average fuel			0.01	L/hour	16 U
176	ECU rated power			1	kW	16 U
177	ECU rated speed			1	RPM	16 U
178	ECU idle speed			1	RPM	16 U
179	ECU desired speed			1	RPM	16 U
180	ECU preheat status					16 U
181	Manifold pressure			1	kPa	16 U
182	Intercooler level			1	%	16 U
183	CAN link status					16U
184-255	Reserved					16S

Auxiliary & Flexible sender category codes

Type code	Type	Minimum value	Maximum value	Scaling factor	Units
0	Unused	0	0		
1	Pressure	0	10000	1	KPa
2	Temperature	-50	10000	1	Degrees C
3	Level	0	200	1	%
4-65535	Reserved				

Fuel Level codes

Type code	Type
0	Litres
1	Imperial Gallons
2	US Gallons
3-65535	Reserved

Engine operating state

Type code	Type
0	Engine stopped
1	Pre-Start
2	Warming up
3	Running
4	Cooling down
5	Engine Stopped
6	Post run
7	
8-13	Available for SAE assignment
14	Reserved
15	Not available

DPTC filter lamp command

Type code	Type
0	Off
1	On - solid
2-3	Reserved for SAE assignment
4	On Fast blink (1Hz)
5-6	Reserved for SAE assignment
7	Not available

Exhaust system high temperature lamp

Type code	Type
0	Engine stopped
1	Pre-Start
2-6	Available for SAE assignment
7	Not available

DPTC Action regeneration forced

Type code	Type
0	Not active
1	Active forced by switch
2	Active forced by service tool
3-6	Not Available
7	Not available

CAN link status codes

Type code	Type
0	Link OK
1	Link Lost
2	Link Unknown
65535	Unimplemented
3-65534	Reserved

10.8 Page 6 - Derived Instrumentation

Notes:

1. These are read only registers.
2. Registers 22, 23, 46, 47, 70 and 71 do indeed have limits of +/- 999.9%
3. Registers 78-81 return 0 for leading, 1 for indeterminate, 2 for lagging (72xx/73xx only)
4. Registers 85-108 have been added to support the 8680 although not all will be implemented initially.

8xxx/74xx register allocation

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ Sign
0-1	Generator total watts	-99,999,999	99,999,999	1	W	32S
2-3	Generator L1 VA	0	99,999,999	1	VA	32
4-5	Generator L2 VA	0	99,999,999	1	VA	32
6-7	Generator L3 VA	0	99,999,999	1	VA	32
8-9	Generator total VA	0	99,999,999	1	VA	32
10-11	Generator L1 VAr	0	99,999,999	1	VAr	32
12-13	Generator L2 VAr	0	99,999,999	1	VAr	32
14-15	Generator L3 VAr	0	99,999,999	1	VAr	32
16-17	Generator total VAr	0	99,999,999	1	VAr	32
18	Generator power factor L1	-1	1	0.01		16S
19	Generator power factor L2	-1	1	0.01		16S
20	Generator power factor L3	-1	1	0.01		16S
21	Generator average power factor	-1	1	0.01		16S
22	Generator percentage of full power	-999.9	+999.9	0.1	%	16S
23	Generator percentage of full VAr	-999.9	+999.9	0.1	%	16S
24-25	Mains total watts	-99,999,999	999,999,999	1	W	32S
26-27	Mains L1 VA	0	99,999,999	1	VA	32
28-29	Mains L2 VA	0	99,999,999	1	VA	32
30-31	Mains L3 VA	0	99,999,999	1	VA	32
32-33	Mains total VA	0	999,999,999	1	VA	32
34-35	Mains L1 VAr	0	99,999,999	1	VAr	32
36-37	Mains L2 VAr	0	99,999,999	1	VAr	32
38-39	Mains L3 VAr	0	99,999,999	1	VAr	32
40-41	Mains total VAr	0	999,999,999	1	VAr	32
42	Mains power factor L1	-1	1	0.01		16S
43	Mains power factor L2	-1	1	0.01		16S
44	Mains power factor L3	-1	1	0.01		16S
45	Mains average power factor	-1	1	0.01		16S
46	Mains percentage of full power	-999.9	+999.9	0.1	%	16S
47	Mains percentage of full VAr	-999.9	+999.9	0.1	%	16S
48-49	Bus total watts	-999,999,999	999,999,999	1	W	32S
50-51	Bus L1 VA	0	99,999,999	1	VA	32
52-53	Bus L2 VA	0	99,999,999	1	VA	32
54-55	Bus L3 VA	0	99,999,999	1	VA	32
56-57	Bus total VA	0	999,999,999	1	VA	32
58-59	Bus L1 VAr	0	99,999,999	1	VAr	32
60-61	Bus L2 VAr	0	99,999,999	1	VAr	32
62-63	Bus L3 VAr	0	99,999,999	1	VAr	32
64-65	Bus total VAr	0	999,999,999	1	VAr	32
66	Bus power factor L1	-1	1	0.01		16S
67	Bus power factor L2	-1	1	0.01		16S
68	Bus power factor L3	-1	1	0.01		16S
69	Bus average power factor	-1	1	0.01		16S
70	Bus percentage of full power	-999.9	+999.9	0.1	%	16S
71	Bus percentage of full VAr	-999.9	+999.9	0.1	%	16S
72-73	Load total watts	-999,999,999	999,999,999	1	W	32S
74-75	Load total VAr	0	999,999,999	1	VAr	32

Derived Instrumentation Continued

76	Mains R.O.C.O.F.	0	10.00	0.01	Hz/s	16
77	Mains vector shift	0	360.0	0.1	Degrees	16
78	Gen L1 lead /lag	0	2			16
79	Gen L2 lead /lag	0	2			16
80	Gen L3 lead /lag	0	2			16
81	Gen total lead /lag	0	2			16
82	Gen L1 percentage of full power	-999.9	+999.9	0.1	%	16S
83	Gen L2 percentage of full power	-999.9	+999.9	0.1	%	16S
84	Gen L3 percentage of full power	-999.9	+999.9	0.1	%	16S
85	Bus 2 average power factor	-1	1	0.01		16S
86-87	Bus 2 total watts	-999,999,999	999,999,999	1	W	32S
88-89	Bus 2 L1 VA	0	99,999,999	1	VA	32
90-91	Bus 2 L2 VA	0	99,999,999	1	VA	32
92-93	Bus 2 L3 VA	0	99,999,999	1	VA	32
94-95	Bus 2 total VA	0	999,999,999	1	VA	32
96-97	Bus 2 L1 VAr	0	99,999,999	1	VAr	32
98-99	Bus 2 L2 VAr	0	99,999,999	1	VAr	32
100-101	Bus 2 L3 VAr	0	99,999,999	1	VAr	32
102-103	Bus 2 total VAr	0	999,999,999	1	VAr	32
104	Bus 2 power factor L1	-1	1	0.01		16S
105	Bus 2 power factor L2	-1	1	0.01		16S
106	Bus 2 power factor L3	-1	1	0.01		16S
107	Bus 2 percentage of full power	-999.9	+999.9	0.1	%	16S
108	Bus 2 percentage of full VAr	-999.9	+999.9	0.1	%	16S
109	Mains L1 lead/lag	0	2			16
110	Mains L2 lead/lag	0	2			16
111	Mains L3 lead/lag	0	2			16
112	Mains total lead/lag	0	2			16
113-255	Reserved					

3xx register allocation

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ Sign
0-1	S2 total watts	-99,999,999	99,999,999	1	W	32S
2-3	S2 L1 VA	0	99,999,999	1	VA	32
4-5	S2 L2 VA	0	99,999,999	1	VA	32
6-7	S2 L3 VA	0	99,999,999	1	VA	32
8-9	S2 total VA	0	99,999,999	1	VA	32
10-11	S2 L1 VAr	0	99,999,999	1	VAr	32
12-13	S2 L2 VAr	0	99,999,999	1	VAr	32
14-15	S2 L3 VAr	0	99,999,999	1	VAr	32
16-17	S2 total VAr	0	99,999,999	1	VAr	32
18	S2 power factor L1	-1	1	0.01		16S
19	S2 power factor L2	-1	1	0.01		16S
20	S2 power factor L3	-1	1	0.01		16S
21	S2 average power factor	-1	1	0.01		16S
22	S2 percentage of full power	-999.9	+999.9	0.1	%	16S
23	S2 percentage of full VAr	-999.9	+999.9	0.1	%	16S
24-25	S1 total watts	-99,999,999	999,999,999	1	W	32S
26-27	S1 L1 VA	0	99,999,999	1	VA	32
28-29	S1 L2 VA	0	99,999,999	1	VA	32
30-31	S1 L3 VA	0	99,999,999	1	VA	32
32-33	S1 total VA	0	999,999,999	1	VA	32
34-35	S1 L1 VAr	0	99,999,999	1	VAr	32
36-37	S1 L2 VAr	0	99,999,999	1	VAr	32
38-39	S1 L3 VAr	0	99,999,999	1	VAr	32
40-41	S1 total VAr	0	999,999,999	1	VAr	32
42	S1 power factor L1	-1	1	0.01		16S
43	S1 power factor L2	-1	1	0.01		16S
44	S1 power factor L3	-1	1	0.01		16S
45	S1 average power factor	-1	1	0.01		16S
46	S1 percentage of full power	-999.9	+999.9	0.1	%	16S
47	S1 percentage of full VAr	-999.9	+999.9	0.1	%	16S
48-49	Unimplemented (signed 32)					32S
50-65	Unimplemented (unsigned 32)					32
66-71	Unimplemented (signed 16)					16S
72-73	Unimplemented (signed 32)					32S
74-75	Unimplemented (unsigned 32)					32
76-77	Unimplemented (unsigned 16)					16
78	S2 L1 lead /lag	0	2			16
79	S2 L2 lead /lag	0	2			16
80	S2 L3 lead /lag	0	2			16
81	S2 total lead /lag	0	2			16
82	S2 L1 percentage of full power	-999.9	+999.9	0.1	%	16S
83	S2 L2 percentage of full power	-999.9	+999.9	0.1	%	16S
84	S2 L3 percentage of full power	-999.9	+999.9	0.1	%	16S
85	Unimplemented (signed 16)					16S
86-87	Unimplemented (signed 32)					32S
88-103	Unimplemented (unsigned 32)					32
104-108	Unimplemented (signed 16)					16S
109	S1L1 lead/lag	0	2			16
110	S1L2 lead/lag	0	2			16
111	S1L3 lead/lag	0	2			16
112	S1total lead/lag	0	2			16
113-255	Reserved					

10.9 Page 7 - Accumulated Instrumentation

Notes:

1. These are read/write registers though some systems may not support writing to some registers.

8xxx/74xx register allocation

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ Sign
0-1	Current time since 1/1/70	0	4.29×10^9	1	Seconds	32
2-3	Time to next maintenance	-2.14×10^9	2.14×10^9	1	Seconds	32S
4-5	Time of next maintenance since 1/1/70	0	4.29×10^9	1	Seconds	32
6-7	Engine run time	0	4.29×10^9	1	Seconds	32
8-9	Generator positive KW hours	0	4.29×10^9	0.1	KW hour	32
10-11	Generator negative KW hours	0	4.29×10^9	0.1	KW hour	32
12-13	Generator KVA hours	0	4.29×10^9	0.1	KVA hour	32
14-15	Generator KVAr hours	0	4.29×10^9	0.1	KVAr hour	32
16-17	Number of starts	0	99999			32
18-19	Mains positive KW hours	0	4.29×10^9	0.1	KW hour	32
20-21	Mains negative KW hours	0	4.29×10^9	0.1	KW hour	32
22-23	Mains KVA hours	0	4.29×10^9	0.1	KVA hour	32
24-25	Mains KVAr hours	0	4.29×10^9	0.1	KVAr hour	32
26-27	Bus positive KW hours	0	4.29×10^9	0.1	KW hour	32
28-29	Bus negative KW hours	0	4.29×10^9	0.1	KW hour	32
30-31	Bus KVA hours	0	4.29×10^9	0.1	KVA hour	32
32-33	Bus KVAr hours	0	4.29×10^9	0.1	KVAr hour	32
34-35	Fuel used	0	4.29×10^9	1	Litre	32
36-37	Maximum positive mains R.O.C.O.F.	0	10.00	0.01	Hz/s	32
38-39	Maximum negative mains R.O.C.O.F.	0	10.00	0.01	Hz/s	32
40-41	Maximum positive mains vector shift	0	360.0	0.1	Degrees	32
42-43	Maximum negative mains vector shift	0	360.0	0.1	Degrees	32
44-45	Time to next maintenance alarm 1	-2.14×10^9	2.14×10^9	1	Seconds	32S
46-47	Time of next maintenance alarm 1 since 1/1/70	0	4.29×10^9	1	Seconds	32
48-49	Time to next maintenance alarm 2	-2.14×10^9	2.14×10^9	1	Seconds	32S
50-51	Time of next maintenance alarm 2 since 1/1/70	0	4.29×10^9	1	Seconds	32
52-53	Time to next maintenance alarm 3	-2.14×10^9	2.14×10^9	1	Seconds	32S
54-55	Time of next maintenance alarm 3 since 1/1/70	0	4.29×10^9	1	Seconds	32
56-255	Reserved					

3xx register allocation

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ Sign
0-1	Current time since 1/1/70	0	4.29×10^9	1	Seconds	32
2-7	Unimplemented (Reserved for future use)					32
8-9	S2 positive KW hours	0	4.29×10^9	0.1	KW hour	32
10-11	Unimplemented (Reserved for future use)					32
12-13	S2 KVA hours	0	4.29×10^9	0.1	KVA hour	32
14-15	S2 KVAr hours	0	4.29×10^9	0.1	KVAr hour	32
16-17	Unimplemented (Reserved for future use)					23
18-19	S1 positive KW hours	0	4.29×10^9	0.1	KW hour	32
20-21	Unimplemented (Reserved for future use)					23
22-23	S1 KVA hours	0	4.29×10^9	0.1	KVA hour	32
24-25	S1 KVAr hours	0	4.29×10^9	0.1	KVAr hour	32
26-55	Unimplemented (Reserved for future use)					32
56-255	Reserved					

10.10 Page 8 - Alarm Conditions

Notes:

1. These are read only registers.
2. This is the old alarm system, for 72x/73xx and 8xxx/74xx families page 154 should be used instead.
3. Each alarm can be in one of 15 conditions as shown in the table below.
4. Registers 1-32 contain the status of named, internally generated, alarms and indications. These may be extended by future versions of GenComm and any software that reads them must be able to cope with such extensions. This is possible because register 0 specifies the number of pre-defined internal alarm conditions that are implemented on a slave device, the software should read and process the specified number. The software does not need to know the definitions of any new alarms since it can read the alarms strings and display them as specified by the alarm condition. All unimplemented pre-defined alarms return the unimplemented value 15, not an exception.
5. Registers 129-160 contain the status of unnamed digital inputs. Register 128 specifies the number of unnamed digital inputs and any software that reads them must be able to cope with all 128 in the same way as for the pre-defined alarms. All unimplemented digital inputs up to 128 will return the unimplemented value 15, not an exception.
6. Each alarm has 2 strings in pages 32-95 which can be displayed on a PC for example, the alarm code specifies which string it is appropriate to display.
7. The contents of alarm strings will never change while the slave device is operating so a copy can be held by the master to minimise traffic.

Registers

Register offset	Name	Minimum value	Maximum value	Bits/ Sign
0	Number of named alarms	97	128	16
1	Emergency stop	0	15	13/16-16/16
	Low oil pressure	0	15	9/16-12/16
	High coolant temperature	0	15	5/16-8/16
	High oil temperature	0	15	1/16-4/16
2	Under speed	0	15	13/16-16/16
	Over speed	0	15	9/16-12/16
	Fail to start	0	15	5/16-8/16
	Fail to come to rest	0	15	1/16-4/16
3	Loss of speed sensing	0	15	13/16-16/16
	Generator low voltage	0	15	9/16-12/16
	Generator high voltage	0	15	5/16-8/16
	Generator low frequency	0	15	1/16-4/16
4	Generator high frequency	0	15	13/16-16/16
	Generator high current	0	15	9/16-12/16
	Generator earth fault	0	15	5/16-8/16
	Generator reverse power	0	15	1/16-4/16
5	Air flap	0	15	13/16-16/16
	Oil pressure sender fault	0	15	9/16-12/16
	Coolant temperature sender fault	0	15	5/16-8/16
	Oil temperature sender fault	0	15	1/16-4/16
6	Fuel level sender fault	0	15	13/16-16/16
	Magnetic pickup fault	0	15	9/16-12/16
	Loss of AC speed signal	0	15	5/16-8/16
	Charge alternator failure	0	15	1/16-4/16
7	Low battery voltage	0	15	13/16-16/16
	High battery voltage	0	15	9/16-12/16
	Low fuel level	0	15	5/16-8/16
	High fuel level	0	15	1/16-4/16

Page 8 registers continued

8	Generator failed to close	0	15	13/16-16/16
	Mains failed to close	0	15	9/16-12/16
	Generator failed to open	0	15	5/16-8/16
	Mains failed to open	0	15	1/16-4/16
9	Mains low voltage	0	15	13/16-16/16
	Mains high voltage	0	15	9/16-12/16
	Bus failed to close	0	15	5/16-8/16
	Bus failed to open	0	15	1/16-4/16
10	Mains low frequency	0	15	13/16-16/16
	Mains high frequency	0	15	9/16-12/16
	Mains failed	0	15	5/16-8/16
	Mains phase rotation wrong	0	15	1/16-4/16
11	Generator phase rotation wrong	0	15	13/16-16/16
	Maintenance due	0	15	9/16-12/16
	Clock not set	0	15	5/16-8/16
	Local LCD configuration lost	0	15	1/16-4/16
12	Local telemetry configuration lost	0	15	13/16-16/16
	Control unit not calibrated	0	15	9/16-12/16
	Modem power fault	0	15	5/16-8/16
	Generator short circuit	0	15	1/16-4/16
13	Failure to synchronise	0	15	13/16-16/16
	Bus live	0	15	9/16-12/16
	Scheduled run	0	15	5/16-8/16
	Bus phase rotation wrong	0	15	1/16-4/16
14	Priority selection error	0	15	13/16-16/16
	Multiset communications (MSC) data error	0	15	9/16-12/16
	Multiset communications (MSC) ID error	0	15	5/16-8/16
	Multiset communications (MSC) failure	0	15	1/16-4/16
15	Multiset communications (MSC) too few sets	0	15	13/16-16/16
	Multiset communications (MSC) alarms inhibited	0	15	9/16-12/16
	Multiset communications (MSC) old version units	0	15	5/16-8/16
	Mains reverse power	0	15	1/16-4/16
16	Minimum sets not reached	0	15	13/16-16/16
	Insufficient capacity available	0	15	9/16-12/16
	Expansion input unit not calibrated	0	15	5/16-8/16
	Expansion input unit failure	0	15	1/16-4/16
17	Auxiliary sender 1 low	0	15	13/16-16/16
	Auxiliary sender 1 high	0	15	9/16-12/16
	Auxiliary sender 1 fault	0	15	5/16-8/16
	Auxiliary sender 2 low	0	15	1/16-4/16
18	Auxiliary sender 2 high	0	15	13/16-16/16
	Auxiliary sender 2 fault	0	15	9/16-12/16
	Auxiliary sender 3 low	0	15	5/16-8/16
	Auxiliary sender 3 high	0	15	1/16-4/16
19	Auxiliary sender 3 fault	0	15	13/16-16/16
	Auxiliary sender 4 low	0	15	9/16-12/16
	Auxiliary sender 4 high	0	15	5/16-8/16
	Auxiliary sender 4 fault	0	15	1/16-4/16
20	Engine control unit (ECU) link lost	0	15	13/16-16/16
	Engine control unit (ECU) failure	0	15	9/16-12/16
	Engine control unit (ECU) error	0	15	5/16-8/16
	Low coolant temperature	0	15	1/16-4/16
21	Out of sync	0	15	13/16-16/16
	Low Oil Pressure Switch	0	15	9/16-12/16
	Alternative Auxiliary Mains Fail	0	15	5/16-8/16
	Loss of excitation	0	15	1/16-4/16

Page 8 registers continued

22	Mains kW Limit	0	15	13/16-16/16
	Negative phase sequence	0	15	9/16-12/16
	Mains ROCOF	0	15	5/16-8/16
	Mains vector shift	0	15	1/16-4/16
23	Mains G59 low frequency	0	15	13/16-16/16
	Mains G59 high frequency	0	15	9/16-12/16
	Mains G59 low voltage	0	15	5/16-8/16
	Mains G59 high voltage	0	15	1/16-4/16
24	Mains G59 trip	0	15	13/16-16/16
	Generator kW Overload	0	15	9/16-12/16
	Engine Inlet Temperature high	0	15	5/16-8/16
	Bus 1 live	0	15	1/16-4/16
25	Bus 1 phase rotation wrong	0	15	13/16-16/16
	Bus 2 live	0	15	9/16-12/16
	Bus 2 phase rotation wrong	0	15	5/16-8/16
	Reserved	0	15	1/16-4/16
26-32	Unimplemented			
33-127	Reserved			

Page 8 registers continued

128	Number of unnamed digital inputs	0	128	16
129	Unnamed digital input 1	0	15	13/16-16/16
	Unnamed digital input 2	0	15	9/16-12/16
	Unnamed digital input 3	0	15	5/16-8/16
	Unnamed digital input 4	0	15	1/16-4/16
130	Unnamed digital input 5	0	15	13/16-16/16
	Unnamed digital input 6	0	15	9/16-12/16
	Unnamed digital input 7	0	15	5/16-8/16
	Unnamed digital input 8	0	15	1/16-4/16
131	Unnamed digital input 9	0	15	13/16-16/16
	Unnamed digital input 10	0	15	9/16-12/16
	Unnamed digital input 11	0	15	5/16-8/16
	Unnamed digital input 12	0	15	1/16-4/16
132	Unnamed digital input 13	0	15	13/16-16/16
	Unnamed digital input 14	0	15	9/16-12/16
	Unnamed digital input 15	0	15	5/16-8/16
	Unnamed digital input 16	0	15	1/16-4/16
133	Unnamed digital inputs 17-20	0	15	16
134	Unnamed digital inputs 21-24	0	15	16
135	Unnamed digital inputs 25-28	0	15	16
136	Unnamed digital inputs 29-32	0	15	16
137	Unnamed digital inputs 33-36	0	15	16
138	Unnamed digital inputs 37-40	0	15	16
139	Unnamed digital inputs 41-44	0	15	16
140	Unnamed digital inputs 45-48	0	15	16
141	Unnamed digital inputs 49-52	0	15	16
142	Unnamed digital inputs 53-56	0	15	16
143	Unnamed digital inputs 57-60	0	15	16
144	Unnamed digital inputs 61-64	0	15	16
145	Unnamed digital inputs 65-68	0	15	16
146	Unnamed digital inputs 69-72	0	15	16
147	Unnamed digital inputs 73-76	0	15	16
148	Unnamed digital inputs 77-80	0	15	16
149	Unnamed digital inputs 81-84	0	15	16
150	Unnamed digital inputs 85-88	0	15	16
151	Unnamed digital inputs 89-92	0	15	16
152	Unnamed digital inputs 93-96	0	15	16
153	Unnamed digital inputs 97-100	0	15	16
154	Unnamed digital inputs 101-104	0	15	16
155	Unnamed digital inputs 105-108	0	15	16
156	Unnamed digital inputs 109-112	0	15	16
157	Unnamed digital inputs 113-116	0	15	16
158	Unnamed digital inputs 117-120	0	15	16
159	Unnamed digital inputs 121-124	0	15	16
160	Unnamed digital inputs 125-128	0	15	16
161-255	Reserved			

Alarm condition codes

Condition	Meaning	Displayed string
0	Disabled digital input	None
1	Not active alarm	None
2	Warning alarm	Active string
3	Shutdown alarm	Active string
4	Electrical trip alarm	Active string
5-7	Reserved	
8	Inactive indication (no string)	None
9	Inactive indication (displayed string)	Inactive string
10	Active indication	Active string
11-14	Reserved	
15	Unimplemented alarm	None

Notes on alarm codes

1. An alarm that is fitted but disabled by the configuration of the slave device returns code 0.
2. An alarm that is not implemented on a particular control unit returns code 15.
3. An indication that does not require a message to be displayed when inactive returns either code 8 or 10.
4. An indication that does require a message to be displayed when inactive returns either code 9 or 10.
5. The inactive strings are only required for indications, in all other cases they will contain 32 spaces.

10.11 Page 9 – Total Harmonic Distortion

Notes:

1. These are read only registers.
2. Only supported on 88xx/84xx modules at present (introduced at version 1.0 of these modules)
3. 8810/8410 don't support registers 120-131 – they will return Unimplemented (sentinel value)

Registers

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ Sign
0	V1 Voltage L1 THD	0	10000	0.01	%	16
1	V1 Voltage L1 Fundamental level	0	100	1		16
2	V1 Voltage L1 3rd harmonic level	0	100	1		16
3	V1 Voltage L1 5th harmonic level	0	100	1		16
4	V1 Voltage L1 7th harmonic level	0	100	1		16
5	V1 Voltage L1 9th harmonic level	0	100	1		16
6	V1 Voltage L1 11th harmonic level	0	100	1		16
7	V1 Voltage L1 13th harmonic level	0	100	1		16
8	V1 Voltage L1 15th harmonic level	0	100	1		16
9	V1 Voltage L1 17th harmonic level	0	100	1		16
10	V1 Voltage L1 19th harmonic level	0	100	1		16
11	V1 Voltage L1 21st harmonic level	0	100	1		16
12-23	V1 Voltage L2 THD etc					
24-35	V1 Voltage L3 THD etc					
36-47	V2 Voltage L1 THD etc					
48-59	V2 Voltage L2 THD etc					
60-71	V2 Voltage L3 THD etc					
72-83	Current L1 THD etc					
84-95	Current L2 THD etc					
96-107	Current L3 THD etc					
108-119	Current Neutral/Earth THD etc					
120-131	Current 5th CT THD etc					
132-255	Reserved					

10.12 Page 11 - Diagnostic - General

Notes:

4. These are read only registers.
5. Register 0 gives the version as major/minor, with the major version in the upper 8 bits, the minor version in the lower 8 bits.

Registers

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ Sign
0	Software version	0	9999	0.01		16
1	CPU power usage	0	200	1	%	16
2	Button number pressed, 0=none	0	255	1		16
3	Backup supply voltage	0	40	0.1	V	16
4-255	Reserved					

10.13 Page 12 - Diagnostic - Digital Inputs

Notes

1. These are read only registers.
2. These registers represent the state of the actual inputs to the control unit before the application of any time delays or other processing and are intended for diagnostic purposes only.
3. The number of named digital inputs may be increased in future versions of GenComm. Manufacturers may not add their own to the list of named inputs as there are no corresponding strings to identify them. Any inputs that are required but not named must be included in the list of unnamed digital inputs.
4. The meaning of the named digital input codes is shown in the table below.
5. Register 16 indicates the number of unnamed digital inputs that are supported, any software that displays these must cope with any number up to 128. Each is represented by only one bit as there is no need to indicate that it is unimplemented.
6. Unimplemented inputs (including totally unimplemented registers) return 3, not an exception.

Registers

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ Sign
0	Emergency stop input	0	3			15/16-16/16
	Low oil pressure switch input	0	3			13/16-14/16
	High engine temp. switch input	0	3			11/16-12/16
	Remote start input	0	3			9/16-10/16
	Remote fuel on input	0	3			7/16-8/16
	Lamp test input	0	3			5/16-6/16
	Reset input	0	3			3/16-4/16
	Panel lock input	0	3			1/16-2/16
1	Start button input	0	3			15/16-16/16
	Stop button input	0	3			13/16-14/16
	Transfer to generator button input	0	3			11/16-12/16
	Transfer to mains button input	0	3			9/16-10/16
	Unimplemented	3	3			7/16-8/16
	Unimplemented	3	3			5/16-6/16
	Unimplemented	3	3			3/16-4/16
	Unimplemented	3	3			1/16-2/16
2-15	Reserved					16
16	Number of unnamed digital inputs	0	128			16
17	Unnamed digital input 1	Open	Closed			16/16
	Unnamed digital input 2	Open	Closed			15/16
	Unnamed digital input 3	Open	Closed			14/16
	Unnamed digital input 4	Open	Closed			13/16
	Unnamed digital input 5	Open	Closed			12/16
	Unnamed digital input 6	Open	Closed			11/16
	Unnamed digital input 7	Open	Closed			10/16
	Unnamed digital input 8	Open	Closed			9/16
	Unnamed digital input 9	Open	Closed			8/16
	Unnamed digital input 10	Open	Closed			7/16
	Unnamed digital input 11	Open	Closed			6/16
	Unnamed digital input 12	Open	Closed			5/16
	Unnamed digital input 13	Open	Closed			4/16
	Unnamed digital input 14	Open	Closed			3/16
	Unnamed digital input 15	Open	Closed			2/16
	Unnamed digital input 16	Open	Closed			1/16
18	Unnamed digital input 17-32	Open	Closed			16
19	Unnamed digital input 33-48	Open	Closed			16
20	Unnamed digital input 49-64	Open	Closed			16
21	Unnamed digital input 65-80	Open	Closed			16
22	Unnamed digital input 81-96	Open	Closed			16
23	Unnamed digital input 97-112	Open	Closed			16
24	Unnamed digital input 113-128	Open	Closed			16
25-255	Reserved					

Named digital input codes

Code	Meaning
0	Open
1	Closed
2	Reserved
3	Unimplemented

10.14 Page 13 - Diagnostic - Digital Outputs

Notes:

1. Generally these are read only registers to avoid conflict between the slave devices chosen output state and commands from a master. However, in some cases a slave device may accept write commands to these registers, e.g. a hub may have digital outputs which are not controlled by the hub itself but from a master device. A slave device may only accept write commands to these registers if this does not cause a conflict with internally generated controls of the outputs.
2. These registers represent the state of the actual digital outputs of the control unit after any internal processing and are primarily intended for diagnostic purposes only (but see note 1).
3. The number of named outputs may be increased in future versions of GenComm. Manufacturers may not add their own to the list of named outputs as there are no corresponding strings to identify them. Any outputs that are required but not named must be included in the list of unnamed digital outputs.
4. The meaning of the named digital output codes is shown in the table below.
5. Register 16 indicates the number of unnamed digital outputs that are supported, any software that displays these must cope with any number up to 128. Each is represented by only one bit as there is no need to indicate that it is unimplemented.
6. Unimplemented outputs (including totally unimplemented registers) return 3, not an exception.

Registers

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ Sign
0	Fuel relay	0	3			15/16-16/16
	Start relay	0	3			13/16-14/16
	Mains loading relay	0	3			11/16-12/16
	Generator loading relay	0	3			9/16-10/16
	Modem power relay	0	3			7/16-8/16
	Unimplemented	3	3			5/16-6/16
	Unimplemented	3	3			3/16-4/16
	Unimplemented	3	3			1/16-2/16
1-15	Reserved	3	3			16
16	Number of unnamed digital outputs	0	128			16
17	Unnamed digital output 1	De-energised	Energised			16/16
	Unnamed digital output 2	De-energised	Energised			15/16
	Unnamed digital output 3	De-energised	Energised			14/16
	Unnamed digital output 4	De-energised	Energised			13/16
	Unnamed digital output 5	De-energised	Energised			12/16
	Unnamed digital output 6	De-energised	Energised			11/16
	Unnamed digital output 7	De-energised	Energised			10/16
	Unnamed digital output 8	De-energised	Energised			9/16
	Unnamed digital output 9	De-energised	Energised			8/16
	Unnamed digital output 10	De-energised	Energised			7/16
	Unnamed digital output 11	De-energised	Energised			6/16
	Unnamed digital output 12	De-energised	Energised			5/16
	Unnamed digital output 13	De-energised	Energised			4/16
	Unnamed digital output 14	De-energised	Energised			3/16
	Unnamed digital output 15	De-energised	Energised			2/16
	Unnamed digital output 16	De-energised	Energised			1/16
18	Unnamed digital output 17-32	De-energised	Energised			16
19	Unnamed digital output 33-48	De-energised	Energised			16
20	Unnamed digital output 49-64	De-energised	Energised			16
21	Unnamed digital output 65-80	De-energised	Energised			16
22	Unnamed digital output 81-96	De-energised	Energised			16
23	Unnamed digital output 97-112	De-energised	Energised			16
24	Unnamed digital output 113-128	De-energised	Energised			16
25-255	Reserved					

Named digital output codes

Code	Meaning
0	De-energised
1	Energised
2	Reserved
3	Unimplemented

10.15 Page 14 - Diagnostic - LEDs

Notes:

1. Generally these are read only registers to avoid conflict between the slave devices chosen LED state and commands from a master. However, in some cases a slave device may accept write commands to these registers, e.g. a hub may have LEDs which are not controlled by the hub itself but from a master device. A slave device may only accept write commands to these registers if this does not cause a conflict with internally generated controls of the outputs.
2. These registers represent the state of the actual LEDs on the control unit after any internal processing and are primarily intended for diagnostic purposes only (but see note 1).
3. Register 0 indicates the number of LEDs that are supported, any software that displays these must cope with any number up to 128.
4. Unimplemented LEDs (including totally unimplemented registers) return 15, not an exception.

Registers

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ Sign
0	Number of LEDs	0	128			16
1	LED 1 colour (see table below)	0	15			13/16-16/16
	LED 2 colour	0	15			9/16-12/16
	LED 3 colour	0	15			5/16-8/16
	LED 4 colour	0	15			1/16-4/16
2	LEDs 5-8 colour	0	15			16
3	LEDs 9-12 colour	0	15			16
4	LEDs 13-16 colour	0	15			16
5	LEDs 17-20 colour	0	15			16
6	LEDs 21-24 colour	0	15			16
7	LEDs 25-28 colour	0	15			16
8	LEDs 29-32 colour	0	15			16
9	LEDs 33-36 colour	0	15			16
10	LEDs 37-40 colour	0	15			16
11	LEDs 41-44 colour	0	15			16
12	LEDs 45-48 colour	0	15			16
13	LEDs 49-52 colour	0	15			16
14	LEDs 53-56 colour	0	15			16
15	LEDs 57-60 colour	0	15			16
16	LEDs 61-64 colour	0	15			16
17	LEDs 65-68 colour	0	15			16
18	LEDs 69-72 colour	0	15			16
19	LEDs 73-76 colour	0	15			16
20	LEDs 77-80 colour	0	15			16
21	LEDs 81-84 colour	0	15			16
22	LEDs 85-88 colour	0	15			16
23	LEDs 89-92 colour	0	15			16
24	LEDs 93-96 colour	0	15			16
25	LEDs 97-100 colour	0	15			16
26	LEDs 101-104 colour	0	15			16
27	LEDs 105-108 colour	0	15			16
28	LEDs 109-112 colour	0	15			16
29	LEDs 113-116 colour	0	15			16
30	LEDs 117-120 colour	0	15			16
31	LEDs 121-124 colour	0	15			16
32	LEDs 125-128 colour	0	15			16
33-255	Reserved					

LED colours

Code	Colour
0	Not lit
1	Reserved
2	Red
3	Orange
4	Yellow
5	Green
6	Blue
7	Purple
8	Reserved
9	White
10	Reserved
11	Reserved
12	Reserved
13	Reserved
14	Reserved
15	Unimplemented LED

10.16 Page 16 - Control Registers

Notes:

1. These are a mixture of read only and write only registers.
2. Registers 0 to 7 contain flags that indicate the available system control functions. If a bit is set the corresponding function code is available.
3. One of the system control keys from the table below must be written into register 8 and its ones-compliment written into register 9 with a single function 16 (write multiple registers) to perform the specified system control function.
4. Writing any other value or using a function that is not available will return extended exception code 7 (Illegal value written to register) and have no affect.
5. Function codes 0 to 31 perform exactly the same function as pressing the equivalent button on the control unit.
6. Function 34 'reset alarms' is not the same as function 7. The former resets any alarm condition codes that can be reset. The latter simulates a button which may or may not exist on the control unit, if it does not exist it will have no affect. If all alarm condition codes are able to be reset the shutdown, electrical trip and warning alarm active flags (as appropriate) in page 3 will consequently reset.
7. Function 34 does not under any circumstances reset the telemetry alarm flag in page 3, function 35 must be used for this.
8. Locking the user controls stops the buttons corresponding to function codes 0-31 from operating and stops any attempt to configure the unit from the user controls. It does not stop the user from viewing status information and instrumentation values.
9. Function 38 resets the Page 7 values 'Time to next maintenance' and 'Time of next maintenance since 1/1/70'. The reset values are manufacturer specific, if it is desired to set one of these two items to a specific value then they can be directly written to in Page 7.
10. Function 10 resets only those alarms associated with the detection of mains failure while running in parallel with the mains, i.e. G59 alarms and ROCOF and vector shift.
11. Function 43 is used to register an 8721 display unit with an 8700 module.
12. Function 44 is used to register an 8711 display unit with an 8700 module.
13. Function 45 is used to register an 8716 display unit with an 8700 module.
14. Functions 46,47 & 48 are used as part of the data logging functionality (of the 8xxx/74xx family)

Registers

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ Sign	Read/write
0	System control function 0 supported	0	1			16/16	Read only
	System control function 1 supported	0	1			15/16	Read only
	System control function 2 supported	0	1			14/16	Read only
	System control function 3 supported	0	1			13/16	Read only
	System control function 4 supported	0	1			12/16	Read only
	System control function 5 supported	0	1			11/16	Read only
	System control function 6 supported	0	1			10/16	Read only
	System control function 7 supported	0	1			9/16	Read only
	System control function 8 supported	0	1			8/16	Read only
	System control function 9 supported	0	1			7/16	Read only
	System control function 10 supported	0	1			6/16	Read only
	System control function 11 supported	0	1			5/16	Read only
	System control function 12 supported	0	1			4/16	Read only
	System control function 13 supported	0	1			3/16	Read only
	System control function 14 supported	0	1			2/16	Read only
	System control function 15 supported	0	1			1/16	Read only
1	System control function 16-31 supported	0	65535			16	Read only
2	System control function 32-47 supported	0	65535			16	Read only
3	System control function 48-63 supported	0	65535			16	Read only
4	System control function 64-79 supported	0	65535			16	Read only
5	System control function 80-95 supported	0	65535			16	Read only
6	System control function 96-111supported	0	65535			16	Read only
7	System control function 112-127 supported	0	65535			16	Read only
8	System control key	0	65535			16	Write only
9	Compliment of system control key	0	65535			16	Write only
10-255	Reserved						

System control keys

Function code	System control function	System control key
0	Select Stop mode	35700
1	Select Auto mode	35701
2	Select Manual mode	35702
3	Select Test on load mode	35703
4	Select Auto with manual restore mode	35704
5	Start engine if in manual or test modes	35705
6	Mute alarm	35706
7	Reset alarms	35707
8	Transfer to generator	35708
9	Transfer to mains	35709
10	Reset mains failure	35710
11	Close Bus (Bus Tie Controller)	35711
12	Open Bus (Bus Tie Controller)	35712
13	Toggle Bus Open/Closed (Bus Tie Controller)	35713
14	Scroll through mode selections (mode button on 330/331/334/335)	35714
15	Enable selected mode (scroll button on 330/331/334/335)	35715
16-31	Reserved	35716-35731
32	Telemetry start if in auto mode	35732
33	Cancel telemetry start in auto mode	35733
34	Reset alarms	35734
35	Clear telemetry alarm flag	35735
36	Lock the user controls	35736
37	Unlock the user controls	35737
38	Reset the maintenance alarm 1 due times	35738
39	MSC alarm inhibit on	35739
40	MSC alarm inhibit off	35740
41	Reset the maintenance alarm 2 due times	35741
42	Reset the maintenance alarm 3 due times	35742
43	8721 Display unit registered/alive	35743
44	8711 Display unit registered/alive	35744
45	8716 Display unit registered/alive	35745
46	Start data logging (temporarily overrides the module state)	35746
47	Stop data logging (temporarily overrides the module state)	35747
48	Erase all data log files internal to the module (NOT on USB)	35748
49	Force USB drive to stop logging, ready to eject	35749
50-65535	Reserved	

10.17 Page 17 - J1939 active diagnostic trouble codes in decoded format

Notes:

1. These are read only registers.
2. Some Engine Control Units (ECUs) do not comply with J1939 with respect to trouble codes, the trouble code type must be read to determine the interpretation of the codes.
3. For an ECU that is fully compliant with J1939 this page contains the status as indicated by the last DM1 message, refer to J1939-73 section 5.7.1.
4. For an ECU that is not fully compliant with J1939 this page contains trouble codes as read by the mechanism appropriate to the ECU.
5. The meaning of the lamp status codes is shown in the table below.
6. For details of the Suspect Parameter Number (SPN) refer to J1939-04 Appendix C.
7. For details of the Failure Mode Indicator (FMI) refer to J1939-73 Appendix A.
8. For details of the Occurrence Count (OC) refer to J1939-73 section 5.7.1, a value of 127 indicates that no OC is available.
9. For details of the Fault Code Number, Status of Fault Code and Number of Occurrences refer to the Scania document 'Fault codes EMS S6'.
10. For details of the Fault Code Number refer to the MTU document “Part 3 Maintenance and repair E531 711 / 01 E”

Registers

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ Sign
0	Number of active trouble codes	0	63			16
1	Malfunction indicator lamp status	0	3			15/16-16/16
	Red stop lamp status	0	3			13/16-14/16
	Amber warning lamp status	0	3			11/16-12/16
	Protect lamp status	0	3			9/16-10/16
	Reserved for SAE assignment	0	3			7/16-8/16
	Reserved for SAE assignment	0	3			5/16-6/16
	Reserved for SAE assignment	0	3			3/16-4/16
	Reserved for SAE assignment	0	3			1/16-2/16
2-6	Trouble code 1					80
7-11	Trouble code 2					80
12-16	Trouble code 3					80
17-21	Trouble code 4					80
22-246	Trouble codes 5-49					
247-251	Trouble code 50					80

Lamp status codes

Code	System control function
0	Lamp off
1	Lamp on
2	Undefined
3	Unimplemented

Trouble code type

Code	Format
0	J1939
1	Scania Keyword 2000 (KW2K)
2	MTU
3	Cummins Modbus
4-99	Reserved

J1939 type trouble code

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ Sign
0--1	SPN	0	524287			32
2	FMI	0	31			16
3	OC	0	127			16
4	Trouble code type	0	0			16

Scania Keyword 2000 (KW2K) type trouble code

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ Sign
0-1	Fault code Number	0	65535			32
2	Status of Fault Code	0	255			16
3	Number of Occurrences	0	255			16
4	Trouble code type	1	1			16

MTU type trouble code

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ Sign
0-1	Fault code Number	0	400			32
2	Status of Fault Code	0	255			16
3	Number of Occurrences	0	255			16
4	Trouble code type	2	2			16

10.18 Page 18 - J1939 active diagnostic trouble codes in raw format

Notes:

1. These are read only registers.
2. This page contains the status as indicated by the last DM1 message, refer to J1939-73 section 5.7.1.
3. The meaning of the lamp status codes is shown in the table below.
4. For details of the Suspect Parameter Number (SPN) refer to J1939-04 Appendix C.
5. For details of the Failure Mode Indicator (FMI) refer to J1939-73 Appendix A.
6. For details of the Occurrence Count (OC) refer to J1939-73 section 5.7.1, a value of 127 indicates that no OC is available.
7. For details of the Conversion Method (CM) refer to J1939-73 section 5.7.1

Registers

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ Sign
0	Number of active trouble codes	0	126			16
1	Reserved	0	0			16
2	Reserved	0	0			16
3	Reserved for SAE assignment	0	3			15/16-16/16
	Reserved for SAE assignment	0	3			13/16-14/16
	Reserved for SAE assignment	0	3			11/16-12/16
	Reserved for SAE assignment	0	3			9/16-10/16
	Protect lamp status	0	3			7/16-8/16
	Amber warning lamp status	0	3			5/16-6/16
	Red stop lamp status	0	3			3/16-4/16
	Malfunction indicator lamp status	0	3			1/16-2/16
4	Trouble code 1: Least significant 16 bits of SPN	0	65535			16
5	Trouble code 1: CM	0	1			16/16
	Trouble code 1: OC	0	127			9/16-15/16
	Trouble code 1: FMI	0	31			4/16-8/16
	Trouble code 1: Most significant 3 bits of SPN	0	7			1/16-3/16
6-7	Trouble code 2 as above					
8-9	Trouble code 3 as above					
10-255	Trouble codes 4-126 as above					

Lamp status codes

Code	System control function
0	Lamp off
1	Lamp on
2	Undefined
3	Unimplemented

10.19 Page 20 - Various Strings

Notes:

1. These are read only registers.
2. Each string consists of 32 Unicode characters with the first character at the lowest register address, NULL terminators are not used.
3. The manufacturer string and model string must not be used to identify a particular product as they may change from one unit to the next, e.g. a manufacturer may change its name in some way.
4. The remaining strings can be used in a status display.
5. The contents of these strings will never change while the slave device is operating so a copy can be held by the master to minimise traffic.

Registers

Register offset	Name	Minimum value	Maximum value	Bits
0	Manufacturer string	UNICODE	UNICODE	512
32	Model string	UNICODE	UNICODE	512
64	Control unit not configured string	UNICODE	UNICODE	512
96	Module variant	UNICODE	UNICODE	512
128	Control unit failure string	UNICODE	UNICODE	512
160	Shutdown alarm string	UNICODE	UNICODE	512
192	Electrical trip alarm string	UNICODE	UNICODE	512
224	Warning alarm string	UNICODE	UNICODE	512

10.20 Page 22- Auxiliary sender strings

Notes:

1. These are read only registers.
2. Each string consists of 32 Unicode characters with the first character at the lowest register address, NULL terminators are not used.
3. The strings can be used in a status display.
4. The contents of these strings will never change while the slave device is operating so a copy can be held by the master to minimise traffic.
5. Reading the string for an unimplemented sender will return 32 spaces (Unicode 0x0020).

Registers

Register offset	Name	Minimum value	Maximum value	Bits
0	Auxiliary sender 1 string	UNICODE	UNICODE	512
32	Auxiliary sender 2 string	UNICODE	UNICODE	512
64	Auxiliary sender 3 string	UNICODE	UNICODE	512
96	Auxiliary sender 4 string	UNICODE	UNICODE	512
128-255	Reserved	UNICODE	UNICODE	512

10.21 Page 24 - Identity Strings

Notes:

1. These may be read/write or read only registers depending on the product.
2. Each string consists of 32 Unicode characters with the first character at the lowest register address, NULL terminators are not used.
3. The strings are user defined but are intended to allow the site and unit to be identified.
4. The contents of these strings will never change while the slave device is operating so a copy can be held by the master to minimise traffic.

Registers

Register offset	Name	Minimum value	Maximum value	Bits
0	Identity string 1	UNICODE	UNICODE	512
32	Identity string 2	UNICODE	UNICODE	512
64	Identity string 3	UNICODE	UNICODE	512
96	Identity string 4	UNICODE	UNICODE	512
128	Identity string 5	UNICODE	UNICODE	512
160	Identity string 6	UNICODE	UNICODE	512
192	Identity string 7	UNICODE	UNICODE	512
224	Identity string 8	UNICODE	UNICODE	512

10.22 Page 26 - State Machine Name Strings

Notes:

1. These are read only registers.
2. Each string consists of 32 Unicode characters with the first character at the lowest register address, NULL terminators are not used.
3. The strings contain the names of the state machines that are implemented in a particular slave device.
4. The contents of these strings will never change while the slave device is operating so a copy can be held by the master to minimise traffic.
5. Reading the string for a unimplemented state machine will return 32 spaces (Unicode 0x0020).

Registers

Register offset	Name	Minimum value	Maximum value	Bits
0	S.M. 1 name string	UNICODE	UNICODE	512
32	S.M. 2 name string	UNICODE	UNICODE	512
64	S.M. 3 name string	UNICODE	UNICODE	512
96	S.M. 4 name string	UNICODE	UNICODE	512
128	S.M. 5 name string	UNICODE	UNICODE	512
160	S.M. 6 name string	UNICODE	UNICODE	512
192	S.M. 7 name string	UNICODE	UNICODE	512
224	S.M. 8 name string	UNICODE	UNICODE	512

10.23 Page 28 - State Machine State Strings

Notes:

1. These are read only registers.
2. Each string consists of 32 Unicode characters with the first character at the lowest register address, NULL terminators are not used.
3. The contents of these strings may change at any time when the corresponding state machine changes state, refer to the 'generating set status information' page for details.
4. A complete string must be read with a single query to avoid the possibility of reading parts from different strings, any attempt to read part of a string will return extended exception 13 (Block violation).
5. Up to 3 complete consecutive strings can be read with a single query, limited only by the packet size limitations of Modbus.
6. Reading a string causes the corresponding state machine status code in the 'generating set status information' page to change to 0.
7. A string can be read regardless of the state machine status code.
8. Reading the string for a unimplemented state machine will return 32 spaces (Unicode 0x0020).
9. This page is not implemented on the 72xx/73xx and 8xxx/74xx families.

Registers

Register offset	Name	Minimum value	Maximum value	Bits
0	S.M. 1 state string	UNICODE	UNICODE	512
32	S.M. 2 state string	UNICODE	UNICODE	512
64	S.M. 3 state string	UNICODE	UNICODE	512
96	S.M. 4 state string	UNICODE	UNICODE	512
128	S.M. 5 state string	UNICODE	UNICODE	512
160	S.M. 6 state string	UNICODE	UNICODE	512
192	S.M. 7 state string	UNICODE	UNICODE	512
224	S.M. 8 state string	UNICODE	UNICODE	512

10.24 Pages 32 to 95 - Alarm Strings (Old alarm system)

Notes:

1. These are read only registers.
2. Each string consists of 32 Unicode characters with the first character at the lowest register address, NULL terminators are not used.
3. There are 2 strings corresponding to each alarm, refer to the alarm conditions page for details of their use.
4. The contents of these strings will never change while the slave device is operating so a copy can be held by the master to minimise traffic.
5. Reading the string for an unimplemented alarm will return 32 spaces (Unicode 0x0020).
6. The inactive string for an alarm may not be used, in which case it will return 32 spaces (Unicode 0x0020).
7. The old alarm system is not implemented on the 72xx/73xx and 8xxx/74xx families.

Registers

Page	Register offset	Name	Minimum value	Maximum value	Bits
32	0	Emergency stop inactive string	UNICODE	UNICODE	512
	32	Emergency stop active string	UNICODE	UNICODE	512
	64	Low oil pressure inactive string	UNICODE	UNICODE	512
	96	Low oil pressure active string	UNICODE	UNICODE	512
	128	High coolant temperature inactive string	UNICODE	UNICODE	512
	160	High coolant temperature active string	UNICODE	UNICODE	512
	192	High oil temperature inactive string	UNICODE	UNICODE	512
	224	High oil temperature active string	UNICODE	UNICODE	512
33	0	Under speed inactive string	UNICODE	UNICODE	512
	32	Under speed active string	UNICODE	UNICODE	512
	64	Over speed inactive string	UNICODE	UNICODE	512
	96	Over speed active string	UNICODE	UNICODE	512
	128	Fail to start inactive string	UNICODE	UNICODE	512
	160	Fail to start active string	UNICODE	UNICODE	512
	192	Fail to come to rest inactive string	UNICODE	UNICODE	512
	224	Fail to come to rest active string	UNICODE	UNICODE	512
34	0	Loss of speed sensing inactive string	UNICODE	UNICODE	512
	32	Loss of speed sensing active string	UNICODE	UNICODE	512
	64	Generator low voltage inactive string	UNICODE	UNICODE	512
	96	Generator low voltage active string	UNICODE	UNICODE	512
	128	Generator high voltage inactive string	UNICODE	UNICODE	512
	160	Generator high voltage active string	UNICODE	UNICODE	512
	192	Generator low frequency inactive string	UNICODE	UNICODE	512
	224	Generator low frequency active string	UNICODE	UNICODE	512
35	0	Generator high frequency inactive string	UNICODE	UNICODE	512
	32	Generator high frequency active string	UNICODE	UNICODE	512
	64	Generator high current inactive string	UNICODE	UNICODE	512
	96	Generator high current active string	UNICODE	UNICODE	512
	128	Generator earth fault inactive string	UNICODE	UNICODE	512
	160	Generator earth fault active string	UNICODE	UNICODE	512
	192	Generator reverse power inactive string	UNICODE	UNICODE	512
	224	Generator reverse power active string	UNICODE	UNICODE	512
36	0	Air flap inactive string	UNICODE	UNICODE	512
	32	Air flap active string	UNICODE	UNICODE	512
	64	Oil pressure sender fault inactive string	UNICODE	UNICODE	512
	96	Oil pressure sender fault active string	UNICODE	UNICODE	512
	128	Coolant temperature sender fault inactive string	UNICODE	UNICODE	512
	160	Coolant temperature sender fault active string	UNICODE	UNICODE	512
	192	Oil temperature sender fault inactive string	UNICODE	UNICODE	512
	224	Oil temperature sender fault active string	UNICODE	UNICODE	512

Alarm strings continued

Page	Register offset	Name	Minimum value	Maximum value	Bits
37	0	Fuel level sender fault inactive string	UNICODE	UNICODE	512
	32	Fuel level sender fault active string	UNICODE	UNICODE	512
	64	Magnetic pickup fault inactive string	UNICODE	UNICODE	512
	96	Magnetic pickup fault active string	UNICODE	UNICODE	512
	128	Loss of AC speed signal inactive string	UNICODE	UNICODE	512
	160	Loss of AC speed signal active string	UNICODE	UNICODE	512
	192	Charge alternator failure inactive string	UNICODE	UNICODE	512
	224	Charge alternator failure active string	UNICODE	UNICODE	512
38	0	Low battery voltage inactive string	UNICODE	UNICODE	512
	32	Low battery voltage active string	UNICODE	UNICODE	512
	64	High battery voltage inactive string	UNICODE	UNICODE	512
	96	High battery voltage active string	UNICODE	UNICODE	512
	128	Low fuel level inactive string	UNICODE	UNICODE	512
	160	Low fuel level active string	UNICODE	UNICODE	512
	192	High fuel level inactive string	UNICODE	UNICODE	512
	224	High fuel level active string	UNICODE	UNICODE	512
39	0	Generator failed to close inactive string	UNICODE	UNICODE	512
	32	Generator failed to close active string	UNICODE	UNICODE	512
	64	Mains failed to close inactive string	UNICODE	UNICODE	512
	96	Mains failed to close active string	UNICODE	UNICODE	512
	128	Generator failed to open inactive string	UNICODE	UNICODE	512
	160	Generator failed to open active string	UNICODE	UNICODE	512
	192	Mains failed to open inactive string	UNICODE	UNICODE	512
	224	Mains failed to open active string	UNICODE	UNICODE	512
40	0	Mains low voltage inactive string	UNICODE	UNICODE	512
	32	Mains low voltage active string	UNICODE	UNICODE	512
	64	Mains high voltage inactive string	UNICODE	UNICODE	512
	96	Mains high voltage active string	UNICODE	UNICODE	512
	128	Bus failed to close inactive string	UNICODE	UNICODE	512
	160	Bus failed to close active string	UNICODE	UNICODE	512
	192	Bus failed to open inactive string	UNICODE	UNICODE	512
	224	Bus failed to open active string	UNICODE	UNICODE	512
41	0	Mains low frequency inactive string	UNICODE	UNICODE	512
	32	Mains low frequency active string	UNICODE	UNICODE	512
	64	Mains high frequency inactive string	UNICODE	UNICODE	512
	96	Mains high frequency active string	UNICODE	UNICODE	512
	128	Mains failed inactive string	UNICODE	UNICODE	512
	160	Mains failed active string	UNICODE	UNICODE	512
	192	Mains phase rotation wrong inactive string	UNICODE	UNICODE	512
	224	Mains phase rotation wrong active string	UNICODE	UNICODE	512
42	0	Generator phase rotation wrong inactive string	UNICODE	UNICODE	512
	32	Generator phase rotation wrong active string	UNICODE	UNICODE	512
	64	Maintenance due inactive string	UNICODE	UNICODE	512
	96	Maintenance due active string	UNICODE	UNICODE	512
	128	Clock not set inactive string	UNICODE	UNICODE	512
	160	Clock not set active string	UNICODE	UNICODE	512
	192	Local LCD configuration lost inactive string	UNICODE	UNICODE	512
	224	Local LCD configuration lost inactive string	UNICODE	UNICODE	512

Alarm strings continued

Page	Register offset	Name	Minimum value	Maximum value	Bits
43	0	Local telemetry configuration lost inactive string	UNICODE	UNICODE	512
	32	Local telemetry configuration lost active string	UNICODE	UNICODE	512
	64	Calibration lost inactive string	UNICODE	UNICODE	512
	96	Calibration lost active string	UNICODE	UNICODE	512
	128	Modem power fault inactive string	UNICODE	UNICODE	512
	160	Modem power fault active string	UNICODE	UNICODE	512
	192	Generator short circuit inactive string	UNICODE	UNICODE	512
	224	Generator short circuit active string	UNICODE	UNICODE	512
44	0	Failure to synchronise inactive string	UNICODE	UNICODE	512
	32	Failure to synchronise active string	UNICODE	UNICODE	512
	64	Bus live inactive string	UNICODE	UNICODE	512
	96	Bus live active string	UNICODE	UNICODE	512
	128	Scheduled run inactive string	UNICODE	UNICODE	512
	160	Scheduled run active string	UNICODE	UNICODE	512
	192	Bus phase rotation wrong inactive string	UNICODE	UNICODE	512
	224	Bus phase rotation wrong active string	UNICODE	UNICODE	512
45	0	Priority selection error inactive string	UNICODE	UNICODE	512
	32	Priority selection error active string	UNICODE	UNICODE	512
	64	MSC data error inactive string	UNICODE	UNICODE	512
	96	MSC data error active string	UNICODE	UNICODE	512
	128	MSC ID error inactive string	UNICODE	UNICODE	512
	160	MSC ID error active string	UNICODE	UNICODE	512
	192	MSC failure inactive string	UNICODE	UNICODE	512
	224	MSC failure active string	UNICODE	UNICODE	512
46	0	MSC too few sets inactive string	UNICODE	UNICODE	512
	32	MSC too few sets active string	UNICODE	UNICODE	512
	64	MSC alarms inhibited inactive string	UNICODE	UNICODE	512
	96	MSC alarms inhibited active string	UNICODE	UNICODE	512
	128	MSC old version units inactive string	UNICODE	UNICODE	512
	160	MSC old version units active string	UNICODE	UNICODE	512
	192	Mains reverse power inactive string	UNICODE	UNICODE	512
	224	Mains reverse power active string	UNICODE	UNICODE	512
47	0	Minimum sets not reached inactive string	UNICODE	UNICODE	512
	32	Minimum sets not reached active string	UNICODE	UNICODE	512
	64	Insufficient capacity available inactive string	UNICODE	UNICODE	512
	96	Insufficient capacity available active string	UNICODE	UNICODE	512
	128	Expansion input unit not calibrated inactive string	UNICODE	UNICODE	512
	160	Expansion input unit not calibrated active string	UNICODE	UNICODE	512
	192	Expansion input unit failure inactive string	UNICODE	UNICODE	512
	224	Expansion input unit failure active string	UNICODE	UNICODE	512

Alarm strings continued

Page	Register offset	Name	Minimum value	Maximum value	Bits
48	0	Auxiliary sender 1 low inactive string	UNICODE	UNICODE	512
	32	Auxiliary sender 1 low active string	UNICODE	UNICODE	512
	64	Auxiliary sender 1 high inactive string	UNICODE	UNICODE	512
	96	Auxiliary sender 1 high active string	UNICODE	UNICODE	512
	128	Auxiliary sender 1 fault inactive string	UNICODE	UNICODE	512
	160	Auxiliary sender 1 fault active string	UNICODE	UNICODE	512
	192	Auxiliary sender 2 low inactive string	UNICODE	UNICODE	512
	224	Auxiliary sender 2 low active string	UNICODE	UNICODE	512
49	0	Auxiliary sender 2 high inactive string	UNICODE	UNICODE	512
	32	Auxiliary sender 2 high active string	UNICODE	UNICODE	512
	64	Auxiliary sender 2 fault inactive string	UNICODE	UNICODE	512
	96	Auxiliary sender 2 fault active string	UNICODE	UNICODE	512
	128	Auxiliary sender 3 low inactive string	UNICODE	UNICODE	512
	160	Auxiliary sender 3 low active string	UNICODE	UNICODE	512
	192	Auxiliary sender 3 high inactive string	UNICODE	UNICODE	512
	224	Auxiliary sender 3 high active string	UNICODE	UNICODE	512
50	0	Auxiliary sender 3 fault inactive string	UNICODE	UNICODE	512
	32	Auxiliary sender 3 fault active string	UNICODE	UNICODE	512
	64	Auxiliary sender 4 low inactive string	UNICODE	UNICODE	512
	96	Auxiliary sender 4 low active string	UNICODE	UNICODE	512
	128	Auxiliary sender 4 high inactive string	UNICODE	UNICODE	512
	160	Auxiliary sender 4 high active string	UNICODE	UNICODE	512
	192	Auxiliary sender 4 high inactive string	UNICODE	UNICODE	512
	224	Auxiliary sender 4 high active string	UNICODE	UNICODE	512
51	0	Engine control unit (ECU) link lost inactive string	UNICODE	UNICODE	512
	32	Engine control unit (ECU) link lost active string	UNICODE	UNICODE	512
	64	Engine control unit (ECU) failure inactive string	UNICODE	UNICODE	512
	96	Engine control unit (ECU) failure active string	UNICODE	UNICODE	512
	128	Engine control unit (ECU) error inactive string	UNICODE	UNICODE	512
	160	Engine control unit (ECU) error active string	UNICODE	UNICODE	512
	192	Low coolant temperature inactive string	UNICODE	UNICODE	512
	224	Low coolant temperature active string	UNICODE	UNICODE	512
52	0	Out of sync inactive string	UNICODE	UNICODE	512
	32	Out of sync active string	UNICODE	UNICODE	512
	64	Low Oil Pressure Switch inactive string	UNICODE	UNICODE	512
	96	Low Oil Pressure Switch active string	UNICODE	UNICODE	512
	128	Alternative Aux Mains Fail inactive string	UNICODE	UNICODE	512
	160	Alternative Aux Mains Fail active string	UNICODE	UNICODE	512
	192	Loss of excitation inactive string	UNICODE	UNICODE	512
	224	Loss of excitation active string	UNICODE	UNICODE	512

Alarm strings continued

Page	Register offset	Name	Minimum value	Maximum value	Bits
53	0	Mains kW Limit inactive string	UNICODE	UNICODE	512
	32	Mains kW Limit active string	UNICODE	UNICODE	512
	64	Negative phase sequence inactive string	UNICODE	UNICODE	512
	96	Negative phase sequence active string	UNICODE	UNICODE	512
	128	Mains ROCOF inactive string	UNICODE	UNICODE	512
	160	Mains ROCOF active string	UNICODE	UNICODE	512
	192	Mains vector shift inactive string	UNICODE	UNICODE	512
	224	Mains vector shift active string	UNICODE	UNICODE	512
54	0	Mains G59 low frequency inactive string	UNICODE	UNICODE	512
	32	Mains G59 low frequency active string	UNICODE	UNICODE	512
	64	Mains G59 high frequency inactive string	UNICODE	UNICODE	512
	96	Mains G59 high frequency active string	UNICODE	UNICODE	512
	128	Mains G59 low voltage inactive string	UNICODE	UNICODE	512
	160	Mains G59 low voltage active string	UNICODE	UNICODE	512
	192	Mains G59 high voltage inactive string	UNICODE	UNICODE	512
	224	Mains G59 high voltage active string	UNICODE	UNICODE	512
55	0	Mains G59 trip inactive string	UNICODE	UNICODE	512
	32	Mains G59 trip active string	UNICODE	UNICODE	512
	64	Generator kW Overload inactive string	UNICODE	UNICODE	512
	96	Generator kW Overload active string	UNICODE	UNICODE	512
	128	Engine Inlet Temp High inactive string	UNICODE	UNICODE	512
	160	Engine Inlet Temp High inactive string	UNICODE	UNICODE	512
	192	Bus 1 live inactive string	UNICODE	UNICODE	512
	224	Bus 1 live active string	UNICODE	UNICODE	512
56	0	Bus 1 phase rotation wrong inactive string	UNICODE	UNICODE	512
	32	Bus 1 phase rotation wrong active string	UNICODE	UNICODE	512
	64	Bus 2 live inactive string	UNICODE	UNICODE	512
	96	Bus 2 live active string	UNICODE	UNICODE	512
	128	Bus 2 phase rotation wrong inactive string	UNICODE	UNICODE	512
	160	Bus 2 phase rotation wrong active string	UNICODE	UNICODE	512
	192	Reserved	UNICODE	UNICODE	512
	224	Reserved	UNICODE	UNICODE	512
57-63		Reserved			

Alarm strings continued

Page	Register offset	Name	Minimum value	Maximum value	Bits
64	0	Unnamed digital input 1 inactive string	UNICODE	UNICODE	512
	32	Unnamed digital input 1 active string	UNICODE	UNICODE	512
	64	Unnamed digital input 2 inactive string	UNICODE	UNICODE	512
	96	Unnamed digital input 2 active string	UNICODE	UNICODE	512
	128	Unnamed digital input 3 inactive string	UNICODE	UNICODE	512
	160	Unnamed digital input 3 active string	UNICODE	UNICODE	512
	192	Unnamed digital input 4 inactive string	UNICODE	UNICODE	512
	224	Unnamed digital input 4 active string	UNICODE	UNICODE	512
65		Unnamed digital input 5-8 strings			
66		Unnamed digital input 9-12 strings			
67		Unnamed digital input 13-16 strings			
68		Unnamed digital input 17-20 strings			
69		Unnamed digital input 21-24 strings			
70		Unnamed digital input 25-28 strings			
71		Unnamed digital input 29-32 strings			
72		Unnamed digital input 33-36 strings			
73		Unnamed digital input 37-40 strings			
74		Unnamed digital input 41-44 strings			
75		Unnamed digital input 45-48 strings			
76		Unnamed digital input 49-52 strings			
77		Unnamed digital input 53-56 strings			
78		Unnamed digital input 57-60 strings			
79		Unnamed digital input 61-64 strings			
80		Unnamed digital input 65-68 strings			
81		Unnamed digital input 69-72 strings			
82		Unnamed digital input 73-76 strings			
83		Unnamed digital input 77-80 strings			
84		Unnamed digital input 81-84 strings			
85		Unnamed digital input 85-88 strings			
86		Unnamed digital input 89-92 strings			
87		Unnamed digital input 93-96 strings			
88		Unnamed digital input 97-100 strings			
89		Unnamed digital input 101-104 strings			
90		Unnamed digital input 105-108 strings			
91		Unnamed digital input 109-112 strings			
92		Unnamed digital input 113-116 strings			
93		Unnamed digital input 117-120 strings			
94		Unnamed digital input 121-124 strings			
95		Unnamed digital input 125-128 strings			

10.25 Pages 32-36 - 2131 Expansion module name strings

1. These registers provide the user defined names of each channel of each expansion module.
2. These pages are implemented on the 72xx/73xx, 8xxx/74xx and later families and replace the alarm strings from the old alarm system.

32	0	2131 Expansion module 0 input A name string	UNICODE	UNICODE	512
	32	2131 Expansion module 0 input B name string	UNICODE	UNICODE	512
	64	2131 Expansion module 0 input C name string	UNICODE	UNICODE	512
	96	2131 Expansion module 0 input D name string	UNICODE	UNICODE	512
	128	2131 Expansion module 0 input E name string	UNICODE	UNICODE	512
	160	2131 Expansion module 0 input F name string	UNICODE	UNICODE	512
	192	2131 Expansion module 0 input G name string	UNICODE	UNICODE	512
	224	2131 Expansion module 0 input H name string	UNICODE	UNICODE	512
33	0	2131 Expansion module 0 input I name string	UNICODE	UNICODE	512
	32	2131 Expansion module 0 input J name string	UNICODE	UNICODE	512
	64	2131 Expansion module 1 input A name string	UNICODE	UNICODE	512
	96	2131 Expansion module 1 input B name string	UNICODE	UNICODE	512
	128	2131 Expansion module 1 input C name string	UNICODE	UNICODE	512
	160	2131 Expansion module 1 input D name string	UNICODE	UNICODE	512
	192	2131 Expansion module 1 input E name string	UNICODE	UNICODE	512
	224	2131 Expansion module 1 input F name string	UNICODE	UNICODE	512
34	0	2131 Expansion module 1 input G name string	UNICODE	UNICODE	512
	32	2131 Expansion module 1 input H name string	UNICODE	UNICODE	512
	64	2131 Expansion module 1 input I name string	UNICODE	UNICODE	512
	96	2131 Expansion module 1 input J name string	UNICODE	UNICODE	512
	128	2131 Expansion module 2 input A name string	UNICODE	UNICODE	512
	160	2131 Expansion module 2 input B name string	UNICODE	UNICODE	512
	192	2131 Expansion module 2 input C name string	UNICODE	UNICODE	512
	224	2131 Expansion module 2 input D name string	UNICODE	UNICODE	512
35	0	2131 Expansion module 2 input E name string	UNICODE	UNICODE	512
	32	2131 Expansion module 2 input F name string	UNICODE	UNICODE	512
	64	2131 Expansion module 2 input G name string	UNICODE	UNICODE	512
	96	2131 Expansion module 2 input H name string	UNICODE	UNICODE	512
	128	2131 Expansion module 2 input I name string	UNICODE	UNICODE	512
	160	2131 Expansion module 2 input J name string	UNICODE	UNICODE	512
	192	2131 Expansion module 3 input A name string	UNICODE	UNICODE	512
	224	2131 Expansion module 3 input B name string	UNICODE	UNICODE	512
36	0	2131 Expansion module 3 input C name string	UNICODE	UNICODE	512
	32	2131 Expansion module 3 input D name string	UNICODE	UNICODE	512
	64	2131 Expansion module 3 input E name string	UNICODE	UNICODE	512
	96	2131 Expansion module 3 input F name string	UNICODE	UNICODE	512
	128	2131 Expansion module 3 input G name string	UNICODE	UNICODE	512
	160	2131 Expansion module 3 input H name string	UNICODE	UNICODE	512
	192	2131 Expansion module 3 input I name string	UNICODE	UNICODE	512
	224	2131 Expansion module 3 input J name string	UNICODE	UNICODE	512

10.26 Pages 37-40 - 2133 Expansion module name strings

1. These registers provide the user defined names of each channel of each expansion module.
2. These pages are implemented on the 72xx/73xx, 8xxx/74xx and later families and replace the alarm strings from the old alarm system.

37	0	2133 Expansion module 0 input A name string	UNICODE	UNICODE	512
	32	2133 Expansion module 0 input B name string	UNICODE	UNICODE	512
	64	2133 Expansion module 0 input C name string	UNICODE	UNICODE	512
	96	2133 Expansion module 0 input D name string	UNICODE	UNICODE	512
	128	2133 Expansion module 0 input E name string	UNICODE	UNICODE	512
	160	2133 Expansion module 0 input F name string	UNICODE	UNICODE	512
	192	2133 Expansion module 0 input G name string	UNICODE	UNICODE	512
	224	2133 Expansion module 0 input H name string	UNICODE	UNICODE	512
38	0	2133 Expansion module 1 input A name string	UNICODE	UNICODE	512
	32	2133 Expansion module 1 input B name string	UNICODE	UNICODE	512
	64	2133 Expansion module 1 input C name string	UNICODE	UNICODE	512
	96	2133 Expansion module 1 input D name string	UNICODE	UNICODE	512
	128	2133 Expansion module 1 input E name string	UNICODE	UNICODE	512
	160	2133 Expansion module 1 input F name string	UNICODE	UNICODE	512
	192	2133 Expansion module 1 input G name string	UNICODE	UNICODE	512
	224	2133 Expansion module 2 input G name string	UNICODE	UNICODE	512
39	0	2133 Expansion module 2 input A name string	UNICODE	UNICODE	512
	32	2133 Expansion module 2 input B name string	UNICODE	UNICODE	512
	64	2133 Expansion module 2 input C name string	UNICODE	UNICODE	512
	96	2133 Expansion module 2 input D name string	UNICODE	UNICODE	512
	128	2133 Expansion module 2 input E name string	UNICODE	UNICODE	512
	160	2133 Expansion module 2 input F name string	UNICODE	UNICODE	512
	192	2133 Expansion module 2 input G name string	UNICODE	UNICODE	512
	224	2133 Expansion module 2 input H name string	UNICODE	UNICODE	512
40	0	2133 Expansion module 3 input A name string	UNICODE	UNICODE	512
	32	2133 Expansion module 3 input B name string	UNICODE	UNICODE	512
	64	2133 Expansion module 3 input C name string	UNICODE	UNICODE	512
	96	2133 Expansion module 3 input D name string	UNICODE	UNICODE	512
	128	2133 Expansion module 3 input E name string	UNICODE	UNICODE	512
	160	2133 Expansion module 3 input F name string	UNICODE	UNICODE	512
	192	2133 Expansion module 3 input G name string	UNICODE	UNICODE	512
	224	2133 Expansion module 3 input H name string	UNICODE	UNICODE	512

10.27 Pages 41-43 - 2152 Expansion module name strings

1. These registers provide the user defined names of each channel of each expansion module.
2. These pages are implemented on the 72xx/73xx, 8xxx/74xx and later families and replace the alarm strings from the old alarm system.

41	0	2152 Expansion module 0 input A name string	UNICODE	UNICODE	512
	32	2152 Expansion module 0 input B name string	UNICODE	UNICODE	512
	64	2152 Expansion module 0 input C name string	UNICODE	UNICODE	512
	96	2152 Expansion module 0 input D name string	UNICODE	UNICODE	512
	128	2152 Expansion module 0 input E name string	UNICODE	UNICODE	512
	160	2152 Expansion module 0 input F name string	UNICODE	UNICODE	512
	192	2152 Expansion module 1 input A name string	UNICODE	UNICODE	512
	224	2152 Expansion module 1 input B name string	UNICODE	UNICODE	512
42	0	2152 Expansion module 1 input C name string	UNICODE	UNICODE	512
	32	2152 Expansion module 1 input D name string	UNICODE	UNICODE	512
	64	2152 Expansion module 1 input E name string	UNICODE	UNICODE	512
	96	2152 Expansion module 1 input F name string	UNICODE	UNICODE	512
	128	2152 Expansion module 2 input A name string	UNICODE	UNICODE	512
	160	2152 Expansion module 2 input B name string	UNICODE	UNICODE	512
	192	2152 Expansion module 2 input C name string	UNICODE	UNICODE	512
	224	2152 Expansion module 2 input D name string	UNICODE	UNICODE	512
43	0	2152 Expansion module 2 input E name string	UNICODE	UNICODE	512
	32	2152 Expansion module 2 input F name string	UNICODE	UNICODE	512
	64	2152 Expansion module 3 input A name string	UNICODE	UNICODE	512
	96	2152 Expansion module 3 input B name string	UNICODE	UNICODE	512
	128	2152 Expansion module 3 input C name string	UNICODE	UNICODE	512
	160	2152 Expansion module 3 input D name string	UNICODE	UNICODE	512
	192	2152 Expansion module 3 input E name string	UNICODE	UNICODE	512
	224	2152 Expansion module 3 input F name string	UNICODE	UNICODE	512

10.28 Pages 44-48 - 2131 Expansion module digital alarm strings

1. These registers provide the user defined alarm names of each channel of each expansion module when configured as a digital input.
2. These pages are implemented on the 72xx/73xx, 8xxx/74xx and later families and replace the alarm strings from the old alarm system.

44	0	2131 Expansion module 0 digital input A string	UNICODE	UNICODE	512
	32	2131 Expansion module 0 digital input B string	UNICODE	UNICODE	512
	64	2131 Expansion module 0 digital input C string	UNICODE	UNICODE	512
	96	2131 Expansion module 0 digital input D string	UNICODE	UNICODE	512
	128	2131 Expansion module 0 digital input E string	UNICODE	UNICODE	512
	160	2131 Expansion module 0 digital input F string	UNICODE	UNICODE	512
	192	2131 Expansion module 0 digital input G String	UNICODE	UNICODE	512
	224	2131 Expansion module 0 digital input H string	UNICODE	UNICODE	512
45	0	2131 Expansion module 0 digital input I string	UNICODE	UNICODE	512
	32	2131 Expansion module 0 digital input J string	UNICODE	UNICODE	512
	64	2131 Expansion module 1 digital input A string	UNICODE	UNICODE	512
	96	2131 Expansion module 1 digital input B string	UNICODE	UNICODE	512
	128	2131 Expansion module 1 digital input C string	UNICODE	UNICODE	512
	160	2131 Expansion module 1 digital input D string	UNICODE	UNICODE	512
	192	2131 Expansion module 1 digital input E string	UNICODE	UNICODE	512
	224	2131 Expansion module 1 digital input F string	UNICODE	UNICODE	512
46	0	2131 Expansion module 1 digital input G string	UNICODE	UNICODE	512
	32	2131 Expansion module 1 digital input H string	UNICODE	UNICODE	512
	64	2131 Expansion module 1 digital input I string	UNICODE	UNICODE	512
	96	2131 Expansion module 1 digital input J string	UNICODE	UNICODE	512
	128	2131 Expansion module 2 digital input A string	UNICODE	UNICODE	512
	160	2131 Expansion module 2 digital input B string	UNICODE	UNICODE	512
	192	2131 Expansion module 2 digital input C string	UNICODE	UNICODE	512
	224	2131 Expansion module 2 digital input D string	UNICODE	UNICODE	512
47	0	2131 Expansion module 2 digital input E string	UNICODE	UNICODE	512
	32	2131 Expansion module 2 digital input F string	UNICODE	UNICODE	512
	64	2131 Expansion module 2 digital input G string	UNICODE	UNICODE	512
	96	2131 Expansion module 2 digital input H string	UNICODE	UNICODE	512
	128	2131 Expansion module 2 digital input I string	UNICODE	UNICODE	512
	160	2131 Expansion module 2 digital input J string	UNICODE	UNICODE	512
	192	2131 Expansion module 3 digital input A string	UNICODE	UNICODE	512
	224	2131 Expansion module 3 digital input B string	UNICODE	UNICODE	512
48	0	2131 Expansion module 3 digital input C string	UNICODE	UNICODE	512
	32	2131 Expansion module 3 digital input D string	UNICODE	UNICODE	512
	64	2131 Expansion module 3 digital input E string	UNICODE	UNICODE	512
	96	2131 Expansion module 3 digital input F string	UNICODE	UNICODE	512
	128	2131 Expansion module 3 digital input G string	UNICODE	UNICODE	512
	160	2131 Expansion module 3 digital input H string	UNICODE	UNICODE	512
	192	2131 Expansion module 3 digital input I string	UNICODE	UNICODE	512
	224	2131 Expansion module 3 digital input J string	UNICODE	UNICODE	512

10.29 Pages 49-58 - 2131 Expansion module analogue alarm strings

1. These registers provide the user defined alarm names of each channel of each expansion module when configured as an analogue input.
2. These pages are implemented on the 72xx/73xx, 8xxx/74xx and later families and replace the alarm strings from the old alarm system.

49	0	2131 Expansion module 0 input A (low) string	UNICODE	UNICODE	512
	32	2131 Expansion module 0 input A (high) string	UNICODE	UNICODE	512
	64	2131 Expansion module 0 input B (low) string	UNICODE	UNICODE	512
	96	2131 Expansion module 0 input B (high) string	UNICODE	UNICODE	512
	128	2131 Expansion module 0 input C (low) string	UNICODE	UNICODE	512
	160	2131 Expansion module 0 input C (high) string	UNICODE	UNICODE	512
	192	2131 Expansion module 0 input D (low) string	UNICODE	UNICODE	512
	224	2131 Expansion module 0 input D (high) string	UNICODE	UNICODE	512
50	0	2131 Expansion module 0 input E (low) string	UNICODE	UNICODE	512
	32	2131 Expansion module 0 input E (high) string	UNICODE	UNICODE	512
	64	2131 Expansion module 0 input F (low) string	UNICODE	UNICODE	512
	96	2131 Expansion module 0 input F (high) string	UNICODE	UNICODE	512
	128	2131 Expansion module 0 input G (low) string	UNICODE	UNICODE	512
	160	2131 Expansion module 0 input G (high) string	UNICODE	UNICODE	512
	192	2131 Expansion module 0 input H (low) string	UNICODE	UNICODE	512
	224	2131 Expansion module 0 input H (high) string	UNICODE	UNICODE	512
51	0	2131 Expansion module 0 input I (low) string	UNICODE	UNICODE	512
	32	2131 Expansion module 0 input I (high) string	UNICODE	UNICODE	512
	64	2131 Expansion module 0 input J (low) string	UNICODE	UNICODE	512
	96	2131 Expansion module 0 input J (high) string	UNICODE	UNICODE	512
	128	2131 Expansion module 1 input A (low) string	UNICODE	UNICODE	512
	160	2131 Expansion module 1 input A (high) string	UNICODE	UNICODE	512
	192	2131 Expansion module 1 input B (low) string	UNICODE	UNICODE	512
	224	2131 Expansion module 1 input B (high) string	UNICODE	UNICODE	512
52	0	2131 Expansion module 1 input C (low) string	UNICODE	UNICODE	512
	32	2131 Expansion module 1 input C (high) string	UNICODE	UNICODE	512
	64	2131 Expansion module 1 input D (low) string	UNICODE	UNICODE	512
	96	2131 Expansion module 1 input D (high) string	UNICODE	UNICODE	512
	128	2131 Expansion module 1 input E (low) string	UNICODE	UNICODE	512
	160	2131 Expansion module 1 input E (high) string	UNICODE	UNICODE	512
	192	2131 Expansion module 1 input F (low) string	UNICODE	UNICODE	512
	224	2131 Expansion module 1 input F (high) string	UNICODE	UNICODE	512
53	0	2131 Expansion module 1 input G (low) string	UNICODE	UNICODE	512
	32	2131 Expansion module 1 input G (high) string	UNICODE	UNICODE	512
	64	2131 Expansion module 1 input H (low) string	UNICODE	UNICODE	512
	96	2131 Expansion module 1 input H (high) string	UNICODE	UNICODE	512
	128	2131 Expansion module 1 input I (low) string	UNICODE	UNICODE	512
	160	2131 Expansion module 1 input I (high) string	UNICODE	UNICODE	512
	192	2131 Expansion module 1 input J (low) string	UNICODE	UNICODE	512
	224	2131 Expansion module 1 input J (high) string	UNICODE	UNICODE	512
54-58		2131 Expansion module 2-3 inputs A-J strings	UNICODE	UNICODE	512

10.30 Pages 59-66 - 2133 Expansion module analogue alarm strings

1. These registers provide the user defined alarm names of each channel of each expansion module when configured as an analogue input.
2. These pages are implemented on the 72xx/73xx, 8xxx/74xx and later families and replace the alarm strings from the old alarm system.

59	0	2133 Expansion module 0 input A (low) string	UNICODE	UNICODE	512
	32	2133 Expansion module 0 input A (high) string	UNICODE	UNICODE	512
	64	2133 Expansion module 0 input B (low) string	UNICODE	UNICODE	512
	96	2133 Expansion module 0 input B (high) string	UNICODE	UNICODE	512
	128	2133 Expansion module 0 input C (low) string	UNICODE	UNICODE	512
	160	2133 Expansion module 0 input C (high) string	UNICODE	UNICODE	512
	192	2133 Expansion module 0 input D (low) string	UNICODE	UNICODE	512
	224	2133 Expansion module 0 input D (high) string	UNICODE	UNICODE	512
60	0	2133 Expansion module 0 input E (low) string	UNICODE	UNICODE	512
	32	2133 Expansion module 0 input E (high) string	UNICODE	UNICODE	512
	64	2133 Expansion module 0 input F (low) string	UNICODE	UNICODE	512
	96	2133 Expansion module 0 input F (high) string	UNICODE	UNICODE	512
	128	2133 Expansion module 0 input G (low) string	UNICODE	UNICODE	512
	160	2133 Expansion module 0 input G (high) string	UNICODE	UNICODE	512
	192	2133 Expansion module 0 input H (low) string	UNICODE	UNICODE	512
	224	2133 Expansion module 0 input H (high) string	UNICODE	UNICODE	512
61-62		2133 Expansion module 1 input A-H strings	UNICODE	UNICODE	512
63-64		2133 Expansion module 1 input A-H strings	UNICODE	UNICODE	512
65-66		2133 Expansion module 1 input A-H strings	UNICODE	UNICODE	512

10.31 Page 137 - Active synchronisation and load share configuration

1. These registers may be individually read and written at any time.
2. The 72xx/73xx family only supports registers 128-130.

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ Sign	Read/Write
	Local bus control (CAN port 0)						
0	Device identifier	0	15	1	1	16	Read/Write
1-31	Reserved						
	Miscellaneous						
32	Generating set run priority	1	16	1	1	16	Read/Write
33	Frequency control offset	0	1.0	0.01	Hz	16	Read/Write
34	Reserved	0	0			16	Read/Write
35	Reserved	0	0			16	Read/Write
36	Load level setting (minimum)	0	100	1	%	16	Read/Write
37	Load level setting (maximum)	0	100	1	%	16	Read/Write
38	Reserved	0	0			16S	Read/Write
39	VAr level setting (maximum)	-100	100	1	%	16 S	Read/Write
40	Bus / Mains load setting	Bus	Mains			16	Read/Write
41	Internal governor IF gain	0	10	0.001	V	16	Read/Write
42	Internal governor IF offset	-10	10	0.001	V	16 S	Read/Write
43	Internal AVR IF gain	0	10	0.001	V	16	Read/Write
44	Internal AVR IF offset	-10	10	0.001	V	16 S	Read/Write
45	Commissioning screens enable flag	0 (no)	1 (yes)			16	Read/Write
46-47	Reserved	0	0			16	Read/Write
	Frequency synchroniser						
48	Reserved	0	0			16	Read/Write
49	Relay pulse rate	0.5	2.5	0.01	Hz	16	Read/Write
50	Relay pulse length	0.1	1.6	0.1	Sec	16	Read/Write
51	Gain (proportional gain)	0	0		%	16	Read/Write
52	Compensation (integral gain)	0	100	1	%	16	Read/Write
52-63	Reserved						
	Phase synchroniser						
64-79	Reserved	0	0			16	Read/Write

Page 137 registers continued

	Load share						
80	Reserved	0	0			16	Read/Write
81	Relay pulse rate	0.5	2.5	0.01	Hz	16	Read/Write
82	Relay pulse length	0.1	1.6	0.1	Sec	16	Read/Write
83	Gain (proportional gain)	0	100	1	%	16	Read/Write
84	Compensation (integral gain)	0	100			16	Read/Write
85-95	Reserved						
	Voltage matcher						
96	Reserved	0	0			16	Read/Write
97	Relay pulse rate	0.5	2.5	0.01	Hz	16	Read/Write
98	Relay pulse length	0.1	1.6	0.1	Sec	16	Read/Write
99	Gain (proportional gain)	0	0	1	%	16	Read/Write
100	Compensation (integral gain)	0	100	1	%	16	Read/Write
101-111	Reserved						
	Reactive load control						
112	Reserved	0	0			16	Read/Write
113	Relay pulse rate	0.5	2.5	0.01	Hz	16	Read/Write
114	Relay pulse length	0.1	1.6	0.1	Sec	16	Read/Write
115	Gain (proportional gain)	0	100	1	%	16	Read/Write
116	Compensation (integral gain)	0	0			16	Read/Write
117-127	Reserved						
	Manual frequency trim						
128	Manual frequency trim	-5.0	5.0	0.1	Hz	16S	Read/Write
129	Minimum frequency trim	-5.0	5.0	0.1	Hz	16S	Read
130	Maximum frequency trim	-5.0	5.0	0.1	Hz	16S	Read
131-136	Reserved						
136-255	Reserved						

10.32 Page 142 – ECU Trouble Codes

1. Reading register 0 effectively latches a copy of the trouble code list at that time and so allows the list to be read without risk of the contents changing until register 0 is re-read. This also applies to reading the short descriptive strings for the trouble codes (see following pages), so that the list of trouble codes can be read in one or more sections and then the associated strings read as needed. To see any updates to the list, the PC needs to re-read register 0 and so latch the list once more.

Registers

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ sign	Read/write
0	Number of trouble codes	0	50			16	Read only
1	Amber warning lamp status	0	1			1/16	Read only
	Red stop lamp status	0	1			2/16	Read only
	Reserved for SAE assignment					3-16/16	Read only
2-5	Trouble Code 1					64	Read only
6-9	Trouble Code 2					64	Read only
10-13	Trouble Code 3					64	Read only
14-201	Trouble Codes 4-50						Read only
202-255	Reserved						Read only

Trouble code format

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ Sign
0--1	Trouble code value	0	524287			9-32/32
	Additional trouble code status	0	255			1-8/32
2	Engine type code	0	31			16
3	reserved	0	0			16

10.33 Page 143-149 – ECU Trouble Code short description string

1. Each short description string is provided with 32x 16 bit registers, one Unicode-16 character in each register. The order of the strings is directly related to the trouble code number position in the list, so trouble code 1 from page 142 will occupy registers 0-31 in page 143, trouble code 2 will occupy registers 32-63 and so on.

2. For now, only page 143 has been implemented to prove the idea, but if it's acceptable then the extra 6 pages to support a maximum of 50 trouble code strings can be added.

3. A point for discussion is whether we need to add similar look-up facilities for the additional trouble code status strings (FMI for J1939 errors, ACTIVE/PASSIVE indication for Keyword 2000 ECUs etc) for the cases where the PC software isn't able to locate the required engine module strings on disc as this would require another 7 GenComm pages to provide the look-up for all 50 entries in the list.

4. The reading of the strings is only required when the PC doesn't have access to its own long version of the strings (such as when the PC doesn't have the equivalent engine module on disc). The contents of the trouble code list is "frozen" when page 142 register 0 is read so that the PC can read all the trouble code list entries and any strings without the list changing.

10.34 Page 152 – User calibration of expansion module analogue inputs

1. This provides a similar interface to page 132 but for DSENet expansion modules.
2. The 8xxx/74xx family now supports 4x 2130, 10x 2157, 10x 2548, 4x 2131, 4x 2133 and 4x 2152.
3. The 335 module supports 2x 2130, 2x 2157, 2x 2548
4. No provision is made for more than these quantities of each type.

Registers

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ sign	Read/write
0-1	2130 Expansion Module 0 input E user scale	0	200	0.1	%	32	Read / write
2-3	2130 Expansion Module 0 input F user scale	0	200	0.1	%	32	Read / write
4-5	2130 Expansion Module 0 input G user scale	0	200	0.1	%	32	Read / write
6-7	2130 Expansion Module 0 input H user scale	0	200	0.1	%	32	Read / write
8-15	2130 Expansion Module 1 inputs E-H user scale						Read / write
16-23	2130 Expansion Module 2 inputs E-H user scale						Read / write
24-31	2130 Expansion Module 3 inputs E-H user scale						Read / write
32-33	2131 Expansion Module 0 input A user scale	0	200	0.1	%	32	Read / write
34-35	2131 Expansion Module 0 input B user scale	0	200	0.1	%	32	Read / write
36-37	2131 Expansion Module 0 input C user scale	0	200	0.1	%	32	Read / write
38-39	2131 Expansion Module 0 input D user scale	0	200	0.1	%	32	Read / write
40-41	2131 Expansion Module 0 input E user scale	0	200	0.1	%	32	Read / write
42-43	2131 Expansion Module 0 input F user scale	0	200	0.1	%	32	Read / write
44-45	2131 Expansion Module 0 input G user scale	0	200	0.1	%	32	Read / write
46-47	2131 Expansion Module 0 input H user scale	0	200	0.1	%	32	Read / write
48-49	2131 Expansion Module 0 input I user scale	0	200	0.1	%	32	Read / write
50-51	2131 Expansion Module 0 input J user scale	0	200	0.1	%	32	Read / write
52-71	2131 Expansion Module 1 inputs A-J user scale						Read / write
72-91	2131 Expansion Module 2 inputs A-J user scale						Read / write
92-111	2131 Expansion Module 3 inputs A-J user scale						Read / write
112-113	2133 Expansion Module 0 input A user scale	0	200	0.1	%	32	Read / write
114-115	2133 Expansion Module 0 input B user scale	0	200	0.1	%	32	Read / write
116-117	2133 Expansion Module 0 input C user scale	0	200	0.1	%	32	Read / write
118-119	2133 Expansion Module 0 input D user scale	0	200	0.1	%	32	Read / write
120-121	2133 Expansion Module 0 input E user scale	0	200	0.1	%	32	Read / write
122-123	2133 Expansion Module 0 input F user scale	0	200	0.1	%	32	Read / write
124-125	2133 Expansion Module 0 input G user scale	0	200	0.1	%	32	Read / write
126-127	2133 Expansion Module 0 input H user scale	0	200	0.1	%	32	Read / write
128-143	2133 Expansion Module 1 inputs A-H user scale						Read / write
144-159	2133 Expansion Module 2 inputs A-H user scale						Read / write
160-175	2133 Expansion Module 3 inputs A-H user scale						Read / write
176-255	Reserved						

10.35 Page 153 – Unnamed alarm conditions

1. This indicates to the PC the current condition/status of all the unnamed alarm sources, including expansion modules.
2. Its operation is very similar to that of page 8 registers 128 & upwards except that the maximum number of supported sources has been increased to reflect the much larger number of inputs available.
3. The 8xxx/74xx family now supports 4x 2130, 10x 2157, 10x 2548, 4x 2131, 4x 2133 and 4x 2152.
4. No provision is made for more than these quantities of each type.
5. An alarm that is fitted but disabled by the configuration of the slave device returns code 0.
6. An alarm that is not implemented on a particular control unit returns code 15.
7. An indication that does not require a message to be displayed when inactive returns either code 8 or 10.
8. An indication that does require a message to be displayed when inactive returns either code 9 or 10.

72xx/73xx family register allocation

Register offset	Name	Minimum value	Maximum value	Bits/ Sign
0	Number of unnamed alarm sources	0	256	16
1	Unnamed digital input 1	0	15	13/16-16/16
	Unnamed digital input 2	0	15	9/16-12/16
	Unnamed digital input 3	0	15	5/16-8/16
	Unnamed digital input 4	0	15	1/16-4/16
2	Unnamed digital input 5	0	15	13/16-16/16
	Unnamed digital input 6	0	15	9/16-12/16
	Unnamed digital input 7	0	15	5/16-8/16
	Unnamed digital input 8	0	15	1/16-4/16
3	Unnamed digital input 9	0	15	13/16-16/16
	Reserved for digital input 10	0	15	9/16-12/16
	Reserved for digital input 11	0	15	5/16-8/16
	Reserved for digital input 12	0	15	1/16-4/16
4	Reserved for digital inputs 13-16			
5	2130 expansion module 0 digital input A	0	15	13/16-16/16
	2130 expansion module 0 digital input B	0	15	9/16-12/16
	2130 expansion module 0 digital input C	0	15	5/16-8/16
	2130 expansion module 0 digital input D	0	15	1/16-4/16
6	2130 expansion module 0 digital input E	0	15	13/16-16/16
	2130 expansion module 0 digital input F	0	15	9/16-12/16
	2130 expansion module 0 digital input G	0	15	5/16-8/16
	2130 expansion module 0 digital input H	0	15	1/16-4/16
7-8	2130 expansion module 1 digital input A-H			
9-10	2130 expansion module 2 digital input A-H			
11-12	2130 expansion module 3 digital input A-H			
13-24	Reserved for expansion modules 4-9			
25	2130 expansion module 0 analogue input E low	0	15	13/16-16/16
	2130 expansion module 0 analogue input E high	0	15	9/16-12/16
	2130 expansion module 0 analogue input F low	0	15	5/16-8/16
	2130 expansion module 0 analogue input F high	0	15	1/16-4/16
26	2130 expansion module 0 analogue input G low	0	15	13/16-16/16
	2130 expansion module 0 analogue input G high	0	15	9/16-12/16
	2130 expansion module 0 analogue input H low	0	15	5/16-8/16
	2130 expansion module 0 analogue input H high	0	15	1/16-4/16
27-28	2130 expansion module 1 analogue inputs E-H			
29-30	2130 expansion module 2 analogue inputs E-H			
31-32	2130 expansion module 3 analogue inputs E-H			
33-44	Reserved for 2130 expansion module 4-9 analogue inputs E-H			

72xx/73xx family register allocation continued

45	Internal flexible sender analogue input low	0	15	13/16-16/16
	Internal flexible sender analogue input high	0	15	9/16-12/16
	Maintenance alarm 1	0	15	5/16-8/16
	Maintenance alarm 2	0	15	1/16-4/16
46	Maintenance alarm 3	0	15	13/16-16/16
	PLC function 1	0	15	9/16-12/16
	PLC function 2	0	15	5/16-8/16
	PLC function 3	0	15	1/16-4/16
47	PLC function 4	0	15	13/16-16/16
	PLC function 5	0	15	9/16-12/16
	PLC function 6	0	15	5/16-8/16
	PLC function 7	0	15	1/16-4/16
48	PLC function 8	0	15	13/16-16/16
	PLC function 9	0	15	9/16-12/16
	PLC function 10	0	15	5/16-8/16
	PLC function 11	0	15	1/16-4/16
49	PLC function 12	0	15	13/16-16/16
	PLC function 13	0	15	9/16-12/16
	PLC function 14	0	15	5/16-8/16
	PLC function 15	0	15	1/16-4/16
50	PLC function 16	0	15	13/16-16/16
	PLC function 17	0	15	9/16-12/16
	PLC function 18	0	15	5/16-8/16
	PLC function 19	0	15	1/16-4/16
51	PLC function 20	0	15	13/16-16/16
	Unimplemented alarm	0	15	9/16-12/16
	Unimplemented alarm	0	15	5/16-8/16
	Unimplemented alarm	0	15	1/16-4/16
47-64	Unimplemented	0	15	16
65-255	Reserved			

8xxx /74xx family register allocation

Register offset	Name	Minimum value	Maximum value	Bits/ Sign
0	Number of unnamed alarm sources	396	396	16
1	Unnamed digital input 1	0	15	13/16-16/16
	Unnamed digital input 2	0	15	9/16-12/16
	Unnamed digital input 3	0	15	5/16-8/16
	Unnamed digital input 4	0	15	1/16-4/16
2	Unnamed digital input 5	0	15	13/16-16/16
	Unnamed digital input 6	0	15	9/16-12/16
	Unnamed digital input 7	0	15	5/16-8/16
	Unnamed digital input 8	0	15	1/16-4/16
3	Unnamed digital input 9	0	15	13/16-16/16
	Unnamed digital input 10	0	15	9/16-12/16
	Unnamed digital input 11	0	15	5/16-8/16
	Unnamed digital input 12	0	15	1/16-4/16
4	Unnamed digital input 13	0	15	13/16-16/16
	Unnamed digital input 14	0	15	9/16-12/16
	Unnamed digital input 15	0	15	5/16-8/16
	Unnamed digital input 16	0	15	1/16-4/16
5	Unnamed digital input 17	0	15	13/16-16/16
	Unnamed digital input 18	0	15	9/16-12/16
	Unnamed digital input 19	0	15	5/16-8/16
	Unnamed digital input 20	0	15	1/16-4/16
6	Unnamed digital input 21	0	15	13/16-16/16
	Unnamed digital input 22	0	15	9/16-12/16
	Unnamed digital input 23	0	15	5/16-8/16
	Unnamed digital input 24	0	15	1/16-4/16
7	Unnamed digital input 25	0	15	13/16-16/16
	Unnamed digital input 26	0	15	9/16-12/16
	Unnamed digital input 27	0	15	5/16-8/16
	Unnamed digital input 28	0	15	1/16-4/16
8	Unnamed digital input 29	0	15	13/16-16/16
	Unnamed digital input 30	0	15	9/16-12/16
	Unnamed digital input 31	0	15	5/16-8/16
	Unnamed digital input 32	0	15	1/16-4/16
9	2130 expansion module 0 digital input A	0	15	13/16-16/16
	2130 expansion module 0 digital input B	0	15	9/16-12/16
	2130 expansion module 0 digital input C	0	15	5/16-8/16
	2130 expansion module 0 digital input D	0	15	1/16-4/16
10	2130 expansion module 0 digital input E	0	15	13/16-16/16
	2130 expansion module 0 digital input F	0	15	9/16-12/16
	2130 expansion module 0 digital input G	0	15	5/16-8/16
	2130 expansion module 0 digital input H	0	15	1/16-4/16
11-12	2130 expansion module 1 digital input A-H			
13-14	2130 expansion module 2 digital input A-H			
15-16	2130 expansion module 3 digital input A-H			

8xxx / 74xx family register allocation continued

17	2131 expansion module 0 digital input A	0	15	13/16-16/16
	2131 expansion module 0 digital input B	0	15	9/16-12/16
	2131 expansion module 0 digital input C	0	15	5/16-8/16
	2131 expansion module 0 digital input D	0	15	1/16-4/16
18	2131 expansion module 0 digital input E	0	15	13/16-16/16
	2131 expansion module 0 digital input F	0	15	9/16-12/16
	2131 expansion module 0 digital input G	0	15	5/16-8/16
	2131 expansion module 0 digital input H	0	15	1/16-4/16
19	2131 expansion module 0 digital input I	0	15	13/16-16/16
	2131 expansion module 0 digital input J	0	15	9/16-12/16
	2131 expansion module 1 digital input A	0	15	5/16-8/16
	2131 expansion module 1 digital input B	0	15	1/16-4/16
20	2131 expansion module 1 digital input C	0	15	13/16-16/16
	2131 expansion module 1 digital input D	0	15	9/16-12/16
	2131 expansion module 1 digital input E	0	15	5/16-8/16
	2131 expansion module 1 digital input F	0	15	1/16-4/16
21	2131 expansion module 1 digital input G	0	15	13/16-16/16
	2131 expansion module 1 digital input H	0	15	9/16-12/16
	2131 expansion module 1 digital input I	0	15	5/16-8/16
	2131 expansion module 1 digital input J	0	15	1/16-4/16
22	2131 expansion module 2 digital input A	0	15	13/16-16/16
	2131 expansion module 2 digital input B	0	15	9/16-12/16
	2131 expansion module 2 digital input C	0	15	5/16-8/16
	2131 expansion module 2 digital input D	0	15	1/16-4/16
23	2131 expansion module 2 digital input E	0	15	13/16-16/16
	2131 expansion module 2 digital input F	0	15	9/16-12/16
	2131 expansion module 2 digital input G	0	15	5/16-8/16
	2131 expansion module 2 digital input H	0	15	1/16-4/16
24	2131 expansion module 2 digital input I	0	15	13/16-16/16
	2131 expansion module 2 digital input J	0	15	9/16-12/16
	2131 expansion module 3 digital input A	0	15	5/16-8/16
	2131 expansion module 3 digital input B	0	15	1/16-4/16
25	2131 expansion module 3 digital input C	0	15	13/16-16/16
	2131 expansion module 3 digital input D	0	15	9/16-12/16
	2131 expansion module 3 digital input E	0	15	5/16-8/16
	2131 expansion module 3 digital input F	0	15	1/16-4/16
26	2131 expansion module 3 digital input G	0	15	13/16-16/16
	2131 expansion module 3 digital input H	0	15	9/16-12/16
	2131 expansion module 3 digital input I	0	15	5/16-8/16
	2131 expansion module 3 digital input J	0	15	1/16-4/16
27-28	Unimplemented	15	15	

8xxx / 74xx family register allocation continued

29	2130 expansion module 0 analogue input E low	0	15	13/16-16/16
	2130 expansion module 0 analogue input E high	0	15	9/16-12/16
	2130 expansion module 0 analogue input F low	0	15	5/16-8/16
	2130 expansion module 0 analogue input F high	0	15	1/16-4/16
30	2130 expansion module 0 analogue input G low	0	15	13/16-16/16
	2130 expansion module 0 analogue input G high	0	15	9/16-12/16
	2130 expansion module 0 analogue input H low	0	15	5/16-8/16
	2130 expansion module 0 analogue input H high	0	15	1/16-4/16
31-32	2130 expansion module 1 analogue inputs E-H			
33-34	2130 expansion module 2 analogue inputs E-H			
35-36	2130 expansion module 3 analogue inputs E-H			
37-48	Unimplemented	15	15	16
49	Internal flexible sender 1 analogue input low	0	15	13/16-16/16
	Internal flexible sender 1 analogue input high	0	15	9/16-12/16
	Internal flexible sender 2 analogue input low	0	15	5/16-8/16
	Internal flexible sender 2 analogue input high	0	15	1/16-4/16
50	Internal flexible sender 3 analogue input low	0	15	13/16-16/16
	Internal flexible sender 3 analogue input high	0	15	9/16-12/16
	Internal flexible sender 4 analogue input low	0	15	5/16-8/16
	Internal flexible sender 4 analogue input high	0	15	1/16-4/16
51	Internal flexible sender 5 analogue input low	0	15	13/16-16/16
	Internal flexible sender 5 analogue input high	0	15	9/16-12/16
	Maintenance alarm 1	0	15	5/16-8/16
	Maintenance alarm 2	0	15	1/16-4/16
52	Maintenance alarm 3	0	15	13/16-16/16
	PLC function 1	0	15	9/16-12/16
	PLC function 2	0	15	5/16-8/16
	PLC function 3	0	15	1/16-4/16
53	PLC function 4	0	15	13/16-16/16
	PLC function 5	0	15	9/16-12/16
	PLC function 6	0	15	5/16-8/16
	PLC function 7	0	15	1/16-4/16
54	PLC function 8	0	15	13/16-16/16
	PLC function 9	0	15	9/16-12/16
	PLC function 10	0	15	5/16-8/16
	PLC function 11	0	15	1/16-4/16
55	PLC function 12	0	15	13/16-16/16
	PLC function 13	0	15	9/16-12/16
	PLC function 14	0	15	5/16-8/16
	PLC function 15	0	15	1/16-4/16
56	PLC function 16	0	15	13/16-16/16
	PLC function 17	0	15	9/16-12/16
	PLC function 18	0	15	5/16-8/16
	PLC function 19	0	15	1/16-4/16
57	PLC function 20	0	15	13/16-16/16
	Unimplemented	0	15	9/16-12/16
	Unimplemented	0	15	5/16-8/16
	Unimplemented	0	15	1/16-4/16
58-63	Unimplemented	0	15	16

8xxx / 74xx family register allocation continued

64	2131 expansion module 0 analogue input A low	0	15	13/16-16/16
	2131 expansion module 0 analogue input A high	0	15	9/16-12/16
	2131 expansion module 0 analogue input B low	0	15	5/16-8/16
	2131 expansion module 0 analogue input B high	0	15	1/16-4/16
65	2131 expansion module 0 analogue input C low	0	15	13/16-16/16
	2131 expansion module 0 analogue input C high	0	15	9/16-12/16
	2131 expansion module 0 analogue input D low	0	15	5/16-8/16
	2131 expansion module 0 analogue input D high	0	15	1/16-4/16
66	2131 expansion module 0 analogue input E low	0	15	13/16-16/16
	2131 expansion module 0 analogue input E high	0	15	9/16-12/16
	2131 expansion module 0 analogue input F low	0	15	5/16-8/16
	2131 expansion module 0 analogue input F high	0	15	1/16-4/16
67	2131 expansion module 0 analogue input G low	0	15	13/16-16/16
	2131 expansion module 0 analogue input G high	0	15	9/16-12/16
	2131 expansion module 0 analogue input H low	0	15	5/16-8/16
	2131 expansion module 0 analogue input H high	0	15	1/16-4/16
68	2131 expansion module 0 analogue input I low	0	15	13/16-16/16
	2131 expansion module 0 analogue input I high	0	15	9/16-12/16
	2131 expansion module 0 analogue input J low	0	15	5/16-8/16
	2131 expansion module 0 analogue input J high	0	15	1/16-4/16
69 - 74	2131 expansion module 1 analogue input A – J			
74 - 78	2131 expansion module 2 analogue input A – J			
79 - 83	2131 expansion module 3 analogue input A – J			
84	2133 expansion module 0 analogue input A low	0	15	13/16-16/16
	2133 expansion module 0 analogue input A high	0	15	9/16-12/16
	2133 expansion module 0 analogue input B low	0	15	5/16-8/16
	2133 expansion module 0 analogue input B high	0	15	1/16-4/16
85	2133 expansion module 0 analogue input C low	0	15	13/16-16/16
	2133 expansion module 0 analogue input C high	0	15	9/16-12/16
	2133 expansion module 0 analogue input D low	0	15	5/16-8/16
	2133 expansion module 0 analogue input D high	0	15	1/16-4/16
86	2133 expansion module 0 analogue input E low	0	15	13/16-16/16
	2133 expansion module 0 analogue input E high	0	15	9/16-12/16
	2133 expansion module 0 analogue input F low	0	15	5/16-8/16
	2133 expansion module 0 analogue input F high	0	15	1/16-4/16
87	2133 expansion module 0 analogue input G low	0	15	13/16-16/16
	2133 expansion module 0 analogue input G high	0	15	9/16-12/16
	2133 expansion module 0 analogue input H low	0	15	5/16-8/16
	2133 expansion module 0 analogue input H high	0	15	1/16-4/16
88 – 91	2133 expansion module 1 analogue input A – H			
92 – 95	2133 expansion module 2 analogue input A - H			
96 – 99	2133 expansion module 3 analogue input A – H			
100-255	Reserved			

3xx family register allocation

1. Unimplemented registers within a family/module are shaded

Register offset	Name	Min value	Max value	Bits/ Sign	330	331	332	333	334	335
0	Number of unnamed alarm sources	0	256	16	✓	✓	✓	✓	✓	✓
1	Unnamed digital input A	0	15	13/16-16/16	✓	✓	✓	✓	✓	✓
	Unnamed digital input B	0	15	9/16-12/16	✓	✓	✓	✓	✓	✓
	Unnamed digital input C	0	15	5/16-8/16		✓	✓	✓	✓	✓
	Unnamed digital input D	0	15	1/16-4/16		✓	✓	✓	✓	✓
2	Unnamed digital input E	0	15	13/16-16/16			✓	✓	✓	✓
	Unnamed digital input F	0	15	9/16-12/16			✓	✓	✓	✓
	Unnamed digital input G	0	15	5/16-8/16			✓	✓	✓	✓
	Unnamed digital input H	0	15	1/16-4/16			✓	✓	✓	✓
3	Unnamed digital input I	0	15	13/16-16/16			✓	✓	✓	✓
	Unnamed digital input J	0	15	9/16-12/16			✓	✓	✓	✓
	Unnamed digital input K	0	15	5/16-8/16			✓	✓	✓	✓
	Unnamed digital input L	0	15	1/16-4/16						✓
4	Unimplemented (Reserved for future digital inputs)									
5	2130 expansion module 0 digital input A	0	15	13/16-16/16						✓
	2130 expansion module 0 digital input B	0	15	9/16-12/16						✓
	2130 expansion module 0 digital input C	0	15	5/16-8/16						✓
	2130 expansion module 0 digital input D	0	15	1/16-4/16						✓
6	2130 expansion module 0 digital input E	0	15	13/16-16/16						✓
	2130 expansion module 0 digital input F	0	15	9/16-12/16						✓
	2130 expansion module 0 digital input G	0	15	5/16-8/16						✓
	2130 expansion module 0 digital input H	0	15	1/16-4/16						✓
7 – 8	2130 expansion module 1 digital inputs A-H									✓
9 – 10	2130 expansion module 2 digital inputs A-H									
11-12	2130 expansion module 3 digital inputs A-H									
13-24	Reserved for expansion modules 4-9 digital inputs									
25	2130 expansion module 0 analogue input E low	0	15	13/16-16/16						✓
	2130 expansion module 0 analogue input E high	0	15	9/16-12/16						✓
	2130 expansion module 0 analogue input F low	0	15	5/16-8/16						✓
	2130 expansion module 0 analogue input F high	0	15	1/16-4/16						✓
26	2130 expansion module 0 analogue input G low	0	15	13/16-16/16						✓
	2130 expansion module 0 analogue input G high	0	15	9/16-12/16						✓
	2130 expansion module 0 analogue input H low	0	15	5/16-8/16						✓
	2130 expansion module 0 analogue input H high	0	15	1/16-4/16						✓

3xx family register allocation continued

Register offset	Name	Min value	Max value	Bits/ Sign	330	331	332	333	334	335
27 - 28	2130 expansion module 1 analogue inputs E-H									✓
29-30	2130 expansion module 2 analogue inputs E-H									
31-32	2130 expansion module 3 analogue inputs E-H									
33-44	Unimplemented (Reserved for 2130 expansion module 4-9 analogue inputs E-H)									
45	PLC function 1	0	15	13/16-16/16						✓
	PLC function 2	0	15	9/16-12/16						✓
	PLC function 3	0	15	5/16-8/16						✓
	PLC function 4	0	15	1/16-4/16						✓
46	PLC function 5	0	15	13/16-16/16						✓
	PLC function 6	0	15	9/16-12/16						✓
	PLC function 7	0	15	5/16-8/16						✓
	PLC function 8	0	15	1/16-4/16						✓
47	PLC function 9	0	15	13/16-16/16						✓
	PLC function 10	0	15	9/16-12/16						✓
	PLC function 11	0	15	5/16-8/16						✓
	PLC function 12	0	15	1/16-4/16						✓
48	PLC function 13	0	15	13/16-16/16						✓
	PLC function 14	0	15	9/16-12/16						✓
	PLC function 15	0	15	5/16-8/16						✓
	PLC function 16	0	15	1/16-4/16						✓
49	PLC function 17	0	15	13/16-16/16						✓
	PLC function 18	0	15	9/16-12/16						✓
	PLC function 19	0	15	5/16-8/16						✓
	PLC function 20	0	15	1/16-4/16						✓
50-64	Unimplemented	0	15	16						
65-255	Reserved									

Alarm condition codes

Condition	Meaning	Displayed string
0	Disabled input	None
1	Not active alarm	None
2	Warning alarm	Active string
3	Shutdown alarm	Active string
4	Electrical trip alarm	Active string
5-7	Reserved	
8	Inactive indication (no string)	None
9	Inactive indication (displayed string)	Inactive string
10	Active indication	Active string
11-14	Reserved	
15	Unimplemented alarm	None

10.36 Page 154 – Named Alarm Conditions

1. This is part of the new alarm system from the 72xx/73xx onwards and replaces page 8.
2. Its operation is very similar to that of page 8 registers 0 to 127 except that the supported sources have been re-ordered and are family specific.
3. These are read only registers.
4. Each alarm can be in one of 15 conditions as shown in the table below.
5. All unimplemented pre-defined alarms return the unimplemented value 15, not an exception.
6. Each family has a different list of registers.
7. An alarm that is fitted but disabled by the configuration of the slave device returns code 0.
8. An alarm that is not implemented on a particular control unit returns code 15.
9. An indication that does not require a message to be displayed when inactive returns either code 8 or 10.
10. An indication that does require a message to be displayed when inactive returns either code 9 or 10.

72xx/73xx family register allocation

Register offset	Name	Minimum value	Maximum value	Bits/ Sign
0	Number of named alarms	30	256	16
1	Emergency stop	0	15	13/16-16/16
	Low oil pressure	0	15	9/16-12/16
	High coolant temperature	0	15	5/16-8/16
	Low coolant temperature	0	15	1/16-4/16
2	Under speed	0	15	13/16-16/16
	Over speed	0	15	9/16-12/16
	Generator Under frequency	0	15	5/16-8/16
	Generator Over frequency	0	15	1/16-4/16
3	Generator low voltage	0	15	13/16-16/16
	Generator high voltage	0	15	9/16-12/16
	Battery low voltage	0	15	5/16-8/16
	Battery high voltage	0	15	1/16-4/16
4	Charge alternator failure	0	15	13/16-16/16
	Fail to start	0	15	9/16-12/16
	Fail to stop	0	15	5/16-8/16
	Generator fail to close	0	15	1/16-4/16
5	Mains fail to close	0	15	13/16-16/16
	Oil pressure sender fault	0	15	9/16-12/16
	Loss of magnetic pick up	0	15	5/16-8/16
	Magnetic pick up open circuit	0	15	1/16-4/16
6	Generator high current	0	15	13/16-16/16
	Calibration lost	0	15	9/16-12/16
	Low fuel level	0	15	5/16-8/16
	CAN ECU Warning	0	15	1/16-4/16
7	CAN ECU Shutdown	0	15	13/16-16/16
	CAN ECU Data fail	0	15	9/16-12/16
	Low oil level switch	0	15	5/16-8/16
	High temperature switch	0	15	1/16-4/16
8	Low fuel level switch	0	15	13/16-16/16
	Expansion unit watchdog alarm	0	15	9/16-12/16
	kW overload alarm	0	15	5/16-8/16
	Negative phase sequence current alarm	0	15	1/16-4/16
9	Earth fault trip alarm	0	15	13/16-16/16
	Generator phase rotation alarm	0	15	9/16-12/16
	Auto Voltage Sense Fail	0	15	5/16-8/16
	Maintenance alarm	0	15	1/16-4/16

72xx/73xx family register allocation continued

10	Loading frequency alarm	0	15	13/16-16/16
	Loading voltage alarm	0	15	9/16-12/16
	Fuel usage running	0	15	5/16-8/16
	Fuel usage stopped	0	15	1/16-4/16
11	Protections disabled	0	15	13/16-16/16
	Protections blocked	0	15	9/16-12/16
	Generator Short Circuit	0	15	5/16-8/16
	Mains High Current	0	15	1/16-4/16
12	Mains Earth Fault	0	15	13/16-16/16
	Mains Short Circuit	0	15	9/16-12/16
	ECU protect	0	15	5/16-8/16
	ECU Malfunction	0	15	1/16-4/16
13	ECU Information	0	15	13/16-16/16
	ECU Shutdown	0	15	9/16-12/16
	ECU Warning	0	15	5/16-8/16
	ECU Electrical Trip	0	15	1/16-4/16
14	ECU After treatment	0	15	13/16-16/16
	ECU Water In Fuel	0	15	9/16-12/16
	Generator Reverse Power	0	15	5/16-8/16
	Unimplemented	0	15	1/16-4/16
65-255	Reserved			

8xxx / 74xx family register allocation

Register offset	Name	Minimum value	Maximum value	Bits/ Sign
0	Number of named alarms	99	256	16
1	Emergency stop	0	15	13/16-16/16
	Low oil pressure	0	15	9/16-12/16
	High coolant temperature	0	15	5/16-8/16
	Low coolant temperature	0	15	1/16-4/16
2	Under speed	0	15	13/16-16/16
	Over speed	0	15	9/16-12/16
	Generator Under frequency	0	15	5/16-8/16
	Generator Over frequency	0	15	1/16-4/16
3	Generator low voltage	0	15	13/16-16/16
	Generator high voltage	0	15	9/16-12/16
	Battery low voltage	0	15	5/16-8/16
	Battery high voltage	0	15	1/16-4/16
4	Charge alternator failure	0	15	13/16-16/16
	Fail to start	0	15	9/16-12/16
	Fail to stop	0	15	5/16-8/16
	Generator fail to close	0	15	1/16-4/16
5	Mains fail to close	0	15	13/16-16/16
	Oil pressure sender fault	0	15	9/16-12/16
	Loss of magnetic pick up	0	15	5/16-8/16
	Magnetic pick up open circuit	0	15	1/16-4/16
6	Generator high current	0	15	13/16-16/16
	Calibration lost	0	15	9/16-12/16
	Low fuel level	0	15	5/16-8/16
	CAN ECU Warning	0	15	1/16-4/16
7	CAN ECU Shutdown	0	15	13/16-16/16
	CAN ECU Data fail	0	15	9/16-12/16
	Low oil level switch	0	15	5/16-8/16
	High temperature switch	0	15	1/16-4/16
8	Low fuel level switch	0	15	13/16-16/16
	Expansion unit watchdog alarm	0	15	9/16-12/16
	kW overload alarm	0	15	5/16-8/16
	Negative phase sequence current alarm	0	15	1/16-4/16
9	Earth fault trip alarm	0	15	13/16-16/16
	Generator phase rotation alarm	0	15	9/16-12/16
	Auto Voltage Sense Fail	0	15	5/16-8/16
	Maintenance alarm	0	15	1/16-4/16
10	Loading frequency alarm	0	15	13/16-16/16
	Loading voltage alarm	0	15	9/16-12/16
	Fuel usage running	0	15	5/16-8/16
	Fuel usage stopped	0	15	1/16-4/16
11	Protections disabled	0	15	13/16-16/16
	Protections blocked	0	15	9/16-12/16
	Generator breaker failed to open	0	15	5/16-8/16
	Mains breaker failed to open	0	15	1/16-4/16
12	Bus breaker failed to close	0	15	13/16-16/16
	Bus breaker failed to open	0	15	9/16-12/16
	Generator reverse power alarm	0	15	5/16-8/16
	Short circuit alarm	0	15	1/16-4/16
13	Air flap closed alarm	0	15	13/16-16/16
	Failure to sync	0	15	9/16-12/16
	Bus live	0	15	5/16-8/16
	Bus not live	0	15	1/16-4/16

8xxx / 74xx family register allocations continued

14	Bus phase rotation	0	15	13/16-16/16
	Priority selection error	0	15	9/16-12/16
	MSC data error	0	15	5/16-8/16
	MSC ID error	0	15	1/16-4/16
15	Bus low voltage	0	15	13/16-16/16
	Bus high voltage	0	15	9/16-12/16
	Bus low frequency	0	15	5/16-8/16
	Bus high frequency	0	15	1/16-4/16
16	MSC failure	0	15	13/16-16/16
	MSC too few sets	0	15	9/16-12/16
	MSC alarms inhibited	0	15	5/16-8/16
	MSC old version units on the bus	0	15	1/16-4/16
17	Mains reverse power alarm/mains export alarm	0	15	13/16-16/16
	Minimum sets not reached	0	15	9/16-12/16
	Insufficient capacity	0	15	5/16-8/16
	Out of sync	0	15	1/16-4/16
18	Alternative aux mains fail	0	15	13/16-16/16
	Loss of excitation	0	15	9/16-12/16
	Mains ROCOF	0	15	5/16-8/16
	Mains vector shift	0	15	1/16-4/16
19	Mains decoupling low frequency	0	15	13/16-16/16
	Mains decoupling high frequency	0	15	9/16-12/16
	Mains decoupling low voltage	0	15	5/16-8/16
	Mains decoupling high voltage	0	15	1/16-4/16
20	Mains decoupling combined alarm	0	15	13/16-16/16
	Charge air temperature	0	15	9/16-12/16
	Mains phase rotation alarm identifier	0	15	5/16-8/16
	AVR Max Trim Limit alarm	0	15	1/16-4/16
21	High coolant temperature electrical trip alarm	0	15	13/16-16/16
	Temperature sender open circuit alarm	0	15	9/16-12/16
	Out of sync Bus	0	15	5/16-8/16
	Out of sync Mains	0	15	1/16-4/16
22	Bus 1 live	0	15	13/16-16/16
	Bus 1 phase rotation	0	15	9/16-12/16
	Bus 2 live	0	15	5/16-8/16
	Bus 2 phase rotation	0	15	1/16-4/16
23	Out of sync Mains (Aux Mains Fail)	0	15	13/16-16/16
	ECU Protect	0	15	9/16-12/16
	ECU Malfunction	0	15	5/16-8/16
	ECU Information	0	15	1/16-4/16
24	ECU Shutdown	0	15	13/16-16/16
	ECU Warning	0	15	9/16-12/16
	ECU Electrical Trip	0	15	5/16-8/16
	ECU After-treatment	0	15	1/16-4/16
25	Water In Fuel	0	15	13/16-16/16
	ECU Heater	0	15	9/16-12/16
	ECU Cooler	0	15	5/16-8/16
	Unimplemented	0	15	1/16-4/16
26-64	Unimplemented			
65-255	Reserved			

332/333 register allocation

Register offset	Name	Minimum value	Maximum value	Bits/ Sign
0	Number of named alarms	0	256	16
1	Battery High Voltage	0	15	13/16-16/16
	Battery Low Voltage	0	15	9/16-12/16
	Generator Failure Latched	0	15	5/16-8/16
	Generator Failure Unlatched	0	15	1/16-4/16
2	Mains Failure Latched	0	15	13/16-16/16
	Mains Failure Unlatched	0	15	9/16-12/16
	Fail to start	0	15	5/16-8/16
	Fail to stop	0	15	1/16-4/16
3	Failed to reach loading voltage	0	15	13/16-16/16
	Failed to reach loading frequency	0	15	9/16-12/16
	Unimplemented	0	15	5/16-8/16
	Unimplemented	0	15	1/16-4/16
4-64	Unimplemented			
65-255	Reserved			

330/331/334/335 register allocation

Register offset	Name	Minimum value	Maximum value	Bits/ Sign
0	Number of named alarms	0	256	16
1	Battery High Voltage	0	15	13/16-16/16
	Battery Low Voltage	0	15	9/16-12/16
	S2 Failure Latched	0	15	5/16-8/16
	S2 Failure Unlatched	0	15	1/16-4/16
2	S1 Failure Latched	0	15	13/16-16/16
	S1 Failure Unlatched	0	15	9/16-12/16
	Fail to start	0	15	5/16-8/16
	Fail to stop	0	15	1/16-4/16
3	Failed to reach loading voltage	0	15	13/16-16/16
	Failed to reach loading frequency	0	15	9/16-12/16
	Expansion unit watchdog alarm (335 only)	0	15	5/16-8/16
	Unimplemented	0	15	1/16-4/16
4-64	Unimplemented			
65-255	Reserved			

Alarm condition codes

Condition	Meaning	Displayed string
0	Disabled input	None
1	Not active alarm	None
2	Warning alarm	Active string
3	Shutdown alarm	Active string
4	Electrical trip alarm	Active string
5-7	Reserved	
8	Inactive indication (no string)	None
9	Inactive indication (displayed string)	Inactive string
10	Active indication	Active string
11-14	Reserved	
15	Unimplemented alarm	None

10.37 Page 156 – Expansion module enable status

1. This page indicates which expansion modules are currently included in the configuration.
2. The 72xx does not support expansion modules so all registers return false.
3. The 73xx currently only supports the 2130, 2157 and 2548.
4. The 335 currently only supports the 2130, 2157 and 2548.
5. False = 0, True =1.
6. These registers are Read-Only
7. Unimplemented registers within a family/module are shaded

Registers

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ sign	8xxx/74xx	73xx	335
0	2130 Expansion module 0 enable	False	True			16	✓	✓	✓
1	2130 Expansion module 1 enable	False	True			16	✓	✓	✓
2	2130 Expansion module 2 enable	False	True			16	✓	✓	
3	2130 Expansion module 3 enable	False	True			16	✓	✓	
4	2130 Expansion module 4 enable	False	True			16	✓	✓	
5	2130 Expansion module 5 enable	False	True			16			
6	2130 Expansion module 6 enable	False	True			16			
7	2130 Expansion module 7 enable	False	True			16			
8	2130 Expansion module 8 enable	False	True			16			
9	2130 Expansion module 9 enable	False	True			16			
10	2157 Expansion module 0 enable	False	True			16	✓	✓	✓
11	2157 Expansion module 1 enable	False	True			16	✓	✓	✓
12	2157 Expansion module 2 enable	False	True			16	✓	✓	
13	2157 Expansion module 3 enable	False	True			16	✓	✓	
14	2157 Expansion module 4 enable	False	True			16	✓	✓	
15	2157 Expansion module 5 enable	False	True			16	✓	✓	
16	2157 Expansion module 6 enable	False	True			16	✓	✓	
17	2157 Expansion module 7 enable	False	True			16	✓	✓	
18	2157 Expansion module 8 enable	False	True			16	✓	✓	
19	2157 Expansion module 9 enable	False	True			16	✓	✓	
20	2548 Expansion module 0 enable	False	True			16	✓	✓	✓
21	2548 Expansion module 1 enable	False	True			16	✓	✓	✓
22	2548 Expansion module 2 enable	False	True			16	✓	✓	
23	2548 Expansion module 3 enable	False	True			16	✓	✓	
24	2548 Expansion module 4 enable	False	True			16	✓	✓	
25	2548 Expansion module 5 enable	False	True			16	✓	✓	
26	2548 Expansion module 6 enable	False	True			16	✓	✓	
27	2548 Expansion module 7 enable	False	True			16	✓	✓	
28	2548 Expansion module 8 enable	False	True			16	✓	✓	
29	2548 Expansion module 9 enable	False	True			16	✓	✓	
30	2131 Expansion module 0 enable	False	True			16	✓		
31	2131 Expansion module 1 enable	False	True			16	✓		
32	2131 Expansion module 2 enable	False	True			16	✓		
33	2131 Expansion module 3 enable	False	True			16	✓		
34	2133 Expansion module 0 enable	False	True			16	✓		
35	2133 Expansion module 1 enable	False	True			16	✓		
36	2133 Expansion module 2 enable	False	True			16	✓		
37	2133 Expansion module 3 enable	False	True			16	✓		
38	2152 Expansion module 0 enable	False	True			16	✓		
39	2152 Expansion module 1 enable	False	True			16	✓		
40	2152 Expansion module 2 enable	False	True			16	✓		
41	2152 Expansion module 3 enable	False	True			16	✓		
42	2510/20 Expansion module 0 enable	NO	YES			16	✓	✓	
43	2510/20 Expansion module 1 enable	NO	YES			16	✓	✓	
44	2510/20 Expansion module 2 enable	NO	YES			16	✓	✓	
45-255	Reserved								

10.38 Page 158 – Expansion module communications status

2. This indicates which expansion modules are failing to communicate with the host module.
3. If an expansion module is not enabled in the configuration, it will not report a failure to communicate.
4. False = 0, True =1.
5. These registers are Read-Only
6. Unimplemented registers within a family/module are shaded

Registers

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ sign	8xxx/74xx	73xx	335
0	2130 Expansion module 0 comms failure	False	True			16	✓	✓	✓
1	2130 Expansion module 1 comms failure	False	True			16	✓	✓	✓
2	2130 Expansion module 2 comms failure	False	True			16	✓	✓	
3	2130 Expansion module 3 comms failure	False	True			16	✓	✓	
4	2130 Expansion module 4 comms failure	False	True			16	✓	✓	
5	2130 Expansion module 5 comms failure	False	True			16			
6	2130 Expansion module 6 comms failure	False	True			16			
7	2130 Expansion module 7 comms failure	False	True			16			
8	2130 Expansion module 8 comms failure	False	True			16			
9	2130 Expansion module 9 comms failure	False	True			16			
10	2157 Expansion module 0 comms failure	False	True			16	✓	✓	✓
11	2157 Expansion module 1 comms failure	False	True			16	✓	✓	✓
12	2157 Expansion module 2 comms failure	False	True			16	✓	✓	
13	2157 Expansion module 3 comms failure	False	True			16	✓	✓	
14	2157 Expansion module 4 comms failure	False	True			16	✓	✓	
15	2157 Expansion module 5 comms failure	False	True			16	✓	✓	
16	2157 Expansion module 6 comms failure	False	True			16	✓	✓	
17	2157 Expansion module 7 comms failure	False	True			16	✓	✓	
18	2157 Expansion module 8 comms failure	False	True			16	✓	✓	
19	2157 Expansion module 9 comms failure	False	True			16	✓	✓	
20	2548 Expansion module 0 comms failure	False	True			16	✓	✓	✓
21	2548 Expansion module 1 comms failure	False	True			16	✓	✓	✓
22	2548 Expansion module 2 comms failure	False	True			16	✓	✓	
23	2548 Expansion module 3 comms failure	False	True			16	✓	✓	
24	2548 Expansion module 4 comms failure	False	True			16	✓	✓	
25	2548 Expansion module 5 comms failure	False	True			16	✓	✓	
26	2548 Expansion module 6 comms failure	False	True			16	✓	✓	
27	2548 Expansion module 7 comms failure	False	True			16	✓	✓	
28	2548 Expansion module 8 comms failure	False	True			16	✓	✓	
29	2548 Expansion module 9 comms failure	False	True			16	✓	✓	
30	2131 Expansion module 0 comms failure	False	True			16	✓		
31	2131 Expansion module 1 comms failure	False	True			16	✓		
32	2131 Expansion module 2 comms failure	False	True			16	✓		
33	2131 Expansion module 3 comms failure	False	True			16	✓		
34	2133 Expansion module 0 comms failure	False	True			16	✓		
35	2134 Expansion module 1 comms failure	False	True			16	✓		
36	2135 Expansion module 2 comms failure	False	True			16	✓		
37	2136 Expansion module 3 comms failure	False	True			16	✓		
38	2152 Expansion module 0 comms failure	False	True			16	✓		
39	2152 Expansion module 1 comms failure	False	True			16	✓		
40	2152 Expansion module 2 comms failure	False	True			16	✓		
41	2152 Expansion module 3 comms failure	False	True			16	✓		
42-255	Reserved								

10.39 Page 160 – Unnamed input function

1. This indicates to the PC software how each digital input, both built in and in the expansion modules, is configured.
2. A digital input function is the function field from the alarm block.
3. Each family has different register allocations.
4. Registers 112-159 return unimplemented on the 8xxx/74xx.
5. Registers 192-197 on the 8xxx/74xx actually return the function from the digital alarm blocks for the flexible senders; they duplicate the values returned in registers 16-18.
6. Registers 205-224 were not in this document but are in the 8xxx/74xx code, they need checking.
7. These registers are Read-Only.

72xx/73xx family register allocation

Register offset	Name	Minimum value	Maximum value	Bits/ sign
0	Digital input A function	0	65535	16
1	Digital input B function	0	65535	16
2	Digital input C function	0	65535	16
3	Digital input D function	0	65535	16
4	Digital input E function	0	65535	16
5	Digital input F function	0	65535	16
6	Digital input G function	0	65535	16
7	Digital input H function	0	65535	16
8	Digital input I function	0	65535	16
9-15	Reserved			
16	2130 Expansion module 0 digital input A	0	65535	16
17	2130 Expansion module 0 digital input B	0	65535	16
18	2130 Expansion module 0 digital input C	0	65535	16
19	2130 Expansion module 0 digital input D	0	65535	16
20	2130 Expansion module 0 digital input E	0	65535	16
21	2130 Expansion module 0 digital input F	0	65535	16
22	2130 Expansion module 0 digital input G	0	65535	16
23	2130 Expansion module 0 digital input H	0	65535	16
24-31	2130 Expansion module 1 digital inputs A-H			
32-39	2130 Expansion module 2 digital inputs A-H			
40-47	2130 Expansion module 3 digital inputs A-H			
48-95	Reserved for 2130 expansion module 4-9 inputs A-H			
96	2130 Expansion module 0 analogue input E (low)	0	65535	16
97	2130 Expansion module 0 analogue input E (high)	0	65535	16
98	2130 Expansion module 0 analogue input F (low)	0	65535	16
99	2130 Expansion module 0 analogue input F (high)	0	65535	16
100	2130 Expansion module 0 analogue input G (low)	0	65535	16
101	2130 Expansion module 0 analogue input G (high)	0	65535	16
102	2130 Expansion module 0 analogue input H (low)	0	65535	16
103	2130 Expansion module 0 analogue input H (high)	0	65535	16
104-111	2130 Expansion module 1 analogue inputs E-H			
112-119	2130 Expansion module 2 analogue inputs E-H			
120-127	2130 Expansion module 3 analogue inputs E-H			
128-175	2130 Expansion module 4-9 analogue inputs E-H			
176	Internal flexible sender input (low)	0	65535	16
177	Internal flexible sender input (high)	0	65535	16
178	Maintenance alarm 1	0	65535	16
179	Maintenance alarm 2	0	65535	16
180	Maintenance alarm 3	0	65535	16
181	PLC function 1	0	65535	16
182	PLC function 2	0	65535	16
183	PLC function 3	0	65535	16
184	PLC function 4	0	65535	16
185	PLC function 5	0	65535	16
186	PLC function 6	0	65535	16
187	PLC function 7	0	65535	16
188	PLC function 8	0	65535	16
189	PLC function 9	0	65535	16
190	PLC function 10	0	65535	16
191	PLC function 11	0	65535	16
192	PLC function 12	0	65535	16
193	PLC function 13	0	65535	16
194	PLC function 14	0	65535	16
195	PLC function 15	0	65535	16
196	PLC function 16	0	65535	16
197	PLC function 17	0	65535	16

72xx/73xx family register allocation continued

198	PLC function 18	0	65535	16
199	PLC function 19	0	65535	16
200	PLC function 20	0	65535	16
201-255	Reserved			

8xxx / 74xx family register allocation

Register offset	Name	Min value	Max value	Bits/ sign
0	Digital input A function	0	65535	16
1	Digital input B function	0	65535	16
2	Digital input C function	0	65535	16
3	Digital input D function	0	65535	16
4	Digital input E function	0	65535	16
5	Digital input F function	0	65535	16
6	Digital input G function	0	65535	16
7	Digital input H function	0	65535	16
8	Digital input I function	0	65535	16
9	Digital input J function	0	65535	16
10	Digital input K function	0	65535	16
11	Digital input L function	0	65535	16
12	Digital input M function	0	65535	16
13	Digital input N function	0	65535	16
14	Digital input O function	0	65535	16
15	Digital input P function	0	65535	16
16	Digital input Q function	0	65535	16
17	Digital input R function	0	65535	16
18	Digital input S function	0	65535	16
19	Digital input T function	0	65535	16
20	Digital input U function	0	65535	16
21	Digital input V function	0	65535	16
22	Digital input W function	0	65535	16
23	Digital input X function	0	65535	16
24	Digital input Y function	0	65535	16
25	Digital input Z function	0	65535	16
26	Digital input AA function	0	65535	16
27	Digital input AB function	0	65535	16
28	Digital input AC function	0	65535	16
29	Digital input AD function	0	65535	16
30	Digital input AE function	0	65535	16
31	Digital input AF function	0	65535	16
32	2130 Expansion module 0 digital input A function	0	65535	16
33	2130 Expansion module 0 digital input B function	0	65535	16
34	2130 Expansion module 0 digital input C function	0	65535	16
35	2130 Expansion module 0 digital input D function	0	65535	16
36	2130 Expansion module 0 digital input E function	0	65535	16
37	2130 Expansion module 0 digital input F function	0	65535	16
38	2130 Expansion module 0 digital input G function	0	65535	16
39	2130 Expansion module 0 digital input H function	0	65535	16
40-47	2130 Expansion module 1 digital inputs A-H functions			
48-55	2130 Expansion module 2 digital inputs A-H functions			
56-63	2130 Expansion module 3 digital inputs A-H functions			

8xxx / 74xx family register allocation continued

64	2131 Expansion module 0 digital input A function	0	65535	16
65	2131 Expansion module 0 digital input B function	0	65535	16
66	2131 Expansion module 0 digital input C function	0	65535	16
67	2131 Expansion module 0 digital input D function	0	65535	16
68	2131 Expansion module 0 digital input E function	0	65535	16
69	2131 Expansion module 0 digital input F function	0	65535	16
70	2131 Expansion module 0 digital input G function	0	65535	16
71	2131 Expansion module 0 digital input H function	0	65535	16
72	2131 Expansion module 0 digital input I function	0	65535	16
73	2131 Expansion module 0 digital input J function	0	65535	16
74-83	2131 Expansion module 1 digital inputs A-J functions			
84-93	2131 Expansion module 2 digital inputs A-J functions			
94-103	2131 Expansion module 3 digital inputs A-J functions			
104-111	Reserved			
112	2130 Expansion module 0 analogue input E (low)	0	65535	16
113	2130 Expansion module 0 analogue input E (high)	0	65535	16
114	2130 Expansion module 0 analogue input F (low)	0	65535	16
115	2130 Expansion module 0 analogue input F (high)	0	65535	16
116	2130 Expansion module 0 analogue input G (low)	0	65535	16
117	2130 Expansion module 0 analogue input G (high)	0	65535	16
118	2130 Expansion module 0 analogue input H (low)	0	65535	16
119	2130 Expansion module 0 analogue input H (high)	0	65535	16
120-127	2130 Expansion module 1 analogue inputs E-H			
128-135	2130 Expansion module 2 analogue inputs E-H			
136-143	2130 Expansion module 3 analogue inputs E-H			
144-159	Reserved for 2130 Expansion module 4-9 analogue inputs E-H			
192	Internal flexible sender 1 input (low)	0	65535	16
193	Internal flexible sender 1 input (high)	0	65535	16
194	Internal flexible sender 2 input (low)	0	65535	16
195	Internal flexible sender 2 input (high)	0	65535	16
196	Internal flexible sender 3 input (low)	0	65535	16
197	Internal flexible sender 3 input (high)	0	65535	16
198	Internal flexible sender 4 input (low)	0	65535	16
199	Internal flexible sender 4 input (high)	0	65535	16
200	Internal flexible sender 5 input (low)	0	65535	16
201	Internal flexible sender 5 input (high)	0	65535	16
202	Maintenance alarm 1 function	0	65535	16
203	Maintenance alarm 2 function	0	65535	16
204	Maintenance alarm 3 function	0	65535	16
205	PLC function 1	0	65535	16
206	PLC function 2	0	65535	16
207	PLC function 3	0	65535	16
208	PLC function 4	0	65535	16
209	PLC function 5	0	65535	16
210	PLC function 6	0	65535	16
211	PLC function 7	0	65535	16
212	PLC function 8	0	65535	16
213	PLC function 9	0	65535	16
214	PLC function 10	0	65535	16
215	PLC function 11	0	65535	16
216	PLC function 12	0	65535	16
217	PLC function 13	0	65535	16
218	PLC function 14	0	65535	16
219	PLC function 15	0	65535	16
220	PLC function 16	0	65535	16
221	PLC function 17	0	65535	16
222	PLC function 18	0	65535	16
223	PLC function 19	0	65535	16

8xxx/74xx family register allocation continued

224	PLC function 20	0	65535	16
225-255	Reserved			

3xx family register allocation

1. The 335 module supports expansion units (2130, 2157 and 2548) and PLC facilities.
2. Unimplemented registers within a family/module are shaded

Register offset	Name	Min value	Max value	Bits/ sign	330	331	332	333	334	335
0	Digital input A function	0	65535	16	✓	✓	✓	✓	✓	✓
1	Digital input B function	0	65535	16	✓	✓	✓	✓	✓	✓
2	Digital input C function	0	65535	16		✓	✓	✓	✓	✓
3	Digital input D function	0	65535	16		✓	✓	✓	✓	✓
4	Digital input E function	0	65535	16			✓	✓	✓	✓
5	Digital input F function	0	65535	16			✓	✓	✓	✓
6	Digital input G function	0	65535	16			✓	✓	✓	✓
7	Digital input H function	0	65535	16			✓	✓	✓	✓
8	Digital input I function	0	65535	16			✓	✓	✓	✓
9	Digital input J function	0	65535	16			✓	✓	✓	✓
10	Digital input K function	0	65535	16			✓	✓	✓	✓
11	Digital input L function	0	65535	16						✓
12-15	Unimplemented (reserved for future digital inputs)									
16	2130 Expansion module 0 digital input A function	0	65535	16						✓
17	2130 Expansion module 0 digital input B function	0	65535	16						✓
18	2130 Expansion module 0 digital input C function	0	65535	16						✓
19	2130 Expansion module 0 digital input D function	0	65535	16						✓
20	2130 Expansion module 0 digital input E function	0	65535	16						✓
21	2130 Expansion module 0 digital input F function	0	65535	16						✓
22	2130 Expansion module 0 digital input G function	0	65535	16						✓
23	2130 Expansion module 0 digital input H function	0	65535	16						✓
24-31	2130 Expansion module 1 digital inputs A-H functions	0	65535	16						✓
32-39	Reserved for 2130 Expansion module 2 digital inputs									
40-47	Reserved for 2130 Expansion module 3 digital inputs									
48-95	Reserved for 2130 expansion module 4-9 inputs A-H									
96	2130 Expansion module 0 analogue input E (low)	0	65535	16						✓
97	2130 Expansion module 0 analogue input E (high)	0	65535	16						✓
98	2130 Expansion module 0 analogue input F (low)	0	65535	16						✓
99	2130 Expansion module 0 analogue input F (high)	0	65535	16						✓
100	2130 Expansion module 0 analogue input G (low)	0	65535	16						✓
101	2130 Expansion module 0 analogue input G (high)	0	65535	16						✓
102	2130 Expansion module 0 analogue input H (low)	0	65535	16						✓
103	2130 Expansion module 0 analogue input H (high)	0	65535	16						✓
104-111	2130 Expansion module 1 analogue inputs E-H	0	65535	16						✓
112-119	Reserved for 2130 Expansion module 2 analogue inputs									
120-127	Reserved for 2130 Expansion module 3 analogue inputs									
128-175	Reserved for 2130 Expansion module 4-9 analogue inputs									

3xx family register allocation continued

Register offset	Name	Min value	Max value	Bits/ sign	330	331	332	333	334	335
176	PLC function 1	0	65535	16						✓
177	PLC function 2	0	65535	16						✓
178	PLC function 3	0	65535	16						✓
179	PLC function 4	0	65535	16						✓
180	PLC function 5	0	65535	16						✓
181	PLC function 6	0	65535	16						✓
182	PLC function 7	0	65535	16						✓
183	PLC function 8	0	65535	16						✓
184	PLC function 9	0	65535	16						✓
185	PLC function 10	0	65535	16						✓
186	PLC function 11	0	65535	16						✓
187	PLC function 12	0	65535	16						✓
188	PLC function 13	0	65535	16						✓
189	PLC function 14	0	65535	16						✓
190	PLC function 15	0	65535	16						✓
191	PLC function 16	0	65535	16						✓
192	PLC function 17	0	65535	16						✓
193	PLC function 18	0	65535	16						✓
194	PLC function 19	0	65535	16						✓
195	PLC function 20	0	65535	16						✓
196-255	Reserved									

10.40 Pages 166-169 - User configurable pages

Refer to DSE for documentation of these pages.

10.41 Page 170 – Unnamed input status

1. This indicates to the PC software the current status of each digital input and the current value and units of each analogue input.
2. For digital inputs the raw status is the state of the physical input to the module and the processed status allows for configurable inversion.
3. For analogue inputs the ‘sender category’ indicates the units needed for the input and the value is the processed reading of the input, the category codes and corresponding reading ranges are shown in the table below.
4. Maintenance alarms return unimplemented on the 8xxx/74xx family.
5. Each input E-G of 2130 expansion modules appears twice, once as a digital and once as an analogue, because they can be configured as either.
6. Flexible sender inputs appear as both analogues and as digital inputs Q-S.
7. Refer to DSE for documentation on the PLC registers.
8. The 2133 inputs can only measure temperature so there is no requirement for sender category registers
9. The 2130 sender category and input reading registers are indeed all duplicated, no one knows why.
10. The 8xxx/74xx family now supports 4x 2130, 10x 2157, 10x 2548, 4x 2131, 4x 2133 and 4x 2152.
11. The 335 supports 2x2130, 2x2157, 2x2548
12. No provision is made for more than these quantities of each type.
13. Each family has different register allocations.
14. This is continued on page 171.
15. These registers are read-only

72xx/73xx family register allocation

Register offset	Name	Min value	Max value	Bits/ sign
0	Digital input A raw status	0	1	16
1	Digital input A processed status	0	1	16
2	Digital input B raw status	0	1	16
3	Digital input B processed status	0	1	16
4	Digital input C raw status	0	1	16
5	Digital input C processed status	0	1	16
6	Digital input D raw status	0	1	16
7	Digital input D processed status	0	1	16
8	Digital input E raw status	0	1	16
9	Digital input E processed status	0	1	16
10	Digital input F raw status	0	1	16
11	Digital input F processed status	0	1	16
12	Digital input G raw status	0	1	16
13	Digital input G processed status	0	1	16
14	Digital input H raw status	0	1	16
15	Digital input H processed status	0	1	16
16	Digital input I raw status	0	1	16
17	Digital input I processed status	0	1	16
18-31	Reserved			
32	2130 Expansion module 0 digital input A raw status	0	1	16
33	2130 Expansion module 0 digital input A processed status	0	1	16
34	2130 Expansion module 0 digital input B raw status	0	1	16
35	2130 Expansion module 0 digital input B processed status	0	1	16
36	2130 Expansion module 0 digital input C raw status	0	1	16
37	2130 Expansion module 0 digital input C processed status	0	1	16
38	2130 Expansion module 0 digital input D raw status	0	1	16
39	2130 Expansion module 0 digital input D processed status	0	1	16
40	2130 Expansion module 0 digital input E raw status	0	1	16
41	2130 Expansion module 0 digital input E processed status	0	1	16
42	2130 Expansion module 0 digital input F raw status	0	1	16
43	2130 Expansion module 0 digital input F processed status	0	1	16
44	2130 Expansion module 0 digital input G raw status	0	1	16
45	2130 Expansion module 0 digital input G processed status	0	1	16
46	2130 Expansion module 0 digital input H raw status	0	1	16
47	2130 Expansion module 0 digital input H processed status	0	1	16

72xx/73xx family register allocation continued

48-63	2130 Expansion module 1 digital inputs A-H raw & processed status			
64-79	2130 Expansion module 2 digital inputs A-H raw & processed status			
80-95	2130 Expansion module 3 digital inputs A-H raw & processed status			
96-191	Reserved for 2130 Expansion module 4-9			
192	2130 Expansion module 0 analogue input E sender category	0	3	16
193	2130 Expansion module 0 analogue input E input reading			16S
194	2130 Expansion module 0 analogue input E sender category	0	3	16
195	2130 Expansion module 0 analogue input E input reading			16S
196	2130 Expansion module 0 analogue input F sender category	0	3	16
197	2130 Expansion module 0 analogue input F input reading			16S
198	2130 Expansion module 0 analogue input F sender category	0	3	16
199	2130 Expansion module 0 analogue input F input reading			16S
200	2130 Expansion module 0 analogue input G sender category	0	3	16
201	2130 Expansion module 0 analogue input G input reading			16S
202	2130 Expansion module 0 analogue input G sender category	0	3	16
203	2130 Expansion module 0 analogue input G input reading			16S
204	2130 Expansion module 0 analogue input H sender category	0	3	16
205	2130 Expansion module 0 analogue input H input reading			16S
206	2130 Expansion module 0 analogue input H sender category	0	3	16
207	2130 Expansion module 0 analogue input H input reading			16S
208-223	2130 Expansion module 1 inputs E-H			
224-239	2130 Expansion module 2 inputs E-H			
240-255	2130 Expansion module 3 inputs E-H			

8xxx / 74xx family register allocation

Register offset	Name	Min value	Max value	Bits/ sign
0	Digital input A raw status	0	1	16
1	Digital input A processed status	0	1	16
2	Digital input B raw status	0	1	16
3	Digital input B processed status	0	1	16
4	Digital input C raw status	0	1	16
5	Digital input C processed status	0	1	16
6	Digital input D raw status	0	1	16
7	Digital input D processed status	0	1	16
8	Digital input E raw status	0	1	16
9	Digital input E processed status	0	1	16
10	Digital input F raw status	0	1	16
11	Digital input F processed status	0	1	16
12	Digital input G raw status	0	1	16
13	Digital input G processed status	0	1	16
14	Digital input H raw status	0	1	16
15	Digital input H processed status	0	1	16
16	Digital input I raw status	0	1	16
17	Digital input I processed status	0	1	16
18	Digital input J raw status	0	1	16
19	Digital input J processed status	0	1	16
20	Digital input K raw status	0	1	16
21	Digital input K processed status	0	1	16
22	Digital input L raw status	0	1	16
23	Digital input L processed status	0	1	16
24	Digital input M raw status	0	1	16
25	Digital input M processed status	0	1	16
26	Digital input N raw status	0	1	16
27	Digital input N processed status	0	1	16
28	Digital input O raw status	0	1	16
29	Digital input O processed status	0	1	16
30	Digital input P raw status	0	1	16
31	Digital input P processed status	0	1	16

8xxx / 74xx family register allocation continued

32	Digital input Q raw status	0	1	16
33	Digital input Q processed status	0	1	16
34	Digital input R raw status	0	1	16
35	Digital input R processed status	0	1	16
36	Digital input S raw status	0	1	16
37	Digital input S processed status	0	1	16
38	Digital input T raw status	0	1	16
39	Digital input T processed status	0	1	16
40	Digital input U raw status	0	1	16
41	Digital input U processed status	0	1	16
42	Digital input V raw status	0	1	16
43	Digital input V processed status	0	1	16
44	Digital input W raw status	0	1	16
45	Digital input W processed status	0	1	16
46	Digital input X raw status	0	1	16
47	Digital input X processed status	0	1	16
48	Digital input Y raw status	0	1	16
49	Digital input Y processed status	0	1	16
50	Digital input Z raw status	0	1	16
51	Digital input Z processed status	0	1	16
52	Digital input AA raw status	0	1	16
53	Digital input AA processed status	0	1	16
54	Digital input AB raw status	0	1	16
55	Digital input AB processed status	0	1	16
56	Digital input AC raw status	0	1	16
57	Digital input AC processed status	0	1	16
58	Digital input AD raw status	0	1	16
59	Digital input AD processed status	0	1	16
60	Digital input AE raw status	0	1	16
61	Digital input AE processed status	0	1	16
62	Digital input AF raw status	0	1	16
63	Digital input AF processed status	0	1	16
64	2130 Expansion module 0 digital input A raw status	0	1	16
65	2130 Expansion module 0 digital input A processed status	0	1	16
66	2130 Expansion module 0 digital input B raw status	0	1	16
67	2130 Expansion module 0 digital input B processed status	0	1	16
68	2130 Expansion module 0 digital input C raw status	0	1	16
69	2130 Expansion module 0 digital input C processed status	0	1	16
70	2130 Expansion module 0 digital input D raw status	0	1	16
71	2130 Expansion module 0 digital input D processed status	0	1	16
72	2130 Expansion module 0 digital input E raw status	0	1	16
73	2130 Expansion module 0 digital input E processed status	0	1	16
74	2130 Expansion module 0 digital input F raw status	0	1	16
75	2130 Expansion module 0 digital input F processed status	0	1	16
76	2130 Expansion module 0 digital input G raw status	0	1	16
77	2130 Expansion module 0 digital input G processed status	0	1	16
78	2130 Expansion module 0 digital input H raw status	0	1	16
79	2130 Expansion module 0 digital input H processed status	0	1	16
80-95	2130 Expansion module 1 digital inputs A-H status			
96-111	2130 Expansion module 2 digital inputs A-H status			
112-127	2130 Expansion module 3 digital inputs A-H status			

8xxx /74xx family register allocation continued

128	2131Expansion module 0 digital input A raw status	0	1	16
129	2131Expansion module 0 digital input A processed status	0	1	16
130	2131Expansion module 0 digital input B raw status	0	1	16
131	2131Expansion module 0 digital input B processed status	0	1	16
132	2131Expansion module 0 digital input C raw status	0	1	16
133	2131Expansion module 0 digital input C processed status	0	1	16
134	2131Expansion module 0 digital input D raw status	0	1	16
135	2131Expansion module 0 digital input D processed status	0	1	16
136	2131Expansion module 0 digital input E raw status	0	1	16
137	2131Expansion module 0 digital input E processed status	0	1	16
138	2131Expansion module 0 digital input F raw status	0	1	16
139	2131Expansion module 0 digital input F processed status	0	1	16
140	2131Expansion module 0 digital input G raw status	0	1	16
141	2131Expansion module 0 digital input G processed status	0	1	16
142	2131Expansion module 0 digital input H raw status	0	1	16
143	2131Expansion module 0 digital input H processed status	0	1	16
144	2131Expansion module 0 digital input I raw status	0	1	16
145	2131Expansion module 0 digital input I processed status	0	1	16
146	2131Expansion module 0 digital input J raw status	0	1	16
147	2131Expansion module 0 digital input J processed status	0	1	16
148-167	2131Expansion module 1 digital inputs A-J status			
168-187	2131Expansion module 2 digital inputs A-J status			
188-207	2131Expansion module 3 digital inputs A-J status			
208-223	Reserved			
224	2130 Expansion module 0 analogue input E sender category	0	3	16
225	2130 Expansion module 0 analogue input E input reading			16S
226	2130 Expansion module 0 analogue input E sender category	0	3	16
227	2130 Expansion module 0 analogue input E input reading			16S
228	2130 Expansion module 0 analogue input F sender category	0	3	16
229	2130 Expansion module 0 analogue input F input reading			16S
230	2130 Expansion module 0 analogue input F sender category	0	3	16
231	2130 Expansion module 0 analogue input F input reading			16S
232	2130 Expansion module 0 analogue input G sender category	0	3	16
233	2130 Expansion module 0 analogue input G input reading			16S
234	2130 Expansion module 0 analogue input G sender category	0	3	16
235	2130 Expansion module 0 analogue input G input reading			16S
236	2130 Expansion module 0 analogue input H sender category	0	3	16
237	2130 Expansion module 0 analogue input H input reading			16S
238	2130 Expansion module 0 analogue input H sender category	0	3	16
239	2130 Expansion module 0 analogue input H input reading			16S
240-255	2130 Expansion module 1 analogue inputs E-H			

3xx family register allocation

Register offset	Name	Min value	Max value	Bits / sign	330	331	332	333	334	335
0	Digital input A raw status	0	1	16	✓	✓	✓	✓	✓	✓
1	Digital input A processed status	0	1	16	✓	✓	✓	✓	✓	✓
2	Digital input B raw status	0	1	16	✓	✓	✓	✓	✓	✓
3	Digital input B processed status	0	1	16	✓	✓	✓	✓	✓	✓
4	Digital input C raw status	0	1	16		✓	✓	✓	✓	✓
5	Digital input C processed status	0	1	16		✓	✓	✓	✓	✓
6	Digital input D raw status	0	1	16		✓	✓	✓	✓	✓
7	Digital input D processed status	0	1	16		✓	✓	✓	✓	✓
8	Digital input E raw status	0	1	16			✓	✓	✓	✓
9	Digital input E processed status	0	1	16			✓	✓	✓	✓
10	Digital input F raw status	0	1	16			✓	✓	✓	✓
11	Digital input F processed status	0	1	16			✓	✓	✓	✓
12	Digital input G raw status	0	1	16			✓	✓	✓	✓
13	Digital input G processed status	0	1	16			✓	✓	✓	✓
14	Digital input H raw status	0	1	16			✓	✓	✓	✓
15	Digital input H processed status	0	1	16			✓	✓	✓	✓
16	Digital input I raw status	0	1	16			✓	✓	✓	✓
17	Digital input I processed status	0	1	16			✓	✓	✓	✓
18	Digital input J raw status	0	1	16			✓	✓	✓	✓
19	Digital input J processed status	0	1	16			✓	✓	✓	✓
20	Digital input K raw status	0	1	16			✓	✓	✓	✓
21	Digital input K processed status	0	1	16			✓	✓	✓	✓
22	Digital input L raw status	0	1	16						✓
23	Digital input L processed status	0	1	16						✓
24-31	Unimplemented (reserved for future digital inputs)									
32	2130 Expansion module 0 digital input A raw status	0	1	16						✓
33	2130 Expansion module 0 digital input A processed status	0	1	16						✓
34	2130 Expansion module 0 digital input B raw status	0	1	16						✓
35	2130 Expansion module 0 digital input B processed status	0	1	16						✓
36	2130 Expansion module 0 digital input C raw status	0	1	16						✓
37	2130 Expansion module 0 digital input C processed status	0	1	16						✓
38	2130 Expansion module 0 digital input D raw status	0	1	16						✓
39	2130 Expansion module 0 digital input D processed status	0	1	16						✓
40	2130 Expansion module 0 digital input E raw status	0	1	16						✓
41	2130 Expansion module 0 digital input E processed status	0	1	16						✓
42	2130 Expansion module 0 digital input F raw status	0	1	16						✓
43	2130 Expansion module 0 digital input F processed status	0	1	16						✓
44	2130 Expansion module 0 digital input G raw status	0	1	16						✓
45	2130 Expansion module 0 digital input G processed status	0	1	16						✓
46	2130 Expansion module 0 digital input H raw status	0	1	16						✓
47	2130 Expansion module 0 digital input H processed status	0	1	16						✓
48-63	2130 Expansion module 1 digital inputs A-H status									✓
64-79	Reserved for 2130 Expansion module 2 digital inputs A-H status)									
80-95	Reserved for 2130 Expansion module 3 digital inputs A-H status)									
96-191	Reserved for 2130 Expansion module 4-9									
192	2130 Expansion module 0 analogue input E sender category	0	3	16						✓
193	2130 Expansion module 0 analogue input E input reading			16S						✓
194	2130 Expansion module 0 analogue input E sender category	0	3	16						✓
195	2130 Expansion module 0 analogue input E input reading			16S						✓
196	2130 Expansion module 0 analogue input F sender category	0	3	16						✓
197	2130 Expansion module 0 analogue input F input reading			16S						✓
198	2130 Expansion module 0 analogue input F sender category	0	3	16						✓
199	2130 Expansion module 0 analogue input F input reading			16S						✓

3xx family register allocation continued

Register offset	Name	Min value	Maxi value	Bits / sign	330	331	332	333	334	335
200	2130 Expansion module 0 analogue input G sender category	0	3	16						✓
201	2130 Expansion module 0 analogue input G input reading			16S						✓
202	2130 Expansion module 0 analogue input G sender category	0	3	16						✓
203	2130 Expansion module 0 analogue input G input reading			16S						✓
204	2130 Expansion module 0 analogue input H sender category	0	3	16						✓
205	2130 Expansion module 0 analogue input H input reading			16S						✓
206	2130 Expansion module 0 analogue input H sender category	0	3	16						✓
207	2130 Expansion module 0 analogue input H input reading			16S						✓
208-223	2130 Expansion module 1 analogue inputs E-H									✓
224-239	Reserved for 2130 Expansion module 2 analogue inputs E-H									
240-255	Reserved for 2130 Expansion module 3 analogue inputs E-H									

Sender category codes and value ranges

Type code	Type	Minimum value	Maximum value	Scaling factor	Units
0	Unused	0	0		
1	Pressure	0	10000	1	KPa
2	Temperature	-200	10000	1	Degrees C
3	Level	0	200	1	%
4-65535	Reserved				

10.42 Page 171 – Unnamed input status continued

1. This page is a continuation of page 170; refer to that page for notes.
2. Each family has different register allocations.
3. These registers are Read-Only

72xx/73xx family register allocation continued

Register offset	Name	Minimum value	Maximum value	Bits/ sign
0-95	Reserved for 2130 Expansion module 4-9 inputs E-H			
96	Internal flexible sender analogue input sender category	0	1	16
97	Internal flexible sender analogue input reading	0	1	16
98	Internal flexible sender analogue input sender category	0	1	16
99	Internal flexible sender analogue input reading	0	1	16
100	Maintenance alarm 1 (raw)	0	1	16
101	Maintenance alarm 1 (processed)	0	1	16
102	Maintenance alarm 2 (raw)	0	1	16
103	Maintenance alarm 2 (processed)	0	1	16
104	Maintenance alarm 3 (raw)	0	1	16
105	Maintenance alarm 3 (processed)	0	1	16
106-255	Reserved			

8xxx / 74xx family register allocation continued

Register offset	Name	Minimum value	Maximum value	Bits/ sign
0-15	2130 Expansion module 2 analogue inputs E-H			
16-31	2130 Expansion module 3 analogue inputs E-H			
32	2131 Expansion module 0 analogue input A sender category	0	3	16
33	2131 Expansion module 0 analogue input A input reading			16S
34	2131 Expansion module 0 analogue input B sender category	0	3	16
35	2131 Expansion module 0 analogue input B input reading			16S
36	2131 Expansion module 0 analogue input C sender category	0	3	16
37	2131 Expansion module 0 analogue input C input reading			16S
38	2131 Expansion module 0 analogue input D sender category	0	3	16
39	2131 Expansion module 0 analogue input D input reading			16S
40	2131 Expansion module 0 analogue input E sender category	0	3	16
41	2131 Expansion module 0 analogue input E input reading			16S
42	2131 Expansion module 0 analogue input F sender category	0	3	16
43	2131 Expansion module 0 analogue input F input reading			16S
44	2131 Expansion module 0 analogue input G sender category	0	3	16
45	2131 Expansion module 0 analogue input G input reading			16S
46	2131 Expansion module 0 analogue input H sender category	0	3	16
47	2131 Expansion module 0 analogue input H input reading			16S
48	2131 Expansion module 0 analogue input I sender category	0	3	16
49	2131 Expansion module 0 analogue input I input reading			16S
50	2131 Expansion module 0 analogue input J sender category	0	3	16
51	2131 Expansion module 0 analogue input J input reading			16S
52-71	2131 Expansion module 1 analogue inputs A-J			
72-91	2131 Expansion module 2 analogue inputs A-J			
92-111	2131 Expansion module 3 analogue inputs A-J			
112-127	Reserved			

8xxx / 74xx family register allocation continued

128	Internal flexible sender 1 analogue input sender category	0	1	16
129	Internal flexible sender 1 analogue input reading	0	1	16
130	Internal flexible sender 1 analogue input sender category	0	1	16
131	Internal flexible sender 1 analogue input reading	0	1	16
132	Internal flexible sender 2 analogue input sender category	0	1	16
133	Internal flexible sender 2 analogue input reading	0	1	16
134	Internal flexible sender 2 analogue input sender category	0	1	16
135	Internal flexible sender 2 analogue input reading	0	1	16
136	Internal flexible sender 3 analogue input sender category	0	1	16
137	Internal flexible sender 3 analogue input reading	0	1	16
138	Internal flexible sender 3 analogue input sender category	0	1	16
139	Internal flexible sender 3 analogue input reading	0	1	16
140	Internal flexible sender 4 analogue input sender category	0	1	16
141	Internal flexible sender 4 analogue input reading	0	1	16
142	Internal flexible sender 4 analogue input sender category	0	1	16
143	Internal flexible sender 4 analogue input reading	0	1	16
144	Internal flexible sender 5 analogue input sender category	0	1	16
145	Internal flexible sender 5 analogue input reading	0	1	16
146	Internal flexible sender 5 analogue input sender category	0	1	16
147	Internal flexible sender 5 analogue input reading	0	1	16
148	Maintenance alarm 1 (raw)	0	1	16
149	Maintenance alarm 1 (processed)	0	1	16
150	Maintenance alarm 2 (raw)	0	1	16
151	Maintenance alarm 2 (processed)	0	1	16
152	Maintenance alarm 3 (raw)	0	1	16
153	Maintenance alarm 3 (processed)	0	1	16
154	PLC alarm 1 trigger			16
155	PLC alarm 1 condition			16
156	PLC alarm 2 trigger			16
157	PLC alarm 2 condition			16
158	PLC alarm 3 trigger			16
159	PLC alarm 3 condition			16
160	PLC alarm 4 trigger			16
161	PLC alarm 4 condition			16
162	PLC alarm 5 trigger			16
163	PLC alarm 5 condition			16
164	PLC alarm 6 trigger			16
165	PLC alarm 6 condition			16
166	PLC alarm 7 trigger			16
167	PLC alarm 7 condition			16
168	PLC alarm 8 trigger			16
169	PLC alarm 8 condition			16
170	PLC alarm 9 trigger			16
171	PLC alarm 9 condition			16
172	PLC alarm 10 trigger			16
173	PLC alarm 10 condition			16
174	PLC alarm 11 trigger			16
175	PLC alarm 11 condition			16
176	PLC alarm 12 trigger			16
177	PLC alarm 12 condition			16
178	PLC alarm 13 trigger			16
179	PLC alarm 13 condition			16
180	PLC alarm 14 trigger			16
181	PLC alarm 14 condition			16
182	PLC alarm 15 trigger			16
183	PLC alarm 15 condition			16
184	PLC alarm 16 trigger			16
185	PLC alarm 16 condition			16

8xxx / 74xx family register allocation continued

186	PLC alarm 17 trigger			16
187	PLC alarm 17 condition			16
188	PLC alarm 18 trigger			16
189	PLC alarm 18 condition			16
190	PLC alarm 19 trigger			16
191	PLC alarm 19 condition			16
192	PLC alarm 20 trigger			16
193	PLC alarm 20 condition			16
194	2133 Expansion module 0 analogue input A input reading			16S
195	2133 Expansion module 0 analogue input B input reading			16S
196	2133 Expansion module 0 analogue input C input reading			16S
197	2133 Expansion module 0 analogue input D input reading			16S
198	2133 Expansion module 0 analogue input E input reading			16S
199	2133 Expansion module 0 analogue input F input reading			16S
200	2133 Expansion module 0 analogue input G input reading			16S
201	2133 Expansion module 0 analogue input H input reading			16S
202-209	2133 Expansion module 1 analogue inputs A-H input readings			16S
210-217	2133 Expansion module 2 analogue inputs A-H input readings			16S
218-225	2133 Expansion module 3 analogue inputs A-H input readings			16S
226-255	Reserved			

3xx family register allocation continued

Register offset	Name	Minimum value	Maximum value	Bits/ sign	330	331	332	333	334	335
0-95	Reserved for 2130 Expansion modules 4-9analogue inputs E-H									
96	PLC alarm 1 trigger			16						✓
97	PLC alarm 1 condition			16						✓
98	PLC alarm 2 trigger			16						✓
99	PLC alarm 2 condition			16						✓
100	PLC alarm 3 trigger			16						✓
101	PLC alarm 3 condition			16						✓
102	PLC alarm 4 trigger			16						✓
103	PLC alarm 4 condition			16						✓
104	PLC alarm 5 trigger			16						✓
105	PLC alarm 5 condition			16						✓
106	PLC alarm 6 trigger			16						✓
107	PLC alarm 6 condition			16						✓
108	PLC alarm 7 trigger			16						✓
109	PLC alarm 7 condition			16						✓
110	PLC alarm 8 trigger			16						✓
111	PLC alarm 8 condition			16						✓
112	PLC alarm 9 trigger			16						✓
113	PLC alarm 9 condition			16						✓
114	PLC alarm 10 trigger			16						✓
115	PLC alarm 10 condition			16						✓
116	PLC alarm 11 trigger			16						✓
117	PLC alarm 11 condition			16						✓
118	PLC alarm 12 trigger			16						✓
119	PLC alarm 12 condition			16						✓
120	PLC alarm 13 trigger			16						✓
121	PLC alarm 13 condition			16						✓
122	PLC alarm 14 trigger			16						✓
123	PLC alarm 14 condition			16						✓
124	PLC alarm 15 trigger			16						✓
125	PLC alarm 15 condition			16						✓
126	PLC alarm 16 trigger			16						✓
127	PLC alarm 16 condition			16						✓

3xx family register allocation continued

Register offset	Name	Minimum value	Maximum value	Bits/ sign	330	331	332	333	334	335
128	PLC alarm 17 trigger			16						✓
129	PLC alarm 17 condition			16						✓
130	PLC alarm 18 trigger			16						✓
131	PLC alarm 18 condition			16						✓
132	PLC alarm 19 trigger			16						✓
133	PLC alarm 19 condition			16						✓
134	PLC alarm 20 trigger			16						✓
135	PLC alarm 20 condition			16						✓
136-255	Reserved									

10.43 Page 180 – Unnamed output sources & polarities

1. This page indicates the control source and polarity settings for every digital output and LED, taken directly from the configuration.
2. Each family has different register allocations for registers 0-63 but common ones for the remainder of the page.
3. This is continued on page 181.
4. These registers are Read-Only

72xx/73xx family register allocations 0-63

Register offset	Name	Minimum value	Maximum value	Bits/ sign	Read/write
0	Digital output A source (Fuel)	0	65535	16	Read only
1	Digital output A polarity (Fuel)	0	1	16	Read only
2	Digital output B source (Crank)	0	65535	16	Read only
3	Digital output B polarity (Crank)	0	1	16	Read only
4	Digital output E source	0	65535	16	Read only
5	Digital output E polarity	0	1	16	Read only
6	Digital output F source	0	65535	16	Read only
7	Digital output F polarity	0	1	16	Read only
8	Digital output G source	0	65535	16	Read only
9	Digital output G polarity	0	1	16	Read only
10	Digital output H source	0	65535	16	Read only
11	Digital output H polarity	0	1	16	Read only
12	Digital output D source (Generator)	0	65535	16	Read only
13	Digital output D polarity (Generator)	0	1	16	Read only
14	Digital output C source (Mains)	0	65535	16	Read only
15	Digital output C polarity (Mains)	0	1	16	Read only
16	STOP LED source (STOP)	0	65535	16	Read only
17	STOP LED polarity (STOP)	0	1	16	Read only
18	MANUAL LED source (MANUAL)	0	65535	16	Read only
19	MANUAL LED polarity (MANUAL)	0	1	16	Read only
20	TEST LED source (TEST)	0	65535	16	Read only
21	TEST LED polarity (TEST)	0	1	16	Read only
22	AUTO LED source (AUTO)	0	65535	16	Read only
23	AUTO LED polarity (AUTO)	0	1	16	Read only
24	MAINS LED source (MAINS)	0	65535	16	Read only
25	MAINS LED polarity (MAINS)	0	1	16	Read only
26	MAINS BREAKER LED source (MAINS BREAKER)	0	65535	16	Read only
27	MAINS BREAKER LED polarity (MAINS BREAKER)	0	1	16	Read only
28	GEN BREAKER LED source (GEN BREAKER)	0	65535	16	Read only
29	GEN BREAKER LED polarity (GEN BREAKER)	0	1	16	Read only
30	GEN LED source (GEN)	0	65535	16	Read only
31	GEN LED polarity (GEN)	0	1	16	Read only
32	USER LED 1 source (USER LED 1)	0	65535	16	Read only
33	USER LED 1 polarity (USER LED 1)	0	1	16	Read only
34	USER LED 2 source (USER LED 2)	0	65535	16	Read only
35	USER LED 2 polarity (USER LED 2)	0	1	16	Read only
36	USER LED 3 source (USER LED 3)	0	65535	16	Read only
37	USER LED 3 polarity (USER LED 3)	0	1	16	Read only
38	USER LED 4 source (USER LED 4)	0	65535	16	Read only
39	USER LED 4 polarity (USER LED 4)	0	1	16	Read only
40-63	Reserved				

8xxx /74xx family register allocations 0-63

Register offset	Name	Minimum value	Maximum value	Bits/ sign	Read/write
0	Digital output A source (Fuel)	0	65535	16	Read only
1	Digital output A polarity (Fuel)	0	1	16	Read only
2	Digital output B source (Crank)	0	65535	16	Read only
3	Digital output B polarity (Crank)	0	1	16	Read only
4	Digital output E source	0	65535	16	Read only
5	Digital output E polarity	0	1	16	Read only
6	Digital output F source	0	65535	16	Read only
7	Digital output F polarity	0	1	16	Read only
8	Digital output G source	0	65535	16	Read only
9	Digital output G polarity	0	1	16	Read only
10	Digital output H source	0	65535	16	Read only
11	Digital output H polarity	0	1	16	Read only
12	Digital output I source	0	65535	16	Read only
13	Digital output I polarity	0	1	16	Read only
14	Digital output J source	0	65535	16	Read only
15	Digital output J polarity	0	1	16	Read only
16	Digital output K source	0	65535	16	Read only
17	Digital output K polarity	0	1	16	Read only
18	Digital output L source	0	65535	16	Read only
19	Digital output L polarity	0	1	16	Read only
20	Digital output M source	0	65535	16	Read only
21	Digital output M polarity	0	1	16	Read only
22	Digital output N source	0	65535	16	Read only
23	Digital output N polarity	0	1	16	Read only
24	Digital output D source (Generator)	0	65535	16	Read only
25	Digital output D polarity (Generator)	0	1	16	Read only
26	Digital output C source (Mains)	0	65535	16	Read only
27	Digital output C polarity (Mains)	0	1	16	Read only
28	STOP LED source (STOP)	0	65535	16	Read only
29	STOP LED polarity (STOP)	0	1	16	Read only
30	MANUAL LED source (MANUAL)	0	65535	16	Read only
31	MANUAL LED polarity (MANUAL)	0	1	16	Read only
32	TEST LED source (TEST)	0	65535	16	Read only
33	TEST LED polarity (TEST)	0	1	16	Read only
34	AUTO LED source (AUTO)	0	65535	16	Read only
35	AUTO LED polarity (AUTO)	0	1	16	Read only
36	MAINS LED source (MAINS)	0	65535	16	Read only
37	MAINS LED polarity (MAINS)	0	1	16	Read only
38	MAINS BREAKER LED source (MAINS BREAKER)	0	65535	16	Read only
39	MAINS BREAKER LED polarity (MAINS BREAKER)	0	1	16	Read only
40	GEN BREAKER LED source (GEN BREAKER)	0	65535	16	Read only
41	GEN BREAKER LED polarity (GEN BREAKER)	0	1	16	Read only
42	GEN LED source (GEN)	0	65535	16	Read only
43	GEN LED polarity (GEN)	0	1	16	Read only
44	USER LED 1 source (USER LED 1)	0	65535	16	Read only
45	USER LED 1 polarity (USER LED 1)	0	1	16	Read only
46	USER LED 2 source (USER LED 2)	0	65535	16	Read only
47	USER LED 2 polarity (USER LED 2)	0	1	16	Read only
48	USER LED 3 source (USER LED 3)	0	65535	16	Read only
49	USER LED 3 polarity (USER LED 3)	0	1	16	Read only
50	USER LED 4 source (USER LED 4)	0	65535	16	Read only
51	USER LED 4 polarity (USER LED 4)	0	1	16	Read only
52-63	Reserved				

332/333 register allocation

Register offset	Name	Minimum value	Maximum value	Bits/ sign	Read/write
0	Mains breaker output source	0	65535	16	Read only
1	Mains breaker output polarity	0	1	16	Read only
2	Generator breaker output source	0	65535	16	Read only
3	Generator breaker output polarity	0	1	16	Read only
4	Digital output C source	0	65535	16	Read only
5	Digital output C polarity	0	1	16	Read only
6	Digital output D source	0	65535	16	Read only
7	Digital output D polarity	0	1	16	Read only
8	Digital output E source	0	65535	16	Read only
9	Digital output E polarity	0	1	16	Read only
10-15	Reserved for future outputs				
16	Exercise LED source	0	65535	16	Read only
17	Exercise LED polarity	0	1	16	Read only
18	Manual LED source	0	65535	16	Read only
19	Manual LED source	0	1	16	Read only
20	Prohibit Return LED source	0	65535	16	Read only
21	Prohibit Return LED source	0	1	16	Read only
22	Auto LED source	0	65535	16	Read only
23	Auto LED source	0	1	16	Read only
24	Generator breaker LED source	0	65535	16	Read only
25	Generator breaker LED source	0	1	16	Read only
26	Mains breaker LED source	0	65535	16	Read only
27	Mains breaker LED source	0	1	16	Read only
28	Generator available LED source	0	65535	16	Read only
29	Generator available LED source	0	1	16	Read only
28	Mains available LED source	0	65535	16	Read only
29	Mains available LED source	0	1	16	Read only
28	Warning LED source	0	65535	16	Read only
29	Warning LED polarity	0	1	16	Read only
30	LCD Indicator 1 source (USER LED 1)	0	65535	16	Read only
31	LCD Indicator 1 polarity (USER LED 1)	0	1	16	Read only
32	LCD Indicator 2 source (USER LED 2)	0	65535	16	Read only
33	LCD Indicator 2 polarity (USER LED 2)	0	1	16	Read only
34	LCD Indicator 3 source (USER LED 3)	0	65535	16	Read only
35	LCD Indicator 3 polarity (USER LED 3)	0	1	16	Read only
36-63	Reserved				

330/331/334 Register allocations 0 - 63

Register offset	Name	Minimum value	Maximum value	Bits/ sign	330	331	334
0	Digital output A source	0	65535	16	✓	✓	✓
1	Digital output A polarity	0	1	16	✓	✓	✓
2	Digital output B source	0	65535	16	✓	✓	✓
3	Digital output B polarity	0	1	16	✓	✓	✓
4	Digital output C source	0	65535	16	✓	✓	✓
5	Digital output C polarity	0	1	16	✓	✓	✓
6	Digital output D source	0	65535	16	✓	✓	✓
7	Digital output D polarity	0	1	16	✓	✓	✓
8	Digital output E source	0	65535	16	✓	✓	✓
9	Digital output E polarity	0	1	16	✓	✓	✓
10	Digital output F source	0	65535	16	✓	✓	
11	Digital output F polarity	0	1	16	✓	✓	
12	Digital output G source	0	65535	16		✓	
13	Digital output G polarity	0	1	16		✓	
14	Digital output H source	0	65535	16		✓	
15	Digital output H polarity	0	1	16		✓	
16	Stop LED source	0	65535	16			✓
17	Stop LED polarity	0	1	16			✓
18	Manual LED source	0	65535	16			✓
19	Manual LED polarity	0	1	16			✓
20	Auto LED source	0	65535	16			✓
21	Auto LED polarity	0	1	16			✓
22	Mode LED source	0	65535	16			✓
23	Mode LED polarity	0	1	16			✓
24	S2 breaker LED source	0	65535	16			✓
25	S2 breaker LED polarity	0	1	16			✓
26	S1breaker LED source	0	65535	16			✓
27	S1 breaker LED polarity	0	1	16			✓
28	S2 available LED source	0	65535	16			✓
29	S2 available LED polarity	0	1	16			✓
30	S1 available LED source	0	65535	16			✓
31	S1 available LED polarity	0	1	16			✓
32	Warning LED source	0	65535	16	✓	✓	✓
33	Warning LED polarity	0	1	16	✓	✓	✓
34	USER LED / LCD Indicator 1 source (USER LED 1)	0	65535	16			✓
35	USER LED / LCD Indicator 1 polarity (USER LED 1)	0	1	16			✓
36	USER LED / LCD Indicator 2 source (USER LED 2)	0	65535	16			✓
37	USER LED / LCD Indicator 2 polarity (USER LED 2)	0	1	16			✓
38	USER LED / LCD Indicator 3 source (USER LED 3)	0	65535	16			✓
39	USER LED / LCD Indicator 3 polarity (USER LED 3)	0	1	16			✓
40-63	Reserved						

335 Register allocations 0 - 63

Register offset	Name	Minimum value	Maximum value	Bits/ sign	Read/write
0	Digital output A source	0	65535	16	Read only
1	Digital output A polarity	0	1	16	Read only
2	Digital output B source	0	65535	16	Read only
3	Digital output B polarity	0	1	16	Read only
4	Digital output C source	0	65535	16	Read only
5	Digital output C polarity	0	1	16	Read only
6	Digital output D source	0	65535	16	Read only
7	Digital output D polarity	0	1	16	Read only
8	Digital output E source	0	65535	16	Read only
9	Digital output E polarity	0	1	16	Read only
10	Digital output F source	0	65535	16	Read only
11	Digital output F polarity	0	1	16	Read only
12	Digital output G source	0	65535	16	Read only
13	Digital output G polarity	0	1	16	Read only
14	Digital output H source	0	65535	16	Read only
15	Digital output H polarity	0	1	16	Read only
16	Digital output I source	0	65535	16	Read only
17	Digital output I polarity	0	1	16	Read only
18	Digital output J source	0	65535	16	Read only
19	Digital output J polarity	0	1	16	Read only
20	Digital output K source	0	65535	16	Read only
21	Digital output K polarity	0	1	16	Read only
22	Digital output L source	0	65535	16	Read only
23	Digital output L polarity	0	1	16	Read only
24	Stop LED source	0	65535	16	Read only
25	Stop LED polarity	0	1	16	Read only
26	Manual LED source	0	65535	16	Read only
27	Manual LED polarity	0	1	16	Read only
28	Mode LED source	0	65535	16	Read only
29	Mode LED polarity	0	1	16	Read only
30	Auto LED source	0	65535	16	Read only
31	Auto LED polarity	0	1	16	Read only
32	S2 breaker LED source	0	65535	16	Read only
33	S2 breaker LED polarity	0	1	16	Read only
34	S1breaker LED source	0	65535	16	Read only
35	S1 breaker LED polarity	0	1	16	Read only
36	S2 available LED source	0	65535	16	Read only
37	S2 available LED polarity	0	1	16	Read only
38	S1 available LED source	0	65535	16	Read only
39	S1 available LED polarity	0	1	16	Read only
40	USER LED 1 source	0	65535	16	Read only
41	USER LED 1 polarity	0	1	16	Read only
42	USER LED 2 source	0	65535	16	Read only
43	USER LED 2 polarity	0	1	16	Read only
44	USER LED 3 source	0	65535	16	Read only
45	USER LED 3 polarity	0	1	16	Read only
46	USER LED 4 source	0	65535	16	Read only
47	USER LED 4 polarity	0	1	16	Read only
48	USER LED 1 colour	0	1	16	Read only
49	USER LED 2 colour	0	1	16	Read only
50	USER LED 3 colour	0	1	16	Read only
51	USER LED 4 colour	0	1	16	Read only
52-63	Reserved				

8xxx/74xx/72xx/73xx/3xx Common family register allocations 64-255

Register offset	Name	Minimum value	Maximum value	Bits/ sign	8xxx/ 74xx	72xx/ 73xx	335
64	2157 expansion module 0 output A source	0	65535	16	✓	✓	✓
65	2157 expansion module 0 output A polarity	0	1	16	✓	✓	✓
66	2157 expansion module 0 output B source	0	65535	16	✓	✓	✓
67	2157 expansion module 0 output B polarity	0	1	16	✓	✓	✓
68	2157 expansion module 0 output C source	0	65535	16	✓	✓	✓
69	2157 expansion module 0 output C polarity	0	1	16	✓	✓	✓
70	2157 expansion module 0 output D source	0	65535	16	✓	✓	✓
71	2157 expansion module 0 output D polarity	0	1	16	✓	✓	✓
72	2157 expansion module 0 output E source	0	65535	16	✓	✓	✓
73	2157 expansion module 0 output E polarity	0	1	16	✓	✓	✓
74	2157 expansion module 0 output F source	0	65535	16	✓	✓	✓
75	2157 expansion module 0 output F polarity	0	1	16	✓	✓	✓
76	2157 expansion module 0 output G source	0	65535	16	✓	✓	✓
77	2157 expansion module 0 output G polarity	0	1	16	✓	✓	✓
78	2157 expansion module 0 output H source	0	65535	16	✓	✓	✓
79	2157 expansion module 0 output H polarity	0	1	16	✓	✓	✓
80-95	2157 expansion module 1 outputs A-H	0	65535	16	✓	✓	✓
96-111	2157 expansion module 2 outputs A-H	0	1	16	✓	✓	
112-127	2157 expansion module 3 outputs A-H	0	65535	16	✓	✓	
128-223	2157 expansion module 4-9 outputs A-H	0	1	16	✓	✓	
224	2548 expansion module 0 output A source	0	65535	16	✓	✓	✓
225	2548 expansion module 0 output A polarity	0	1	16	✓	✓	✓
226	2548 expansion module 0 output B source	0	65535	16	✓	✓	✓
227	2548 expansion module 0 output B polarity	0	1	16	✓	✓	✓
228	2548 expansion module 0 output C source	0	65535	16	✓	✓	✓
229	2548 expansion module 0 output C polarity	0	1	16	✓	✓	✓
230	2548 expansion module 0 output D source	0	65535	16	✓	✓	✓
231	2548 expansion module 0 output D polarity	0	1	16	✓	✓	✓
232	2548 expansion module 0 output E source	0	65535	16	✓	✓	✓
233	2548 expansion module 0 output E polarity	0	1	16	✓	✓	✓
234	2548 expansion module 0 output F source	0	65535	16	✓	✓	✓
235	2548 expansion module 0 output F polarity	0	1	16	✓	✓	✓
236	2548 expansion module 0 output G source	0	65535	16	✓	✓	✓
237	2548 expansion module 0 output G polarity	0	1	16	✓	✓	✓
238	2548 expansion module 0 output H source	0	65535	16	✓	✓	✓
239	2548 expansion module 0 output H polarity	0	1	16	✓	✓	✓
240	2548 expansion module 0 sounder output Source	0	65535	16	✓	✓	✓
241	2548 expansion module 0 sounder output polarity	0	1	16	✓	✓	✓
242-255	2548 expansion module 1 outputs A-G				✓	✓	✓

LED colours

Type code	Type
0	Red
1	Green

10.44 Page 181 – Unnamed output sources & polarities continued

1. This page is a continuation of page 180; refer to that page for notes.

8xxx/74xx/72xx/73xx/3xx Common family register allocations 0-255 continued

Register offset	Name	Minimum value	Maximum value	Bits/ sign	8xxx/ 74xx	72xx/ 73xx	335
0	2548 expansion module 1 output H source	0	65535	16	✓	✓	✓
1	2548 expansion module 1 output H polarity	0	1	16	✓	✓	✓
2	2548 expansion module 1 sounder output Source	0	65535	16	✓	✓	✓
3	2548 expansion module 1 sounder output polarity	0	1	16	✓	✓	✓
4-21	2548 expansion module 2 outputs A-H & sounder				✓	✓	
22-39	2548 expansion module 3 outputs A-H & sounder				✓	✓	
40-57	2548 expansion module 4 outputs A-H & sounder				✓	✓	
58-75	2548 expansion module 5 outputs A-H & sounder				✓	✓	
76-93	2548 expansion module 6 outputs A-H & sounder				✓	✓	
94-111	2548 expansion module 7 outputs A-H & sounder				✓	✓	
112-129	2548 expansion module 8 outputs A-H & sounder				✓	✓	
130-147	2548 expansion module 9 outputs A-H & sounder				✓	✓	
148-255	Reserved						

10.45 Page 182 – Virtual output sources & polarities

1. This page indicates the control source and polarity settings for every virtual output, taken directly from the configuration.

Registers

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ sign	Read/write
0	Virtual output 1 source	0	65535			16	Read only
1	Virtual output 1 polarity	0	1			16	Read only
2	Virtual output 2 source	0	65535			16	Read only
3	Virtual output 2 polarity	0	1			16	Read only
4	Virtual output 3 source	0	65535			16	Read only
5	Virtual output 3 polarity	0	1			16	Read only
6	Virtual output 4 source	0	65535			16	Read only
7	Virtual output 4 polarity	0	1			16	Read only
8	Virtual output 5 source	0	65535			16	Read only
9	Virtual output 5 polarity	0	1			16	Read only
10	Virtual output 6 source	0	65535			16	Read only
11	Virtual output 6 polarity	0	1			16	Read only
12	Virtual output 7 source	0	65535			16	Read only
13	Virtual output 7 polarity	0	1			16	Read only
14	Virtual output 8 source	0	65535			16	Read only
15	Virtual output 8 polarity	0	1			16	Read only
16	Virtual output 9 source	0	65535			16	Read only
17	Virtual output 9 polarity	0	1			16	Read only
18	Virtual output 10 source	0	65535			16	Read only
19	Virtual output 10 polarity	0	1			16	Read only
20	Virtual output 11 source	0	65535			16	Read only
21	Virtual output 11 polarity	0	1			16	Read only
22	Virtual output 12 source	0	65535			16	Read only
23	Virtual output 12 polarity	0	1			16	Read only
24	Virtual output 13 source	0	65535			16	Read only
25	Virtual output 13 polarity	0	1			16	Read only
26	Virtual output 14 source	0	65535			16	Read only
27	Virtual output 14 polarity	0	1			16	Read only
28	Virtual output 15 source	0	65535			16	Read only
29	Virtual output 15 polarity	0	1			16	Read only
30	Virtual output 16 source	0	65535			16	Read only
31	Virtual output 16 polarity	0	1			16	Read only
32	Virtual output 17 source	0	65535			16	Read only
33	Virtual output 17 polarity	0	1			16	Read only
34	Virtual output 18 source	0	65535			16	Read only
35	Virtual output 18 polarity	0	1			16	Read only
36	Virtual output 19 source	0	65535			16	Read only
37	Virtual output 19 polarity	0	1			16	Read only
38	Virtual output 20 source	0	65535			16	Read only
39	Virtual output 20 polarity	0	1			16	Read only
40-255	Reserved						

10.46 Page 183 – Configurable output sources & polarities

1. This page indicates the control source and polarity settings for every configurable output, taken directly from the configuration.

Registers

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ sign	Read/write
0	configurable output 1 item A source	0	65535			16	Read only
1	configurable output 1 item A polarity	0	1			16	Read only
2	configurable output 1 item B source	0	65535			16	Read only
3	configurable output 1 item B polarity	0	1			16	Read only
4	configurable output 1 item C source	0	65535			16	Read only
5	configurable output 1 item C polarity	0	1			16	Read only
6	configurable output 2 item A source	0	65535			16	Read only
7	configurable output 2 item A polarity	0	1			16	Read only
8	configurable output 2 item B source	0	65535			16	Read only
9	configurable output 2 item B polarity	0	1			16	Read only
10	configurable output 2 item C source	0	65535			16	Read only
11	configurable output 2 item C polarity	0	1			16	Read only
12	configurable output 3 item A source	0	65535			16	Read only
13	configurable output 3 item A polarity	0	1			16	Read only
14	configurable output 3 item B source	0	65535			16	Read only
15	configurable output 3 item B polarity	0	1			16	Read only
16	configurable output 3 item C source	0	65535			16	Read only
17	configurable output 3 item C polarity	0	1			16	Read only
18-255	Reserved						

10.47 Page 184 – Analogue output sources, types and values

1. The analogue output source list is the same as the list in the expansion configuration and is not duplicated here.
2. The analogue output type is described in the table below.
3. The analogue output value for an output configured for voltage is in millivolts.
4. The analogue output value for an output configured for current is in microamps but should be displayed in milliamps.

Registers

Register offset	Name	Minimum value	Maximum value	Bits/ sign	Read/write
0	2152 expansion module 0 analogue output A source	0	65535	16	Read only
1	2152 expansion module 0 analogue output A type	0	1	16	Read only
2	2152 expansion module 0 analogue output B source	0	65535	16	Read only
3	2152 expansion module 0 analogue output B type	0	1	16	Read only
4	2152 expansion module 0 analogue output C source	0	65535	16	Read only
5	2152 expansion module 0 analogue output C type	0	1	16	Read only
6	2152 expansion module 0 analogue output D source	0	65535	16	Read only
7	2152 expansion module 0 analogue output D type	0	1	16	Read only
8	2152 expansion module 0 analogue output E source	0	65535	16	Read only
9	2152 expansion module 0 analogue output E type	0	1	16	Read only
10	2152 expansion module 0 analogue output F source	0	65535	16	Read only
11	2152 expansion module 0 analogue output F type	0	1	16	Read only
12-23	2152 expansion module 1 analogue outputs A-F				Read only
24-35	2152 expansion module 2 analogue outputs A-F				Read only
36-47	2152 expansion module 3 analogue outputs A-F				Read only
48	2152 expansion module 0 analogue output A value	See table below		16S	Read only
49	2152 expansion module 0 analogue output B value	See table below		16S	Read only
50	2152 expansion module 0 analogue output C value	See table below		16S	Read only
51	2152 expansion module 0 analogue output D value	See table below		16S	Read only
52	2152 expansion module 0 analogue output E value	See table below		16S	Read only
53	2152 expansion module 0 analogue output F value	See table below		16S	Read only
54-59	2152 expansion module 1 analogue outputs A-F value				Read only
60-65	2152 expansion module 2 analogue outputs A-F value				Read only
66-71	2152 expansion module 3 analogue outputs A-F value				Read only
72-255	Reserved				

Output types and value ranges

Type code	Type	Minimum value	Maximum value	Scaling factor	Units
0	Voltage	0	10000	0.001	V
1	Current	0	20000	0.001	mA
2-65535	Reserved				

10.48 Page 190 – Unnamed output status

1. This page indicates the current status of each output from the module, both digital outputs and LEDs.
2. LED outputs are affected by lamp test.
3. LED and button allocations vary by model and are shown in the table below.
4. Each family has different allocations for registers 0-31 but common ones for the remainder of the page.
5. These registers are Read-Only
6. Unimplemented registers within a family/module are shaded.

72xx/73xx family register allocation 0-31

Register offset	Name	Minimum value	Maximum value	Bits/ sign
0	Digital output A status (Fuel)	0	1	16
1	Digital output B status (Crank)	0	1	16
2	Digital output E status	0	1	16
3	Digital output F status	0	1	16
4	Digital output G status	0	1	16
5	Digital output H status	0	1	16
6	Digital output D status (Gen)	0	1	16
7	Digital output C status (Mains)	0	1	16
8	STOP LED status(STOP)	0	1	16
9	MANUAL LED status (MANUAL)	0	1	16
10	TEST LED status (TEST)	0	1	16
11	AUTO LED status (AUTO)	0	1	16
12	MAINS LED status (MAINS)	0	1	16
13	MAINS BREAKER LED status (MAINS BREAKER)	0	1	16
14	GEN BREAKER LED status (GEN BREAKER)	0	1	16
15	GEN LED status (GEN)	0	1	16
16	USER LED 1 status (USER LED 1)	0	1	16
17	USER LED 2 status (USER LED 2)	0	1	16
18	USER LED 3 status (USER LED 3)	0	1	16
19	USER LED 4 status (USER LED 4)	0	1	16
20-31	Reserved			

332/333 register allocation 0-31

Register offset	Name	Minimum value	Maximum value	Bits/ sign
0	Digital output A	0	1	16
1	Digital output B	0	1	16
2	Digital output C	0	1	16
3	Digital output D	0	1	16
4	Digital output E	0	1	16
5-15	Reserved for future outputs	0	1	16
16	Exercise LED	0	1	16
17	Manual LED	0	1	16
18	Prohibit Return LED	0	1	16
19	Auto LED	0	1	16
20	Generator breaker LED	0	1	16
21	Mains breaker LED	0	1	16
22	Generator available LED	0	1	16
23	Mains available LED	0	1	16
24	Warning LED	0	1	16
25	LCD Indicator 1 (USER LED 1)	0	1	16
26	LCD Indicator 2 (USER LED 2)	0	1	16
27	LCD Indicator 3 (USER LED 3)	0	1	16
28-31	Reserved			

330/331/334 register allocation 0-31

Register offset	Name	Minimum value	Maximum value	Bits/ sign	330	331	334
0	Digital output A	0	1	16	✓	✓	✓
1	Digital output B	0	1	16	✓	✓	✓
2	Digital output C	0	1	16	✓	✓	✓
3	Digital output D	0	1	16	✓	✓	✓
4	Digital output E	0	1	16	✓	✓	✓
5	Digital output F	0	1	16	✓	✓	
6	Digital output G	0	1	16		✓	
7	Digital output H	0	1	16		✓	
8-15	Unimplemented - Reserved for future outputs	0	1	16			
16	Stop LED	0	1	16			✓
17	Manual LED	0	1	16			✓
18	Mode LED	0	1	16			✓
19	Auto LED	0	1	16			✓
20	S2 breaker LED	0	1	16			✓
21	S1 breaker LED	0	1	16			✓
22	S2 available LED	0	1	16			✓
23	S1 available LED	0	1	16			✓
24	Warning LED	0	1	16	✓	✓	✓
25	USER / LCD Indicator 1 (USER LED 1)	0	1	16			✓
26	USER / LCD Indicator 2 (USER LED 2)	0	1	16			✓
27	USER / LCD Indicator 3 (USER LED 3)	0	1	16			✓
28-31	Reserved						

335 register allocation 0-31

Register offset	Name	Minimum value	Maximum value	Bits/ sign
0	Digital output A status	0	1	16
1	Digital output B status	0	1	16
2	Digital output C status	0	1	16
3	Digital output D status	0	1	16
4	Digital output E status	0	1	16
5	Digital output F status	0	1	16
6	Digital output G status	0	1	16
7	Digital output H status	0	1	16
8	Digital output I status	0	1	16
9	Digital output J status	0	1	16
10	Digital output K status	0	1	16
11	Digital output L status	0	1	16
12-15	Unimplemented - Reserved for future outputs	0	1	16
16	Stop LED	0	1	16
17	Manual LED	0	1	16
18	Mode LED	0	1	16
19	Auto LED	0	1	16
20	S2 breaker LED	0	1	16
21	S1 breaker LED	0	1	16
22	S2 available LED	0	1	16
23	S1 available LED	0	1	16
24	USER LED 1	0	1	16
25	USER LED 2	0	1	16
26	USER LED 3	0	1	16
27	USER LED 4	0	1	16
28-31	Reserved			

8xxx / 74xx family register allocation 0-255

Register offset	Name	Minimum value	Maximum value	Bits/ sign
0	Digital output A status (Fuel)	0	1	16
1	Digital output B status (Crank)	0	1	16
2	Digital output E status	0	1	16
3	Digital output F status	0	1	16
4	Digital output G status	0	1	16
5	Digital output H status	0	1	16
6	Digital output I status	0	1	16
7	Digital output J status	0	1	16
8	Digital output K status	0	1	16
9	Digital output L status	0	1	16
10	Digital output M status	0	1	16
11	Digital output N status	0	1	16
12	Digital output D status (Gen)	0	1	16
13	Digital output C status (Mains)	0	1	16
14	STOP LED status(STOP)	0	1	16
15	MANUAL LED status (MANUAL)	0	1	16
16	TEST LED status (TEST)	0	1	16
17	AUTO LED status (AUTO)	0	1	16
18	MAINS LED status (MAINS)	0	1	16
19	MAINS BREAKER LED status (MAINS BREAKER)	0	1	16
20	GEN BREAKER LED status (GEN BREAKER)	0	1	16
21	GEN LED status (GEN)	0	1	16
22	USER LED 1 status (USER LED 1)	0	1	16
23	USER LED 2 status (USER LED 2)	0	1	16
24	USER LED 3 status (USER LED 3)	0	1	16
25	USER LED 4 status (USER LED 4)	0	1	16
26-31	Reserved			

Common register allocation 32-255

Register offset	Name	Minimum value	Maximum value	Bits/ sign	8xxx/74xx	73xx	335
32	2157 expansion module 0 output A	0	1	16	✓	✓	✓
33	2157 expansion module 0 output B	0	1	16	✓	✓	✓
34	2157 expansion module 0 output C	0	1	16	✓	✓	✓
35	2157 expansion module 0 output D	0	1	16	✓	✓	✓
36	2157 expansion module 0 output E	0	1	16	✓	✓	✓
37	2157 expansion module 0 output F	0	1	16	✓	✓	✓
38	2157 expansion module 0 output G	0	1	16	✓	✓	✓
39	2157 expansion module 0 output H	0	1	16	✓	✓	✓
40-47	2157 expansion module 1 outputs A-H				✓	✓	✓
48-55	2157 expansion module 2 outputs A-H				✓	✓	
56-63	2157 expansion module 3 outputs A-H				✓	✓	
64-71	2157 expansion module 4 outputs A-H				✓	✓	
72-79	2157 expansion module 5 outputs A-H				✓	✓	
80-87	2157 expansion module 6 outputs A-H				✓	✓	
88-95	2157 expansion module 7 outputs A-H				✓	✓	
96-103	2157 expansion module 8 outputs A-H				✓	✓	
104-111	2157 expansion module 9 outputs A-H				✓	✓	
112	2548 expansion module 0 output A	0	1	16	✓	✓	✓
113	2548 expansion module 0 output B	0	1	16	✓	✓	✓
114	2548 expansion module 0 output C	0	1	16	✓	✓	✓
115	2548 expansion module 0 output D	0	1	16	✓	✓	✓
116	2548 expansion module 0 output E	0	1	16	✓	✓	✓
117	2548 expansion module 0 output F	0	1	16	✓	✓	✓
118	2548 expansion module 0 output G	0	1	16	✓	✓	✓
119	2548 expansion module 0 output H	0	1	16	✓	✓	✓
120	2548 expansion module 0 sounder output	0	1	16	✓	✓	✓
121-129	2548 expansion module 1 outputs A-H & sounder				✓	✓	✓
130-138	2548 expansion module 2 outputs A-H & sounder				✓	✓	
139-147	2548 expansion module 3 outputs A-H & sounder				✓	✓	
148-156	2548 expansion module 4 outputs A-H & sounder				✓	✓	
157-165	2548 expansion module 5 outputs A-H & sounder				✓	✓	
166-174	2548 expansion module 6 outputs A-H & sounder				✓	✓	
175-183	2548 expansion module 7 outputs A-H & sounder				✓	✓	
184-192	2548 expansion module 8 outputs A-H & sounder				✓	✓	
193-201	2548 expansion module 9 outputs A-H & sounder				✓	✓	
202-255	Reserved						

8xxx / 74xx LED allocation by model

Register	Model 8x10/7410	Model 8x60	Model 8680
14	Stop mode LED	Stop mode LED	0xFFFF
15	Manual mode LED	Manual mode LED	0xFFFF
16	0x0000	Test mode LED	Manual mode LED
17	Auto mode LED	Auto mode LED	Auto mode LED
18	0x0000	Mains available LED	Bus 1 live LED
19	Bus breaker LED	Mains breaker LED	Bus breaker LED
20	0x0000	Bus breaker LED	0xFFFF
21	Gen available LED	Bus available LED	Bus 2 live LED

10.49 Page 191 – Virtual output status

1. This page indicates the status of each virtual output.

Registers

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ sign	Read/write
0	Virtual output 1 status	0	1			16	Read only
1	Virtual output 2 status	0	1			16	Read only
2	Virtual output 3 status	0	1			16	Read only
3	Virtual output 4 status	0	1			16	Read only
4	Virtual output 5 status	0	1			16	Read only
5	Virtual output 6 status	0	1			16	Read only
6	Virtual output 7 status	0	1			16	Read only
7	Virtual output 8 status	0	1			16	Read only
8	Virtual output 9 status	0	1			16	Read only
9	Virtual output 10 status	0	1			16	Read only
10	Virtual output 11 status	0	1			16	Read only
11	Virtual output 12 status	0	1			16	Read only
12	Virtual output 13 status	0	1			16	Read only
13	Virtual output 14 status	0	1			16	Read only
14	Virtual output 15 status	0	1			16	Read only
15	Virtual output 16 status	0	1			16	Read only
16	Virtual output 17 status	0	1			16	Read only
17	Virtual output 18 status	0	1			16	Read only
18	Virtual output 19 status	0	1			16	Read only
19	Virtual output 20 status	0	1			16	Read only
20-255	Reserved						

10.50 Page 192 – Configurable output status

1. This page indicates the status of each virtual output.

Registers

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ sign	Read/write
0	configurable output 1 item A status	0	1			16	Read only
1	configurable output 1 item B status	0	1			16	Read only
2	configurable output 1 item C status	0	1			16	Read only
3	configurable output 2 item A status	0	1			16	Read only
4	configurable output 2 item B status	0	1			16	Read only
5	configurable output 2 item C status	0	1			16	Read only
6	configurable output 3 item A status	0	1			16	Read only
7	configurable output 3 item B status	0	1			16	Read only
8	configurable output 3 item C status	0	1			16	Read only
9-255	Reserved						

10.51 Page 193 – Remote control sources

1. This page allows remote control flags to read or written, these can be used to drive outputs, LED's or the elements of the control logic.

Registers

Register offset	Name	Minimum value	Maximum value	Scaling factor	Units	Bits/ sign	Read/write
0	Remote control source 1	0	1			16	Read/write
1	Remote control source 2	0	1			16	Read/write
2	Remote control source 3	0	1			16	Read/write
3	Remote control source 4	0	1			16	Read/write
4	Remote control source 5	0	1			16	Read/write
5	Remote control source 6	0	1			16	Read/write
6	Remote control source 7	0	1			16	Read/write
7	Remote control source 8	0	1			16	Read/write
8	Remote control source 9	0	1			16	Read/write
9	Remote control source 10	0	1			16	Read/write
10-255	Reserved						

10.52 Page 200-239 – Unnamed alarm strings

1. This is implemented for 86xx/87xx modules to provide the various unnamed alarm strings (including internal and external digital and analogue inputs).
2. They are used in place of pages 64-95 in the old alarm system, the inactive strings are not implemented to reduce the register count required to support the large number of expansion inputs.
3. The order of the strings is the same as for the input functions and input status pages to simplify the look-up process for the PC software.
4. Reading from the reserved pages will return spaces.
5. The register allocation is different for each family.

72xx/73xx family register allocation

Page	Register offset	Name	Minimum value	Maximum value	Bits
200	0	Digital input A active string	UNICODE	UNICODE	512
	32	Digital input B active string	UNICODE	UNICODE	512
	64	Digital input C active string	UNICODE	UNICODE	512
	96	Digital input D active string	UNICODE	UNICODE	512
	128	Digital input E active string	UNICODE	UNICODE	512
	160	Digital input F active string	UNICODE	UNICODE	512
	192	Digital input G active string	UNICODE	UNICODE	512
	224	Digital input H active string	UNICODE	UNICODE	512
201	0	Digital input I active string	UNICODE	UNICODE	512
	32	Reserved (for digital input J-P strings)			
202	0	2130 expansion module 0 digital input A string	UNICODE	UNICODE	512
	32	2130 expansion module 0 digital input B string	UNICODE	UNICODE	512
	64	2130 expansion module 0 digital input C string	UNICODE	UNICODE	512
	96	2130 expansion module 0 digital input D string	UNICODE	UNICODE	512
	128	2130 expansion module 0 digital input E string	UNICODE	UNICODE	512
	160	2130 expansion module 0 digital input F string	UNICODE	UNICODE	512
	192	2130 expansion module 0 digital input G string	UNICODE	UNICODE	512
	224	2130 expansion module 0 digital input H string	UNICODE	UNICODE	512
203	0-255	2130 expansion module 1 digital input A-H string	UNICODE	UNICODE	512
204	0-255	2130 expansion module 2 digital input A-H string	UNICODE	UNICODE	512
205	0-255	2130 expansion module 3 digital input A-H string	UNICODE	UNICODE	512
206-211	0-255	Reserved for 2130 expansion module 4-9 digital input A-H string	UNICODE	UNICODE	512
212	0	2130 Expansion module 0 input E (low) string	UNICODE	UNICODE	512
	32	2130 Expansion module 0 input E (high) string	UNICODE	UNICODE	512
	64	2130 Expansion module 0 input F (low) string	UNICODE	UNICODE	512
	96	2130 Expansion module 0 input F (high) string	UNICODE	UNICODE	512
	128	2130 Expansion module 0 input G (low) string	UNICODE	UNICODE	512
	160	2130 Expansion module 0 input G (high) string	UNICODE	UNICODE	512
	192	2130 Expansion module 0 input H (low) string	UNICODE	UNICODE	512
	224	2130 Expansion module 0 input H (high) string	UNICODE	UNICODE	512
213		2130 Expansion module 1 inputs E-H strings	UNICODE	UNICODE	512
214		2130 Expansion module 2 inputs E-H strings	UNICODE	UNICODE	512
215		2130 Expansion module 3 inputs E-H strings	UNICODE	UNICODE	512
216-221		Reserved for 2130 Expansion modules 4-9 inputs E-H strings	UNICODE	UNICODE	512

72xx/73xx family register allocation continued

222	0	Internal flexible sender input (low) string	UNICODE	UNICODE	512
	32	Internal flexible sender input (high) string	UNICODE	UNICODE	512
	64	Maintenance alarm 1 string	UNICODE	UNICODE	512
	96	Maintenance alarm 2 string	UNICODE	UNICODE	512
	128	Maintenance alarm 3 string	UNICODE	UNICODE	512
	160	PLC function 1 string	UNICODE	UNICODE	512
	192	PLC function 2 string	UNICODE	UNICODE	512
	224	PLC function 3 string	UNICODE	UNICODE	512
223	0	PLC function 4 string	UNICODE	UNICODE	512
	32	PLC function 5 string	UNICODE	UNICODE	512
	64	PLC function 6 string	UNICODE	UNICODE	512
	96	PLC function 7 string	UNICODE	UNICODE	512
	128	PLC function 8 string	UNICODE	UNICODE	512
	160	PLC function 9 string	UNICODE	UNICODE	512
	192	PLC function 10 string	UNICODE	UNICODE	512
	224	PLC function 11 string	UNICODE	UNICODE	512
224	0	PLC function 12 string	UNICODE	UNICODE	512
	32	PLC function 13 string	UNICODE	UNICODE	512
	64	PLC function 14 string	UNICODE	UNICODE	512
	96	PLC function 15 string	UNICODE	UNICODE	512
	128	PLC function 16 string	UNICODE	UNICODE	512
	160	PLC function 17 string	UNICODE	UNICODE	512
	192	PLC function 18 string	UNICODE	UNICODE	512
	224	PLC function 19 string	UNICODE	UNICODE	512
225	0	PLC function 20 string	UNICODE	UNICODE	512
	32	Reserved	UNICODE	UNICODE	512
	64	Reserved	UNICODE	UNICODE	512
	96	Reserved	UNICODE	UNICODE	512
	128	Reserved	UNICODE	UNICODE	512
	160	Reserved	UNICODE	UNICODE	512
	192	Reserved	UNICODE	UNICODE	512
	224	Reserved	UNICODE	UNICODE	512
226-239		Reserved			

8xxx / 74xx family register allocation

Page	Register offset	Name	Minimum value	Maximum value	Bits
200	0	Digital input A active string	UNICODE	UNICODE	512
	32	Digital input B active string	UNICODE	UNICODE	512
	64	Digital input C active string	UNICODE	UNICODE	512
	96	Digital input D active string	UNICODE	UNICODE	512
	128	Digital input E active string	UNICODE	UNICODE	512
	160	Digital input F active string	UNICODE	UNICODE	512
	192	Digital input G active string	UNICODE	UNICODE	512
	224	Digital input H active string	UNICODE	UNICODE	512
201	0	Digital input I active string	UNICODE	UNICODE	512
	32	Digital input J active string	UNICODE	UNICODE	512
	64	Digital input K active string	UNICODE	UNICODE	512
	96	Digital input L active string	UNICODE	UNICODE	512
	128	Digital input M active string	UNICODE	UNICODE	512
	160	Digital input N active string	UNICODE	UNICODE	512
	192	Digital input O active string	UNICODE	UNICODE	512
	224	Digital input P active string	UNICODE	UNICODE	512
202	0	Digital input Q active string	UNICODE	UNICODE	512
	32	Digital input R active string	UNICODE	UNICODE	512
	64	Digital input S active string	UNICODE	UNICODE	512
	96	Digital input T active string	UNICODE	UNICODE	512
	128	Digital input U active string	UNICODE	UNICODE	512
	160	Digital input V active string	UNICODE	UNICODE	512
	192	Digital input W active string	UNICODE	UNICODE	512
	224	Digital input X active string	UNICODE	UNICODE	512
203	0	Digital input Y active string	UNICODE	UNICODE	512
	32	Digital input Z active string	UNICODE	UNICODE	512
	64	Digital input AA active string	UNICODE	UNICODE	512
	96	Digital input AB active string	UNICODE	UNICODE	512
	128	Digital input AC active string	UNICODE	UNICODE	512
	160	Digital input AD active string	UNICODE	UNICODE	512
	192	Digital input AE active string	UNICODE	UNICODE	512
	224	Digital input AF active string	UNICODE	UNICODE	512
204	0	2130 expansion module 0 digital input A string	UNICODE	UNICODE	512
	32	2130 expansion module 0 digital input B string	UNICODE	UNICODE	512
	64	2130 expansion module 0 digital input C string	UNICODE	UNICODE	512
	96	2130 expansion module 0 digital input D string	UNICODE	UNICODE	512
	128	2130 expansion module 0 digital input E string	UNICODE	UNICODE	512
	160	2130 expansion module 0 digital input F string	UNICODE	UNICODE	512
	192	2130 expansion module 0 digital input G string	UNICODE	UNICODE	512
	224	2130 expansion module 0 digital input H string	UNICODE	UNICODE	512
205	0-255	2130 expansion module 1 digital input A-H string	UNICODE	UNICODE	512
206	0-255	2130 expansion module 2 digital input A-H string	UNICODE	UNICODE	512
207	0-255	2130 expansion module 3 digital input A-H string	UNICODE	UNICODE	512
208-213	0-255	Reserved for 2130 expansion module 4-9 digital input A-H string	UNICODE	UNICODE	512
214	0	2130 Expansion module 0 input E (low) string	UNICODE	UNICODE	512
	32	2130 Expansion module 0 input E (high) string	UNICODE	UNICODE	512
	64	2130 Expansion module 0 input F (low) string	UNICODE	UNICODE	512
	96	2130 Expansion module 0 input F (high) string	UNICODE	UNICODE	512
	128	2130 Expansion module 0 input G (low) string	UNICODE	UNICODE	512
	160	2130 Expansion module 0 input G (high) string	UNICODE	UNICODE	512
	192	2130 Expansion module 0 input H (low) string	UNICODE	UNICODE	512
	224	2130 Expansion module 0 input H (high) string	UNICODE	UNICODE	512

8xxx / 74xx family register allocation

215		2130 Expansion module 1 inputs E-H strings	UNICODE	UNICODE	512
216		2130 Expansion module 2 inputs E-H strings	UNICODE	UNICODE	512
217		2130 Expansion module 3 inputs E-H strings	UNICODE	UNICODE	512
218-223		Reserved for 2130 Expansion modules 4-9 inputs E-H strings			
224	0	Internal flexible sender 1 input (low) string	UNICODE	UNICODE	512
	32	Internal flexible sender 1 input (high) string	UNICODE	UNICODE	512
	64	Internal flexible sender 2 input (low) string	UNICODE	UNICODE	512
	96	Internal flexible sender 2 input (high) string	UNICODE	UNICODE	512
	128	Internal flexible sender 3 input (low) string	UNICODE	UNICODE	512
	160	Internal flexible sender 3 input (high) string	UNICODE	UNICODE	512
	192	Internal flexible sender 4 input (low) string	UNICODE	UNICODE	512
	224	Internal flexible sender 4 input (high) string	UNICODE	UNICODE	512
225	0	Internal flexible sender 5 input (low) string	UNICODE	UNICODE	512
	32	Internal flexible sender 5 input (high) string	UNICODE	UNICODE	512
	64	Maintenance alarm 1 string	UNICODE	UNICODE	512
	96	Maintenance alarm 2 string	UNICODE	UNICODE	512
	128	Maintenance alarm 3 string	UNICODE	UNICODE	512
	160	PLC function 1 string	UNICODE	UNICODE	512
	192	PLC function 2 string	UNICODE	UNICODE	512
	224	PLC function 3 string	UNICODE	UNICODE	512
226	0	PLC function 4 string	UNICODE	UNICODE	512
	32	PLC function 5 string	UNICODE	UNICODE	512
	64	PLC function 6 string	UNICODE	UNICODE	512
	96	PLC function 7 string	UNICODE	UNICODE	512
	128	PLC function 8 string	UNICODE	UNICODE	512
	160	PLC function 9 string	UNICODE	UNICODE	512
	192	PLC function 10 string	UNICODE	UNICODE	512
	224	PLC function 11 string	UNICODE	UNICODE	512
227	0	PLC function 12 string	UNICODE	UNICODE	512
	32	PLC function 13 string	UNICODE	UNICODE	512
	64	PLC function 14 string	UNICODE	UNICODE	512
	96	PLC function 15 string	UNICODE	UNICODE	512
	128	PLC function 16 string	UNICODE	UNICODE	512
	160	PLC function 17 string	UNICODE	UNICODE	512
	192	PLC function 18 string	UNICODE	UNICODE	512
	224	PLC function 19 string	UNICODE	UNICODE	512
228	0	PLC function 20 string	UNICODE	UNICODE	512
	32	Reserved	UNICODE	UNICODE	512
	64	Reserved	UNICODE	UNICODE	512
	96	Reserved	UNICODE	UNICODE	512
	128	Reserved	UNICODE	UNICODE	512
	160	Reserved	UNICODE	UNICODE	512
	192	Reserved	UNICODE	UNICODE	512
	224	Reserved	UNICODE	UNICODE	512
229-239		Reserved			

332/333 register allocation

Page	Register offset	Name	Minimum value	Maximum value	Bits
200	0	Digital input A active string	UNICODE	UNICODE	512
	32	Digital input B active string	UNICODE	UNICODE	512
	64	Digital input C active string	UNICODE	UNICODE	512
	96	Digital input D active string	UNICODE	UNICODE	512
	128	Digital input E active string	UNICODE	UNICODE	512
	160	Digital input F active string	UNICODE	UNICODE	512
	192	Digital input G active string	UNICODE	UNICODE	512
	224	Digital input H active string	UNICODE	UNICODE	512
201	0	Digital input I active string	UNICODE	UNICODE	512
	32	Digital input J active string	UNICODE	UNICODE	512
	64	Digital input K active string			
	96-255	Reserved for future outputs			
202	0	Module description 1	UNICODE	UNICODE	512
	32	Module description 2	UNICODE	UNICODE	512
	64	Site ID	UNICODE	UNICODE	512
	96	Generator ID	UNICODE	UNICODE	512
	128-255	Reserved for future use			
203	0	LCD indicator 1	UNICODE	UNICODE	512
	32	LCD indicator 2	UNICODE	UNICODE	512
	64	LCD indicator 3	UNICODE	UNICODE	512
	96-255	Reserved			
204-231	0	Reserved			

330/331 register allocation

Page	Register offset	Name	Minimum value	Maximum value	Bits
200		Reserved			
201		Reserved			
202	0	Module description 1	UNICODE	UNICODE	512
	32	Module description 2	UNICODE	UNICODE	512
	64-255	Reserved for future use			
203		Reserved			
204-231		Reserved			

334 register allocation

Page	Register offset	Name	Minimum value	Maximum value	Bits
200	0	Digital input A active string	UNICODE	UNICODE	512
	32	Digital input B active string	UNICODE	UNICODE	512
	64	Digital input C active string	UNICODE	UNICODE	512
	96	Digital input D active string	UNICODE	UNICODE	512
	128	Digital input E active string	UNICODE	UNICODE	512
	160	Digital input F active string	UNICODE	UNICODE	512
	192	Digital input G active string	UNICODE	UNICODE	512
	224	Digital input H active string	UNICODE	UNICODE	512
201	0	Digital input I active string	UNICODE	UNICODE	512
	32	Digital input J active string	UNICODE	UNICODE	512
	64	Digital input K active string	UNICODE	UNICODE	512
	96-255	Reserved for future outputs			
202	0	Module description 1	UNICODE	UNICODE	512
	32	Module description 2	UNICODE	UNICODE	512
	64	Site ID (note 1)	UNICODE	UNICODE	512
	96	S2 ID (note 1)	UNICODE	UNICODE	512
	128-255	Reserved for future use			
203	0	LCD indicator / Insert 1	UNICODE	UNICODE	512
	32	LCD indicator / Insert 2	UNICODE	UNICODE	512
	64	LCD indicator / Insert 3	UNICODE	UNICODE	512
	96-255	Reserved			
204-231		Reserved			

335 register allocation

Page	Register offset	Name	Minimum value	Maximum value	Bits
200	0	Digital input A active string	UNICODE	UNICODE	512
	32	Digital input B active string	UNICODE	UNICODE	512
	64	Digital input C active string	UNICODE	UNICODE	512
	96	Digital input D active string	UNICODE	UNICODE	512
	128	Digital input E active string	UNICODE	UNICODE	512
	160	Digital input F active string	UNICODE	UNICODE	512
	192	Digital input G active string	UNICODE	UNICODE	512
	224	Digital input H active string	UNICODE	UNICODE	512
201	0	Digital input I active string	UNICODE	UNICODE	512
	32	Digital input J active string	UNICODE	UNICODE	512
	64	Digital input K active string	UNICODE	UNICODE	512
	96	Digital input L active string	UNICODE	UNICODE	512
	128-255	Reserved for future outputs			
202	0	2130 expansion module 0 digital input A string	UNICODE	UNICODE	512
	32	2130 expansion module 0 digital input B string	UNICODE	UNICODE	512
	64	2130 expansion module 0 digital input C string	UNICODE	UNICODE	512
	96	2130 expansion module 0 digital input D string	UNICODE	UNICODE	512
	128	2130 expansion module 0 digital input E string	UNICODE	UNICODE	512
	160	2130 expansion module 0 digital input F string	UNICODE	UNICODE	512
	192	2130 expansion module 0 digital input G string	UNICODE	UNICODE	512
	224	2130 expansion module 0 digital input H string	UNICODE	UNICODE	512
203	0-255	2130 expansion module 1 digital input A-H string	UNICODE	UNICODE	512
204-211	0-255	Reserved for 2130 expansion module 2-9 digital input A-H string	UNICODE	UNICODE	512
212	0	2130 Expansion module 0 input E (low) string	UNICODE	UNICODE	512
	32	2130 Expansion module 0 input E (high) string	UNICODE	UNICODE	512
	64	2130 Expansion module 0 input F (low) string	UNICODE	UNICODE	512
	96	2130 Expansion module 0 input F (high) string	UNICODE	UNICODE	512
	128	2130 Expansion module 0 input G (low) string	UNICODE	UNICODE	512
	160	2130 Expansion module 0 input G (high) string	UNICODE	UNICODE	512
	192	2130 Expansion module 0 input H (low) string	UNICODE	UNICODE	512
	224	2130 Expansion module 0 input H (high) string	UNICODE	UNICODE	512
213		2130 Expansion module 1 inputs E-H strings	UNICODE	UNICODE	512
214-221		Reserved for 2130 Expansion modules 2-9 inputs E-H strings			

335 register allocation continued

222	0	PLC function 1 string	UNICODE	UNICODE	512
	32	PLC function 2 string	UNICODE	UNICODE	512
	64	PLC function 3 string	UNICODE	UNICODE	512
	96	PLC function 4 string	UNICODE	UNICODE	512
	128	PLC function 5 string	UNICODE	UNICODE	512
	160	PLC function 6 string	UNICODE	UNICODE	512
	192	PLC function 7 string	UNICODE	UNICODE	512
	224	PLC function 8 string	UNICODE	UNICODE	512
223	0	PLC function 9 string	UNICODE	UNICODE	512
	32	PLC function 10 string	UNICODE	UNICODE	512
	64	PLC function 11 string	UNICODE	UNICODE	512
	96	PLC function 12 string	UNICODE	UNICODE	512
	128	PLC function 13 string	UNICODE	UNICODE	512
	160	PLC function 14 string	UNICODE	UNICODE	512
	192	PLC function 15 string	UNICODE	UNICODE	512
	224	PLC function 16 string	UNICODE	UNICODE	512
224	0	PLC function 17 string	UNICODE	UNICODE	512
	32	PLC function 18 string	UNICODE	UNICODE	512
	64	PLC function 19 string	UNICODE	UNICODE	512
	96	PLC function 20 string	UNICODE	UNICODE	512
	128-255	Reserved			
225	0	Module description 1	UNICODE	UNICODE	512
	32	Module description 2	UNICODE	UNICODE	512
	64	Site ID (note 1)	UNICODE	UNICODE	512
	96	S2 ID (note 1)	UNICODE	UNICODE	512
	128-255	Reserved for future use			
226-239	0	Reserved			

10.53 Page 240-246 – Analogue Input Name Strings

1. This page provides the name strings for user configurable analogue inputs.
2. The order of the strings is the same as for the input functions and input status pages to simplify the look-up process for the PC software.
3. The register allocation is different for each family.

72xx/73xx family register allocation

Page	Register offset	Name	Minimum value	Maximum value	Bits
240	0	2130 Expansion module 0 input E name string	UNICODE	UNICODE	512
	32	2130 Expansion module 0 input F name string	UNICODE	UNICODE	512
	64	2130 Expansion module 0 input G name string	UNICODE	UNICODE	512
	96	2130 Expansion module 0 input H name string	UNICODE	UNICODE	512
	128	2130 Expansion module 1 input E name string	UNICODE	UNICODE	512
	160	2130 Expansion module 1 input F name string	UNICODE	UNICODE	512
	192	2130 Expansion module 1 input G name string	UNICODE	UNICODE	512
	224	2130 Expansion module 1 input H name string	UNICODE	UNICODE	512
241	0	2130 Expansion module 2 input E name string	UNICODE	UNICODE	512
	32	2130 Expansion module 2 input F name string	UNICODE	UNICODE	512
	64	2130 Expansion module 2 input G name string	UNICODE	UNICODE	512
	96	2130 Expansion module 2 input H name string	UNICODE	UNICODE	512
	128	2130 Expansion module 3 input E name string	UNICODE	UNICODE	512
	160	2130 Expansion module 3 input F name string	UNICODE	UNICODE	512
	192	2130 Expansion module 3 input G name string	UNICODE	UNICODE	512
	224	2130 Expansion module 3 input H name string	UNICODE	UNICODE	512
242-244		Reserved for 2130 expansion module 4-9 input E-H name strings			
245	0	Internal Flexible sender name string	UNICODE	UNICODE	512
	32	Reserved			
	64	Reserved			
	96	Reserved			
	128	Reserved			
	160	Reserved			
	192	Reserved			
	224	Reserved			
246	0	Reserved			
	32	Reserved			
	64	Reserved			
	96	Reserved			
	128	Reserved			
	160	Reserved			
	192	Reserved			
	224	Reserved			

8xxx/74xx family register allocation

Page	Register offset	Name	Minimum value	Maximum value	Bits
240	0	2130 Expansion module 0 input E name string	UNICODE	UNICODE	512
	32	2130 Expansion module 0 input F name string	UNICODE	UNICODE	512
	64	2130 Expansion module 0 input G name string	UNICODE	UNICODE	512
	96	2130 Expansion module 0 input H name string	UNICODE	UNICODE	512
	128	2130 Expansion module 1 input E name string	UNICODE	UNICODE	512
	160	2130 Expansion module 1 input F name string	UNICODE	UNICODE	512
	192	2130 Expansion module 1 input G name string	UNICODE	UNICODE	512
	224	2130 Expansion module 1 input H name string	UNICODE	UNICODE	512
241	0	2130 Expansion module 2 input E name string	UNICODE	UNICODE	512
	32	2130 Expansion module 2 input F name string	UNICODE	UNICODE	512
	64	2130 Expansion module 2 input G name string	UNICODE	UNICODE	512
	96	2130 Expansion module 2 input H name string	UNICODE	UNICODE	512
	128	2130 Expansion module 3 input E name string	UNICODE	UNICODE	512
	160	2130 Expansion module 3 input F name string	UNICODE	UNICODE	512
	192	2130 Expansion module 3 input G name string	UNICODE	UNICODE	512
	224	2130 Expansion module 3 input H name string	UNICODE	UNICODE	512
242-244		Reserved			
245	0	Internal Flexible sender 1 name string	UNICODE	UNICODE	512
	32	Internal Flexible sender 2 name string	UNICODE	UNICODE	512
	64	Internal Flexible sender 3 name string	UNICODE	UNICODE	512
	96	Internal Flexible sender 4 name string	UNICODE	UNICODE	512
	128	Internal Flexible sender 5 name string	UNICODE	UNICODE	512
	160	Configurable output 1 string	UNICODE	UNICODE	512
	192	Configurable output 2 string	UNICODE	UNICODE	512
	224	Configurable output 3 string	UNICODE	UNICODE	512
246	0	Reserved			
	32	Reserved			
	64	Reserved			
	96	Reserved			
	128	Reserved			
	160	Reserved			
	192	Reserved			
	224	Reserved			

335 register allocation

Page	Register offset	Name	Minimum value	Maximum value	Bits
240	0	2130 Expansion module 0 input E name string	UNICODE	UNICODE	512
	32	2130 Expansion module 0 input F name string	UNICODE	UNICODE	512
	64	2130 Expansion module 0 input G name string	UNICODE	UNICODE	512
	96	2130 Expansion module 0 input H name string	UNICODE	UNICODE	512
	128	2130 Expansion module 1 input E name string	UNICODE	UNICODE	512
	160	2130 Expansion module 1 input F name string	UNICODE	UNICODE	512
	192	2130 Expansion module 1 input G name string	UNICODE	UNICODE	512
	224	2130 Expansion module 1 input H name string	UNICODE	UNICODE	512
241-244		Reserved for 2130 Expansion modules 2-9 inputs E-H strings			
245-246		Reserved			

10.54 Page 250 – Misc strings

1. This page provides the strings for the insert card.

Registers

Page	Register offset	Name	Minimum value	Maximum value	Bits
250	0	LED Insert card string 1	UNICODE	UNICODE	512
	32	LED Insert card string 2	UNICODE	UNICODE	512
	64	LED Insert card string 3	UNICODE	UNICODE	512
	96	LED Insert card string 4	UNICODE	UNICODE	512
	128	Reserved	UNICODE	UNICODE	512
	160	Reserved	UNICODE	UNICODE	512
	192	Reserved	UNICODE	UNICODE	512
	224	Reserved	UNICODE	UNICODE	512