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**GenComm standard for use with generating set control equipment**

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**Table of contents**

1. Changes from previous version 2

2. Introduction 7

3. General Definitions and Requirements 7

4. Hubs and Protocol Conversions 8

5. Multiple Masters 8

6. Exception Responses 9

7. Modbus Functions Used 11

8. Description of Each Function 11

8.1 Function 3 – Read Multiple Registers 11

8.2 Function 16 – Write Multiple Registers 13

9. Language Codes 14

10. Modbus Registers Defined 18

10.1 Index of Register Pages 18

10.2 Page 0 – Communications Status Information 20

10.3 Page 1 – Communications Configuration 23

10.4 Page 2 – Modem Configuration 25

10.5 Page 3 – Generating Set Status Information 26

10.6 Page 4 – Basic Instrumentation 30

10.7 Page 5 - Extended Instrumentation 34

10.8 Page 6 - Derived Instrumentation 39

10.9 Page 7 - Accumulated Instrumentation 46

10.10 Page 8 - Alarm Conditions 49

10.11 Page 9 – Total Harmonic Distortion 53

10.12 Page 10 – Automatic Voltage Regulator (AVR) registers 54

10.13 Page 11 - Diagnostic - General 55

10.14 Page 12 - Diagnostic - Digital Inputs 55

10.15 Page 13 - Diagnostic - Digital Outputs 57

10.16 Page 14 - Diagnostic - LEDs 58

10.17 Page 16 - Control Registers 60

10.18 Page 17 - J1939 active diagnostic trouble codes in decoded format 63

10.19 Page 18 - J1939 active diagnostic trouble codes in raw format 65

10.20 Page 20 - Various Strings 66

10.21 Page 22- Auxiliary sender strings 66

10.22 Page 24 - Identity Strings 66

10.23 Page 26 - State Machine Name Strings 67

10.24 Page 28 - StateMachineState Strings 67

10.25 Pages 32 to 95 - Alarm Strings (Old alarm system) 68

10.26 Pages 32-36 - 2131 Expansion module name strings 74

10.27 Pages 37-40 - 2133 Expansion module name strings 75

10.28 Pages 41-43 - 2152 Expansion module name strings 76

10.29 Pages 44-48 - 2131 Expansion module digital alarm strings 77

10.30 Pages 49-58 - 2131 Expansion module analogue alarm strings 78

10.31 Pages 59-66 - 2133 Expansion module analogue alarm strings 79

10.32 Page 130 – 86xx New MTS Test support 80

10.33 Page 137 - Active synchronisation and load share configuration 81

10.34 Page 142 – ECU Trouble Codes 83

10.35 Page 143-149 – ECU Trouble Code short description string 84

10.36 Page 152 – User calibration of expansion module analogue inputs 85

10.37 Page 153 – Unnamed alarm conditions 86

10.38 Page 154 – Named Alarm Conditions 101

10.39 Page 155 – Previous ECU Trouble Codes 111

10.40 Page 156 – Expansion module enable status 112

10.41 Page 158 – Expansion module communications status 114

10.42 Page 160 – Unnamed Alarm function 115

10.43 Page 161 – Unnamed Alarm function (continued) 125

10.44 Page 162 – Unnamed Alarm functions (continued) 125

10.45 Page 163 – Unnamed Alarm functions (continued) 126

10.46 Pages 166-169 - User configurable pages 126

10.47 Page 170 – Unnamed input status 127

10.48 Page 171 – Unnamed input status continued 138

10.49 Page 180 – Unnamed output sources & polarities 147

10.50 Page 181 – Unnamed output sources & polarities continued 156

10.51 Page 182 – Virtual output sources & polarities 157

10.52 Page 183 – Configurable output sources & polarities 158

10.53 Page 184 – Analogue output sources, types and values 159

10.54 Page 185 – PWM Analogue output sources, types and values 160

10.55 Page 190 – Unnamed output status 161

10.56 Page 191 – Virtual output status 167

10.57 Page 192 – PLC Maths Registers 168

10.58 Page 193 – Remote control sources 170

10.59 Page 200-239 – Unnamed alarm strings 171

10.60 Page 240-246 – Analogue Input Name Strings 184

10.61 Page 250 – Misc strings 187

# 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.

Version 2.1

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 (193and 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

In page 154: Expansion unit watchdog alarm added to 335 register table

In page 160,170: Clarification of expansion digital/analogue inputs

In page 180: Digital outputs and LED colours added for 335; Corrections to 334/335register order

In page 190:Common family register table (as detailed in notes) re-labelled

In pages 225-231: 335 PLC function strings moved

Version 2.9

In pages 153, 160, 170, 222-239, 240-246: Corrections to 7xxx tables.

In page 152: Numbers of expansion modules for 335 amended

In page 153: Register matrix added for 3xx family

In page 154: 330,331,333 module documented and unimplemented/reserved registers corrected for 3xx

In page 156: Register matrix added to identify expansion module support for 8xxx/73xx/335

In page 158: Register matrix added to identify expansion module support for 8xxx/73xx/335

In page 160: Register matrix added to identify expansion module support for 3xx

In page 170: Numbers of expansion modules for 335 amended and Register matrix added to identify expansion module support for 3xx

In page 171: Register matrix added to identify expansion module and PLC support for 3xx

In page 180: 330,331 and 333 modules documented; Register matrix added to identify allocation for 3xx family; Matrix added to common family register table to identify implemented registers for each family/module; LED colour table amended

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 showdetails of registersand 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.

In Page 170: Correction to 8xxx 2131 expansion modules 1-3 description; Correction to numbers of digital inputs available for use on 3xx;

In Page 171:Correction to 8xxx table for 2133 Expansion modules 2 and 3 registers start addresses; Registers reserved for 2130 expansion modules 4-9 added to 3xx table.

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

Version 2.15

In Page 4: Registers 195 and 196 added.

In Page 6: Average, difference, min and max values added and notes extended.

Version 2.16

Support for 7450 DC Generator Controller added:

In Page 4: Register 5 renamed for clarity (to distinguish between 2 batteries); Registers 197 to 213 added.

In page 6: New table for 7450 added; 8xxx/74xx table title changed to indicate 8xxx/7410/7420 register allocation

In page 7: Existing maintenance registers renamed to indicate engine maintenance; Registers added for 7450 plant battery maintenance/accumulated data

In page 153: Registers 51 and 52 renamed to indicate engine maintenance alarms; register 100 added for 7450 Plant battery maintenance alarms to 8xxx/74xx table

In page 154: Added registers 26 to 28 for 7450 to 8xxx/74xx table

In page 160: Added registers 225 to 227 for 7450 to 8xxx/74xx table

In page 171: 8xxx/74xx registers 148 to 153 are marked as unimplemented

In page 225: Renamed registers in 8xxx/74xx table to indicate Engine Maintenance strings

In page 228: Added registers 32 to 127 for 7450 to 8xxx/74xx table

Version 2.17

In page 6: All Var registers now signed to reflect what has always been the case in practice.

Version 2.19

In page 6: Registers 142-145 are unsigned.

Version 2.20

In page 4: 32 bit values aligned to an even address (register 204 to 213).

In page 6: 7450 table – registers are signed.

Version 2.21

In page 16: Added system control keys for plant battery maintenance alarms.

In page 4: register 200 renamed for clarity.

In page154: register 27 fields renamed for clarity.

In page 160: Page title renamed and preliminary page comments amended for clarity.

Version 2.22

In page 4: Added register for Plant Battery Temperature. DC current registers now all 32 bit signed (load, battery, total); added 2 registers for DC shunt currents

In page 6: Appended 7450 table to re-titled 86xx/74xx table. Added DC Power percentage (to 0.01%)

In page 7: Added new registers for plant battery maintenance cycles and capacity

In page 154: Added new alarms for the 73xx Var

In page 153: Note added to indicate number of unnamed alarms required in 86xx, 7410, 7420 and 7450

In pages 200-239; Moved Plant Battery Maintenance strings into page 232, and added note to indicate there are 17 pages used/reserved for PLC function strings.

Version 2.23

In page 154: 86xx/74xx register 25 now contains DC Total Watts Overload (moved from register 28)

Version 2.24

In page 153: Added notes to indicate that page 153 is used in conjunction with pages 160 to 165

In page 160: Added notes to indicate that this page is used in conjunction with page 153 registers 1 to 64

Added page 161: to be used in conjunction with page 153 registers 65 to 128. Plant Battery Maintenance alarm functions moved into registers 140 to 142 from page 160.

Version 2.25

In page 6: Removed unused registers 212-215 (Depth of Discharge, Full Charge)

In page 6: Add registers 212,213 as 32 bit ‘Time to empty’ (time in seconds until the engine runs out of fuel): 87xx v5.3

In page 154: Edit register 28 to include named alarms for high fuel level & low kW load (wet stacking): 87xx v5.3

Version 2.26

In page 4: Zero, positive and negative sequence voltages added.

In page 6: Mains voltage rolling averages added.

Version 2.27

In page 5: Auto DPF Regeneration Inhibit status added.

In page 16: Control keys for Inhibiting auto regeneration and starting manual regeneration.

Version 2.28

In page 180: P100 table added.

In page 190: P100 output table added.

Version 2.29

In page 5: Added register 185 as DPTC Active Regen Inhibit switch

Version 2.30

In page 3: Add register for charging states

In page 4: added new DC Battery cycle state value and table

In page 7: Added register for 7450 Battery Charge state percentage

Added register allocation matrix for E800

In page 153: Added register allocation matrix for E800

In page 154: Added register allocation matrix for E800

In page 160: Added register allocation matrix for E800

In page 161: Added register allocation matrix for E800

In page 170: Added register allocation matrix for E800

In page 180: Added register allocation matrix for E800

In page 181: Added register allocation matrix for E800

In page 190 Added register allocation matrix for E800

In page 200-239: Added register allocation matrix for E800

In pages 240-246: Added register allocation matrix for E800

Version 2.31

In page 3: Added new control mode for E800 ’Off Mode’

In page 16: Added system control function code to stop E800 engine, for speed control of E800 Engine

and to select E800 Off mode

In page 154: P100 alarms defined. Corrections to E800 register allocation.

In page 160: P100 defined.

In page 170: P100 defined.

In page 190: Added E800 MUTE/LAMP TEST LED status register.

In page 200: P100 defined.

Version 2.32

In page 170-171: Added register allocation for 6010, 6020

Version 2.33

In page 6: Added register Mains voltage asymmetry

Version 2.34

Added PLC maths registers to Page 192

Added Heater fitted to Page 3

Version 2.35

In page 153: Noted that the P100 has no unnamed alarms.

In page 154: Auxiliary mains failure added.

In page 160: Note about P100 not having unnamed inputs added

In page 170: Note about P100 not having unnamed inputs added

Version 2.36

In page 154: Register numbering typo corrected for P100.

Version 2.37

In page 16: Changes to 87xx display register commands to stop them conflicting with the Synclock command numbers.

Version 2.38

In page 153: Amended E800 unnamed alarms.

In page 154: Added E800 LCD Heater fault ids.

In pages 160-163 Amended E800 unnamed alarm function tables

In pages 170-171: Amended E800 unnamed input status tables and clarified E800 sender category ranges

In pages 180: Amended E800 unnamed output source and polarities table

Added page 185: E800 PWM analogue outputs including configuration data (control type, output type, frequency and source)

In page 190: Amended E800 Unnamed output status table

Version 2.38

In page 16: Battery Charger Lamp Test fn.

In page 154: New Battery Charger Alarm ID’s

Version 2.39

Page 16: Updated for battery chargers

Page 154: Updated for battery chargers

Version 2.40

Page 185: Amended E800 table to re-order the blocks of values such that the Analogue output source and type are in contiguous registers with the source on an even boundary.

Version 2.41

Page 185: Amended E800 table to return duty cycle values in registers 32-35 and to add scaling factors

Page 3: Amended register 6 to add controlled shutdown (used in Exxx) in same bit position as electrical trip

Page 154: Amended alarm condition code table to indicate condition 4 is also used for controlled shutdown (Exxx)

Version 2.43

Page 3: Added register 33 for 8661 to indicate whether the module is operating as a bus controller or a mains controller

Version 2.44

Page 153: Amended E800 registers 45 to 50 to match page 227

Version 2.45

Pages 201,202,203: E800 tables corrected to match page 153

Version 2.46

Page 16: Changes for E800: Function codes 0, 76, 77 and78 amended

Version 2.47

Page 155: Description of new page on the 73xx.

Version 2.48

Page 5: Separated 94xx Battery charger registers from main modules.

Version 2.49

Page 137: added generator nominal

Version 2.50

Page 16: Added several control keys to Page 16, for the battery charger auxiliary output.

Version 2.51

Include reference o page 130 for new end of line MTS tests for 86xx modules (v6+) – register descriptions etc. are included in other GENCOMM documentation & are not for public use.

Version 2.52

Page 3: Added some items for the battery charger auxiliary output.

Page 4: Added battery charger auxiliary voltage and current, this page is now full.

Page 5: Added auxiliary output current limit value.

Page 154: Added some new alarms

Version 2.53

Page 171: Added 60xx MkII flexible sender categories and values.

Version 2.54

Page 192: Added PLC elements

Version 2.55

Page 10 added to support AVRs.

Version 2.56

Page 6, Page 153, Page 154, Page 160, Page 170, Page 171, Page 180, Pages 200-239: Added 61xxMk II register tables

Version 2.57

In section 3, note 8 changed.

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# 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>

# 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, the 73xx family is an exception to this rule as they always uses 1 stop bit.
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.

# 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.

# 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.

# 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. |

# 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. |

# Description of Each Function

## 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 |

## 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 |  |

# 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 |
|  | PeoplesRepublic |  | 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 |

# 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.

## 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 |  |

## 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. |

## 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 |

## 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 |

## 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/controlled shutdown 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 / controlled shutdown 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 | Battery Charger Mode | 0 | 12 | 1 |  | 16 |
| 28 | Battery Charger De-Rating Mode | 0 | 2 | 1 |  | 16 |
| 29 | Battery Charger Active Cell Count | 0 | 24 | 1 | Cells | 16 |
| 30 | Battery Chemistry ID | 0 | 100 | 1 |  | 16 |
| 31 | Charging Stages | 0 | 4 | 1 |  | 16 |
| 32 | Heater fitted | No | Yes |  |  |  |
| 33 | Controller mode (8661) | 0 (Bus) | 1 (mains) |  |  | 16 |
| 34 | Battery Charger Mode (Auxiliary) | 0 | 12 | 1 |  | 16 |
| 35 | Active Cell Count (Auxiliary) | 0 | 24 |  | Cells | 16 |
| 36 | Battery Chemistry ID (Auxiliary) | 0 | 100 |  |  | 16 |
| 37 | Charging Stages (Auxiliary) | 0 | 4 |  |  | 16 |
| 38-255 | 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 | Off Mode |
| 8-65534 | 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 |

**Battery Charger Specific Registers**

|  |  |  |  |
| --- | --- | --- | --- |
| Number | Battery Charger Mode Description | De-Rating Mode Description | Battery Chemistry ID |
| 0 | Start Up |  |  |
| 1 | Initialisation | Standard De-Rating |  |
| 2 | Boost/Bulk Charge | Low Mains Voltage De-Rating | Wet (Vented) Lead Acid |
| 3 | Absorption/Boost Run On Charge |  | Calcium |
| 4 | Float/Trickle Charge |  | Lead Acid Antimony |
| 5 | Storage Charge |  | VRLA (AGM) |
| 6 | Battery Test Mode |  | VRLA (GEL) |
| 7 | DC Alarm |  | NiCd 10/20 Cell |
| 8 | Mains Alarm |  | NiCd 9/18 Cell |
| 9 | Temperature Alarm |  |  |
| 10 | Lamp Test |  |  |
| 11 | Charging Stopped |  |  |
|  |  |  |  |
| 255 |  |  | Custom Profile |

## 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 | Engine 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 | Governor output | -100.0 | +100.0 | 0.1 | % | 16S |
| 196 | AVR output | -100.0 | +100.0 | 0.1 | % | 16S |
| 197 | DC Plant Battery Charge State | 0.0 | 100.0 | 0.1 | % | 16 |
| 198 | DC Plant Battery Discharge State | 0.0 | 100.0 | 0.1 | % | 16 |
| 199 | DC Voltage | 0.0 | 75.0 | 0.1 | V | 16 |
| 200-201 | DC Shunt 1 Current | - 1,250,000.0 | + 1,250,000.0 | 0.1 | A | 32S |
| 202-203 | DC Shunt 2 Current | - 1,250,000.0 | + 1,250,000.0 | 0.1 | A | 32S |
| 204-205 | DC Load Current | - 2,500,000.0 | + 2,500,000.0 | 0.1 | A | 32S |
| 206-207 | DC Plant Battery Current | - 2,500,000.0 | + 2,500,000.0 | 0.1 | A | 32S |
| 208-209 | DC Total Current | - 2,500,000.0 | + 2,500,000.0 | 0.1 | A | 32S |
| 210-211 | DC Plant Battery Cycles | 0 | 99999 |  |  | 32 |
| 212-213 | DC Charger Watts | -99,999,999 | 99,999,999 | 1 | W | 32 S |
| 214-215 | DC Plant Battery Watts | -99,999,999 | 99,999,999 | 1 | W | 32 S |
| 216-217 | DC Load Watts | -99,999,999 | 99,999,999 | 1 | W | 32 S |
| 218-219 | DC Total Watts | -99,999,999 | 99,999,999 | 1 | W | 32 S |
| 220 | DC Charge Mode | 0 | 2 |  |  | 16 |
| 221 | DC Plant Battery temperature | -50 | 200 | 1 | Degrees C | 16 S |
| 222 | DC Battery Cycle State | 0 | 2 |  |  | 16 |
| 223 | Mains zero sequence voltage angle | -360.0 | +360.0 | 0.1 | Degrees | 16S |
| 224 | Mains positive sequence voltage angle | -360.0 | +360.0 | 0.1 | Degrees | 16S |
| 225 | Mains negative sequence voltage angle | -360.0 | +360.0 | 0.1 | Degrees | 16S |
| 226-227 | Mains zero sequence voltage magnitude | 0 | 30,000 | 0.1 | V | 32 |
| 228-229 | Mains positive sequence voltage magnitude | 0 | 30,000 | 0.1 | V | 32 |
| 230-231 | Mains negative sequence voltage magnitude | 0 | 30,000 | 0.1 | V | 32 |
| 232-233 | Battery Charger Output Current | 0 | 50,000 | 1 | mA | 32S |
| 234-235 | Battery Charger Output Voltage | 0 | 100,000 | 1 | mV | 32S |
| 236-237 | Battery Open Circuit Voltage | 0 | 100,000 | 1 | mV | 32S |
| 238-239 | Load L1-N voltage (8661) | 0 | 18,000 | 0.1 | V | 32 |
| 240-241 | Load L2-N voltage (8661) | 0 | 18,000 | 0.1 | V | 32 |
| 242-243 | Load L3-N voltage (8661) | 0 | 18,000 | 0.1 | V | 32 |
| 244-245 | Load L1-L2 voltage (8661) | 0 | 30,000 | 0.1 | V | 32 |
| 246-247 | Load L2-L3 voltage (8661) | 0 | 30,000 | 0.1 | V | 32 |
| 248-249 | Load L3-L1 voltage (8661) | 0 | 30,000 | 0.1 | V | 32 |
| 250 | Load frequency | 0 | 70 | 0.1 | Hz | 16 |
| 251 | Load phase rotation | 0 | 3 |  |  | 16 |
| 252-253 | Battery Charger Auxiliary Voltage | 0 | 100,000 | 1 | mV | 32S |
| 254-255 | Battery Charger Auxiliary Current | 0 | 50,000 | 1 | mV | 32S |

**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 |

**DC Charge Mode**

|  |  |
| --- | --- |
| Code | Meaning |
| 0 | Discharging |
| 1 | Charging |
| 2 | Floating |
| 4-65534 | Reserved |
| 65535 | Unimplemented |

**DC Battery Cycle State**

|  |  |
| --- | --- |
| Code | Meaning |
| 0 | Unknown |
| 1 | Full Discharged Reached |
| 2 | Full Charge Reached |
| 3-65534 | Reserved |
| 65535 | Unimplemented |

## 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 | 0.01 | MPa | 16 U |
| 81 | Injector Rail 2 pressure | 0 | 2509 | 0.01 | 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 | Auto DPF Regeneration Inhibit |  |  |  |  | 16U |
| 185 | DPTC Active Regeneration Inhibit Switch (received from engine) SPN 3703 |  |  |  |  | 16U |
| 186 | Soot Load | 0 |  | 1 | % | 16U |
| 187 | Ash Load | 0 |  | 1 | % | 16U |
| 188-189 | Reserved |  |  |  |  |  |
| 190 | LCD Temperature | -100 | 200 | 1 | Degrees C | 16S |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
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|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| 191-255 | Reserved |  |  |  |  |  |

**94xx Battery charger register allocation**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Register offset | Name | Minimum value | Maximum value | Scaling factor | Units | Bits/ Sign |
| 0-185 | Reserved |  |  |  |  |  |
| 186-187 | Battery Charger Current Limit | 0 | 50,000 | 1 | mA | 32S |
| 188 | Battery Charger PCB Temperature | -255 | 255 | 1 | Degrees C | 16S |
| 189 | Battery Charger Calculated Ambient Temperature | -300 | 255 | 1 | Degrees C | 16S |
| 190-191 | Auxiliary Current Limit | 0 | 4000 | 1 | mA | 32S |
| 190-255 | Reserved |  |  |  |  |  |

**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 |

**Auto DPF Regeneration Inhibit**

|  |  |
| --- | --- |
| Type code | Type |
| 0 | Auto regeneration permitted |
| 1 | Auto regeneration inhibited |
| 3-65534 | Reserved |

## 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.
5. Register 114 and similar: 'average' is the arithmetic average of all phases that are relevant to the current AC system.
6. Register 115 and similar: 'difference' is the difference between 'max' and min'.
7. Register 116 and similar: 'min' is the lowest of all phases that are relevant to the current AC system.
8. Register 117 and similar: 'max' is the highest of all phases that are relevant to the current AC system.
9. Registers 138-149: When the set is at full load, unity power factor and all phases are balanced, the average, max and min values will also be 100%, not 33.3% for a 3 phase system.
10. Register 150: This is a duplicate of register 21 to avoid mistakes if the register pattern were broken.
11. Registers 212,213: added as part of 87xx v5.3 development (time to empty in seconds)

**61xx MkII 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 | 32S |
| 10-11 | Generator L1 VAr | -99,999,999 | 99,999,999 | 1 | Var | 32S |
| 12-13 | Generator L2 Var | -99,999,999 | 99,999,999 | 1 | Var | 32S |
| 14-15 | Generator L3 Var | -99,999,999 | 99,999,999 | 1 | Var | 32S |
| 16-17 | Generator total Var | -99,999,999 | 99,999,999 | 1 | Var | 32S |
| 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 | -99,999,999 | 99,999,999 | 1 | Var | 32S |
| 36-37 | Mains L2 Var | -99,999,999 | 99,999,999 | 1 | Var | 32S |
| 38-39 | Mains L3 Var | -99,999,999 | 99,999,999 | 1 | Var | 32S |
| 40-41 | Mains total Var | -999,999,999 | 999,999,999 | 1 | Var | 32S |
| 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 | Unimplemented | -999.9 | +999.9 | 0.1 | % | 16S |
| 47 | Unimplemented | -999.9 | +999.9 | 0.1 | % | 16S |
| 48-49 | Unimplemented | -999,999,999 | 999,999,999 | 1 | W | 32S |
| 50-51 | Unimplemented | 0 | 99,999,999 | 1 | VA | 32 |
| 52-53 | Unimplemented | 0 | 99,999,999 | 1 | VA | 32 |
| 54-55 | Unimplemented | 0 | 99,999,999 | 1 | VA | 32 |
| 56-57 | Unimplemented | 0 | 999,999,999 | 1 | VA | 32 |
| 58-59 | Unimplemented | -99,999,999 | 99,999,999 | 1 | Var | 32S |
| 60-61 | Unimplemented | -99,999,999 | 99,999,999 | 1 | Var | 32S |
| 62-63 | Unimplemented | -99,999,999 | 99,999,999 | 1 | Var | 32S |
| 64-65 | Unimplemented | -999,999,999 | 999,999,999 | 1 | Var | 32S |
| 66 | Unimplemented | -1 | 1 | 0.01 |  | 16S |
| 67 | Unimplemented | -1 | 1 | 0.01 |  | 16S |
| 68 | Unimplemented | -1 | 1 | 0.01 |  | 16S |
| 69 | Unimplemented | -1 | 1 | 0.01 |  | 16S |

**61xx MkII Derived Instrumentation Continued**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 70 | Unimplemented | -999.9 | +999.9 | 0.1 | % | 16S |
| 71 | Unimplemented | -999.9 | +999.9 | 0.1 | % | 16S |
| 72-73 | Unimplemented | -999,999,999 | 999,999,999 | 1 | W | 32S |
| 74-75 | Unimplemented | -999,999,999 | 999,999,999 | 1 | Var | 32S |
| 76 | Unimplemented | 0 | 10.00 | 0.01 | Hz/s | 16 |
| 77 | Unimplemented | 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 | Unimplemented | -1 | 1 | 0.01 |  | 16S |
| 86-87 | Unimplemented | -999,999,999 | 999,999,999 | 1 | W | 32S |
| 88-89 | Unimplemented | 0 | 99,999,999 | 1 | VA | 32 |
| 90-91 | Unimplemented | 0 | 99,999,999 | 1 | VA | 32 |
| 92-93 | Unimplemented | 0 | 99,999,999 | 1 | VA | 32 |
| 94-95 | Unimplemented | 0 | 999,999,999 | 1 | VA | 32 |
| 96-97 | Unimplemented | -99,999,999 | 99,999,999 | 1 | Var | 32S |
| 98-99 | Unimplemented | -99,999,999 | 99,999,999 | 1 | Var | 32S |
| 100-101 | Unimplemented | -99,999,999 | 99,999,999 | 1 | Var | 32S |
| 102-103 | Unimplemented | -999,999,999 | 999,999,999 | 1 | Var | 32S |
| 104 | Unimplemented | -1 | 1 | 0.01 |  | 16S |
| 105 | Unimplemented | -1 | 1 | 0.01 |  | 16S |
| 106 | Unimplemented | -1 | 1 | 0.01 |  | 16S |
| 107 | Unimplemented | -999.9 | +999.9 | 0.1 | % | 16S |
| 108 | Unimplemented | -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 | Reserved | 0 | 0 |  |  | 16 |
| 114-115 | Generator L-N voltage average | 0 | 18,000 | 0.1 | V | 32 |
| 116-117 | Generator L-N voltage difference | 0 | 18,000 | 0.1 | V | 32 |
| 118-119 | Generator L-N voltage min | 0 | 18,000 | 0.1 | V | 32 |
| 120-121 | Generator L-N voltage max | 0 | 18,000 | 0.1 | V | 32 |
| 122-123 | Generator L-L voltage average | 0 | 30,000 | 0.1 | V | 32 |
| 124-125 | Generator L-L voltage difference | 0 | 30,000 | 0.1 | V | 32 |
| 126-127 | Generator L-L voltage min | 0 | 30,000 | 0.1 | V | 32 |
| 128-129 | Generator L-L voltage max | 0 | 30,000 | 0.1 | V | 32 |
| 130-131 | Generator current average | 0 | 99,999.9 | 0.1 | A | 32 |
| 132-133 | Generator current difference | 0 | 99,999.9 | 0.1 | A | 32 |
| 134-135 | Generator current min | 0 | 99,999.9 | 0.1 | A | 32 |
| 136-137 | Generator current max | 0 | 99,999.9 | 0.1 | A | 32 |
| 138 | Generator watts average | -999.9 | 999.9 | 0.1 | % | 16S |
| 139 | Generator watts difference | -999.9 | 999.9 | 0.1 | % | 16S |
| 140 | Generator watts min | -999.9 | 999.9 | 0.1 | % | 16S |
| 141 | Generator watts max | -999.9 | 999.9 | 0.1 | % | 16S |
| 142 | Generator VA average | 0 | 999.9 | 0.1 | % | 16 |
| 143 | Generator VA difference | 0 | 999.9 | 0.1 | % | 16 |
| 144 | Generator VA min | 0 | 999.9 | 0.1 | % | 16 |
| 145 | Generator VA max | 0 | 999.9 | 0.1 | % | 16 |
| 146 | Generator Var average | -999.9 | 999.9 | 0.1 | % | 16S |
| 147 | Generator Var difference | -999.9 | 999.9 | 0.1 | % | 16S |
| 148 | Generator Var min | -999.9 | 999.9 | 0.1 | % | 16S |
| 149 | Generator Var max | -999.9 | 999.9 | 0.1 | % | 16S |

**61xx MkII Derived Instrumentation Continued**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 150 | Generator power factor average | -1 | 1 | 0.01 |  | 16S |
| 151 | Generator power factor difference | -1 | 1 | 0.01 |  | 16S |
| 152 | Generator power factor min | -1 | 1 | 0.01 |  | 16S |
| 153 | Generator power factor max | -1 | 1 | 0.01 |  | 16S |
| 154-155 | Mains L-N voltage average | 0 | 18,000 | 0.1 | V | 32 |
| 156-157 | Mains L-N voltage difference | 0 | 18,000 | 0.1 | V | 32 |
| 158-159 | Mains L-N voltage min | 0 | 18,000 | 0.1 | V | 32 |
| 160-161 | Mains L-N voltage max | 0 | 18,000 | 0.1 | V | 32 |
| 162-163 | Mains L-L voltage average | 0 | 30,000 | 0.1 | V | 32 |
| 164-165 | Mains L-L voltage difference | 0 | 30,000 | 0.1 | V | 32 |
| 166-167 | Mains L-L voltage min | 0 | 30,000 | 0.1 | V | 32 |
| 168-169 | Mains L-L voltage max | 0 | 30,000 | 0.1 | V | 32 |
| 170-171 | Mains current average | 0 | 99,999.9 | 0.1 | A | 32 |
| 172-255 | Reserved |  |  |  |  |  |

**8xxx/74xx/P100 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 | 32S |
| 10-11 | Generator L1 VAr | -99,999,999 | 99,999,999 | 1 | Var | 32S |
| 12-13 | Generator L2 Var | -99,999,999 | 99,999,999 | 1 | Var | 32S |
| 14-15 | Generator L3 Var | -99,999,999 | 99,999,999 | 1 | Var | 32S |
| 16-17 | Generator total Var | -99,999,999 | 99,999,999 | 1 | Var | 32S |
| 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 | -99,999,999 | 99,999,999 | 1 | Var | 32S |
| 36-37 | Mains L2 Var | -99,999,999 | 99,999,999 | 1 | Var | 32S |
| 38-39 | Mains L3 Var | -99,999,999 | 99,999,999 | 1 | Var | 32S |
| 40-41 | Mains total Var | -999,999,999 | 999,999,999 | 1 | Var | 32S |
| 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 | -99,999,999 | 99,999,999 | 1 | Var | 32S |
| 60-61 | Bus L2 Var | -99,999,999 | 99,999,999 | 1 | Var | 32S |
| 62-63 | Bus L3 Var | -99,999,999 | 99,999,999 | 1 | Var | 32S |
| 64-65 | Bus total Var | -999,999,999 | 999,999,999 | 1 | Var | 32S |
| 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 |

**8xxx/74xxDerived Instrumentation Continued**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 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 | -999,999,999 | 999,999,999 | 1 | Var | 32S |
| 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 | -99,999,999 | 99,999,999 | 1 | Var | 32S |
| 98-99 | Bus 2 L2 Var | -99,999,999 | 99,999,999 | 1 | Var | 32S |
| 100-101 | Bus 2 L3 Var | -99,999,999 | 99,999,999 | 1 | Var | 32S |
| 102-103 | Bus 2 total Var | -999,999,999 | 999,999,999 | 1 | Var | 32S |
| 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 | Reserved | 0 | 0 |  |  | 16 |
| 114-115 | Generator L-N voltage average | 0 | 18,000 | 0.1 | V | 32 |
| 116-117 | Generator L-N voltage difference | 0 | 18,000 | 0.1 | V | 32 |
| 118-119 | Generator L-N voltage min | 0 | 18,000 | 0.1 | V | 32 |
| 120-121 | Generator L-N voltage max | 0 | 18,000 | 0.1 | V | 32 |
| 122-123 | Generator L-L voltage average | 0 | 30,000 | 0.1 | V | 32 |
| 124-125 | Generator L-L voltage difference | 0 | 30,000 | 0.1 | V | 32 |
| 126-127 | Generator L-L voltage min | 0 | 30,000 | 0.1 | V | 32 |
| 128-129 | Generator L-L voltage max | 0 | 30,000 | 0.1 | V | 32 |
| 130-131 | Generator current average | 0 | 99,999.9 | 0.1 | A | 32 |
| 132-133 | Generator current difference | 0 | 99,999.9 | 0.1 | A | 32 |
| 134-135 | Generator current min | 0 | 99,999.9 | 0.1 | A | 32 |
| 136-137 | Generator current max | 0 | 99,999.9 | 0.1 | A | 32 |
| 138 | Generator watts average | -999.9 | 999.9 | 0.1 | % | 16S |
| 139 | Generator watts difference | -999.9 | 999.9 | 0.1 | % | 16S |
| 140 | Generator watts min | -999.9 | 999.9 | 0.1 | % | 16S |
| 141 | Generator watts max | -999.9 | 999.9 | 0.1 | % | 16S |
| 142 | Generator VA average | 0 | 999.9 | 0.1 | % | 16 |
| 143 | Generator VA difference | 0 | 999.9 | 0.1 | % | 16 |
| 144 | Generator VA min | 0 | 999.9 | 0.1 | % | 16 |
| 145 | Generator VA max | 0 | 999.9 | 0.1 | % | 16 |
| 146 | Generator Var average | -999.9 | 999.9 | 0.1 | % | 16S |
| 147 | Generator Var difference | -999.9 | 999.9 | 0.1 | % | 16S |
| 148 | Generator Var min | -999.9 | 999.9 | 0.1 | % | 16S |
| 149 | Generator Var max | -999.9 | 999.9 | 0.1 | % | 16S |

**8xxx/74xxDerived Instrumentation Continued**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 150 | Generator power factor average | -1 | 1 | 0.01 |  | 16S |
| 151 | Generator power factor difference | -1 | 1 | 0.01 |  | 16S |
| 152 | Generator power factor min | -1 | 1 | 0.01 |  | 16S |
| 153 | Generator power factor max | -1 | 1 | 0.01 |  | 16S |
| 154-155 | Mains L-N voltage average | 0 | 18,000 | 0.1 | V | 32 |
| 156-157 | Mains L-N voltage difference | 0 | 18,000 | 0.1 | V | 32 |
| 158-159 | Mains L-N voltage min | 0 | 18,000 | 0.1 | V | 32 |
| 160-161 | Mains L-N voltage max | 0 | 18,000 | 0.1 | V | 32 |
| 162-163 | Mains L-L voltage average | 0 | 30,000 | 0.1 | V | 32 |
| 164-165 | Mains L-L voltage difference | 0 | 30,000 | 0.1 | V | 32 |
| 166-167 | Mains L-L voltage min | 0 | 30,000 | 0.1 | V | 32 |
| 168-169 | Mains L-L voltage max | 0 | 30,000 | 0.1 | V | 32 |
| 170-171 | Bus L-N voltage average | 0 | 18,000 | 0.1 | V | 32 |
| 172-173 | Bus L-N voltage difference | 0 | 18,000 | 0.1 | V | 32 |
| 174-175 | Bus L-N voltage min | 0 | 18,000 | 0.1 | V | 32 |
| 176-177 | Bus L-N voltage max | 0 | 18,000 | 0.1 | V | 32 |
| 178-179 | Bus L-L voltage average | 0 | 30,000 | 0.1 | V | 32 |
| 180-181 | Bus L-L voltage difference | 0 | 30,000 | 0.1 | V | 32 |
| 182-183 | Bus L-L voltage min | 0 | 30,000 | 0.1 | V | 32 |
| 184-185 | Bus L-L voltage max | 0 | 30,000 | 0.1 | V | 32 |
| 186-187 | Bus 2 L-N voltage average | 0 | 18,000 | 0.1 | V | 32 |
| 188-189 | Bus 2 L-N voltage difference | 0 | 18,000 | 0.1 | V | 32 |
| 190-191 | Bus 2 L-N voltage min | 0 | 18,000 | 0.1 | V | 32 |
| 192-193 | Bus 2 L-N voltage max | 0 | 18,000 | 0.1 | V | 32 |
| 194-195 | Bus 2 L-L voltage average | 0 | 30,000 | 0.1 | V | 32 |
| 196-197 | Bus 2 L-L voltage difference | 0 | 30,000 | 0.1 | V | 32 |
| 198-199 | Bus 2 L-L voltage min | 0 | 30,000 | 0.1 | V | 32 |
| 200-201 | Bus 2 L-L voltage max | 0 | 30,000 | 0.1 | V | 32 |
| 202-203 | DC Charger Watts | -99,999,999 | 99,999,999 | 1 | W | 32 S |
| 204-205 | DC Load Watts | -99,999,999 | 99,999,999 | 1 | W | 32 S |
| 206-207 | DC Battery Watts | -99,999,999 | 99,999,999 | 1 | W | 32 S |
| 208-209 | DC Total Watts | -99,999,999 | 99,999,999 | 1 | W | 32 S |
| 210-211 | DC percentage of full power | -999.99 | +999.90 | 0.01 | % | 32S |
| 212-213 | Time To Empty (87xx v5.3) | -2.14 x109 | 2.14 x109 | 1 | Seconds | 32S |
| 214-215 | Mains L1-N voltage 10s rolling average | 0 | 18,000 | 0.1 | V | 32 |
| 216-217 | Mains L2-N voltage 10s rolling average | 0 | 18,000 | 0.1 | V | 32 |
| 218-219 | Mains L3-N voltage 10s rolling average | 0 | 18,000 | 0.1 | V | 32 |
| 220-221 | Mains L1-L2 voltage 10s rolling average | 0 | 30,000 | 0.1 | V | 32 |
| 222-223 | Mains L2-L3 voltage 10s rolling average | 0 | 30,000 | 0.1 | V | 32 |
| 224-225 | Mains L3-L1 voltage 10s rolling average | 0 | 30,000 | 0.1 | V | 32 |
| 226-227 | Mains voltage asymmetry | 0 | 30000 | 0.1 | V | 32 |
| 228-255 | 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 |  |  |  |  |  |

## 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 x109 | 1 | Seconds | 32 |
| 2-3 | Time to next engine maintenance | -2.14 x109 | 2.14 x109 | 1 | Seconds | 32S |
| 4-5 | Time of next engine maintenance since 1/1/70 | 0 | 4.29 x109 | 1 | Seconds | 32 |
| 6-7 | Engine run time | 0 | 4.29 x109 | 1 | Seconds | 32 |
| 8-9 | Generator positive KW hours | 0 | 4.29 x109 | 0.1 | KW hour | 32 |
| 10-11 | Generator negative KW hours | 0 | 4.29 x109 | 0.1 | KW hour | 32 |
| 12-13 | Generator KVA hours | 0 | 4.29 x109 | 0.1 | KVA hour | 32 |
| 14-15 | Generator KVAr hours | 0 | 4.29 x109 | 0.1 | KVAr hour | 32 |
| 16-17 | Number of starts | 0 | 99999 |  |  | 32 |
| 18-19 | Mains positive KW hours | 0 | 4.29 x109 | 0.1 | KW hour | 32 |
| 20-21 | Mains negative KW hours | 0 | 4.29 x109 | 0.1 | KW hour | 32 |
| 22-23 | Mains KVA hours | 0 | 4.29 x109 | 0.1 | KVA hour | 32 |
| 24-25 | Mains KVAr hours | 0 | 4.29 x109 | 0.1 | KVAr hour | 32 |
| 26-27 | Bus positive KW hours | 0 | 4.29 x109 | 0.1 | KW hour | 32 |
| 28-29 | Bus negative KW hours | 0 | 4.29 x109 | 0.1 | KW hour | 32 |
| 30-31 | Bus KVA hours | 0 | 4.29 x109 | 0.1 | KVA hour | 32 |
| 32-33 | Bus KVAr hours | 0 | 4.29 x109 | 0.1 | KVAr hour | 32 |
| 34-35 | Fuel used | 0 | 4.29 x109 | 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 engine maintenance alarm 1 | -2.14 x109 | 2.14 x109 | 1 | Seconds | 32S |
| 46-47 | Time of next engine maintenance alarm 1 since 1/1/70 | 0 | 4.29 x109 | 1 | Seconds | 32 |
| 48-49 | Time to next engine maintenance alarm 2 | -2.14 x109 | 2.14 x109 | 1 | Seconds | 32S |
| 50-51 | Time of next engine maintenance alarm 2 since 1/1/70 | 0 | 4.29 x109 | 1 | Seconds | 32 |
| 52-53 | Time to next engine maintenance alarm 3 | -2.14 x109 | 2.14 x109 | 1 | Seconds | 32S |
| 54-55 | Time of next engine maintenance alarm 3 since 1/1/70 | 0 | 4.29 x109 | 1 | Seconds | 32 |
| 56-57 | Time to next plant battery maintenance | -2.14 x109 | 2.14 x109 | 1 | Seconds | 32S |
| 58-59 | Time of next plant battery maintenance since 1/1/70 | 0 | 4.29 x109 | 1 | Seconds | 32 |
| 60-61 | Cycles to next plant battery maintenance | 0 | 4.29 x109 | 1 | Numeric | 32 |
| 62-63 | Capacity remaining to next plant battery maintenance | 0 | 4.29 x109 | 1 | Percentage | 32 |
| 64-65 | Time to next plant battery maintenance alarm 1 | -2.14 x109 | 2.14 x109 | 1 | Seconds | 32S |
| 66-67 | Time of next plant battery maintenance alarm 1 since 1/1/70 | 0 | 4.29 x109 | 1 | Seconds | 32 |
| 68-69 | Cycles to next plant battery maintenance alarm 1 | 0 | 4.29 x109 | 1 | Numeric | 32 |
| 70-71 | Capacity remaining to next plant battery maintenance alarm 1 | 0 | 4.29 x109 | 1 | Percentage | 32 |
| 72-73 | Time to next plant battery maintenance alarm 2 | -2.14 x109 | 2.14 x109 | 1 | Seconds | 32S |
| 74-75 | Time of next plant battery maintenance alarm 2 since 1/1/70 | 0 | 4.29 x109 | 1 | Seconds | 32 |
| 76-77 | Cycles to next plant battery maintenance alarm 2 | 0 | 4.29 x109 | 1 | Numeric | 32 |
| 78-79 | Capacity remaining to next plant battery maintenance alarm 2 | 0 | 4.29 x109 | 1 | Percentage | 32 |
| 80-81 | Time to next plant battery maintenance alarm 3 | -2.14 x109 | 2.14 x109 | 1 | Seconds | 32S |
| 82-83 | Time of next plant battery maintenance alarm 3 since 1/1/70 | 0 | 4.29 x109 | 1 | Seconds | 32 |
| 84-85 | Cycles to next plant battery maintenance alarm 3 | 0 | 4.29 x109 | 1 | Numeric | 32 |
| 86-87 | Capacity remaining to next plant battery maintenance alarm 3 | 0 | 4.29 x109 | 1 | Percentage | 32 |
| 88-89 | Plant Battery Run Time | 0 | 4.29 x109 | 1 | Seconds | 32 |
| 90-91 | Plant Battery Cycles | 0 | 99999 |  |  | 32 |
| 92-93 | Plant Battery Charge State | 0 | 100.0 | 0.1 | % | 16 |
| 92-255 | 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 x109 | 1 | Seconds | 32 |
| 2-7 | Unimplemented (Reserved for future use) |  |  |  |  | 32 |
| 8-9 | S2 positive KW hours | 0 | 4.29 x109 | 0.1 | KW hour | 32 |
| 10-11 | Unimplemented (Reserved for future use) |  |  |  |  | 32 |
| 12-13 | S2 KVA hours | 0 | 4.29 x109 | 0.1 | KVA hour | 32 |
| 14-15 | S2 KVAr hours | 0 | 4.29 x109 | 0.1 | KVAr hour | 32 |
| 16-17 | Unimplemented (Reserved for future use) |  |  |  |  | 23 |
| 18-19 | S1 positive KW hours | 0 | 4.29 x109 | 0.1 | KW hour | 32 |
| 20-21 | Unimplemented (Reserved for future use) |  |  |  |  | 23 |
| 22-23 | S1 KVA hours | 0 | 4.29 x109 | 0.1 | KVA hour | 32 |
| 24-25 | S1 KVAr hours | 0 | 4.29 x109 | 0.1 | KVAr hour | 32 |
| 26-55 | Unimplemented (Reserved for future use) |  |  |  |  | 32 |
| 56-255 | Reserved |  |  |  |  |  |

**E800 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 x109 | 1 | Seconds | 32 |
| 2-3 | Time to next engine maintenance | -2.14 x109 | 2.14 x109 | 1 | Seconds | 32S |
| 4-5 | Time of next engine maintenance since 1/1/70 | 0 | 4.29 x109 | 1 | Seconds | 32 |
| 6-7 | Engine run time | 0 | 4.29 x109 | 1 | Seconds | 32 |
| 8-9 | Number of starts | 0 | 99999 |  |  | 32 |
| 10-11 | Fuel used | 0 | 4.29 x109 | 1 | Litre | 32 |
| 12-13 | Time to next engine maintenance alarm 1 | -2.14 x109 | 2.14 x109 | 1 | Seconds | 32S |
| 14-15 | Time of next engine maintenance alarm 1 since 1/1/70 | 0 | 4.29 x109 | 1 | Seconds | 32 |
| 16-17 | Time to next engine maintenance alarm 2 | -2.14 x109 | 2.14 x109 | 1 | Seconds | 32S |
| 18-19 | Time of next engine maintenance alarm 2 since 1/1/70 | 0 | 4.29 x109 | 1 | Seconds | 32 |
| 20-21 | Time to next engine maintenance alarm 3 | -2.14 x109 | 2.14 x109 | 1 | Seconds | 32S |
| 22-23 | Time of next engine maintenance alarm 3 since 1/1/70 | 0 | 4.29 x109 | 1 | Seconds | 32 |
| 24-255 | Reserved |  |  |  |  |  |

## 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.

## 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 |  |  |  |  |  |

## Page 10 – Automatic Voltage Regulator (AVR) registers

**Notes:**

1. These are read only registers.
2. Only supported on an AVR or when a controller is connected to an AVR via a comms port, there are currently no controllers capable of this.
3. The first generation 106 AVR has only a single feedback voltage sensing input which could be connected in many different configurations. We do not yet know how or even if three phase sensing will be implemented in future so no provision has been made, additional registers will need to be added for this.

**Registers**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Register offset | Name | Minimum value | Maximum value | Scaling factor | Units | Bits/ Sign |
| 0 | AVR Software major version | 0 | 99 | 1 |  | 16 |
| 1 | AVR Software minor version | 0 | 99 | 1 |  | 16 |
| 2 | AVR Software build | 0 | 99 | 1 |  | 16 |
| 3 | AVR boot-loader major version | 0 | 99 | 1 |  | 16 |
| 4 | AVR boot-loader minor version | 0 | 99 | 1 |  | 16 |
| 5 | AVR boot-loader build | 0 | 99 | 1 |  | 16 |
| 6 | AVR status (see below) | 0 | 99 | 1 |  | 16 |
| 7 | Reserved flags | 0 | 0 |  |  | 6-16-16/16 |
|  | LED lit | 0 | 1 |  |  | 5/16 |
| Frequency switch | 0 | 1 |  |  | 4/16 |
| Voltage switch | 0 | 1 |  |  | 3/16 |
| Stability switch 1 | 0 | 1 |  |  | 2/16 |
| Stability switch 2 | 0 | 1 |  |  | 1/16 |
| 8 | Alternator frequency | 0 | 70 | 0.1 | Hz | 16 |
| 9 | Alternator feedback voltage | 0 | 600 | 0.1 | V | 16 |
| 10 | Alternator droop current | 0 | 10 | 0.001 | A | 16 |
| 11 | Alternator droop current lag/lead | -180 | +180 | 1 | degrees | 16 S |
| 12 | Alternator auxiliary voltage | 0 | 20 | 0.1 | V | 16 |
| 13 | Alternator excitation voltage | 0 | 300 | 0.1 | V | 16 |
| 14 | External pot. value | 0 | 5000 | 1 | Ohms | 16 |
| 15 | External control voltage | 0 | 10 | 0.001 | V | 16 |
| 16 | Voltage preset position | 0 | 100 | 0.1 | % | 16 |
| 17 | Droop preset position | 0 | 100 | 0.1 | % | 16 |
| 18 | UFRO preset position | 0 | 100 | 0.1 | % | 16 |
| 19 | P preset position | 0 | 100 | 0.1 | % | 16 |
| 20 | I preset position | 0 | 100 | 0.1 | % | 16 |
| 21 | D preset position | 0 | 100 | 0.1 | % | 16 |
| 22-255 | Reserved |  |  |  |  |  |

**AVR Status**

|  |  |
| --- | --- |
| **Code** | **Meaning** |
| 0 | Stopped |
| 1 | Running |
| 2 | Under Frequency Roll Off active |
| 3 | Over excitation trip |
| 4 | Loss of sensing trip |
| 5 | Failed to excite trip |
| 6- | Reserved |

## Page 11 - Diagnostic - General

**Notes:**

1. These are read only registers.
2. Register0 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 |  |  |  |  |  |

## 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 |

## 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 |

## 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 |

## 

## 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 (pre-v6). Also used for Synclock operation…
12. Function 44 is used to register an 8711 display unit with an 8700 module (pre-v6). Also used for Synclock operation…
13. Function 45 is used to register an 8716 display unit with an 8700 module (pre-v6). Also used for Synclock operation…
14. Functions 46,47 & 48 are used as part of the data logging functionality (of the 8xxx/74xx family)
15. Function 51 is used to register an 8721 display unit with an 8700 module (v6 & later).
16. Function 52 is used to register an 8711 display unit with an 8700 module (v6 & later).
17. Function 53 is used to register an 8716 display unit with an 8700 module (v6 & later).

**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 (pre-v6)  8610 Remote start off load (sync lock) | 35743 |
| 44 | 8711 Display unit registered/alive (pre-v6)  8610 Remote start off load cancel (sync lock) | 35744 |
| 45 | 8716 Display unit registered/alive (pre-v6)  8610 MSC alarm inhibit on and switch to manual mode (sync lock) | 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 | Control Processor Reset Lockout Enable (88xx/84xx only) – sent by the display processor to the control processor to signal when the control processor should lockout the reset signal from the display processor | 35750 |
| 51 | 8721 Display unit registered/alive (v6 & later) | 35751 |
| 52 | 8711 Display unit registered/alive (v6 & later) | 35752 |
| 53 | 8716 Display unit registered/alive (v6 & later) | 35753 |
| 54-59 | Reserved |  |
| 60 | SMS run on load signal (88xx/84xx only) - sent by the display processor to the control processor to signal when an SMS command to run the generator on load has been received | 35760 |
| 61 | SMS run off load signal (88xx/84xx only) - sent by the display processor to the control processor to signal when an SMS command to run the generator off load has been received | 35761 |
| 62 | SMS request auto mode (88xx/84xx only) - sent by the display processor to the control processor to signal when an SMS command to change to auto mode has been received | 35762 |
| 63 | SMS request stop mode (88xx/84xx only) - sent by the display processor to the control processor to signal when an SMS command to change to stop mode has been received | 35763 |
| 64 | SMS request clear run mode (88xx/84xx only) - sent by the display processor to the control processor to signal when an SMS command to clear the run request has been received | 35764 |
| 65 | SMS run in island mode signal (8820/8860/8420 only) - sent by the display processor to the control processor to signal when an SMS command to run the generator in island mode has been received | 35765 |
| 66 | Reset battery maintenance alarm 1 | 35766 |
| 67 | Reset battery maintenance alarm 2 | 35767 |
| 68 | Reset battery maintenance alarm 3 | 35768 |
| 69 | Auto DPF regeneration inhibit on | 35769 |
| 70 | Auto DPF regeneration inhibit off | 35770 |
| 71 | Start manual DPF regeneration | 35771 |
| 72 | Battery Charger Boost Mode | 35772 |
| 73 | Battery Charger Stop Charging | 35773 |
| 74 | Battery Charger Battery Test | 35774 |
| 75 | Battery Charger Select Alternative Charging Voltage | 35775 |
| 76 | Select Off Mode | 35776 |
| 77 | Throttle Down | 35777 |
| 78 | Throttle Up | 35778 |
| 79 | Wake ECU | 35779 |
| 80 | Lamp Test | 35780 |
| 81 | Battery Charger Auxiliary Boost Mode | 35781 |
| 82 | Battery Charger Auxiliary Stop Charging | 35782 |
| 83 | Battery Charger Auxiliary Battery Test | 35783 |
| 84 | Battery Charger Auxiliary Select Alternative Charging Voltage | 35784 |
| 85-65535 | Reserved |  |

## 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 |

## 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 |

## 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 |

## 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 |

## 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 |

## 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 |

## Page 28 - StateMachineState 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 |

## 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 |  |  |  |

## 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 |

## 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 |

## 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 |

## 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 |

## 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 |

## 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 |

## Page 130 – 86xx New MTS Test support

This applies to 86xx modules from v6.

For details see other GENCOMM documentation (not for Customer use)

## 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 |  |  |  |  |  |  |
|  | **Generator Nominal** |  |  |  |  |  |  |
| 142-143 | Nominal voltage | 53 | 357 | 1 | V | 32 | Read only |
| 144 | Nominal voltage nudge | -1 | 1 | 1 |  | 16s | Write only |
| 145 | Nominal frequency | 0.3 | 74.7 | 0.1 | Hz | 16 | Read only |
| 146 | Nominal frequency nudge | -1 | 1 | 1 |  | 16s | Write only |
| 147-255 | Reserved |  |  |  |  |  |  |

## 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 |

## 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.

## 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 |  |  |  |  |  |  |

## 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.
9. 86xx/7410/7420 have 396 unnamed alarms spread over 99 registers => total number of unnamed alarms is 99\*4; 7450 has 399 unnamed alarms spread over 100 registers => total number of unnamed alarms is 100\*4
10. This page is used in conjunction with pages 160 to 165 and the registers should be in the same order as those pages.
11. The P100 has no unnamed alarms.
12. The E800 has 396 unnamed alarms spread over 99 registers => total number of unnamed alarms is 99\*4;

**61xx MkII 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 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 |
|  | Flex Sender A digital input | 0 | 15 | | 5/16-8/16 |
|  | Flex Sender B digital input | 0 | 15 | | 1/16-4/16 |
| 3 | Flex Sender C digital input | 0 | 15 | | 13/16-16/16 |
|  | Flex Sender D digital input | 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 | Reserved for expansion module 2 |  |  | |  |
| 11-12 | Reserved for expansion module 3 |  |  | |  |
| 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 0analogue input E high | 0 | 15 | 9/16-12/16 | |
|  | 2130 expansion module 0analogue input F low | 0 | 15 | 5/16-8/16 | |
|  | 2130 expansion module 0analogue 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 0analogue input G high | 0 | 15 | 9/16-12/16 | |
|  | 2130 expansion module 0analogue input H low | 0 | 15 | 5/16-8/16 | |
|  | 2130 expansion module 0analogue input H high | 0 | 15 | 1/16-4/16 | |
| 27-28 | 2130 expansion module 1 analogue inputs E-H |  |  | |  |
| 29-30 | Reserved for expansion module 2 |  |  | |  |
| 31-32 | Reserved for expansion module 3 |  |  | |  |
| 33-44 | Reserved for 2130 expansion module 4-9 analogue inputs E-H |  |  | |  |

**61xx MkII family register allocation continued**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 45 | Flex Sender A analogue input low | 0 | 15 | | 13/16-16/16 |
|  | Flex Sender A analogue input high | 0 | 15 | | 9/16-12/16 |
|  | Flex Sender B analogue input low | 0 | 15 | | 5/16-8/16 |
|  | Flex Sender B analogue input high | 0 | 15 | | 1/16-4/16 |
| 46 | Flex Sender C analogue input low | 0 | 15 | 13/16-16/16 | |
|  | Flex Sender C analogue input high | 0 | 15 | 9/16-12/16 | |
|  | Flex Sender D analogue input low | 0 | 15 | 5/16-8/16 | |
|  | Flex Sender D analogue input high | 0 | 15 | 1/16-4/16 | |
| 47 | Maintenance alarm 1 | 0 | 15 | 13/16-16/16 | |
|  | Maintenance alarm 2 | 0 | 15 | 9/16-12/16 | |
|  | Maintenance alarm 3 | 0 | 15 | 5/16-8/16 | |
|  | Unimplemented alarm | 0 | 15 | 1/16-4/16 | |
| 48-64 | Unimplemented | 0 | 15 | 16 | |
| 65-255 | Reserved |  |  |  | |

**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 0analogue input E high | 0 | 15 | 9/16-12/16 | |
|  | 2130 expansion module 0analogue input F low | 0 | 15 | 5/16-8/16 | |
|  | 2130 expansion module 0analogue 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 0analogue input G high | 0 | 15 | 9/16-12/16 | |
|  | 2130 expansion module 0analogue input H low | 0 | 15 | 5/16-8/16 | |
|  | 2130 expansion module 0analogue 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 | Note 9 | Note 9 | 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 0analogue input E high | 0 | 15 | | 9/16-12/16 | |
|  | 2130 expansion module 0analogue input F low | 0 | 15 | | 5/16-8/16 | |
|  | 2130 expansion module 0analogue 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 0analogue input G high | 0 | 15 | | 9/16-12/16 | |
|  | 2130 expansion module 0analogue input H low | 0 | 15 | | 5/16-8/16 | |
|  | 2130 expansion module 0analogue 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 | | |
|  | Engine Maintenance alarm 1 | 0 | 15 | 5/16-8/16 | | |
|  | Engine Maintenance alarm 2 | 0 | 15 | 1/16-4/16 | | |
| 52 | Engine 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 0analogue input A high | 0 | 15 | 9/16-12/16 |
|  | 2131 expansion module 0analogue input B low | 0 | 15 | 5/16-8/16 |
|  | 2131 expansion module 0analogue 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 0analogue input C high | 0 | 15 | 9/16-12/16 |
|  | 2131 expansion module 0analogue input D low | 0 | 15 | 5/16-8/16 |
|  | 2131 expansion module 0analogue 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 0analogue input E high | 0 | 15 | 9/16-12/16 |
|  | 2131 expansion module 0analogue input F low | 0 | 15 | 5/16-8/16 |
|  | 2131 expansion module 0analogue 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 0analogue input G high | 0 | 15 | 9/16-12/16 |
|  | 2131 expansion module 0analogue input H low | 0 | 15 | 5/16-8/16 |
|  | 2131 expansion module 0analogue 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 0analogue input I high | 0 | 15 | 9/16-12/16 |
|  | 2131 expansion module 0analogue input J low | 0 | 15 | 5/16-8/16 |
|  | 2131 expansion module 0analogue 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 0analogue input A high | 0 | 15 | 9/16-12/16 |
|  | 2133 expansion module 0analogue input B low | 0 | 15 | 5/16-8/16 |
|  | 2133 expansion module 0analogue 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 0analogue input C high | 0 | 15 | 9/16-12/16 |
|  | 2133 expansion module 0analogue input D low | 0 | 15 | 5/16-8/16 |
|  | 2133 expansion module 0analogue 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 0analogue input E high | 0 | 15 | 9/16-12/16 |
|  | 2133 expansion module 0analogue input F low | 0 | 15 | 5/16-8/16 |
|  | 2133 expansion module 0analogue 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 0analogue input G high | 0 | 15 | 9/16-12/16 |
|  | 2133 expansion module 0analogue input H low | 0 | 15 | 5/16-8/16 |
|  | 2133 expansion module 0analogue 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 | Plant Battery Maintenance 1 | 0 | 15 | 13/16-16/16 |
|  | Plant Battery Maintenance 2 | 0 | 15 | 9/16-12/16 |
|  | Plant Battery Maintenance 3 | 0 | 15 | 5/16-8/16 |
|  | Unimplemented | 0 | 15 | 1/16-4/16 |
| 101-255 | Reserved |  |  |  |

**3xxfamily 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 0analogue input E high | 0 | 15 | 9/16-12/16 |  |  |  |  |  |  |
|  | 2130 expansion module 0analogue input F low | 0 | 15 | 5/16-8/16 |  |  |  |  |  |  |
|  | 2130 expansion module 0analogue 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 0analogue input G high | 0 | 15 | 9/16-12/16 |  |  |  |  |  |  |
|  | 2130 expansion module 0analogue input H low | 0 | 15 | 5/16-8/16 |  |  |  |  |  |  |
|  | 2130 expansion module 0analogue 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 |  |  |  |  |  |  |  |  |  |

| **Exxx register allocation** | | | | |  |
| --- | --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Maxvalue | Bits/ Sign | E800 |
| 0 | Number of unnamed alarm sources | Note 12 | Note 12 | 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 (Flexible Digital Input 1) | 0 | 15 | 13/16-16/16 |  |
|  | Unnamed digital input 18 (Flexible Digital Input 2) | 0 | 15 | 9/16-12/16 |  |
|  | Unnamed digital input 19 (Flexible Digital Input 3) | 0 | 15 | 5/16-8/16 |  |
|  | Unnamed digital input 20 (Flexible Digital Input 4) | 0 | 15 | 1/16-4/16 |  |
| 6 | Unnamed digital input 21 (Flexible Digital Input 5) | 0 | 15 | 13/16-16/16 |  |
|  | Unnamed digital input 22 (Flexible Digital Input 6) | 0 | 15 | 9/16-12/16 |  |
|  | Unnamed digital input 23 (Flexible Digital Input 7) | 0 | 15 | 5/16-8/16 |  |
|  | Unnamed digital input 24 (Flexible Digital Input 8) | 0 | 15 | 1/16-4/16 |  |
| 7 | Unnamed digital input 25 (Flexible Digital Input 9) | 0 | 15 | 13/16-16/16 |  |
|  | Unnamed digital input 26 (Flexible Digital Input 10) | 0 | 15 | 9/16-12/16 |  |
|  | Unnamed digital input 27 (Flexible Digital Input 11) | 0 | 15 | 5/16-8/16 |  |
|  | Unnamed digital input 28 (Flexible Digital Input 12) | 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 |  |  |  |  |

| **Exxx register allocation (continued)** | | | | |  |
| --- | --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Maxvalue | Bits/ Sign | E800 |
| 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 |  |  |
| 29 | 2130 expansion module 0 analogue input E low | 0 | 15 | 13/16-16/16 |  |
|  | 2130 expansion module 0analogue input E high | 0 | 15 | 9/16-12/16 |  |
|  | 2130 expansion module 0analogue input F low | 0 | 15 | 5/16-8/16 |  |
|  | 2130 expansion module 0analogue 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 0analogue input G high | 0 | 15 | 9/16-12/16 |  |
|  | 2130 expansion module 0analogue input H low | 0 | 15 | 5/16-8/16 |  |
|  | 2130 expansion module 0analogue 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 |  |  |  |  |
| 37-38 | Unimplemented | 15 | 15 | 16 |  |

| **Exxx register allocation (continued)** | | | | |  |
| --- | --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Maxvalue | Bits/ Sign | E800 |
| 39 | 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 |  |
| 40 | 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 |  |
| 41 | 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 |  |
|  | Internal flexible sender 6 analogue input low | 0 | 15 | 5/16-8/16 |  |
|  | Internal flexible sender 6 analogue input high | 0 | 15 | 1/16-4/16 |  |
| 42 | Internal flexible sender 7 analogue input low | 0 | 15 | 13/16-16/16 |  |
|  | Internal flexible sender 7 analogue input high | 0 | 15 | 9/16-12/16 |  |
|  | Internal flexible sender 8 analogue input low | 0 | 15 | 5/16-8/16 |  |
|  | Internal flexible sender 8 analogue input high | 0 | 15 | 1/16-4/16 |  |
| 43 | Internal flexible sender 9 analogue input low | 0 | 15 | 13/16-16/16 |  |
|  | Internal flexible sender 9 analogue input high | 0 | 15 | 9/16-12/16 |  |
|  | Internal flexible sender 10 analogue input low | 0 | 15 | 5/16-8/16 |  |
|  | Internal flexible sender 10 analogue input high | 0 | 15 | 1/16-4/16 |  |
| 44 | Internal flexible sender 11 analogue input low | 0 | 15 | 13/16-16/16 |  |
|  | Internal flexible sender 11 analogue input high | 0 | 15 | 9/16-12/16 |  |
|  | Internal flexible sender 12 analogue input low | 0 | 15 | 5/16-8/16 |  |
|  | Internal flexible sender 12 analogue input high | 0 | 15 | 1/16-4/16 |  |
| 45 | Engine Maintenance alarm 1 | 0 | 15 | 13/16-16/16 |  |
|  | Engine Maintenance alarm 2 | 0 | 15 | 9/16-12/16 |  |
|  | Engine Maintenance alarm 3 | 0 | 15 | 5/16-8/16 |  |
|  | Unimplemented | 0 | 15 | 1/16-4/16 |  |
| 46 | 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 |  |
| 47 | 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 |  |
| 48 | 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 |  |
| 49 | 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 |  |
| 50 | 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 |  |
| 51-63 | Unimplemented | 0 | 15 | 16 |  |

| **Exxx register allocation (continued)** | | | | |  |
| --- | --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Maxvalue | Bits/ Sign | E800 |
| 64 | 2131 expansion module 0 analogue input A low | 0 | 15 | 13/16-16/16 |  |
|  | 2131 expansion module 0analogue input A high | 0 | 15 | 9/16-12/16 |  |
|  | 2131 expansion module 0analogue input B low | 0 | 15 | 5/16-8/16 |  |
|  | 2131 expansion module 0analogue 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 0analogue input C high | 0 | 15 | 9/16-12/16 |  |
|  | 2131 expansion module 0analogue input D low | 0 | 15 | 5/16-8/16 |  |
|  | 2131 expansion module 0analogue 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 0analogue input E high | 0 | 15 | 9/16-12/16 |  |
|  | 2131 expansion module 0analogue input F low | 0 | 15 | 5/16-8/16 |  |
|  | 2131 expansion module 0analogue 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 0analogue input G high | 0 | 15 | 9/16-12/16 |  |
|  | 2131 expansion module 0analogue input H low | 0 | 15 | 5/16-8/16 |  |
|  | 2131 expansion module 0analogue 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 0analogue input I high | 0 | 15 | 9/16-12/16 |  |
|  | 2131 expansion module 0analogue input J low | 0 | 15 | 5/16-8/16 |  |
|  | 2131 expansion module 0analogue 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 0analogue input A high | 0 | 15 | 9/16-12/16 |  |
|  | 2133 expansion module 0analogue input B low | 0 | 15 | 5/16-8/16 |  |
|  | 2133 expansion module 0analogue 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 0analogue input C high | 0 | 15 | 9/16-12/16 |  |
|  | 2133 expansion module 0analogue input D low | 0 | 15 | 5/16-8/16 |  |
|  | 2133 expansion module 0analogue 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 0analogue input E high | 0 | 15 | 9/16-12/16 |  |
|  | 2133 expansion module 0analogue input F low | 0 | 15 | 5/16-8/16 |  |
|  | 2133 expansion module 0analogue 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 0analogue input G high | 0 | 15 | 9/16-12/16 |  |
|  | 2133 expansion module 0analogue input H low | 0 | 15 | 5/16-8/16 |  |
|  | 2133 expansion module 0analogue 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 |  |  |  |  |

**P100 register allocation**

The P100 has no unnamed alarms.

**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 |

## 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.

**61xx MkII**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 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 |
|  | Unimplemented | 0 | 15 | 5/16-8/16 |
|  | Unimplemented | 0 | 15 | 1/16-4/16 |
| 9 | Unimplemented | 0 | 15 | 13/16-16/16 |
|  | Unimplemented | 0 | 15 | 9/16-12/16 |
|  | Unimplemented | 0 | 15 | 5/16-8/16 |
|  | Maintenance alarm | 0 | 15 | 1/16-4/16 |

**61xx MkII family register allocation continued**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 10 | Loading frequency alarm | 0 | 15 | 13/16-16/16 |
|  | Loading voltage alarm | 0 | 15 | 9/16-12/16 |
|  | Unimplemented | 0 | 15 | 5/16-8/16 |
|  | Unimplemented | 0 | 15 | 1/16-4/16 |
| 11 | Unimplemented | 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 |
| 12 | Unimplemented | 0 | 15 | 13/16-16/16 |
|  | Unimplemented | 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 |
|  | Unimplemented | 0 | 15 | 5/16-8/16 |
|  | Unimplemented | 0 | 15 | 1/16-4/16 |
| 15 | Unimplemented | 0 | 15 | 13/16-16/16 |
|  | High fuel level | 0 | 15 | 9/16-12/16 |
|  | Unimplemented | 0 | 15 | 5/16-8/16 |
|  | Unimplemented | 0 | 15 | 1/16-4/16 |
| 65-255 | Reserved |  |  |  |

**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 |
|  | Generator Positive VAr | 0 | 15 | 1/16-4/16 |
| 15 | Generator Negative VAr | 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 |
| 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 |
|  | DC Total Watts Overload | 0 | 15 | 1/16-4/16 |
| 26 | High Plant Battery Temperature | 0 | 15 | 13/16-16/16 |
|  | Low Plant Battery Temperature | 0 | 15 | 9/16-12/16 |
|  | Low Plant Battery Voltage | 0 | 15 | 5/16-8/16 |
|  | High Plant Battery Voltage | 0 | 15 | 1/16-4/16 |
| 27 | Plant Battery Depth of Discharge | 0 | 15 | 13/16-16/16 |
|  | DC Battery Over Current | 0 | 15 | 9/16-12/16 |
|  | DC Load Over Current | 0 | 15 | 5/16-8/16 |
|  | High Total DC Current | 0 | 15 | 1/16-4/16 |
| 28 | High fuel level | 0 | 15 | 13/16-16/16 |
|  | Low kW Loa d (Wet Stacking) | 0 | 15 | 9/16-12/16 |
|  | Module Communication Fail (8661) | 0 | 15 | 5/16-8/16 |
|  | Bus Module Warning (8661) | 0 | 15 | 1/16-4/16 |
| 29 | Bus Module Trip (8661) | 0 | 15 | 13/16-16/16 |
|  | Mains Module Warning (8661) | 0 | 15 | 9/16-12/16 |
|  | Mains Module Trip (8661) | 0 | 15 | 5/16-8/16 |
|  | Load Live (8661) | 0 | 15 | 1/16-4/16 |
| 30 | Load Not Live (8661) | 0 | 15 | 13/16-16/16 |
|  | Load Phase Rotation (8661) | 0 | 15 | 9/16-12/16 |
|  | Unimplemented | 0 | 15 | 5/16-8/16 |
|  | Unimplemented | 0 | 15 | 1/16-4/16 |
| 31-64 | 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 |  |  |  |

Load Phase Seq Wrong

Load Not Live

Mains Module Trip

Mains Module Warning

Bus Module Trip

Bus Module Warning

Module Communication Fail

**94xx Battery Charger Range**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Register offset | Name | Minimum value | Maximum value | Bits/ Sign |
| 0 | Number of named alarms | 0 | 256 | 16 |
| 1 | Mains High Voltage | 0 | 15 | 13/16-16/16 |
|  | Mains Low Voltage | 0 | 15 | 9/16-12/16 |
|  | High Output/Battery Voltage | 0 | 15 | 5/16-8/16 |
|  | High Output Current | 0 | 15 | 1/16-4/16 |
| 2 | Short Circuit/Reverse Polarity Fault | 0 | 15 | 13/16-16/16 |
|  | Battery Not Connected | 0 | 15 | 9/16-12/16 |
|  | High Battery Temperature | 0 | 15 | 5/16-8/16 |
|  | High Module Temperature | 0 | 15 | 1/16-4/16 |
| 3 | NTC Failure | 0 | 15 | 13/16-16/16 |
|  | Battery Charger Internal Component Failure | 0 | 15 | 9/16-12/16 |
|  | Battery Charger Output Stage Component Failure | 0 | 15 | 5/16-8/16 |
|  | High Input Current | 0 | 15 | 1/16-4/16 |
| 4 | Low Battery Voltage | 0 | 15 | 13/16-16/16 |
|  | Charging Cable Voltage Drop | 0 | 15 | 9/16-12/16 |
| Fan Locked | 0 | 15 | 5/16-8/16 |
| Auxiliary Supply Voltage High | 0 | 15 | 1/16-4/16 |
| 5 | Auxiliary Current High | 0 | 15 | 13/16-16/16 |
|  | Auxiliary Output Short Circuit | 0 | 15 | 9/16-12/16 |
| Unimplemented | 0 | 15 | 5/16-8/16 |
| Unimplemented | 0 | 15 | 1/16-4/16 |
| 6-64 | Unimplemented |  |  |  |
| 65-255 | Reserved |  |  |  |

| **Exxx register allocation** | | | | |  |
| --- | --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Max  value | Bits/ Sign | E800 |
| 0 | Number of named alarms | 43 | 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 |  |
|  | Battery low voltage | 0 | 15 | 5/16-8/16 |  |
|  | Battery high voltage | 0 | 15 | 1/16-4/16 |  |
| 3 | 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 |  |
|  | Oil pressure sender fault | 0 | 15 | 1/16-4/16 |  |
| 4 | Loss of magnetic pick up | 0 | 15 | 13/16-16/16 |  |
|  | Magnetic pick up open circuit | 0 | 15 | 9/16-12/16 |  |
|  | Calibration lost | 0 | 15 | 5/16-8/16 |  |
|  | Low fuel level | 0 | 15 | 1/16-4/16 |  |
| 5 | CAN ECU Warning | 0 | 15 | 13/16-16/16 |  |
|  | CAN ECU Shutdown | 0 | 15 | 9/16-12/16 |  |
|  | CAN ECU Data fail | 0 | 15 | 5/16-8/16 |  |
|  | Low oil level switch | 0 | 15 | 1/16-4/16 |  |
| 6 | High temperature switch | 0 | 15 | 13/16-16/16 |  |
|  | Low fuel level switch | 0 | 15 | 9/16-12/16 |  |
|  | Expansion unit watchdog alarm | 0 | 15 | 5/16-8/16 |  |
|  | Fuel usage running | 0 | 15 | 1/16-4/16 |  |
| 7 | Fuel usage stopped | 0 | 15 | 13/16-16/16 |  |
|  | Protections disabled | 0 | 15 | 9/16-12/16 |  |
|  | Protections blocked | 0 | 15 | 5/16-8/16 |  |
|  | Air flap closed alarm | 0 | 15 | 1/16-4/16 |  |
| 8 | Charge air temperature | 0 | 15 | 13/16-16/16 |  |
|  | High coolant temperature electrical trip alarm | 0 | 15 | 9/16-12/16 |  |
|  | Temperature sender open circuit alarm | 0 | 15 | 5/16-8/16 |  |
|  | ECU Protect | 0 | 15 | 1/16-4/16 |  |
| 9 | ECU Malfunction | 0 | 15 | 13/16-16/16 |  |
|  | ECU Information | 0 | 15 | 9/16-12/16 |  |
|  | ECU Shutdown | 0 | 15 | 5/16-8/16 |  |
|  | ECU Warning | 0 | 15 | 1/16-4/16 |  |
| 10 | ECU Electrical Trip | 0 | 15 | 13/16-16/16 |  |
|  | ECU After-treatment | 0 | 15 | 9/16-12/16 |  |
|  | ECU Water In Fuel | 0 | 15 | 5/16-8/16 |  |
|  | ECU Heater | 0 | 15 | 1/16-4/16 |  |
| 11 | ECU Cooler | 0 | 15 | 13/16-16/16 |  |
|  | Unimplemented (Reserved for MSC data error) | 0 | 15 | 9/16-12/16 |  |
|  | Unimplemented (Reserved for MSC ID error) | 0 | 15 | 5/16-8/16 |  |
|  | Unimplemented (Reserved for MSC failure) | 0 | 15 | 1/16-4/16 |  |
| 12 | Unimplemented (Reserved for MSC too few sets) | 0 | 15 | 13/16-16/16 |  |
|  | Unimplemented (Reserved for MSC alarms inhibited) | 0 | 15 | 9/16-12/16 |  |
|  | Unimplemented (Reserved for MSC old version units on the bus) | 0 | 15 | 5/16-8/16 |  |
|  | LCD Heater Low Voltage | 0 | 15 | 1/16-4/16 |  |
| 13 | LCD Heater High Voltage | 0 | 15 | 13/16-16/16 |  |
|  | LCD Heater Temperature | 0 | 15 | 9/16-12/16 |  |
|  | LCD Heater Sensor Failure | 0 | 15 | 5/16-8/16 |  |
|  | Unimplemented | 0 | 15 | 1/16-4/16 |  |
| 14-64 | Reserved |  |  |  |  |
| 65-255 | Reserved |  |  |  |  |

**P100 Mains Decoupling Module**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Register offset | Name | Minimum value | Maximum value | Bits/ Sign |
| 0 | Number of named alarms | 0 | 256 | 16 |
| 1 | Low frequency stage 1 | 0 | 15 | 13/16-16/16 |
|  | Low frequency stage 2 | 0 | 15 | 9/16-12/16 |
|  | High frequency stage 1 | 0 | 15 | 5/16-8/16 |
|  | High frequency stage 2 | 0 | 15 | 1/16-4/16 |
| 2 | Low voltage stage 1 | 0 | 15 | 13/16-16/16 |
|  | Low voltage stage 2 | 0 | 15 | 9/16-12/16 |
|  | High voltage stage 1 | 0 | 15 | 5/16-8/16 |
|  | High voltage stage 2 | 0 | 15 | 1/16-4/16 |
| 3 | High average voltage | 0 | 15 | 13/16-16/16 |
|  | ROCOF | 0 | 15 | 9/16-12/16 |
|  | Vector Shift | 0 | 15 | 5/16-8/16 |
|  | Loss of Mains | 0 | 15 | 1/16-4/16 |
| 4 | Zero sequence voltage high | 0 | 15 | 13/16-16/16 |
|  | Positive sequence voltage low | 0 | 15 | 9/16-12/16 |
|  | Negative sequence voltage high | 0 | 15 | 5/16-8/16 |
|  | Asymmetry high | 0 | 15 | 1/16-4/16 |
| 5 | Phase rotation wrong | 0 | 15 | 13/16-16/16 |
|  | Common mains decoupling | 0 | 15 | 9/16-12/16 |
|  | Calibration lost | 0 | 15 | 5/16-8/16 |
|  | Auxiliary mains failure | 0 | 15 | 1/16-4/16 |
| 6-64 | 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 / Controlled shutdown 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 |

## Page 155 – Previous ECU Trouble Codes

1. Currently supported in 73xx modules.
2. Functionally identical to page 142 but will return trouble codes that have been previously active (if supported by the engine file). Page 142 returns codes that are currently active.
3. 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 previous 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 |

## 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 | 2157Expansion module 1 enable | False | True |  |  | 16 |  |  |  |
| 12 | 2157Expansion module 2 enable | False | True |  |  | 16 |  |  |  |
| 13 | 2157Expansion module 3 enable | False | True |  |  | 16 |  |  |  |
| 14 | 2157Expansion module 4 enable | False | True |  |  | 16 |  |  |  |
| 15 | 2157Expansion module 5 enable | False | True |  |  | 16 |  |  |  |
| 16 | 2157Expansion module 6 enable | False | True |  |  | 16 |  |  |  |
| 17 | 2157Expansion module 7 enable | False | True |  |  | 16 |  |  |  |
| 18 | 2157Expansion module 8 enable | False | True |  |  | 16 |  |  |  |
| 19 | 2157Expansion module 9 enable | False | True |  |  | 16 |  |  |  |
| 20 | 2548 Expansion module 0 enable | False | True |  |  | 16 |  |  |  |
| 21 | 2548Expansion module 1 enable | False | True |  |  | 16 |  |  |  |
| 22 | 2548Expansion module 2 enable | False | True |  |  | 16 |  |  |  |
| 23 | 2548Expansion module 3 enable | False | True |  |  | 16 |  |  |  |
| 24 | 2548Expansion module 4 enable | False | True |  |  | 16 |  |  |  |
| 25 | 2548Expansion module 5 enable | False | True |  |  | 16 |  |  |  |
| 26 | 2548Expansion module 6 enable | False | True |  |  | 16 |  |  |  |
| 27 | 2548Expansion module 7 enable | False | True |  |  | 16 |  |  |  |
| 28 | 2548Expansion module 8 enable | False | True |  |  | 16 |  |  |  |
| 29 | 2548Expansion 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 | 2510/20Expansion module 0 enable | NO | YES |  |  | 16 |  |  |  |
| 43 | 2510/20Expansion module 1 enable | NO | YES |  |  | 16 |  |  |  |
| 44 | 2510/20Expansion module 2 enable | NO | YES |  |  | 16 |  |  |  |
| 45-255 | Reserved |  |  |  |  |  |  |  |  |

## Page 158 – Expansion module communications status

1. This indicates which expansion modules are failing to communicate with the host module.
2. If an expansion module is not enabled in the configuration, it will not report a failure to communicate.
3. False = 0, True =1.
4. These registers are Read-Only
5. 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 | 2157Expansion module 1 comms failure | False | True |  |  | 16 |  |  |  |
| 12 | 2157Expansion module 2 comms failure | False | True |  |  | 16 |  |  |  |
| 13 | 2157Expansion module 3 comms failure | False | True |  |  | 16 |  |  |  |
| 14 | 2157Expansion module 4 comms failure | False | True |  |  | 16 |  |  |  |
| 15 | 2157Expansion module 5 comms failure | False | True |  |  | 16 |  |  |  |
| 16 | 2157Expansion module 6 comms failure | False | True |  |  | 16 |  |  |  |
| 17 | 2157Expansion module 7 comms failure | False | True |  |  | 16 |  |  |  |
| 18 | 2157Expansion module 8 comms failure | False | True |  |  | 16 |  |  |  |
| 19 | 2157Expansion module 9 comms failure | False | True |  |  | 16 |  |  |  |
| 20 | 2548 Expansion module 0 comms failure | False | True |  |  | 16 |  |  |  |
| 21 | 2548Expansion module 1 comms failure | False | True |  |  | 16 |  |  |  |
| 22 | 2548Expansion module 2 comms failure | False | True |  |  | 16 |  |  |  |
| 23 | 2548Expansion module 3 comms failure | False | True |  |  | 16 |  |  |  |
| 24 | 2548Expansion module 4 comms failure | False | True |  |  | 16 |  |  |  |
| 25 | 2548Expansion module 5 comms failure | False | True |  |  | 16 |  |  |  |
| 26 | 2548Expansion module 6 comms failure | False | True |  |  | 16 |  |  |  |
| 27 | 2548Expansion module 7 comms failure | False | True |  |  | 16 |  |  |  |
| 28 | 2548Expansion module 8 comms failure | False | True |  |  | 16 |  |  |  |
| 29 | 2548Expansion module 9 comms failure | False | True |  |  | 16 |  |  |  |
| 30 | 2131Expansion module 0 comms failure | False | True |  |  | 16 |  |  |  |
| 31 | 2131Expansion module 1 comms failure | False | True |  |  | 16 |  |  |  |
| 32 | 2131Expansion module 2 comms failure | False | True |  |  | 16 |  |  |  |
| 33 | 2131Expansion module 3 comms failure | False | True |  |  | 16 |  |  |  |
| 34 | 2133Expansion module 0 comms failure | False | True |  |  | 16 |  |  |  |
| 35 | 2134Expansion module 1 comms failure | False | True |  |  | 16 |  |  |  |
| 36 | 2135Expansion module 2 comms failure | False | True |  |  | 16 |  |  |  |
| 37 | 2136Expansion module 3 comms failure | False | True |  |  | 16 |  |  |  |
| 38 | 2152Expansion module 0 comms failure | False | True |  |  | 16 |  |  |  |
| 39 | 2152Expansion module 1 comms failure | False | True |  |  | 16 |  |  |  |
| 40 | 2152Expansion module 2 comms failure | False | True |  |  | 16 |  |  |  |
| 41 | 2152Expansion module 3 comms failure | False | True |  |  | 16 |  |  |  |
| 42-255 | Reserved |  |  |  |  |  |  |  |  |

## Page 160 – Unnamed Alarm function

1. This indicates to the PC software how each unnamed alarm (digital inputs, both built in and in the expansion modules, maintenance alarms, flexible senders etc) is configured.
2. The alarm 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.
8. This page is used in conjunction with page 153 and the registers should be in the same order as page 153 registers 1 to 64.
9. Although the P100 does not have any unnamed alarms this is needed to read the functions of digital inputs A-E

**61xx MkII 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 | Flex Sender A Digital input function | 0 | 65535 | 16 |
| 7 | Flex Sender B Digital input function | 0 | 65535 | 16 |
| 8 | Flex Sender C Digital input function | 0 | 65535 | 16 |
| 9 | Flex Sender D Digital input function | 0 | 65535 | 16 |
| 10-15 | 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 |  |  |  |
| 32-95 | Reserved for 2130 expansion module 2-9 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 | Reserved |  |  |  |
| 128-175 | Reserved |  |  |  |
| 176 | Flexible sender A input (low) | 0 | 65535 | 16 |
| 177 | Flexible sender A input (high) | 0 | 65535 | 16 |
| 178 | Flexible sender B input (low) | 0 | 65535 | 16 |
| 179 | Flexible sender B input (high) | 0 | 65535 | 16 |
| 180 | Flexible sender C input (low) | 0 | 65535 | 16 |
| 181 | Flexible sender C input (high) | 0 | 65535 | 16 |
| 182 | Flexible sender D input (low) | 0 | 65535 | 16 |
| 183 | Flexible sender D input (high) | 0 | 65535 | 16 |
| 184 | Maintenance alarm 1 | 0 | 65535 | 16 |
| 185 | Maintenance alarm 2 | 0 | 65535 | 16 |
| 186 | Maintenance alarm 3 | 0 | 65535 | 16 |
| 187-255 | Reserved |  |  |  |

**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 familyregister 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~~ |  |  |  |
| 112-159 | Unimplemented (not used by PC) |  |  |  |
| 160-191 | Unimplemented |  |  |  |
| 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 | Engine Maintenance alarm 1 function | 0 | 65535 | 16 |
| 203 | Engine Maintenance alarm 2 function | 0 | 65535 | 16 |
| 204 | Engine 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 |  |  |  |  |  |  |  |  |  |

| **Exxx register allocation** | | | | |  |
| --- | --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Max value | Bits/ sign | E800 |
| 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 | Flexible Sender Digital input 1 function | 0 | 65535 | 16 |  |
| 17 | Flexible Sender Digital input 2 function | 0 | 65535 | 16 |  |
| 18 | Flexible Sender Digital input 3 function | 0 | 65535 | 16 |  |
| 19 | Flexible Sender Digital input 4 function | 0 | 65535 | 16 |  |
| 20 | Flexible Sender Digital input 5 function | 0 | 65535 | 16 |  |
| 21 | Flexible Sender Digital input 6 function | 0 | 65535 | 16 |  |
| 22 | Flexible Sender Digital input 7 function | 0 | 65535 | 16 |  |
| 23 | Flexible Sender Digital input 8 function | 0 | 65535 | 16 |  |
| 24 | Flexible Sender Digital input 9 function | 0 | 65535 | 16 |  |
| 25 | Flexible Sender Digital input 10 function | 0 | 65535 | 16 |  |
| 26 | Flexible Sender Digital input 11 function | 0 | 65535 | 16 |  |
| 27 | Flexible Sender Digital input 12 function | 0 | 65535 | 16 |  |
| 28-31 | Reserved | 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 |  |  |  |  |
| 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 |  |  |  |  |

| **Exxx register allocation (continued)** | | | | |  |
| --- | --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Max value | Bits/ sign | E800 |
| 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 |  |  |  |  |
| 159-191 | Unimplemented |  |  |  |  |
| 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 | Internal flexible sender 6 input (low) | 0 | 65535 | 16 |  |
| 203 | Internal flexible sender 6 input (high) | 0 | 65535 | 16 |  |
| 204 | Internal flexible sender 7 input (low) | 0 | 65535 | 16 |  |
| 205 | Internal flexible sender 7 input (high) | 0 | 65535 | 16 |  |
| 206 | Internal flexible sender 8 input (low) | 0 | 65535 | 16 |  |
| 207 | Internal flexible sender 8 input (high) | 0 | 65535 | 16 |  |
| 208 | Internal flexible sender 9 input (low) | 0 | 65535 | 16 |  |
| 209 | Internal flexible sender 9 input (high) | 0 | 65535 | 16 |  |
| 210 | Internal flexible sender 10 input (low) | 0 | 65535 | 16 |  |
| 211 | Internal flexible sender 10 input (high) | 0 | 65535 | 16 |  |
| 212 | Internal flexible sender 11 input (low) | 0 | 65535 | 16 |  |
| 213 | Internal flexible sender 11 input (high) | 0 | 65535 | 16 |  |
| 214 | Internal flexible sender 12 input (low) | 0 | 65535 | 16 |  |
| 215 | Internal flexible sender 12 input (high) | 0 | 65535 | 16 |  |
| 216 | Engine Maintenance alarm 1 function | 0 | 65535 | 16 |  |
| 217 | Engine Maintenance alarm 2 function | 0 | 65535 | 16 |  |
| 218 | Engine Maintenance alarm 3 function | 0 | 65535 | 16 |  |
| 219 | PLC function 1 | 0 | 65535 | 16 |  |
| 220 | PLC function 2 | 0 | 65535 | 16 |  |
| 221 | PLC function 3 | 0 | 65535 | 16 |  |
| 222 | PLC function 4 | 0 | 65535 | 16 |  |
| 223 | PLC function 5 | 0 | 65535 | 16 |  |
| 224 | PLC function 6 | 0 | 65535 | 16 |  |
| 225 | PLC function 7 | 0 | 65535 | 16 |  |
| 226 | PLC function 8 | 0 | 65535 | 16 |  |
| 227 | PLC function 9 | 0 | 65535 | 16 |  |
| 228 | PLC function 10 | 0 | 65535 | 16 |  |
| 229 | PLC function 11 | 0 | 65535 | 16 |  |
| 230 | PLC function 12 | 0 | 65535 | 16 |  |
| 231 | PLC function 13 | 0 | 65535 | 16 |  |
| 232 | PLC function 14 | 0 | 65535 | 16 |  |
| 233 | PLC function 15 | 0 | 65535 | 16 |  |
| 234 | PLC function 16 | 0 | 65535 | 16 |  |
| 235 | PLC function 17 | 0 | 65535 | 16 |  |
| 236 | PLC function 18 | 0 | 65535 | 16 |  |
| 237 | PLC function 19 | 0 | 65535 | 16 |  |
| 238 | PLC function 20 | 0 | 65535 | 16 |  |
| 239-255 | Reserved |  |  |  |  |

**P100 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 |
| 5-255 | Reserved |  |  |  |

## Page 161 – Unnamed Alarm function (continued)

1. This indicates to the PC software how each unnamed alarm (digital inputs, both built in and in the expansion modules, maintenance alarms, flexible senders etc) is configured.
2. The alarm function is the function field from the alarm block.
3. Each family has different register allocations.
4. These registers are Read-Only.
5. This page is used in conjunction with page 153 and the registers should be in the same order as page 153 (registers 65 to 128)
6. Registers 0 to 139 are used for expansion modules analogue inputs (see page 153 registers 65 to 99)

**8xxx / 74xx family register allocation**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Max value | Bits/ sign |
| 0-139 | Unimplemented (Reserved for expansion modules analogue inputs) | 0 | 65535 | 16 |
| 140 | Plant Battery Maintenance alarm 1 function | 0 | 65535 | 16 |
| 141 | Plant Battery Maintenance alarm 2 function | 0 | 65535 | 16 |
| 142 | Plant Battery Maintenance alarm 3 function | 0 | 65535 | 16 |
| 143-255 | Reserved for future unnamed alarms |  |  |  |

| **Exxx register allocation** | | | | | |
| --- | --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Max value | Bits/ sign | E800 |
| 0-139 | Unimplemented (Reserved for expansion modules analogue inputs) | 0 | 65535 | 16 |  |
| 140-255 | Reserved for future unnamed alarms |  |  |  |  |

## Page 162 – Unnamed Alarm functions (continued)

1. This indicates to the PC software how each unnamed alarm (digital inputs, both built in and in the expansion modules, maintenance alarms, flexible senders etc) is configured.
2. The alarm function is the function field from the alarm block.
3. Each family has different register allocations.
4. These registers are Read-Only.
5. This page is used in conjunction with page 153 and the registers should be in the same order as page 153 (registers 129 to 192)

**8xxx / 74xx family register allocation continued**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 0-255 | Reserved for future unnamed alarms | 0 | 65535 | 16 |

| **Exxx family register allocation continued** | | | | | |
| --- | --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Max value | Bits/ sign | E800 |
| 0-255 | Reserved for future unnamed alarms | 0 | 65535 | 16 |  |

## Page 163 – Unnamed Alarm functions (continued)

1. This indicates to the PC software how each unnamed alarm (digital inputs, both built in and in the expansion modules, maintenance alarms, flexible senders etc) is configured.
2. The alarm function is the function field from the alarm block.
3. Each family has different register allocations.
4. These registers are Read-Only.
5. This page is used in conjunction with page 153 and the registers should be in the same order as page 153 (registers 193 to 255)

**8xxx / 74xx family register allocation continued**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 0-255 | Reserved for future unnamed alarms | 0 | 65535 | 16 |

| **Exxx family register allocation continued** | | | | | |
| --- | --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Max value | Bits/ sign | E800 |
| 0-255 | Reserved for future unnamed alarms | 0 | 65535 | 16 |  |

## Pages 166-169 - User configurable pages

Refer to DSE for documentation of these pages.

## 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
16. Although the P100 does not have any unnamed alarms this is needed to read the status of digital inputs A-E

**60xx 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 |
| 14-111 | Unimplemented |  |  | 16 |
| 112 | Unimplemented |  |  | 16 |
| 113 | Unimplemented (signed) |  |  | S16 |
| 114-255 | Unimplemented (odd numbered registers are signed 16) |  |  |  |

**61xx MkII 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 | Flex Sender A Digital input raw status | 0 | 1 | 16 |
| 13 | Flex Sender A Digital input processed status | 0 | 1 | 16 |
| 14 | Flex Sender B Digital input raw status | 0 | 1 | 16 |
| 15 | Flex Sender B Digital input processed status | 0 | 1 | 16 |
| 16 | Flex Sender C Digital input raw status | 0 | 1 | 16 |
| 17 | Flex Sender C Digital input processed status | 0 | 1 | 16 |
| 18 | Flex Sender D Digital input raw status | 0 | 1 | 16 |
| 19 | Flex Sender D Digital input processed status | 0 | 1 | 16 |
| 20-31 | 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 |
| 48-63 | 2130 Expansion module 1 digital inputs A-H raw & processed status |  |  |  |
| 64-191 | 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 | Reserved |  |  |  |
| 240-255 | Reserved |  |  |  |

**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 |
| 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 familyregister 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 familyregister 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 |  |  |  |

**3xxfamily 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 |  |  |  |  |  |  |  |  |  |

| **Exxx register allocation** | | | | |  |
| --- | --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Max value | Bits/ sign | E800 |
| 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 |  |
| 32 | Flexible Digital input 1 raw status | 0 | 1 | 16 |  |
| 33 | Flexible Digital input 1 processed status | 0 | 1 | 16 |  |
| 34 | Flexible Digital input 2 raw status | 0 | 1 | 16 |  |
| 35 | Flexible Digital input 2 processed status | 0 | 1 | 16 |  |
| 36 | Flexible Digital input 3 raw status | 0 | 1 | 16 |  |
| 37 | Flexible Digital input 3 processed status | 0 | 1 | 16 |  |
| 38 | Flexible Digital input 4 raw status | 0 | 1 | 16 |  |
| 39 | Flexible Digital input 4 processed status | 0 | 1 | 16 |  |
| 40 | Flexible Digital input 5 raw status | 0 | 1 | 16 |  |
| 41 | Flexible Digital input 5 processed status | 0 | 1 | 16 |  |
| 42 | Flexible Digital input 6 raw status | 0 | 1 | 16 |  |
| 43 | Flexible Digital input 6 processed status | 0 | 1 | 16 |  |
| 44 | Flexible Digital input 7 raw status | 0 | 1 | 16 |  |
| 45 | Flexible Digital input 7 processed status | 0 | 1 | 16 |  |
| 46 | Flexible Digital input 8 raw status | 0 | 1 | 16 |  |
| 47 | Flexible Digital input 8 processed status | 0 | 1 | 16 |  |
| 48 | Flexible Digital input 9 raw status | 0 | 1 | 16 |  |
| 49 | Flexible Digital input 9 processed status | 0 | 1 | 16 |  |
| 50 | Flexible Digital input 10 raw status | 0 | 1 | 16 |  |
| 51 | Flexible Digital input 10 processed status | 0 | 1 | 16 |  |
| 52 | Flexible Digital input 11 raw status | 0 | 1 | 16 |  |
| 53 | Flexible Digital input 11 processed status | 0 | 1 | 16 |  |
| 54 | Flexible Digital input 12 raw status | 0 | 1 | 16 |  |
| 55 | Flexible Digital input 12 processed status | 0 | 1 | 16 |  |
| 56-63 | Reserved | 0 | 1 | 16 |  |

| **Exxx register allocation (continued)** | | | | |  |
| --- | --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Max value | Bits/ sign | E800 |
| 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 |  |  |  |  |
| 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 |  |  |  |  |

**P100 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 |
| 10-255 | Reserved |  |  |  |

**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 |  |  |  |  |

## 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
4. For 60xx, Flexible sensor scaled level value is only implemented for the percentage sensor category

**60xx family register allocation**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Max value | Bits/ sign |
| 0-15 | Unimplemented |  |  | 16 |
| 1 | Unimplemented (signed) |  |  | 16 |
| 2-15 | Unimplemented (odd numbered registers are signed 16) |  |  |  |
| 16 | Oil pressure transducer category | 0 | 4 | 16 |
| 17 | Engine Temperature transducer category | 0 | 4 | 16 |
| 18 | Flexible Sensor transducer category | 0 | 4 | 16 |
| 19 | Flexible Sensor transducer value | 0 | 250 | 16 |
| 20 | Flexible sensor level units | 0 | 2 | 16 |
| 21-22 | Flexible sensor level value scaling | 0 | 999999 | 32 |
| 23-24 | Flexible sensor scaled level value |  |  | 32 |
| 25-255 | Reserved |  |  | 16 |

**60xx MkII family register allocation**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Max value | Bits/ sign |
| 0-15 | Unimplemented |  |  | 16 |
| 1 | Unimplemented (signed) |  |  | 16 |
| 2-15 | Unimplemented (odd numbered registers are signed 16) |  |  |  |
| 16 | Flexible sender A category | 0 | 4 | 16 |
| 17 | Flexible sender A value | 0 | 65535 | 16 |
| 18 | Flexible sender B category | 0 | 4 | 16 |
| 19 | Unimplemented | 0 | 65535 | 16 |
| 20 | Flexible sender C category | 0 | 4 | 16 |
| 21 | Flexible sender C value | 0 | 65535 | 16 |
| 22 | Flexible sender D category | 0 | 4 | 16 |
| 23 | Flexible sender D value | 0 | 65535 | 16 |
| 24-255 | Reserved |  |  | 16 |

**61xx MkII 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 | Flexible sender A analogue input sender category | 0 | 1 | 16 |
| 97 | Flexible sender A analogue input reading | 0 | 1 | 16 |
| 98 | Flexible sender A analogue input sender category | 0 | 1 | 16 |
| 99 | Flexible sender A analogue input reading | 0 | 1 | 16 |
| 100 | Flexible sender B analogue input sender category | 0 | 1 | 16 |
| 101 | Flexible sender B analogue input reading | 0 | 1 | 16 |
| 102 | Flexible sender B analogue input sender category | 0 | 1 | 16 |
| 103 | Flexible sender B analogue input reading | 0 | 1 | 16 |
| 104 | Flexible sender C analogue input sender category | 0 | 1 | 16 |
| 105 | Flexible sender C analogue input reading | 0 | 1 | 16 |
| 106 | Flexible sender C analogue input sender category | 0 | 1 | 16 |
| 107 | Flexible sender C analogue input reading | 0 | 1 | 16 |
| 108 | Flexible sender D analogue input sender category | 0 | 1 | 16 |
| 109 | Flexible sender D analogue input reading | 0 | 1 | 16 |
| 110 | Flexible sender D analogue input sender category | 0 | 1 | 16 |
| 111 | Flexible sender D analogue input reading | 0 | 1 | 16 |
| 112 | Maintenance alarm 1 (raw) | 0 | 1 | 16 |
| 113 | Maintenance alarm 1 (processed) | 0 | 1 | 16 |
| 114 | Maintenance alarm 2 (raw) | 0 | 1 | 16 |
| 115 | Maintenance alarm 2 (processed) | 0 | 1 | 16 |
| 116 | Maintenance alarm 3 (raw) | 0 | 1 | 16 |
| 117 | Maintenance alarm 3 (processed) | 0 | 1 | 16 |
| 118-255 | Reserved |  |  |  |

**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 | Unimplemented - reserved for Engine Maintenance alarm 1 (raw) | 0 | 1 | 16 |
| 149 | Unimplemented - reserved for Engine Maintenance alarm 1 (processed) | 0 | 1 | 16 |
| 150 | Unimplemented - reserved for Engine Maintenance alarm 2 (raw) | 0 | 1 | 16 |
| 151 | Unimplemented - reserved for Engine Maintenance alarm 2 (processed) | 0 | 1 | 16 |
| 152 | Unimplemented - reserved for Engine Maintenance alarm 3 (raw) | 0 | 1 | 16 |
| 153 | Unimplemented - reserved for Engine 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 |

**8xxx / 74xx family register allocation continued**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 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 |
| 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 |  |  |  |  |  |  |  |  |  |

| **Exxx register allocation** | | | | |  |
| --- | --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Max value | Bits/ sign | E800 |
| 0 | 2130 Expansion module 2 analogue input E sender category |  |  |  |  |
| 1 | 2130 Expansion module 2 analogue input E input reading |  |  |  |  |
| 2 | 2130 Expansion module 2 analogue input E sender category |  |  |  |  |
| 3 | 2130 Expansion module 2 analogue input E input reading |  |  |  |  |
| 4 | 2130 Expansion module 2 analogue input F sender category |  |  |  |  |
| 5 | 2130 Expansion module 2 analogue input F input reading |  |  |  |  |
| 6 | 2130 Expansion module 2 analogue input F sender category |  |  |  |  |
| 7 | 2130 Expansion module 2 analogue input F input reading |  |  |  |  |
| 8 | 2130 Expansion module 2 analogue input G sender category |  |  |  |  |
| 9 | 2130 Expansion module 2 analogue input G input reading |  |  |  |  |
| 10 | 2130 Expansion module 2 analogue input G sender category |  |  |  |  |
| 11 | 2130 Expansion module 2 analogue input G input reading |  |  |  |  |
| 12 | 2130 Expansion module 2 analogue input H sender category |  |  |  |  |
| 13 | 2130 Expansion module 2 analogue input H input reading |  |  |  |  |
| 14 | 2130 Expansion module 2 analogue input H sender category |  |  |  |  |
| 15 | 2130 Expansion module 2 analogue input H input reading |  |  |  |  |
| 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 |  |  |  |  |

| **Exxx register allocation (continued)** | | | | |  |
| --- | --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Max value | Bits/ sign | E800 |
| 128 | Internal flexible sender 1 analogue input sender category | 0 | 4 | 16 |  |
| 129 | Internal flexible sender 1 analogue input reading |  |  | 16 S |  |
| 130 | Internal flexible sender 1 analogue input sender category | 0 | 4 | 16 |  |
| 131 | Internal flexible sender 1 analogue input reading |  |  | 16 S |  |
| 132 | Internal flexible sender 2 analogue input sender category | 0 | 4 | 16 |  |
| 133 | Internal flexible sender 2 analogue input reading |  |  | 16 S |  |
| 134 | Internal flexible sender 2 analogue input sender category | 0 | 4 | 16 |  |
| 135 | Internal flexible sender 2 analogue input reading |  |  | 16 S |  |
| 136 | Internal flexible sender 3 analogue input sender category | 0 | 4 | 16 |  |
| 137 | Internal flexible sender 3 analogue input reading |  |  | 16 S |  |
| 138 | Internal flexible sender 3 analogue input sender category | 0 | 4 | 16 |  |
| 139 | Internal flexible sender 3 analogue input reading |  |  | 16 S |  |
| 140 | Internal flexible sender 4 analogue input sender category | 0 | 4 | 16 |  |
| 141 | Internal flexible sender 4 analogue input reading |  |  | 16 S |  |
| 142 | Internal flexible sender 4 analogue input sender category | 0 | 4 | 16 |  |
| 143 | Internal flexible sender 4 analogue input reading |  |  | 16 S |  |
| 144 | Internal flexible sender 5 analogue input sender category | 0 | 4 | 16 |  |
| 145 | Internal flexible sender 5 analogue input reading |  |  | 16 S |  |
| 146 | Internal flexible sender 5 analogue input sender category | 0 | 4 | 16 |  |
| 147 | Internal flexible sender 5 analogue input reading |  |  | 16 S |  |
| 148 | Internal flexible sender 6 analogue input sender category | 0 | 4 | 16 |  |
| 149 | Internal flexible sender 6 analogue input reading |  |  | 16 S |  |
| 150 | Internal flexible sender 6 analogue input sender category | 0 | 4 | 16 |  |
| 151 | Internal flexible sender 6 analogue input reading |  |  | 16 S |  |
| 152 | Internal flexible sender 7 analogue input sender category | 0 | 4 | 16 |  |
| 153 | Internal flexible sender 7 analogue input reading |  |  | 16 S |  |
| 154 | Internal flexible sender 7 analogue input sender category | 0 | 4 | 16 |  |
| 155 | Internal flexible sender 7 analogue input reading |  |  | 16 S |  |
| 156 | Internal flexible sender 8 analogue input sender category | 0 | 4 | 16 |  |
| 157 | Internal flexible sender 8 analogue input reading |  |  | 16 S |  |
| 158 | Internal flexible sender 8 analogue input sender category | 0 | 4 | 16 |  |
| 159 | Internal flexible sender 8 analogue input reading |  |  | 16 S |  |
| 160 | Internal flexible sender 9 analogue input sender category | 0 | 4 | 16 |  |
| 161 | Internal flexible sender 9 analogue input reading |  |  | 16 S |  |
| 162 | Internal flexible sender 9 analogue input sender category | 0 | 4 | 16 |  |
| 163 | Internal flexible sender 9 analogue input reading |  |  | 16 S |  |
| 164 | Internal flexible sender 10 analogue input sender category | 0 | 4 | 16 |  |
| 165 | Internal flexible sender 10 analogue input reading |  |  | 16 S |  |
| 166 | Internal flexible sender 10 analogue input sender category | 0 | 4 | 16 |  |
| 167 | Internal flexible sender 10 analogue input reading |  |  | 16 S |  |
| 168 | Internal flexible sender 11 analogue input sender category | 0 | 4 | 16 |  |
| 169 | Internal flexible sender 11 analogue input reading |  |  | 16 S |  |
| 170 | Internal flexible sender 11 analogue input sender category | 0 | 4 | 16 |  |
| 171 | Internal flexible sender 11 analogue input reading |  |  | 16 S |  |
| 172 | Internal flexible sender 12 analogue input sender category | 0 | 4 | 16 |  |
| 173 | Internal flexible sender 12 analogue input reading |  |  | 16 S |  |
| 174 | Internal flexible sender 12 analogue input sender category | 0 | 4 | 16 |  |
| 175 | Internal flexible sender 12 analogue input reading |  |  | 16 S |  |
| 176-181 | Reserved |  |  |  |  |

| **Exxx register allocation (continued)** | | | | |  |
| --- | --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Max value | Bits/ sign | E800 |
| 182 | PLC alarm 1 trigger |  |  | 16 |  |
| 183 | PLC alarm 1 condition |  |  | 16 |  |
| 184 | PLC alarm 2 trigger |  |  | 16 |  |
| 185 | PLC alarm 2 condition |  |  | 16 |  |
| 186 | PLC alarm 3 trigger |  |  | 16 |  |
| 187 | PLC alarm 3 condition |  |  | 16 |  |
| 188 | PLC alarm 4 trigger |  |  | 16 |  |
| 189 | PLC alarm 4 condition |  |  | 16 |  |
| 190 | PLC alarm 5 trigger |  |  | 16 |  |
| 191 | PLC alarm 5 condition |  |  | 16 |  |
| 192 | PLC alarm 6 trigger |  |  | 16 |  |
| 193 | PLC alarm 6 condition |  |  | 16 |  |
| 194 | PLC alarm 7 trigger |  |  | 16 |  |
| 195 | PLC alarm 7 condition |  |  | 16 |  |
| 196 | PLC alarm 8 trigger |  |  | 16 |  |
| 197 | PLC alarm 8 condition |  |  | 16 |  |
| 198 | PLC alarm 9 trigger |  |  | 16 |  |
| 199 | PLC alarm 9 condition |  |  | 16 |  |
| 200 | PLC alarm 10 trigger |  |  | 16 |  |
| 201 | PLC alarm 10 condition |  |  | 16 |  |
| 202 | PLC alarm 11 trigger |  |  | 16 |  |
| 203 | PLC alarm 11 condition |  |  | 16 |  |
| 204 | PLC alarm 12 trigger |  |  | 16 |  |
| 205 | PLC alarm 12 condition |  |  | 16 |  |
| 206 | PLC alarm 13 trigger |  |  | 16 |  |
| 207 | PLC alarm 13 condition |  |  | 16 |  |
| 208 | PLC alarm 14 trigger |  |  | 16 |  |
| 209 | PLC alarm 14 condition |  |  | 16 |  |
| 210 | PLC alarm 15 trigger |  |  | 16 |  |
| 211 | PLC alarm 15 condition |  |  | 16 |  |
| 212 | PLC alarm 16 trigger |  |  | 16 |  |
| 213 | PLC alarm 16 condition |  |  | 16 |  |
| 214 | PLC alarm 17 trigger |  |  | 16 |  |
| 215 | PLC alarm 17 condition |  |  | 16 |  |
| 216 | PLC alarm 18 trigger |  |  | 16 |  |
| 217 | PLC alarm 18 condition |  |  | 16 |  |
| 218 | PLC alarm 19 trigger |  |  | 16 |  |
| 219 | PLC alarm 19 condition |  |  | 16 |  |
| 220 | PLC alarm 20 trigger |  |  | 16 |  |
| 221 | PLC alarm 20 condition |  |  | 16 |  |
| 222 | 2133 Expansion module 0 analogue input A input reading |  |  | 16S |  |
| 223 | 2133 Expansion module 0 analogue input B input reading |  |  | 16S |  |
| 224 | 2133 Expansion module 0 analogue input C input reading |  |  | 16S |  |
| 225 | 2133 Expansion module 0 analogue input D input reading |  |  | 16S |  |
| 226 | 2133 Expansion module 0 analogue input E input reading |  |  | 16S |  |
| 227 | 2133 Expansion module 0 analogue input F input reading |  |  | 16S |  |
| 228 | 2133 Expansion module 0 analogue input G input reading |  |  | 16S |  |
| 229 | 2133 Expansion module 0 analogue input H input reading |  |  | 16S |  |
| 230-231 | 2133 Expansion module 1 analogue inputs A-H input readings |  |  | 16S |  |
| 232-233 | 2133 Expansion module 2 analogue inputs A-H input readings |  |  | 16S |  |
| 234-235 | 2133 Expansion module 3 analogue inputs A-H input readings |  |  | 16S |  |
| 236-255 | Reserved |  |  |  |  |

## 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

**P100 family 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 | Common Trip LED | 0 | 65535 | 16 | Read only |
| 11 | Common Trip LED | 0 | 1 | 16 | Read only |
| 12 | Voltage alarms green LED | 0 | 65535 | 16 | Read only |
| 13 | Voltage alarms green LED | 0 | 1 | 16 | Read only |
| 14 | Voltage alarms red LED | 0 | 65535 | 16 | Read only |
| 15 | Voltage alarms red LED | 0 | 1 | 16 | Read only |
| 16 | Frequency alarms green LED | 0 | 65535 | 16 | Read only |
| 17 | Frequency alarms green LED | 0 | 1 | 16 | Read only |
| 18 | Frequency alarms red LED | 0 | 65535 | 16 | Read only |
| 19 | Frequency alarms red LED | 0 | 1 | 16 | Read only |
| 20 | ROCOF alarm LED | 0 | 1 | 16 | Read only |
| 21 | ROCOF alarm LED | 0 | 65535 | 16 | Read only |
| 22 | Vector Shift LED | 0 | 1 | 16 | Read only |
| 23 | Vector Shift LED | 0 | 65535 | 16 | Read only |
| 24 | Alternate configuration LED | 0 | 1 | 16 | Read only |
| 25 | Alternate configuration LED | 0 | 65535 | 16 | Read only |
| 26 | Supervision enabled LED | 0 | 1 | 16 | Read only |
| 27 | Supervision enabled LED | 0 | 65535 | 16 | Read only |
| 28-63 | Reserved |  |  |  |  |

**61xx MkII 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 | Reserved | 0 | 65535 | 16 | Read only |
| 13 | Reserved | 0 | 1 | 16 | Read only |
| 14 | Reserved | 0 | 65535 | 16 | Read only |
| 15 | Reserved | 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 | Warning LED Source | 0 | 65535 | 16 | Read only |
| 33 | Warning LED polarity | 0 | 1 | 16 | Read only |
| 34 | USER LCD 1 source (USER LCD 1) | 0 | 65535 | 16 | Read only |
| 35 | USER LCD 1 polarity (USER LCD 1) | 0 | 1 | 16 | Read only |
| 36 | USER LCD 2 source (USER LCD 2) | 0 | 65535 | 16 | Read only |
| 37 | USER LCD 2 polarity (USER LCD 2) | 0 | 1 | 16 | Read only |
| 38 | USER LCD 3 source (USER LCD 3) | 0 | 65535 | 16 | Read only |
| 39 | USER LCD 3 polarity (USER LCD 3) | 0 | 1 | 16 | Read only |
| 40-63 | Reserved |  |  |  |  |

**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 |  |  |  |  |

| **Exxx register allocations 0-63** | | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| Register offset | Name | Min  value | Max  value | Bits/ sign | Read/write | E800 |
| 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 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 C 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 | OFF LED source (OFF) | 0 | 1 | 16 | Read only |  |
| 25 | OFF LED polarity (OFF) | 0 | 65535 | 16 | Read only |  |
| 26 | MANUAL LED source (MANUAL) | 0 | 1 | 16 | Read only |  |
| 27 | MANUAL LED polarity (MANUAL) | 0 | 65535 | 16 | Read only |  |
| 28 | AUTO LED source (AUTO) | 0 | 1 | 16 | Read only |  |
| 29 | AUTO LED polarity (AUTO) | 0 | 65535 | 16 | Read only |  |
| 30 | STOP LED source (STOP) | 0 | 1 | 16 | Read only |  |
| 31 | STOP LED polarity (STOP) | 0 | 65535 | 16 | Read only |  |
| 32 | USER LED 1 source (USER LED 1) | 0 | 1 | 16 | Read only |  |
| 33 | USER LED 1 polarity (USER LED 1) | 0 | 65535 | 16 | Read only |  |
| 34 | USER LED 2 source (USER LED 2) | 0 | 1 | 16 | Read only |  |
| 35 | USER LED 2 polarity (USER LED 2) | 0 | 65535 | 16 | Read only |  |
| 36 | USER LED 3 source (USER LED 3) | 0 | 1 | 16 | Read only |  |
| 37 | USER LED 3 polarity (USER LED 3) | 0 | 65535 | 16 | Read only |  |
| 38 | USER LED 4 source (USER LED 4) | 0 | 1 | 16 | Read only |  |
| 39 | USER LED 4 polarity (USER LED 4) | 0 | 65535 | 16 | Read only |  |
| 40 | PWM 1 Digital output source | 0 | 65535 | 16 | Read only |  |
| 41 | PWM 1 Digital output polarity | 0 | 1 | 16 | Read only |  |
| 42 | PWM 2 Digital output source | 0 | 65535 | 16 | Read only |  |
| 43 | PWM 2 Digital output polarity | 0 | 1 | 16 | Read only |  |
| 44 | PWM 3 Digital output source | 0 | 65535 | 16 | Read only |  |
| 45 | PWM 3 Digital output polarity | 0 | 1 | 16 | Read only |  |
| 46 | PWM 4 Digital output source | 0 | 65535 | 16 | Read only |  |
| 47 | PWM 4 Digital output polarity | 0 | 1 | 16 | Read only |  |
| 48-63 | Reserved |  |  |  |  |  |

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

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Max  value | Bits/ sign | 8xxx/ 74xx | 72xx/  73xx | 335 | E800 |
| 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 |

## 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/E800 Common family register allocations 0-255 continued**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Register offset | Name | Minimum value | Maximum value | Bits/ sign | 8xxx/ 74xx/ E800 | 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 |  |  |  |  |  |  |

## 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 |  |  |  |  |  |  |

## 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 |  |  |  |  |  |  |

## 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 |  |  |  |  |

## Page 185 – PWM Analogue output sources, types and values

1. The PWM output control type indicates whether the PWM is used as a digital output (see pages 180 and 190) or as an analogue output.
2. The analogue output source list is the same as the list in the E800 configuration and is not duplicated here.
3. The analogue output type is described in the table below.
4. The analogue output frequencies are in Hz \* 10
5. The analogue output duty cycle is in 0.01%.

**E800 Registers**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Register offset | Name | Minimum value | Maximum value | Scaling Factor | Units | Bits/ sign | Read/write |
| 0 | PWM 1 output control type | 0 | 1 | 1 | - | 16 | Read only |
| 1 | PWM 1 analogue output frequency | 0 | 2500 | 0.1 | Hz | 16 | Read only |
| 2 | PWM 1 analogue output source | 0 | 65535 | 1 | - | 16 | Read only |
| 3 | PWM 1 analogue output type | 0 | 1 | 1 | - | 16 | Read only |
| 4 | PWM 2 output control type | 0 | 1 | 1 | - | 16 | Read only |
| 5 | PWM 2 analogue output frequency | 0 | 20000 | 0.1 | Hz | 16 | Read only |
| 6 | PWM 2 analogue output source | 0 | 65535 | 1 | - | 16 | Read only |
| 7 | PWM 2 analogue output type | 0 | 1 | 1 | - | 16 | Read only |
| 8 | PWM 3 output control type | 0 | 1 | 1 | - | 16 | Read only |
| 9 | PWM 3 analogue output frequency | 0 | 20000 | 0.1 | Hz | 16 | Read only |
| 10 | PWM 3 analogue output source | 0 | 65535 | 1 | - | 16 | Read only |
| 11 | PWM 3 analogue output type | 0 | 1 | 1 | - | 16 | Read only |
| 12 | PWM 4 output control type | 0 | 1 | 1 | - | 16 | Read only |
| 12 | PWM 4 analogue output frequency | 0 | 20000 | 0.1 | Hz | 16 | Read only |
| 13 | PWM 4 analogue output source | 0 | 65535 | 1 | - | 16 | Read only |
| 15 | PWM 4 analogue output type | 0 | 1 | 1 | - | 16 | Read only |
| 16-31 | Reserved |  |  |  |  |  | Read only |
| 32 | PWM 1 analogue output duty cycle | 0 | 1000 | 0.1 | % | 16S | Read only |
| 33 | PWM 2 analogue output duty cycle | 0 | 1000 | 0.1 | % | 16S | Read only |
| 34 | PWM 3 analogue output duty cycle | 0 | 1000 | 0.1 | % | 16S | Read only |
| 35 | PWM 4 analogue output duty cycle | 0 | 1000 | 0.1 | % | 16S | Read only |
| 20-255 | Reserved |  |  |  |  |  |  |

**Output control types**

|  |  |
| --- | --- |
| Type code | Type |
| 0 | Digital output |
| 1 | PWM Analogue output |
| 2-65535 | Reserved |

**Analogue Output types and value ranges**

|  |  |
| --- | --- |
| Type code | Type |
| 0 | 0-1A Current |
| 1 | 0-4A Current |
| 2-65535 | Reserved |

## 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.

**P100 family 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 | Common trip LED status | 0 | 1 | 16 |
| 6 | Common voltage alarm green LED status | 0 | 1 | 16 |
| 7 | Common voltage alarm red LED status | 0 | 1 | 16 |
| 8 | Common frequency alarm green LED status | 0 | 1 | 16 |
| 9 | Common frequency alarm red LED status | 0 | 1 | 16 |
| 10 | ROCOF alarm LED status | 0 | 1 | 16 |
| 11 | Vector shift alarm LED status | 0 | 1 | 16 |
| 12 | Alternate config selected LED status | 0 | 1 | 16 |
| 13 | Supervision enabled LED status | 0 | 1 | 16 |
| 14-31 | Reserved |  |  |  |

**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 |  |  |  |

| **Exxx register allocation 0-255** | | | | |  |
| --- | --- | --- | --- | --- | --- |
| Register offset | Name | Min  value | Max  value | Bits/ sign | E800 |
| 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 | OFF LED status (OFF) | 0 | 1 | 16 |  |
| 13 | MANUAL LED status (MANUAL) | 0 | 1 | 16 |  |
| 14 | AUTO LED status (AUTO) | 0 | 1 | 16 |  |
| 15 | STOP LED status(STOP) | 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 | PWM 1 digital output status | 0 | 1 | 16 |  |
| 21 | PWM 2 digital output status | 0 | 1 | 16 |  |
| 22 | PWM 3 digital output status | 0 | 1 | 16 |  |
| 23 | PWM 4 digital output status | 0 | 1 | 16 |  |
| 24-31 | Reserved | 0 | 1 | 16 |  |

**Common register allocation 32-255**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Register offset | Name | Minimum value | Maximum value | Bits/ sign | 8xxx/ 74xx | 73xx | 335 | P100 |
| 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 |

## 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 |  |  |  |  |  |  |

## Page 192 – PLC Maths Registers

1. This page return the value of plc elements.

**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 |
| 9-15 | Reserved |  |  |  |  |  |  |
| 16-17 | PLC Data store 1 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| 18-19 | PLC Data store 2 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| 20-21 | PLC Data store 3 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| 22-23 | PLC Data store 4 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| 24-25 | PLC Data store 5 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| 26-27 | PLC Data store 6 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| 28-29 | PLC Data store 7 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| 30-31 | PLC Data store 8 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| 32-63 | Unimplemented |  |  |  |  | 32 S | Read Only |
| 64-65 | PLC Data Register 1 | -2147483648 | 2147483647 |  |  | 32 S | Read Only |
| 66-67 | PLC Data Register 2 | -2147483648 | 2147483647 |  |  | 32 S | Read Only |
| 68-69 | PLC Data Register 3 | -2147483648 | 2147483647 |  |  | 32 S | Read Only |
| 70-71 | PLC Data Register 4 | -2147483648 | 2147483647 |  |  | 32 S | Read Only |
| 72-73 | PLC Data Register 5 | -2147483648 | 2147483647 |  |  | 32 S | Read Only |
| 74-75 | PLC Data Register 6 | -2147483648 | 2147483647 |  |  | 32 S | Read Only |
| 76-77 | PLC Data Register 7 | -2147483648 | 2147483647 |  |  | 32 S | Read Only |
| 78-79 | PLC Data Register 8 | -2147483648 | 2147483647 |  |  | 32 S | Read Only |
| 80-81 | PLC Data Register 9 | -2147483648 | 2147483647 |  |  | 32 S | Read Only |
| 82-83 | PLC Data Register 10 | -2147483648 | 2147483647 |  |  | 32 S | Read Only |
| 84-85 | PLC Data Register 11 | -2147483648 | 2147483647 |  |  | 32 S | Read Only |
| 86-87 | PLC Data Register 12 | -2147483648 | 2147483647 |  |  | 32 S | Read Only |
| 88-89 | PLC Data Register 13 | -2147483648 | 2147483647 |  |  | 32 S | Read Only |
| 90-91 | PLC Data Register 14 | -2147483648 | 2147483647 |  |  | 32 S | Read Only |
| 92-93 | PLC Data Register 15 | -2147483648 | 2147483647 |  |  | 32 S | Read Only |
| 94-95 | PLC Data Register 16 | -2147483648 | 2147483647 |  |  | 32 S | Read Only |
| 96-97 | PLC Data Register 17 | -2147483648 | 2147483647 |  |  | 32 S | Read Only |
| 98-99 | PLC Data Register 18 | -2147483648 | 2147483647 |  |  | 32 S | Read Only |
| 100-101 | PLC Data Register 19 | -2147483648 | 2147483647 |  |  | 32 S | Read Only |
| 102-103 | PLC Data Register 20 | -2147483648 | 2147483647 |  |  | 32 S | Read Only |
| 104-128 | Unimplemented |  |  |  |  | 32 S | Read Only |
| 128-129 | PLC Timer value 1 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 130-131 | PLC Timer value 2 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 132-133 | PLC Timer value 3 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 134-135 | PLC Timer value 4 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 136-137 | PLC Timer value 5 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 138-139 | PLC Timer value 6 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 140-141 | PLC Timer value 7 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 142-143 | PLC Timer value 8 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 144-145 | PLC Timer value 9 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 146-147 | PLC Timer value 10 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 148-149 | PLC Timer value 11 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 150-151 | PLC Timer value 12 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 152-153 | PLC Timer value 13 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 154-155 | PLC Timer value 14 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 156-157 | PLC Timer value 15 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 158-159 | PLC Timer value 16 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 160-161 | PLC Timer value 17 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 162-163 | PLC Timer value 18 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 164-165 | PLC Timer value 19 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 166-167 | PLC Timer value 20 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 169-191 | Unimplemented |  |  |  |  | 32 S | Read Only |
| 192-193 | PLC Counter value 1 | 0 | 999 999 |  |  | 32 S | Read Only |
| 194-195 | PLC Counter value 2 | 0 | 999 999 |  |  | 32 S | Read Only |
| 196-197 | PLC Counter value 3 | 0 | 999 999 |  |  | 32 S | Read Only |
| 198-199 | PLC Counter value 4 | 0 | 999 999 |  |  | 32 S | Read Only |
| 200-201 | PLC Counter value 5 | 0 | 999 999 |  |  | 32 S | Read Only |
| 202-203 | PLC Counter value 6 | 0 | 999 999 |  |  | 32 S | Read Only |
| 204-205 | PLC Counter value 7 | 0 | 999 999 |  |  | 32 S | Read Only |
| 206-207 | PLC Counter value 8 | 0 | 999 999 |  |  | 32 S | Read Only |
| 208-209 | PLC Counter value 9 | 0 | 999 999 |  |  | 32 S | Read Only |
| 210-211 | PLC Counter value 10 | 0 | 999 999 |  |  | 32 S | Read Only |
| 212-213 | PLC Counter value 11 | 0 | 999 999 |  |  | 32 S | Read Only |
| 214-215 | PLC Counter value 12 | 0 | 999 999 |  |  | 32 S | Read Only |
| 216-217 | PLC Counter value 13 | 0 | 999 999 |  |  | 32 S | Read Only |
| 218-219 | PLC Counter value 14 | 0 | 999 999 |  |  | 32 S | Read Only |
| 220-221 | PLC Counter value 15 | 0 | 999 999 |  |  | 32 S | Read Only |
| 222-223 | PLC Counter value 16 | 0 | 999 999 |  |  | 32 S | Read Only |
| 224-225 | PLC Counter value 17 | 0 | 999 999 |  |  | 32 S | Read Only |
| 226-227 | PLC Counter value 18 | 0 | 999 999 |  |  | 32 S | Read Only |
| 228-229 | PLC Counter value 19 | 0 | 999 999 |  |  | 32 S | Read Only |
| 230-231 | PLC Counter value 20 | 0 | 999 999 |  |  | 32 S | Read Only |
| 232-255 | Unimplemented |  |  |  |  | 32 S | Read Only |

## 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 |  |  |  |  |  |  |

## 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.
6. In the 86xx/74xx there are 17 pages of strings reserved for the expansion alarms.

**61xx MkII 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 | Flexible Sensor A Digital input active string | UNICODE | UNICODE | 512 |
|  | 224 | Flexible Sensor B Digital input active string | UNICODE | UNICODE | 512 |
| 201 | 0 | Flexible Sensor C Digital input active string | UNICODE | UNICODE | 512 |
|  | 32 | Flexible Sensor D Digital input active string | UNICODE | UNICODE | 512 |
|  | 64 | Reserved (for digital input K-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 |
| 204-211 | 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 |
| 214-221 |  | Reserved for 2130 Expansion modules 4-9 inputs E-H strings | UNICODE | UNICODE | 512 |

**61xx MkII family register allocation continued**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 222 | 0 | Flexible sender input A (low) string | UNICODE | UNICODE | 512 |
|  | 32 | Flexible sender input A (high) string | UNICODE | UNICODE | 512 |
|  | 64 | Flexible sender input B (low) string | UNICODE | UNICODE | 512 |
|  | 96 | Flexible sender input B (high) string | UNICODE | UNICODE | 512 |
|  | 128 | Flexible sender input C (low) string | UNICODE | UNICODE | 512 |
|  | 160 | Flexible sender input C (high) string | UNICODE | UNICODE | 512 |
|  | 192 | Flexible sender input D (low) string | UNICODE | UNICODE | 512 |
|  | 224 | Flexible sender input D (high) string | UNICODE | UNICODE | 512 |
| 223 | 0 | Maintenance alarm 1 string | UNICODE | UNICODE | 512 |
|  | 32 | Maintenance alarm 2 string | UNICODE | UNICODE | 512 |
| 64 | Maintenance alarm 3 string | 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 |
| 224 | 0 | Reserved | 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 |
| 225 | 0 | Reserved | 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 |  |  |  |

**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 | Engine Maintenance alarm 1 string | UNICODE | UNICODE | 512 |
|  | 96 | Engine Maintenance alarm 2 string | UNICODE | UNICODE | 512 |
|  | 128 | Engine Maintenance alarm 3 string | UNICODE | UNICODE | 512 |
|  | 160 | PLC function1 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 for future PLC function strings | UNICODE | UNICODE | 512 |
|  | 64 | UNICODE | UNICODE | 512 |
|  | 96 | UNICODE | UNICODE | 512 |
|  | 128 | UNICODE | UNICODE | 512 |
|  | 160 | UNICODE | UNICODE | 512 |
|  | 192 | UNICODE | UNICODE | 512 |
|  | 224 | UNICODE | UNICODE | 512 |
| 229-231 |  | Reserved for future PLC function strings | UNICODE | UNICODE | 512 |
| 232 | 0 | Plant Battery Maintenance alarm 1 string | UNICODE | UNICODE | 512 |
|  | 32 | Plant Battery Maintenance alarm 2 string | UNICODE | UNICODE | 512 |
|  | 64 | Plant Battery Maintenance alarm 3 string | 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 |
| 233-239 |  | 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 |  |  |  |

| **Exxx 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 | Reserved | UNICODE | UNICODE | 512 |
|  | 128 | Reserved | UNICODE | UNICODE | 512 |
|  | 160 | Reserved | UNICODE | UNICODE | 512 |
|  | 192 | Reserved | UNICODE | UNICODE | 512 |
|  | 224 | Reserved | UNICODE | UNICODE | 512 |
| 202 | 0 | Flex Digital input A active string | UNICODE | UNICODE | 512 |
|  | 32 | Flex Digital input B active string | UNICODE | UNICODE | 512 |
|  | 64 | Flex Digital input C active string | UNICODE | UNICODE | 512 |
|  | 96 | Flex Digital input D active string | UNICODE | UNICODE | 512 |
|  | 128 | Flex Digital input E active string | UNICODE | UNICODE | 512 |
|  | 160 | Flex Digital input F active string | UNICODE | UNICODE | 512 |
|  | 192 | Flex Digital input G active string | UNICODE | UNICODE | 512 |
|  | 224 | Flex Digital input H active string | UNICODE | UNICODE | 512 |
| 203 | 0 | Flex Digital input I active string | UNICODE | UNICODE | 512 |
|  | 32 | Flex Digital input J active string | UNICODE | UNICODE | 512 |
|  | 64 | Flex Digital input K active string | UNICODE | UNICODE | 512 |
|  | 96 | Flex Digital input L active string | UNICODE | UNICODE | 512 |
|  | 128 | Reserved | UNICODE | UNICODE | 512 |
|  | 160 | Reserved | UNICODE | UNICODE | 512 |
|  | 192 | Reserved | UNICODE | UNICODE | 512 |
|  | 224 | Reserved | 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 |
| 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 | Internal flexible sender 6 input (low) string | UNICODE | UNICODE | 512 |
|  | 96 | Internal flexible sender 6 input (high) string | UNICODE | UNICODE | 512 |
|  | 128 | Internal flexible sender 7 input (low) string | UNICODE | UNICODE | 512 |
|  | 160 | Internal flexible sender 7 input (high) string | UNICODE | UNICODE | 512 |
|  | 192 | Internal flexible sender 8 input (low) string | UNICODE | UNICODE | 512 |
|  | 224 | Internal flexible sender 8 input (high) string | UNICODE | UNICODE | 512 |
| 226 | 0 | Internal flexible sender 9 input (low) string | UNICODE | UNICODE | 512 |
|  | 32 | Internal flexible sender 9 input (high) string | UNICODE | UNICODE | 512 |
|  | 64 | Internal flexible sender 10 input (low) string | UNICODE | UNICODE | 512 |
|  | 96 | Internal flexible sender 10 input (high) string | UNICODE | UNICODE | 512 |
|  | 128 | Internal flexible sender 11 input (low) string | UNICODE | UNICODE | 512 |
|  | 160 | Internal flexible sender 11 input (high) string | UNICODE | UNICODE | 512 |
|  | 192 | Internal flexible sender 12 input (low) string | UNICODE | UNICODE | 512 |
|  | 224 | Internal flexible sender 12 input (high) string | UNICODE | UNICODE | 512 |
| 227 | 0 | Engine Maintenance alarm 1 string | UNICODE | UNICODE | 512 |
|  | 32 | Engine Maintenance alarm 2 string | UNICODE | UNICODE | 512 |
|  | 64 | Engine Maintenance alarm 3 string | UNICODE | UNICODE | 512 |
|  | 96 | PLC function1 string | UNICODE | UNICODE | 512 |
|  | 128 | PLC function 2 string | UNICODE | UNICODE | 512 |
|  | 160 | PLC function 3 string | UNICODE | UNICODE | 512 |
|  | 192 | PLC function 4 string | UNICODE | UNICODE | 512 |
|  | 224 | PLC function 5 string | UNICODE | UNICODE | 512 |
| 228 | 0 | PLC function 6 string | UNICODE | UNICODE | 512 |
|  | 32 | PLC function 7 string | UNICODE | UNICODE | 512 |
|  | 64 | PLC function 8 string | UNICODE | UNICODE | 512 |
|  | 96 | PLC function 9 string | UNICODE | UNICODE | 512 |
|  | 128 | PLC function 10 string | UNICODE | UNICODE | 512 |
|  | 160 | PLC function 11 string | UNICODE | UNICODE | 512 |
|  | 192 | PLC function 12 string | UNICODE | UNICODE | 512 |
|  | 224 | PLC function 13 string | UNICODE | UNICODE | 512 |
| 229 | 0 | PLC function 14 string | UNICODE | UNICODE | 512 |
|  | 32 | PLC function 15 string | UNICODE | UNICODE | 512 |
|  | 64 | PLC function 16 string | UNICODE | UNICODE | 512 |
|  | 96 | PLC function 17 string | UNICODE | UNICODE | 512 |
|  | 128 | PLC function 18 string | UNICODE | UNICODE | 512 |
|  | 160 | PLC function 19 string | UNICODE | UNICODE | 512 |
|  | 192 | PLC function 20 string | UNICODE | UNICODE | 512 |
|  | 224 | Reserved for future PLC function strings | UNICODE | UNICODE | 512 |
| 230-239 |  | Reserved |  |  |  |

**P100 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 |

## 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 |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Exxx 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 | Internal Flexible sender 6 name string | UNICODE | UNICODE | 512 |
|  | 192 | Internal Flexible sender 7 name string | UNICODE | UNICODE | 512 |
|  | 224 | Internal Flexible sender 8 name string | UNICODE | UNICODE | 512 |
| 246 | 0 | Internal Flexible sender 9 name string | UNICODE | UNICODE | 512 |
|  | 32 | Internal Flexible sender 10 name string | UNICODE | UNICODE | 512 |
|  | 64 | Internal Flexible sender 11 name string | UNICODE | UNICODE | 512 |
|  | 96 | Internal Flexible sender 12 name string | UNICODE | UNICODE | 512 |
|  | 128 | Configurable output 1 string | UNICODE | UNICODE | 512 |
|  | 160 | Configurable output 2 string | UNICODE | UNICODE | 512 |
|  | 192 | Configurable output 3 string | UNICODE | UNICODE | 512 |
|  | 224 | Reserved |  |  |  |

## 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 |

94xx Battery Charger

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Page | Register offset | Name | Minimum value | Maximum value | Bits |
| 250 | 0 | Site ID | UNICODE | UNICODE | 512 |
|  | 32 | Charger ID | 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 |

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_