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

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# 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.

Version 2.58

In section 10.38, ‘Boot in tripped mode’ alarm added.

Version 2.59

Page 10 register 11 resolution corrected to 0.1 degrees.

Page 10 register 12 renamed Auxiliary Supply voltage

Version 2.60

Added references for the L40x series.

Page 6: Added L40x to “8xxx/74xx/P100” register allocation title

Page 7: Added L40x to “8xxx/74xx” register allocation title

Page 153: Added L40x unnamed alarm conditions table

Page 154: Added L40x named alarm conditions table

Page 160: Added L40x unnamed alarm function table

Page 170: Added L40x unnamed input status table

Page 180: Added L40x to “72xx/73xx” register allocation title

Page 190: Added L40x to “72xx/73xx” register allocation title

Version 2.61

Added references for the 4xxx series.

Page 6: Added 4xxx to “8xxx/74xx/P100/L40x” register allocation title

Page 7: Added 4xxx to “8xxx/74xx/L40x” register allocation title

Page 153: Added 4xxx to “L40x” register allocation title

Page 154: Added 4xxx to “L40x” register allocation title

Page 160: Added 4xxx to “L40x” register allocation title

Page 170: Added 4xxx to “L40x” register allocation title

Page 171: Added “L40x/4xxx” Unnamed input status continued table

Page 180: Added 4xxx to “72xx/73xx/L40x” register allocation title

Page 190: Added 4xxx to “72xx/73xx/L40x” register allocation title

Version 2.62

Added references for the 66xx series

Page 6: Added 66xx to “8xxx/74xx/P100/L40x/4xxx” register allocation title

Page 7: Added 66xx to “8xxx/74xx/L40x/4xxx” register allocation title

Pages 153,154,160,170,171,180 + 190: Added 66xx to register allocation titles containing “L40x/4xxx”

Version 2.63

Added references for the 71xx series

Page 6: Changed 74xx to 7xxx in the “8xxx/74xx/66xx/P100/L40x/4xxx” register allocation title

Page 7: Changed 74xx to 7xxx in the “8xxx/74xx/66xx/P100/L40x/4xxx” register allocation title

Pages 153,154,160,170,171,180 + 190: Added 71xx to register allocation titles containing “L40x/4xxx”

Version 2.64

Added references for the 60xx series

Page 6: Changed 66xx to 6xxx in the “8xxx/7xxx/66xx/P100/L40x/4xxx” register allocation title

Page 7: Changed 66xx to 6xxx in the “8xxx/7xxx/66xx/P100/L40x/4xxx” register allocation title

Page 153: Added 60xx to the register allocation title containing “L40x/4xxx”, also included additional elements

Page 154: Added 60xx to the register allocation title containing “L40x/4xxx”

Page 160: Added 60xx to the register allocation title containing “L40x/4xxx”, also included additional elements

Page 170: Removed existing register allocation table containing “L40x/4xxx”, combined with existing 60xx table.

Page 180 + 190: Added 60xx to the register allocation title containing “L40x/4xxx”

Version 2.65

Added references for the 61xx series

Page 153: Changed 66xx/60xx to 6xxx in the register allocation title containing “L40x/4xxx”

Page 154: Added 61xx to the “72xx/73xx” family register allocation title

Page 160: Changed 66xx/60xx to 6xxx in the register allocation title containing “L40x/4xxx”

Page 170: Changed 66xx/60xx to 6xxx in the register allocation title containing “L40x/4xxx”

Page 171: Added 61xx to the register allocation title containing “L40x/4xxx”

Page 180 + 190: Changed 66xx/60xx to 6xxx in the register allocation title containing “L40x/4xxx”

Version 2.66

Page 10 Register 7 voltage and frequency flags swapped to match V2 PCB to avoid confusion.

Page 10 Register 22 added.

Version 2.67

Page 10 register 64 added.

Version 2.68

In page 16: Added control keys for Stopping Manual/Forced DPF Regeneration.

In page 154: Amended alarm condition code table to add new code 5 for Controlled Shutdown

Version 2.69

In page 5: Added engine instruments for T4 Selective Catalytic Reduction – Diesel Exhaust Fuel (SCR – DEF).

Version 2.70

In page 5: Swap 947x registers 188 + 189 (ambient/PCB temperatures) around.

Version 2.71

Page 245: 61xx flexible sensor strings

Version 2.72

Page 10: Registers 23-26 added and AVR status 6 and 7 added.

Version 2.73

Page 5: Registers 191-205 (SCR-DEF instruments) amended.

Version 2.74

Page 154: Added DEF and SCR alarms for E800.

Version 2.75

Page 154: Added Generator Under Loaded alarm.

Version 2.76

Page 5: Registers 206-209 added for P100.

Version 2.77

Page 228: Amended table for 8xxx/74xx Registers 32 to 63 to add string for Low load (to reflect the current 86xx usage)

Page 228: Amended table for 8xxx/74xx Registers 64 to 95 to add string for Generator Under loaded (for the 77xx Magnum module)

Page 154: Removed register bits for Generator Under Loaded alarm from 8xxx/74xx named alarm page

Page 153: Added register bits for Low load alarm to 8xxx/74xx unnamed alarm page to reflect the current usage

Page 153: Added register bits for Generator Under Loaded alarm to 8xxx/74xx unnamed alarm page

Version 2.78

Page 160: Added Low kW load and Under Loaded unnamed alarm functions to 8xxx/74xx tables

Version 2.79

Page 154 : New P100 alarms added.

Version 2.80

Page 154 : New P100 alarm added.

Version 2.81

Page 154: Duplication of P100 alarm removed.

Version 2.82

Page 17 : Cummins modbus DTC decode format added

Version 2.83

Page 3: Register 6 bit 12 is now only for electrical trips. Bit 7 is now used for controlled shutdowns.

Page 153: Amended alarm condition code table to add new code 5 for Controlled Shutdown

Version 2.84

Page 5: Register 210 added to allow wide range signed oil pressure for Exxx.

Version 2.85

Page 10: PWM output duty cycle changed to 0.01% resolution.

Version 2.86

Page 154: Amended 72xx/73xx/61xx family register allocation table to add DEF Level Low and SCR Inducement named alarms

Version 2.87

Page 154: Amended 72xx/73xx/61xx family register allocation table to insert VAr and LCD heater named alarms

Version 2.88

Page 10: Amended website reference from www.modbus-ida.org to [www.modbus.org](http://www.modbus.org)

Version 2.89

Page 160: Corrections to Exxx table to match order of page 153

Page 227-229 Inserted unimplemented registers to match order of page 153 registers 176 to 199

Version 2.90

Page 10: Alternator excitation current added.

Page 10: Current limit active flag added

Page 10: Excitation overload trip state added

Version 2.91

Page 5: added register 211

Version 2.92

Page 171:Correction to page 171 for E800, registers 230 to 254 for 2131 expansion modules 1 to 3 inputs A to H

Version 2.93

Page 180, 190: added registers to support output I and J on the 73xx

Added new alarms for the 73xx MKII P153, P154 and strings

Version 2.94

Page 5: added registers 212 to 216 to support Engine Interface v7

Version 2.95

Page 10: ‘Integral limit reached’ flag added.

Version 2.96

Page 171: added registers 146 to 177 to support new flex senders on the 73xx MKII

Corrections to page 153 and 154

Added Register 18 to P154

Version 2.97

Page 154: P100 ROCOF stages 2 and 3 added.

Version 2.98

Page 3 : add register 38 (86xx Mk II: Panel Lock Status)

Page 5: added registers 217 to 228

Version 2.99

Page 137: Renamed page, set registers 0-31 as reserved, added register 78 Cummins CM850 Governor gain, amended note to indicate 8xxx only.

Version 2.100

Page 153: Exxx – Flex sensor IDs now labelled A-L. Flex sensor fault registers added.

Page 154: Exxx – Alarm Conditions for PWMi and Incorrect Speed alarm added. Number of named alarms set to 58.

Page 160: Exxx – Flex sensor IDs now labelled A-L. Flex sensor fault registers added.

Page 172: Exxx – New page. Continuation of page 170/171 containing unnamed input status registers for internal flexible sensor faults

Page 185: Exxx – Renamed page to indicate analogue outputs. Additional analogue output control types and output range/types. Registers 32-35 now contain analogue output value (according to output range); Additional registers for Analogue output/governor output

Page 224-226: Exxx – Flex sensor IDs now labelled A-L

Page 230-231: Exxx – New pages containing Flexible Sensors sensor fault alarm strings

Page 184: Renamed page description to indicate expansion analogue output sources, differentiating it from new Page 185

Page 185: Renamed page description to indicate internal analogue output sources, differentiating it from Page 184

Version 2.101

Page 250: Added onboard analogue output string

Version 2.102

Page 7: Added new accumulators for DC modules.

Page 137: Added current limit register.

Version 2.103

Page 5: Added missing DC Charger Current.

Version 2.104

Page 10: Reg 15 is now signed.

Version 2.105

Page 185: Corrected voltage scaling in analogue output table, to 0.001. Also corrected ranges for voltage.

Version 2.106

Page 10: Added registers 28-30.

Version 2.107

Page 185: Correction to registers 32-35 to indicate unsigned 16 bit values (as per range specified in Page 185 Analogue Output Range Table). Correction to page 185 register 44 to indicate signed 16 bit value (as per range specified in Page 185 Analogue Output Range Table).

Version 2.108

Page 201: added flex sensor strings for sensor B to F

Version 2.109

Page 153: Added alarms for 45xx MKII

Page 154: Added alarms for 45xx MKII

Version 2.110

Page 185: Analogue Output Table amended to clarify PWMi reading and to correct max values used in Exxx

Version 2.111

Page 70: Added Extended PLC Stores 1-100

Page 72: Added Extended PLC Registers 1-100

Page 74: Added Extended PLC Timers 1-50

Page 76: Added Extended PLC Counters 1-50

Version 2.112

Page 154: Added Electrical Trip Reset – Engine Stop Inhibited register

Version 2.113

Page 16: Corrections to available commands

Version 2.114

Page 160: Add registers 9 to 13, 217 to 255

Page 161: add registers 0 to 144 for the 73xx

Page 170: add registers 12 to 27

Page 171: registers 106 to 145

Page 172: Registers 112 to 191

Version 2.115

Page 170: Added missing Digital code to Sender Category Enumeration

Page 171: Added Sender Category Enumeration

Page 172: Added Sender Category Enumeration

Version 2.116

Page 154: Renamed 86xx table register 33 bits 9-12 to indicate E-Trip Stop Inhibited

Version 2.117

Page 154: added battery charger common alarms

Page 156, 158 Added DSENet charger status registers

Version 2.118

Page 153: Unnamed Alarm Conditions (74xx MKII)

Page 170: Unnamed Input Status (74xx MKII)

Page 171: Unnamed Input Status (74xx MKII)

Page 172: Unnamed Input Status (74xx MKII)

Page 160: Unnamed Input Function (74xx MKII)

Page 161: Unnamed Input Function (74xx MKII)

Page 178 : Internal Analogue Sensor Readings and Config values (74xx MKII)

Page 179 : Expansion Module Analogue Sensor Limits (74xx MKII)

Version 2.119

Page 137: DSENet battery charger Modbus ID’s (73xx MKII)

Version 2.120

Page 25: Added names for Modbus Gateway ID’s(73xx MKII)

Version 2.121

Page 178: Added detail for generic Analogue Inputs Unit Info registers (Exxx, 86xx MK2)

Page 179: Added detail for generic Expansion Modules Input Ranges (Exxx, 8610 MK2)

Page 170: 86xx/74xx, Exxx max sender category amended

Page 171: 86xx/74xx, Exxx max sender category amended

Version 2.122

Page 10: Added ‘Auto frequency selection state’

Version 2.123

Page 5: Added Fuel Efficiency kWH/Litre instruments

Page 7: Added Fuel Efficiency accumulated kWH/Litre instrument

Version 2.124

Page 153: Added registers 56 to 103 Expansion alarms

Page 154: Removed DSENet common alarms

Page 161: Added DSENet charger registers 145-155

Page 172: Added register 192-207 DSENet charger alarms status

Page 228: Added page

Version 2.125

Page 170: Amended table for 8xxx / 74xx MKI family registers 32-41 to indicate registers allocated for Flex sensor as Digital input

Version 2.126

Page 137 – Registers 90, 122 and 123 added.

Version 2.127

Page 137 – Registers 91, 124 and 125 added.

Version 2.128

In section 8.1 Note 5 extended to permit the returning of a sentinel for a reserved register.

Version 2.129

Page 154: Exxx named alarms register 13 bits 1-4 renamed as ECU DEF Level Low; Register 15 bits 5-8 used for DEF Level Low

Version 2.130

Page 160/161: 73xx MKII expansion registers renumbered for analogue alarm functions.

Version 2.131

Page 154: Exxx named alarms register 13 bits 1-4 renamed as DEF Level Low (now used for combined ECU and module alarms), and register 15 bits 5-8 set to unimplemented.

Version 2.132

Page 127 reg 91 scale corrected.

Version 2.133

Page 250: AVR allocation added.

Version 2.134

In page 137 Registers 36/37 now signed

Version 2.135

In page 5 Added registers 195 and 196 for battery charger status codes required by 73xx MkII

Version 2.136

Pages 29, 30, 175, 176, 177 Added new pages to document the Configurable CAN Instrumentation for 61xx MkII v2.0 (74xx MKII v1.1 uses pages 175-177 but isn’t documented for some reason).

Update pages 150 & 154 with the new named alarms for 61xx MKII v2.0

Version 2.137

Make page 29, register 255 reserved, and move items into page 30

Version 2.138

Page 177 updated for 74xx MKII V1.1

Page 153 reg 47 added 61xx MKII low load alarm

Page 160 reg 187 added for 61xx MKII low load alarm

Page 223 regs 96 to 127 for 61xx MKII low load alarm (user-supplied string)

Version 2.139

Page 190 Moved 6xxx into a separate table and corrected digital outputs A – F

Version 2.140

Page 156 & 158 Added DSENet chargers to the 86xx

Version 2.141

Page 154 Added Fuel Tank Bund Level Alarm to the 86xx

Version 2.142

Page 0 Added Registers 15 to 21, comms port status

Version 2.143

Page 0 Added Registers 22 to 30, DSENet / MSC port status

Version 2.144

Add page 194, 195 Configurable CAN descriptions.

Version 2.145

Page 5, register 233 fuel distance has been added for the 7450 Ausonia v2.2.0 upgrade.

Version 2.146

Page 153 – 86xx/74xx MKI table eparated to 86xx MKII and 7450 table

Page 154 – 86xx/74xx MKI table eparated to 86xx MKII and 7450 table

Version 2.147

Page 154 – 86xx MKII renamed to 8xxx and 8680 implementation added

Page 154 – Corrected 7450 table

Page 153 – 86xx MKII renamed to 8xxx to incorporate 8680 alarms

Version 2.148

Page 5, register 233 scaling changed for fuel distance due to engine file change (7450 Ausonia v2.2.0).

Version 2.149

Pages 16, 19, 20 – Added Modbus exception codes 10 and 11 to the list of supported exception responses.

Version 2.150

Page 0 – Added MSC quality instrumentation (reg 32).

Version 2.151

Page 137 – Amended comment so page applies to modules other than the 8xxx range, also added register 147 for target speed (used in the Exxx range)

Version 2.152

Page 137 – Split registers 147 onwards to be generic and module specific for the Exxx range

Version 2.153

Page 160/161 tables for 86xx MKII added.

Version 2.154

Page 154 – Breaker alarms added for 335.

Version 2.155

Page 154 – Added MSC link alarms for MSC link 1 and MSC link 2 (Reg 34-36)

Version 2.156

Page 137 – Added ramp rate registers (Reg 169-172)

Version 2.157

Page 5 – Added battery charger registers 202 (configured digital input) and 203 (manual boost)

Version 2.158

Page 154 – Added “Electrical Trip from 8660” alarm into 86xx table

Version 2.159

Section 3 added notes 19 to 26 to support Ethernet connections and gateway connected devices

Version 2.160

Page 10 – added items for A108 AVR

Page 250 – added string definitions for A108

Version 2.161

Page 153 – added Flex A fault for 45xxMKII

Version 2.162

Page 19 (extended instrumentation) added

Version 2.163

Page 136 – Register 113 added

Page 137 – Note 3 added

Page 137 – Renamed registers 83-85 and added 86-88

Page 137 – Renamed registers 115-117 and added 118-120

Version 2.164

Page 5 – Registers 235 to 243 added to provide Bus Sequence instruments, and registers 245 to 253 to provide Gen Sequence instruments. Note that register groups are in same order as page 4 Mains sequence registers (223 – 231). Also note that 234 and 244 are unimplemented to provide padding, ensuring alignment of 32 bit values.

Version 2.165

Page 154 – 8xxx family: Register 0 amended and register 37 added for Gen Sequence and Asymmetry alarms.

Version 2.166

Page 3 – Registers 208-219 & 240-245 added.

Page 153 – Registers 104-106 added for 73xx.

Page 154 – Registers 18 & 19 amended.

Page 160 – Register 217 added for 73xx.

Page 161 – Registers 156-165 added for 73xx.

Page 171 – Registers 178 & 179 added for 73xx.

Page 173 added.

Page 227 – Registers 32-63 added for 73xx/74xx.

Pages 29, 30, 70, 72 & 175-177 made applicable to 73xx MkII.

Page 192 made unapplicable to 73xx MkII.

Version 2.167

Page 16 – Control key 35786 added.

Version 2.168

Page 10 – 86xx Registers renamed to Controller Registers. Unused registers between 69 – 82 removed and others shuffled up.

Version 2.169

Page 137 – Register 32 range corrected

Version 2.170

Page 137 – Registers 51 and 99 now reserved

Version 2.171

Page 137 – Notes 5 and 6 added.

Version 2.172

Page 137 – Registers 49, 81, 97 and 113 minimum value changed.

Version 2.173

Page 5 – Battery Chargers Register 202 – return values modified for each charger range

Version 2.174

Page 0 – Added MSC disgnositcs registers 28,29,31,32,34

Version 2.175

Page 16 – Added droop control keys

Version 2.176

In page 16 - Control keys 93-94 added

In page 154 - Remote Mains Fail added

In page 193 - Note 2 added.

Version 2.177

In page 16 - Control key 95 added

Version 2.178

In page 160 – Register 5 added.

In Page 170 – Registers 10-11 added.

In page 193 - Note 2 corrected

Version 2.179

In page 193 - Note 2 changed.

Version 2.180

Page 19 – Register 53 (Escape Mode Status) added – for 73xx MKII v5.0.

Version 2.181

Page 137- Added Registers 172 to 197

Page 175- Added multibyte string read mechanism for 8610 V4.2 only

Version 2.182

Page 180: Added L401MKII to “8xxx/74xx” register allocation title

Version 2.183

Table standardisation pass 1

Version 2.184

Page 10 – Additional registers for A109 AVR (registers 36-38 and registers 65-68)

Acknowledgements

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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 web site <http://www.modbus.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.
20. Some controllers support the broadcast address of 0, a responce is not sent for Modbus packets sent to this address
21. Where a connection over Ethernet is available to a controller, the Modbus RTU packet is encapsulated in a Ethernet packet
22. Modbus IP connections are defaulted to use IP Port 502 as specified by the IANA, if however this setting is changed, port 502 will not longer be monitored.
23. The Modbus address must still be used as part of an IP packet, this is fixed as Modbus address 10 for the host controller (Modbus slave device)
24. Where a controller has other slave devices connected, (e.g. 8610 MKII with DSENet chargers), the slave devices can be accessed using the Modbus address assigned to them. This results in a single physical network node will respond to several Modbus addresses.
25. Where a controller supports gateway access to connected devices, each device has its own virtual connection to the bus, however this connection may be slow as the messages are forwarded to a new physical connected device.
26. Where a controller has slave devices connected, a Modbus request written to Modbus address 0 (broadcast address) the request is only processed by the Modbus slave (controller) not sent to the connected slaves (DSENet chargers).

# 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  10 – Gateway path unavailable  11 – Gateway target failed to respond |
| 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 |
| ½ | 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 either return extended exception code 12 (Reserved register), or the 16 bit unsigned unimplemented sentinel (0xFFFF), i.e. not an exception. This option permits efficiency improvements by allowing reading across gaps in the register map. In exceptional circumstances the option to return a sentinel may be problematic for a particular page so should not be used, this will be documented in the description of the page.
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  10 – Gateway path unavailable  11 – Gateway target failed to respond |
| 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 odbus 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  10 – Gateway path unavailable  11 – Gateway target failed to respond |
| ¾ | 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**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| <Table type=”Instrumentation” page=”0” modules=”all” /> |  |  |  |  |  |  |
| 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 |
| 12-14 | Unimplemented |  |  |  |  |  |
| 15 | USB connection status | 0 | 1 |  |  | 16 |
| 16 | RS232 port received rate counter | 0 | 65535 |  |  | 16 |
| 17 | RS232 port lost rate counter | 0 | 65535 |  |  | 16 |
| 18 | RS232 port quality instrument | 0 | 100 |  | % | 16 |
| 19 | RS485 port 1 received rate counter | 0 | 65535 |  |  | 16 |
| 20 | RS485 port 1 lost rate counter | 0 | 65535 |  |  | 16 |
| 21 | RS485 port 1 quality instrument | 0 | 100 |  | % | 16 |
| 22-26 | Unimplemented |  |  |  |  |  |
| 27 | DSENet quality instrument | 0 | 100 |  | % | 16 |
| 28 | 8x10 on MSC 1 | 0 | 32 |  |  | 16 |
| 29 | 8x60 on MSC 1 | 0 | 16 |  |  | 16 |
| 30 | MSC Connection 1 quaily instrument | 0 | 100 |  | % | 16 |
| 31 | 8x10 on MSC 2 | 0 | 32 |  |  | 16 |
| 32 | 8x60 on MSC 2 | 0 | 16 |  |  | 16 |
| 33 | MSC Connection 2 quaily instrument | 0 | 100 |  | % | 16 |
| 34 | Active MSC link | 0 | 1 | 0-MSC1  1-MSC2/CAN |  | 16 |
| 35-127 | Unimplemented |  |  |  |  |  |
| 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**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| <Table type=”Instrumentation” page=”1” modules=”all” /> |  |  |  |  |  |  |  |
| 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**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| <Table type=”Instrumentation” page=”2” modules=”all” /> |  |  |  |  |  |  |
| 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**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| <Table type=”Instrumentation” page=”3” modules=”all” /> |  |  |  |  |  |  |
| 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 | 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 |
|  | Controlled shutdown alarm active | No | Yes |  |  | 7/16 |
|  | Unimplemented | 0 | 0 |  |  | 1/16-6/16 |
| 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 | External Panel Lock Active | No | Yes |  |  | 16/16 |
|  | Stop & Panel Lock Active | No | Yes |  |  | 15/16 |
|  | Lock user controls Active | No | Yes |  |  | 14/16 |
|  | Telemetry Panel Lock Active | No | Yes |  |  | 13/16 |
|  | Unimplemented | 0 | 0 |  |  | 1/16-12/16 |
| 39-07 | Reserved |  |  |  |  |  |
| 208-209 | Flex sensor A volume level | 0 | 999,999,999 | 1 | Litre/Imp Gal/US Gal | 32 |
| 210-211 | Flex sensor B volume level | 0 | 999,999,999 | 1 | Litre/Imp Gal/US Gal | 32 |
| 212-213 | Flex sensor C volume level | 0 | 999,999,999 | 1 | Litre/Imp Gal/US Gal | 32 |
| 214-215 | Flex sensor D volume level | 0 | 999,999,999 | 1 | Litre/Imp Gal/US Gal | 32 |
| 216-217 | Flex sensor E volume level | 0 | 999,999,999 | 1 | Litre/Imp Gal/US Gal | 32 |
| 218-219 | Flex sensor F volume level | 0 | 999,999,999 | 1 | Litre/Imp Gal/US Gal | 32 |
| 220-239 | Reserved |  |  |  |  |  |
| 240 | Flex sensor A selected units | 0 | 2 | See table below | | 16 |
| 241 | Flex sensor B selected units | 0 | 2 | See table below | | 16 |
| 242 | Flex sensor C selected units | 0 | 2 | See table below | | 16 |
| 243 | Flex sensor D selected units | 0 | 2 | See table below | | 16 |
| 244 | Flex sensor E selected units | 0 | 2 | See table below | | 16 |
| 245 | Flex sensor F selected units | 0 | 2 | See table below | | 16 |
| 246-255 | Reserved |  |  |  |  |  |

**9462 – Dual Output Battery Charger**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Register offset | Name | Minimum value | Maximum value | Scaling factor | Units | Bits/ sign |
| 27 | Battery Charger Mode Output 1 | 0 | 12 | 1 |  | 16 |
| 38 | Battery Charger Mode Output 2 | 0 | 12 | 1 |  | 16 |

**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.
10. Register 6 bit 12 is used as controlled shutdown in E800 v1.1

**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 |

**Fuel Level codes**

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

## 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.
5. If oil pressure is set to wide range signed value, this instrument is available in page 5. Register 0 in page 4 will reflect all positive values and will be set to the under measureable range sentinel for negative values.

| <Table type=”Instrumentation” page=”4” modules=”all” /> |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 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 |
| 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 |

**9462 – Dual Output Battery Charger**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Register offset | Name | Minimum value | Maximum value | Scaling factor | Units | Bits/ sign |
| 212-213 | DC Charger Watts Output 1 | -99,999,999 | 99,999,999 | 1 | W | 32 S |
| 214-215 | DC Charger Watts Output 2 | -99,999,999 | 99,999,999 | 1 | W | 32 S |
| 221 | Battery temperature Output 1 | -50 | 200 | 1 | Degrees C | 16 S |
| 222 | Battery temperature Output 2 | -50 | 200 | 1 | Degrees C | 16 S |
| 232-233 | Battery Charger Output 1 Current | 0 | 50,000 | 1 | mA | 32S |
| 234-235 | Battery Charger Output 1 Voltage | 0 | 100,000 | 1 | mV | 32S |
| 236-237 | Battery Open Circuit Voltage Output 1 | 0 | 100,000 | 1 | mV | 32S |
| 238-239 | Battery Charger Output 2 Current | 0 | 50,000 | 1 | mA | 32S |
| 240-241 | Battery Charger Output 2 Voltage | 0 | 100,000 | 1 | mV | 32S |
| 242-243 | Battery Open Circuit Voltage Output 2 | 0 | 100,000 | 1 | mV | 32S |

## Page 5 – Extended Instrumentation

**Notes:**

1. These are read only registers.
2. Each auxiliary sender has a register describing its 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
7. Registers 233 Fuel Depth has been added for the 7450 Ausonia v2.2.0 upgrade.
8. Registers 99 (Exhaust Gas Temp Port 14) and 106-107 (Total Revolutions) are no longer available on the 7450 (Ausonia v2.2.0 onwards).

| <Table type=”Instrumentation” page=”5” modules=”all” /> |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 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 |
| 191 | DEF Tank Level |  |  |  | % | 16U |
| 192 | DEF Tank Temperature |  |  |  | Degrees C | 16S |
| 193 | DEF Level Status |  |  |  |  | 16U |
| 194 | DEF Consumption |  |  |  | L/hour | 16U |
| 195 | Aftertreatment Status Reason |  |  |  |  | 16U |
| 196 | Aftertreatment Status Severity |  |  |  |  | 16U |
| 197 | Time left until action needed |  |  |  | s | 16U |
| 198 | Time until Torque Reduction |  |  |  | s | 16U |
| 199 | Time until Speed Reduction |  |  |  | s | 16U |
| 200 | EGR Pressure |  |  |  | kPa | 16U |
| 201 | EGR Temperature |  |  |  | Degrees C | 16S |
| 202 | Ambient Air Temperature |  |  |  | Degrees C | 16S |
| 203 | Air Intake Temperature |  |  |  | Degrees C | 16S |
| 204 | DEF Lamps – SCR Inducement | 0 | 15 |  | See table below | 16U |
| 205 | DEF Lamps – DEF Level Low | 0 | 15 |  | See table below | 16U |
| 206 | Generator high-resolution frequency | 0 | 70 | 0.01 | Hz | 16 |
| 207 | Mains high-resolution frequency | 0 | 70 | 0.01 | Hz | 16 |
| 208 | Bus high-resolution frequency | 0 | 70 | 0.01 | Hz | 16 |
| 209 | Bus 2 high-resolution frequency | 0 | 70 | 0.01 | Hz | 16 |
| 210 | Oil Pressure | -100 | 10000 | 1 | kPa | 16 S |
| 211 | CAN Alternate engine speed selected | 0 | 1 | 0 |  | 16 |
| 212-213 | Generator Excitation Field Current |  |  |  | A | 32U |
| 214-215 | Generator Excitation Field Voltage |  |  |  | V | 32U |
| 216 | Generator Output Voltage Bias Percentage |  |  |  | % | 16U |
| 217-220 | Exhaust gas port 17-20 temperature | -273 | 1734 | 1 | Degrees C | 16 S |
| 221 | Instant Fuel Rate |  |  |  |  | 16U |
| 222 | DPTC Filter Status |  |  |  |  | 16U |
| 223 | DPTC Active Regeneration Inhibit |  |  |  |  | 16U |
| 224 | DPTC Active Regeneration Inhibit ET |  |  |  |  | 16U |
| 225 | DEF Tank Status |  |  |  |  | 16U |
| 226 | Gas Fuel Pressure |  |  |  |  | 16U |
| 227 | Throttle Position 1 |  |  |  |  | 16U |
| 228 | Throttle Position 2 |  |  |  |  | 16U |
| 229-230 | DC Charger Current | - 2,500,000.0 | + 2,500,000.0 | 0.1 | A | 32S |
| 231 | Trip Average Fuel Efficiency | 0 | 10.00 | 0.01 | kW Hour/L | 16U |
| 232 | Instantaneous Fuel Efficiency | 0 | 10.00 | 0.01 | kW Hour/L | 16U |
| 233 | Fuel Distance (in mm) | 0 | 3000 | 1 | mm | 16S |
| 234 | Unimplemented |  |  |  |  |  |
| 235 | Bus zero sequence voltage angle | -360.0 | +360.0 | 0.1 | Degrees | 16S |
| 236 | Bus positive sequence voltage angle | -360.0 | +360.0 | 0.1 | Degrees | 16S |
| 237 | Bus negative sequence voltage angle | -360.0 | +360.0 | 0.1 | Degrees | 16S |
| 238-239 | Bus zero sequence voltage magnitude | 0 | 30,000 | 0.1 | V | 32 |
| 240-241 | Bus positive sequence voltage magnitude | 0 | 30,000 | 0.1 | V | 32 |
| 242-243 | Bus negative sequence voltage magnitude | 0 | 30,000 | 0.1 | V | 32 |
| 244 | Unimplemented |  |  |  |  |  |
| 245 | Gen zero sequence voltage angle | -360.0 | +360.0 | 0.1 | Degrees | 16S |
| 246 | Gen positive sequence voltage angle | -360.0 | +360.0 | 0.1 | Degrees | 16S |
| 247 | Gen negative sequence voltage angle | -360.0 | +360.0 | 0.1 | Degrees | 16S |
| 248-249 | Gen zero sequence voltage magnitude | 0 | 30,000 | 0.1 | V | 32 |
| 250-251 | Gen positive sequence voltage magnitude | 0 | 30,000 | 0.1 | V | 32 |
| 252-253 | Gen negative sequence voltage magnitude | 0 | 30,000 | 0.1 | V | 32 |
| 254-255 | 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 Calculated Ambient Temperature | -255 | 255 | 1 | Degrees C | 16S |
| 189 | Battery Charger PCB Temperature | -300 | 255 | 1 | Degrees C | 16S |
| 190-191 | Auxiliary Current Limit | 0 | 4000 | 1 | mA | 32S |
| 192 | Fan Speed 1 | 10 | 2400 | 1 | rpm | 16S |
| 193 | Fan Speed 2 | 10 | 2400 | 1 | rpm | 16S |
| 194 | Battery Voltage  (when remote Sense connected) |  |  | 0.1 | V | 16S |
| 196 | Battery Charger Output state | 0 | 1 | 1 | Off / On | 16U |
| 197 | Battery Charger Alarm state | 0 | 2 | 1 | 0 = no alarm  1 = Shutdown  2 = Warning | 16U |
| 198-199 | Battery Charger maximum output volttage | 0 | 2,147,483,647 | 1 | mV | 32S |
| 200-201 | Charge stage remaining time | 0 | 4,294,967,295 | 1 | 10 ms | 32U |
| 202 | Configured digital input function | 16 | 20 | 1 | Digial input function code (see table below) | 16U |
| 203 | Charger in manual boost | 0 | 1 | 1 | Boost not active / active | 16U |
| 204 | Digital Input Active | 0 | 1 | 1 | Digital input not active / active | 16U |
| 205-206 | Time Until Battery Detection | 0 | 4,294,967,295 | 1 | 10 ms | 32U |
| 207-208 | Time Until Self Test | 0 | 4,294,967,295 | 1 | 10 ms | 32U |
| 201-255 | Reserved |  |  |  |  |  |

**94xx Battery Charger Digital input code**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Type code 10A Chargers | Type code 15A/20A Chargers | Type code 30A Chargers | Type | Scaling factor |
| 16 | 16 | 12 | Manual boost | 1 |
| 17 | 17 | 16 | Lamp test | 1 |
| 18 | N/A | N/A | Switch to alternative voltage mode | 1 |
| 19 | 19 | 15 | Enable battery detection | 1 |
| 20 | 20 | 14 | Charger off | 1 |

**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 |

**DEF Lamps**

|  |  |
| --- | --- |
| Type code | Type |
| 0 | Off |
| 1 | On Steady (amber/yellow steady) |
| 2 | Flash Slow (red slow blink) |
| 3 | Flash Fast (red fast blink) |
| 11 | Bad Data |
| 15 | Unimplemented |

## 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**

| <Table type=”instrumentation” page=”6” modules=”#61xx MKIII” /> |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 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 |
| 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 |
| 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/7xxx/6xxx/P100/L40x/4xxx register allocation**

| <Table type=”instrumentation” page=”6” modules=”#8xxx,#7xxx,#6xxx,#-61xx MKIII,#Pxxx,# L40x,#4xxx” /> |  |  |  | |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 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 |
| 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 |
| 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**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| <Table type="instrumentation" page="6" modules="3xx" /> |  |  |  |  |  |  |
| 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/7xxx/6xxx/L40x/4xxx register allocation**

| <Table type="instrumentation" page="7" modules="#8xxx,#7xxx,#6xxx,# L40x,#4xxx " /> |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 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 |
| 94-95 | Load kWh | 0 | 4.29 x109 | 0.1 | kW hour | 32 |
| 96-97 | Battery charging kWh | 0 | 4.29 x109 | 0.1 | kW hour | 32 |
| 98-99 | Battery discharging kWh | 0 | 4.29 x109 | 0.1 | kW hour | 32 |
| 100 | Fuel Efficiency KWh/L (accumulated) | 0 | 65535 | 0.01 | kW hour/L | 16 |
| 101-255 | Reserved |  |  |  |  |  |

**3xx register allocation**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| <Table type="instrumentation" page="7" modules="#3xx" /> |  |  |  |  |  |  |
| 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**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| <Table type="instrumentation" page="7" modules="E800" /> |  |  |  |  |  |  |
| 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**

| <Table type="instrumentation" page="8" modules="all" /> |  |  |  | |  |
| --- | --- | --- | --- | --- | --- |
| 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 |
| 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 | |
| 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 |  |  |  | |
| 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**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| <Table type="instrumentation" page="9" modules="all" /> |  |  |  |  |  |  |
| 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 with the exception of the alarm reset.
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.
4. Writing the value 0x1234 to the alarm reset register will reset any latched alarm(s).
5. The P, I and D gain setpoint values in registers 65-67 return the fixed P, I and D gain values in the currently selected stability selection if that value is being used by the AVR. If the AVR is configured to obtain the gain setting from the preset pot then this value will return the unimplemented sentinel and any write to this register will be ignored. If the values are not saved (see note 6) then these gains will be lost when the AVR is powered down and the previous values will be used at the next power up.
6. This register will return a 1 to indicate that storing the P, I and D gain changes made using registers 65-67 is permitted, and a 0 if storing the values is not permitted. Writing a value of 0x1234 to this register will cause the updated gain values to be stored in non-volatile memory.

**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 |  |  | 8-16-16/16 |
|  | Integral limit reached | 0 | 1 |  |  | 7/16 |
|  | Current limit active | 0 | 1 |  |  | 6/16 |
| LED lit | 0 | 1 |  |  | 5/16 |
| DIP Switch 1 | 0 | 1 |  |  | 4/16 |
| DIP Switch 2 | 0 | 1 |  |  | 3/16 |
| DIP Switch 3 | 0 | 1 |  |  | 2/16 |
| DIP Switch 4 | 0 | 1 |  |  | 1/16 |
| 8 | Alternator frequency | 0 | 70 | 0.1 | Hz | 16 |
| 9 | Alternator average 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 | 0.1 | degrees | 16 S |
| 12 | Auxiliary Supply 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 | -10 | 10 | 0.001 | V | 16 S |
| 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 | PWM output duty cycle | 0 | 100 | 0.01 | % | 16 |
| 23 | Voltage set point | 0 | 600 | 0.1 | V | 16 |
| 24 | Droop set point | 0 | 100 | 0.1 | % | 16 |
| 25 | UFRO knee set point | 0 | 60 | 0.1 | Hz | 16 |
| 26 | Alternator auxiliary winding voltage | 0 | 300 | 0.1 | V | 16 |
| 27 | Alternator excitation current | 0 | 30 | 0.001 | A | 16 |
| 28 | P set point | 0 | 100 | 0.1 | % | 16 |
| 29 | I set point | 0 | 100 | 0.1 | % | 16 |
| 30 | D set point | 0 | 100 | 0.1 | % | 16 |
| 31 | Auto frequency selection state (see below) | 0 | 2 | 1 |  | 16 |
| 32 | Alternative Configuration Selection (A108) | 0 | 5 | 1 |  | 16 |
| 33 | Stability Selection (A108) | 0 | 1 | 1 |  | 16 |
| 34 | CAN setpoint offset | -100.0 | 100.0 | 0.1 | % | 16 S |
| 35 | CAN Address | 0 | 255 | 1 |  | 16 |
| 36 | Alternator voltage L1-L2 | 0 | 600 | 0.1 | V | 16 |
| 37 | Alternator voltage L2-L3 | 0 | 600 | 0.1 | V | 16 |
| 38 | Alternator voltage L3-L1 | 0 | 600 | 0.1 | V | 16 |
| 39-63 | Reserved |  |  |  |  |  |
| 64 | Alarm reset | 0x1234 | 0x1234 |  |  | 16 |
| 65 | P Gain Setpoint (see Note 5) | 0.0 | 100.0 | 0.1 |  | 16 |
| 66 | I Gain Setpoint (see Note 5) | 0.0 | 100.0 | 0.1 |  | 16 |
| 67 | D Gain Setpoint (see Note 5) | 0.0 | 100.0 | 0.1 |  | 16 |
| 68 | Save Changes (see note 6) |  |  |  |  | 16 |
| 69-255 | 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 | Under frequency trip |
| 7 | Invalid configuration |
| 8 | Excitation overload trip |
| 9- | Reserved |

**Auto Frequency Selection State**

|  |  |
| --- | --- |
| **Code** | **Meaning** |
| 0 | Disabled |
| 1 | 50Hz selected |
| 2 | 60Hz selected |
| 3- | Reserved |

**DIP switches**

|  |  |  |
| --- | --- | --- |
| **Switch Number** | **A106** | **A108** |
| 1 | Voltage selection | Stability Selection |
| 2 | Frequency Selection | Alternative Configuration Switch 1 |
| 3 | Stability Switch 1 | Alternative Configuration Switch 2 |
| 4 | Stability Switch 2 | Alternative Configuration Switch 3 |

**Controller Registers**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Register offset | Name | Minimum value | Maximum value | Scaling factor | Units | Bits/ Sign | Read/Write |
| 0 | AVR Software major version | 0 | 99 | 1 |  | 16 | Read |
| 1 | AVR Software minor version | 0 | 99 | 1 |  | 16 | Read |
| 2 | AVR Software build | 0 | 99 | 1 |  | 16 | Read |
| 3-7 | Unimplemented |  |  |  |  |  |  |
| 8 | Alternator frequency | 0 | 70 | 0.1 | Hz | 16 | Read |
| 9 | Alternator feedback voltage | 0 | 600 | 0.1 | V | 16 | Read |
| 10 | Alternator droop current | 0 | 10 | 0.001 | A | 16 | Read |
| 11-12 | Unimplemented |  |  |  |  |  |  |
| 13 | Alternator excitation voltage | 0 | 300 | 0.01 | V | 16 | Read |
| 14 | External pot. value | 0 | 5000 | 1 | Ohms | 16 | Read |
| 15 | External control voltage | -10 | 10 | 0.001 | V | 16 S | Read |
| 16-22 | Unimplemented |  |  |  |  |  |  |
| 23 | Voltage set point | 0 | 600 | 0.1 | V | 16 | Read |
| 24 | Droop set point | 0 | 100 | 0.1 | % | 16 | Read/Write |
| 25 | UFRO knee set point | 0 | 60 | 0.1 | Hz | 16 | Read |
| 26 | Alternator auxiliary winding voltage | 0 | 300 | 0.1 | V | 16 | Read |
| 27 | Unimplemented |  |  |  |  |  |  |
| 28 | P set point | 0 | 100 | 0.1 | % | 16 | Read/Write |
| 29 | I set point | 0 | 100 | 0.1 | % | 16 | Read/Write |
| 30 | D set point | 0 | 100 | 0.1 | % | 16 | Read/Write |
| 31 | Unimplemented |  |  |  |  |  |  |
| 32 | Alternative Configuration Selection (A108) | 0 | 5 | 1 |  | 16 | Read/Write |
| 33 | Stability Selection (A108) | 0 | 1 | 1 |  | 16 | Read/Write |
| 34-35 | Unimplemented |  |  |  |  |  |  |
| 36-63 | Reserved |  |  |  |  |  |  |
| 64 | Alarm reset | 0x1234 | 0x1234 |  |  | 16 | Write |
| 65 | Off Load Duty Cycle | 0 | 65535 | 0.1 | % | 16 | Read/Write |
| 66 | Maximum Duty Cycle | 0 | 65535 | 0.1 | % | 16 | Read/Write |
| 67 | Soft Start Ramp Start Point | 0 | 65535 | 0.1 | % | 16 | Read/Write |
| 68 | Soft Start Ramp Rate | 0 | 65535 | 0.1 | %/s | 16 | Read/Write |
| 69 | Droop Set Point Maximum | 0 | 65535 | 0.1 | % | 16 | Read |
| 70 | Off Load Duty Cycle Maximum | 0 | 65535 | 0.1 | % | 16 | Read |
| 71 | Soft Start Ramp Start Point Minimum | 0 | 65535 | 0.1 | % | 16 | Read |
| 72 | Soft Start Ramp Start Point Maximum | 0 | 65535 | 0.1 | % | 16 | Read |
| 73 | Soft Start Ramp Rate Minimum | 0 | 65535 | 0.1 | %/s | 16 | Read |
| 74 | Soft Start Ramp Rate Maximum | 0 | 65535 | 0.1 | %/s | 16 | Read |
| 75 | Alternative configuration Maximum | 0 | 99 | 1 |  | 16 | Read |
| 76 | Stability selection Maximum | 0 | 99 | 1 |  | 16 | Read |
| 83-255 | 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. This is the public subsection of this page
2. These are a mixture of read only and write only registers.
3. Registers 0 to 7 contain flags that indicate the available system control functions. If a bit is set the corresponding function code is available.
4. 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.
5. 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.
6. Function codes 0 to 31 perform exactly the same function as pressing the equivalent button on the control unit.
7. 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.
8. Function 34 does not under any circumstances reset the telemetry alarm flag in page 3, function 35 must be used for this.
9. 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.
10. 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.
11. 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.

**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 |
| 43-45 | Reserved | 35743 - 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 |
| 50-65 | Reserved | 35750 - 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 | Stop manual DPF regeneration | 35785 |
| 86 | DSE Proprietary | 35786 |
| 87 | Battery Charger Max Current Mode Timed | 35787 |
| 88 | Battery Charger max Current Mode Manual | 35788 |
| 89 | AVR Droop Enable | 35789 |
| 90 | AVR Droop Disable | 35790 |
| 91 | Governor Droop Enable | 35791 |
| 92 | Governor Droop Disable | 35792 |
| 93 | Remote Mains Fail Enable | 35793 |
| 94 | Remote Mains Fail Disable | 35794 |
| 95 | Remote Mains Fail Toggle (on then off, leaving the alarm latched but able to be reset) | 35795 |
| 96-65535 | 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 |

**Cummins modbus type trouble code**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Register offset | Name | Minimum value | Maximum value | Scaling factor | Units | Bits/ Sign |
| 0-1 | DTC Number | 0 | 65535 |  |  | 32 |
| 2 | DTC Type | 0 | 255 |  |  | 16 |
| 3 | Not used | 0 | 255 |  |  | 16 |
| 4 | Trouble code type | 3 | 3 |  |  | 16 |

**Cummins modbus DTC types**

|  |  |
| --- | --- |
| Code | System control function |
| 1 | Engine DTC Warning |
| 2 | Engine DTC Shutdown |

## 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 19 – Extended Instrumentation

**Notes:**

1. These are read only registers.
2. The meaning of all status codes is shown in the tables below.
3. For OBD compliance codes, refer to SAE J1939-73 section 5.7.5.3
4. Register 31 requires an offset of -273 deg C to be applied

**Registers**

| Register offset | Name | Minimum value | Maximum value | Scaling factor | Units | Bits/ Sign |
| --- | --- | --- | --- | --- | --- | --- |
| 0-1 | CAN TX count | 0 | 4294967295 | 1 |  | 32 U |
| 2-3 | CAN RX count | 0 | 4294967295 | 1 |  | 32 U |
| 4 | DPF active regeneration status | 0 | 3 | 1 | See table | 16 U |
| 5 | DEF tank level status | 0 | 7 | 1 | See table | 16 U |
| 6 | SCR operator inducement severity | 0 | 7 | 1 | See table | 16 U |
| 7 | Average DEF consumption | 0 | 64255 | 0.05 | L/h | 16 U |
| 8 | Commanded DEF consumption | 0 | 64255 | 0.05 | L/h | 16 U |
| 9 | Active trouble code count | 0 | 250 | 1 |  | 16 U |
| 10 | Previously active trouble code count | 0 | 250 | 1 |  | 16 U |
| 11 | OBD compliance | 0 | 250 | 1 |  | 16 U |
| 12 | Engine alarm warning | 0 | 3 | 1 | See table | 16 U |
| 13 | Engine alarm electrical trip | 0 | 3 | 1 | See table | 16 U |
| 14 | Engine alarm shutdown | 0 | 3 | 1 | See table | 16 U |
| 15 | Engine last rated frequency | 0 |  |  |  | 16 U |
| 16 | DPF active regen. inhibited due to accelerator pedal off idle | 0 | 3 | 1 | See table | 16 U |
| 17 | DPF active regen. inhibited due to out of neutral | 0 | 3 | 1 | See table | 16 U |
| 18 | DPF active regen. inhibited due to parking brake not set | 0 | 3 | 1 | See table | 16 U |
| 19 | DPF active regen. inhibited due to low exhaust gas temperature | 0 | 3 | 1 | See table | 16 U |
| 20 | DPF active regen. inhibited due to system timeout | 0 | 3 | 1 | See table | 16 U |
| 21 | DPF active regen. inhibited due to permanent stystem lockout | 0 | 3 | 1 | See table | 16 U |
| 22 | DPF active regen. inhibited due to system fault active | 0 | 3 | 1 | See table | 16 U |
| 23 | KBT glow relay flag | 0 | 3 | 1 | See table | 16 U |
| 24 | KBT glow lamp flag | 0 | 3 | 1 | See table | 16 U |
| 25 | KBT derating level | 0 | 7 | 1 | See table | 16 U |
| 26 | KBT regen status | 0 | 7 | 1 | See table | 16 U |
| 27 | Time since last service | -32127 | 32128 | 1 | hr | 16 S |
| 28 | Number of software identification fields | 0 | 250 | 1 |  | 16 U |
| 29 | CAN bus state | 0 | 3 | 1 | See table | 16 U |
| 30 | DPF 1 soot mass | 0 | 4000 | 4 | g/L | 16 U |
| 31 | Aftertreatment 1 diesel oxidation catalyst intake gas temperature | 0 | 64255 | 0.03125 | Deg C | 16 U |
| 32 | Engine emergency (immediate) shutdown indication | 0 | 3 | 1 | See table | 16 U |
| 33 | Engine intake air mass flow rate | 0 | 64255 | 0.05 | Kg/h | 16 U |
| 34-35 | DPF 1 time since last active regen | 0 | 4211081215 | 1 | s | 32 U |
| 36 | Aftertreatment 1 DPF diff pressure | 0 | 64255 | 0.1 | kPa | 16 U |
| 37 | Engine protection system timer state | 0 | 3 | 1 | See table | 16 U |
| 38 | Engine protection system timer override | 0 | 3 | 1 | See table | 16 U |
| 39 | Volvo preheat indication | 0 | 3 | 1 | See table | 16 U |
| 40 | GPS Valid | 0 | 1 | 1 |  | 16 U |
| 41 - 42 | GPS Longitude | -108000 | 108000 | 0.1 | minutes | 32 S |
| 43 - 44 | GPS Latitude | -54000 | 54000 | 0.1 | minutes | 32 S |
| 45 | GPS Number of Sattelites | 0 | 99 | 1 |  | 16 U |
| 46 | GPS HDOP | 0 | 99 | 0.1 |  | 16 U |
| 47 - 48 | Module Time since 1/1/1970 | 0 | 4.29 x109 | 1 | Seconds | 32 U |
| 49 - 50 | GPS Last Time since 1/1/1970 | 0 | 4.29 x109 | 1 | Seconds | 32 U |
| 51 | Speed | 0 | 65535 | 0.1 | Knots | 16 U |
| 52 | Heading | 0 | 360 | 0.1 | Degrees | 16 U |
| 53 | Escape Mode Status | 0 | 1 | 1 | bool | 16 U |

**Engine alarm status codes**

|  |  |
| --- | --- |
| Code | System control function |
| 0 | Lamp off |
| 1 | Lamp on |
| 2 | Undefined |
| 3 | Unimplemented |
| 4-65535 | Reserved |

**DPF active regeneration status codes**

|  |  |
| --- | --- |
| Code | System control function |
| 0 | Not active |
| 1 | Active |
| 2 | Undefined |
| 3 | Unimplemented |
| 4-65535 | Reserved |

**DPF active regeneration inhibited status codes**

|  |  |
| --- | --- |
| Code | System control function |
| 0 | Not inhibited |
| 1 | Inhibited |
| 2 | Undefined |
| 3 | Unimplemented |
| 4-65535 | Reserved |

**DEF tank level status codes**

|  |  |
| --- | --- |
| Code | System control function |
| 0 | Off (DEF level adequate) |
| 1 | On solid (DEF level low) |
| 2 | Undefined |
| 3 | Undefined |
| 4 | On fast blink (DEF level lower than level indicated by state 1) |
| 5 | Undefined |
| 6 | Undefined |
| 7 | Unimplemented |
| 8-65535 | Reserved |

**SCR operator inducement severity codes**

|  |  |
| --- | --- |
| Code | System control function |
| 0 | Driver warning, low-level inducement |
| 1 | Inducement level 1 |
| 2 | Inducement level 2 |
| 3 | Inducement level 3 |
| 4 | Inducement level 4 |
| 5 | Inducement level 5 |
| 6 | Temporary override of inducement |
| 7 | Unimplemented |
| 8-65535 | Reserved |

**KBT flag status codes**

|  |  |
| --- | --- |
| Code | System control function |
| 0 | Off |
| 1 | On |
| 2 | Error |
| 3 | Unimplemented |
| 4-65535 | Reserved |

**KBT derating level codes**

|  |  |
| --- | --- |
| Code | System control function |
| 0 | No derating |
| 1 | No derating warning |
| 2 | Derating level 1 |
| 3 | Derating level 2 |
| 4 | Derating level 3 |
| 5 | Engine stop |
| 6 | Engine stop by ECU |
| 7 | Unimplemented |
| 8-65535 | Reserved |

**KBT regen status codes**

|  |  |
| --- | --- |
| Code | System control function |
| 0 | Out of active regen mode |
| 1 | Automatic active regen mode |
| 2 | Parked regen mode |
| 3 | Unimplemented |
| 4-65535 | Reserved |

**CAN bus state codes**

|  |  |
| --- | --- |
| Code | System control function |
| 0 | Bus OK |
| 1 | Bus off |
| 2 | Error passive |
| 3 | Error active |
| 4-65535 | Reserved |

**Engine emergency shutdown indication codes**

|  |  |
| --- | --- |
| Code | System control function |
| 0 | Off (no shutdown requested) |
| 1 | On (shutdown requested) |
| 2 | Reserved |
| 3 | Don’t care / take no action |
| 4-65535 | Reserved |

**Engine protection system timer (& Volvo preheat indication ) states**

|  |  |
| --- | --- |
| Code | System control function |
| 0 | Inactve |
| 1 | Active |
| 2 | Error |
| 3 | Not available |
| 4-65535 | Reserved |

## 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 25 – Modbus Gate way 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 are user defined but are intended to allow each Modbus gateway port to be identified without needting the device to be connected.
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. The active modbus ID for each gateway device is available in Page 137 Register 160 onwards.

**Registers**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Register offset | Name | Minimum value | Maximum value | Bits |
| 0 | Modbus gateway port 0 device identity | UNICODE | UNICODE | 512 |
| 32 | Modbus gateway port 1 device identity | UNICODE | UNICODE | 512 |
| 64 | Modbus gateway port 2 device identity | UNICODE | UNICODE | 512 |
| 96 | Modbus gateway port 3 device identity | UNICODE | UNICODE | 512 |
| 128 | Modbus gateway port 4 device identity | UNICODE | UNICODE | 512 |
| 160 | Modbus gateway port 5 device identity | UNICODE | UNICODE | 512 |
| 192 | Modbus gateway port 6 device identity | UNICODE | UNICODE | 512 |
| 224 | Modbus gateway port 7 device identity | 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 – State Machine State Strings

**Notes:**

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

**Registers**

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

## Page 29 – Configurable CAN Instrument Units

**Notes:**

1. This page is currently only implemented on the 61xx MkII family (version 2.0 & later).
2. It provides the unit information for the received configurable CAN instruments (and is used by the PC SCADA display)
3. There is a 1:1 mapping between the configurable CAN instrument value (in page 177) and the units structure in this (and the following) page, so page 177 registers 0 & 1 use the units settings for registers 0 to 16 below & so on.
4. Each items uses 17 registers, so each page contains 15 items, plus one reserved register (#255)

**61xx MKII (v2.0 & later), 86xx MKII, 73xx MKII (v4.0 & later)**

**Registers**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Register offset | Name | Minimum value | Maximum value | Scaling Factor | Bits / sign | Read/ write |
| 0-16 | Unit info for configurable CAN receive instrument 1 |  | | | | |
| 0 | Category | 0xffff (‘User defined’) | |  |  | Read only |
| 1 | Multiplier | -128 | 127 | 1 | 16S | Read only |
| 2 | Precision | 1 | 1 |  |  | Read only |
| 3-4 | Range Min | Any | Any |  | 32S | Read only |
| 5-6 | Range Max | Any | Any |  | 32S | Read only |
| 7-16 | Unit suffix string | UNICODE | UNICODE |  |  | Read only |
| 17-33 | Unit info for configurable CAN receive instrument 2 |  | | | | |
| 34-50 | Unit info for configurable CAN receive instrument 3 |  | | | | |
| 51-67 | Unit info for configurable CAN receive instrument 4 |  | | | | |
| 68-84 | Unit info for configurable CAN receive instrument 5 |  | | | | |
| 85-101 | Unit info for configurable CAN receive instrument 6 |  | | | | |
| 102-118 | Unit info for configurable CAN receive instrument 7 |  | | | | |
| … |  |  | | | | |
| 238-254 | Unit info for configurable CAN receive instrument 15 |  | | | | |
| 255 | Reserved |  | | | | |

## Page 30 – Configurable CAN Instrument Units (cont)

**61xx MKII (v2.0 & later), 86xx MKII, 73xx MKII (v4.0 & later)**

**Registers**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Register offset | Name | Minimum value | Maximum value | Scaling Factor | Bits / sign | Read/ write |
| 0-16 | Unit info for configurable CAN receive instrument 16 |  |  |  |  |  |
| 17-33 | Unit info for configurable CAN receive instrument 17 |  | | | | |
| 34-50 | Unit info for configurable CAN receive instrument 18 |  | | | | |
| 51-67 | Unit info for configurable CAN receive instrument 19 |  | | | | |
| 68-84 | Unit info for configurable CAN receive instrument 20 |  | | | | |
| 85-101 | Unit info for configurable CAN receive instrument 21 |  | | | | |
| 102-118 | Unit info for configurable CAN receive instrument 22 |  | | | | |
| … |  |  | | | | |
| 238-254 | Unit info for configurable CAN receive instrument 30 |  | | | | |
| 255 | Reserved |  | |  |  |  |

## Pages 32 - 95 - Alarm Strings (Old alarm system)

1. Notes:
2. These are read only registers.
3. Each string consists of 32 Unicode characters with the first character at the lowest register address, NULL terminators are not used.
4. There are 2 strings corresponding to each alarm, refer to the alarm conditions page for details of their use.
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.
6. Reading the string for an unimplemented alarm will return 32 spaces (Unicode 0x0020).
7. The inactive string for an alarm may not be used, in which case it will return 32 spaces (Unicode 0x0020).
8. 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 |
| 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 |
| 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 |
| 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 |
| 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 |  |  |  |
| 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.

| Page | Register offset | Name | Minimum value | Maximum value | Bits |
| --- | --- | --- | --- | --- | --- |
| 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.

| Page | Register offset | Name | Minimum value | Maximum value | Bits |
| --- | --- | --- | --- | --- | --- |
| 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.

| Page | Register offset | Name | Minimum value | Maximum value | Bits |
| --- | --- | --- | --- | --- | --- |
| 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, 74xx MKII and later families and replace the alarm strings from the old alarm system.

| Page | Register offset | Name | Minimum value | Maximum value | Bits |
| --- | --- | --- | --- | --- | --- |
| 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, 74xx MKII and later families and replace the alarm strings from the old alarm system.

| Page | Register offset | Name | Minimum value | Maximum value | Bits |
| --- | --- | --- | --- | --- | --- |
| 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, 74xx MKII and later families and replace the alarm strings from the old alarm system.

| Page | Register offset | Name | Minimum value | Maximum value | Bits |
| --- | --- | --- | --- | --- | --- |
| 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 2 input A-H strings | UNICODE | UNICODE | 512 |
| 65-66 |  | 2133 Expansion module 3 input A-H strings | UNICODE | UNICODE | 512 |

## Page 70 – Extended PLC Stores

1. This page returns the value of the extended plc stores.
2. This page is implemented on the 73xx MKII, 74xx MKII and the 86xx MKII and replaces the plc stores in page 192.

**Registers**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Register offset | Name | Minimum value | Maximum value | Scaling factor | Units | Bits/ sign | Read/write |
| 0-1 | PLC Data store 1 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| 2-3 | PLC Data store 2 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| 4-5 | PLC Data store 3 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| 6-7 | PLC Data store 4 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| 8-9 | PLC Data store 5 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| 10-11 | PLC Data store 6 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| 12-13 | PLC Data store 7 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| 14-15 | PLC Data store 8 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| 16-17 | PLC Data store 9 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| 18-19 | PLC Data store 10 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| … |  |  |  |  |  |  |  |
| 198-199 | PLC Data store 100 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| 200-255 | Reserved |  |  |  |  | 32 S | Read Only |

## Page 72 – Extended PLC Registers

1. This page returns the value of the extended plc registers.
2. This page is implemented on the 73xx MKII, 74xx MKII and the 86xx MKII and replaces the plc registers in page 192.

**Registers**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Register offset | Name | Minimum value | Maximum value | Scaling factor | Units | Bits/ sign | Read/write |
| 0-1 | PLC Data Register 1 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| 2-3 | PLC Data Register 2 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| 4-5 | PLC Data Register 3 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| 6-7 | PLC Data Register 4 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| 8-9 | PLC Data Register 5 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| 10-11 | PLC Data Register 6 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| 12-13 | PLC Data Register 7 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| 14-15 | PLC Data Register 8 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| 16-17 | PLC Data Register 9 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| 18-19 | PLC Data Register 10 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| … |  |  |  |  |  |  |  |
| 198-199 | PLC Data Register 100 | -2147483648 | 2147483647 |  |  | 32 S | Read/write |
| 200-255 | Reserved |  |  |  |  | 32 S | Read Only |

## Page 74 – Extended PLC Timers

1. This page returns the value of the extended plc timers.
2. This page is implemented on the 74xx MKII and the 86xx MKII and replaces the plc timers in page 192.

**Registers**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Register offset | Name | Minimum value | Maximum value | Scaling factor | Units | Bits/ sign | Read/write |
| 0-1 | PLC Timer value 1 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 2-3 | PLC Timer value 2 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 4-5 | PLC Timer value 3 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 6-7 | PLC Timer value 4 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 8-9 | PLC Timer value 5 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 10-11 | PLC Timer value 6 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 12-13 | PLC Timer value 7 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 14-15 | PLC Timer value 8 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 16-17 | PLC Timer value 9 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 18-19 | PLC Timer value 10 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| … |  |  |  |  |  |  |  |
| 98-99 | PLC Timer value 50 | 0 | 864000 | 0.1 | s | 32 S | Read Only |
| 100-255 | Reserved |  |  |  |  | 32 S | Read Only |

## Page 76 – Extended PLC Counters

1. This page returns the value of the extended plc counters.
2. This page is implemented on the 74xx MKII and the 86xx MKII and replaces the plc counters in page 192.

**Registers**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Register offset | Name | Minimum value | Maximum value | Scaling factor | Units | Bits/ sign | Read/write |
| 0-1 | PLC Counter value 1 | 0 | 999 999 |  |  | 32 S | Read Only |
| 2-3 | PLC Counter value 2 | 0 | 999 999 |  |  | 32 S | Read Only |
| 4-5 | PLC Counter value 3 | 0 | 999 999 |  |  | 32 S | Read Only |
| 6-7 | PLC Counter value 4 | 0 | 999 999 |  |  | 32 S | Read Only |
| 8-9 | PLC Counter value 5 | 0 | 999 999 |  |  | 32 S | Read Only |
| 10-11 | PLC Counter value 6 | 0 | 999 999 |  |  | 32 S | Read Only |
| 12-13 | PLC Counter value 7 | 0 | 999 999 |  |  | 32 S | Read Only |
| 14-15 | PLC Counter value 8 | 0 | 999 999 |  |  | 32 S | Read Only |
| 16-17 | PLC Counter value 9 | 0 | 999 999 |  |  | 32 S | Read Only |
| 18-19 | PLC Counter value 10 | 0 | 999 999 |  |  | 32 S | Read Only |
| … |  |  |  |  |  |  |  |
| 98-99 | PLC Counter value 50 | 0 | 999 999 |  |  | 32 S | Read Only |
| 100-255 | Reserved |  |  |  |  | 32 S | Read Only |

## 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 Speed Control, Voltage Control and load share configuration

1. These registers may be individually read and written at any time.
2. Registers 36/37 were previously defined as unsigned but a mains controller has always had the option to set negative power so these now reflect their true nature.
3. Registers 83-85 and 115-117 were used regardless of whether the set was in mains parallel on an 86xx MKII up to V4. From V5 these registers are only used when NOT in mains parallel mode and registers 86-88 and 118-120 are used when in mains parallel.
4. On an 86xx MKII from V5, when a value is written to a writeable register that is greater than the maximum value, the maximum value will be written into the register and no exception will be returned.
5. On an 86xx MKII from V5, when a value is written to a writeable register that is lower than the minimum value, the minimum value will be written into the register and no exception will be returned.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Register offset | Name | Minimum value | | Maximum value | | Scaling factor | Units | Bits/ Sign | Read/Write |
|  | **Local bus control (CAN port 0)** |  | |  | |  |  |  |  |
| 0-31 | Reserved | 0 | | 0 | |  |  | 16 | Read/Write |
|  | **Miscellaneous** |  | |  | |  |  |  |  |
| 32 | Generating set run priority | 1 | | 32 | | 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) | -100 | | 100 | | 1 | % | 16 S | Read/Write |
| 37 | Load level setting (maximum) | -100 | | 100 | | 1 | % | 16 S | 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 | 0.1 | | 2.5 | | 0.01 | Hz | 16 | Read/Write |
| 50 | Relay pulse length | 0.1 | | 1.6 | | 0.1 | Sec | 16 | Read/Write |
| 51 | Reserved |  | |  | |  |  |  |  |
| 52 | Compensation (integral gain) | 0 | | 100 | | 1 | % | 16 | Read/Write |
| 52-63 | Reserved |  | |  | |  |  |  |  |
|  | **Phase synchroniser** |  | |  | |  |  |  |  |
| 64-77 | Reserved | 0 | | 0 | |  |  | 16 | Read/Write |
| 78 | Cummins CM850 Governor gain | 0 | | 63.999 | | 0.1 |  | 16 | Read/Write |
| 79 | Reserved | 0 | | 0 | |  |  | 16 | Read/Write |
|  | **Load share** |  |  | |  | |  |  |  |
| 80 | Reserved | 0 | 0 | |  | |  | 16 | Read/Write |
| 81 | Relay pulse rate | 0.1 | 2.5 | | 0.01 | | Hz | 16 | Read/Write |
| 82 | Relay pulse length | 0.1 | 1.6 | | 0.1 | | Sec | 16 | Read/Write |
| 83 | Proportional gain – NOT mains parallel | 0 | 100 | | 1 | |  | 16 | Read/Write |
| 84 | Integral gain – NOT mains parallel | 0 | 100 | | 1 | |  | 16 | Read/Write |
| 85 | Derivative gain – NOT mains parallel | 0 | 100 | | 1 | |  | 16 | Read/Write |
| 86 | Proportional gain – mains parallel | 0 | 100 | | 1 | |  | 16 | Read/Write |
| 87 | Integral gain – mains parallel | 0 | 100 | | 1 | |  | 16 | Read/Write |
| 88 | Derivative gain – mains parallel | 0 | 100 | | 1 | |  | 16 | Read/Write |
| 89 | Unimplemented |  |  | |  | |  |  |  |
| 90 | Power control mode (see below) | 0 | 2 | |  | |  | 16 | Read/Write |
| 91 | Current power target | -100.0 | +100.0 | | 0.1 | | % | 16S | Read Only |
| 92-95 | Reserved |  |  | |  | |  |  |  |
|  | **Voltage matcher** |  |  | |  | |  |  |  |
| 96 | Reserved | 0 | 0 | |  | |  | 16 | Read/Write |
| 97 | Relay pulse rate | 0.1 | 2.5 | | 0.01 | | Hz | 16 | Read/Write |
| 98 | Relay pulse length | 0.1 | 1.6 | | 0.1 | | Sec | 16 | Read/Write |
| 99 | Reserved |  |  | |  | |  |  |  |
| 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 | 0.1 | 2.5 | | 0.01 | | Hz | 16 | Read/Write |
| 114 | Relay pulse length | 0.1 | 1.6 | | 0.1 | | Sec | 16 | Read/Write |
| 115 | Proportional gain – NOT mains parallel | 0 | 100 | | 1 | | % | 16 | Read/Write |
| 116 | Integral gain – NOT mains parallel | 0 | 100 | | 1 | |  | 16 | Read/Write |
| 117 | Derivative gain – NOT mains parallel | 0 | 100 | | 1 | |  | 16 | Read/Write |
| 118 | Proportional gain – mains parallel | 0 | 100 | | 1 | |  | 16 | Read/Write |
| 119 | Integral gain – mains parallel | 0 | 100 | | 1 | |  | 16 | Read/Write |
| 120 | Derivative gain – mains parallel | 0 | 100 | | 1 | |  | 16 | Read/Write |
| 121 | Unimplemented |  |  | |  | |  |  |  |
| 122 | Power factor setting | -1.00 | +1.00 | | 0.01 | |  | 16s | Read/Write |
| 123 | Reactive power control mode (see below) | 0 | 3 | |  | |  | 16 | Read/Write |
| 124 | Current reactive power target | -100.0 | +100.0 | | 0.1 | | % | 16S | Read Only |
| 125 | Current power factor target | -1.00 | +1.00 | | 0.01 | | % | 16S | Read Only |
| 125-127 | 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 |
| 131-141 | 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 |
|  | **Load share ramp rates** |  |  | |  | |  |  |  |
| 168 | Ramp on rate | 0.0 | 100.0 | | 0.1 | | % | 16 | Read only |
| 169 | Ramp off rate | 0.0 | 100.0 | | 0.1 | | % | 16 | Write only |
| 170 | Reactive power setpoint change ramp rate | 0.0 | 100.0. | | 0.1 | | % | 16 | Read only |
| 171 | Real power setpoint change ramp rate | 0.0 | 100.0 | | 0.1 | | % | 16 | Write only |
| 172 | Governor droop ramp rate | 0 | 100.0 | | 0.1 | | % | 16 | Read / Write |
| 173 | AVR droop ramp rate | 0 | 100.0 | | 0.1 | | % | 16 | Read / Write |
|  | Governor Droop |  |  | |  | |  |  |  |
| 174 | Droop curve max (of nominal) | 90.00 | 110.00 | | 0.01 | | % | 16 | Read only |
| 175 | Droop curve min (of nominal) | 90.00 | 110.00 | | 0.01 | | % | 16 | Read only |
| 176 | Droop graph gradient | -20.0000 | 0.0000 | | 0.0001 | |  | 32s | Read only |
| 178 | Graph offset (% of nominal) | -20.00 | +20.00 | | 0.01 | | % | 16s | Read / Write |
| 179 | Ramp Rate | 0.1 | 100.0 | | 0.1 | | % | 16 | Read / Write |
| 180 | Proportional gain | 0 | 100 | | 1 | | % | 16 | Read / Write |
| 181 | Integral gain | 0 | 100 | | 1 | | % | 16 | Read / Write |
| 182 | Unimplemented |  |  | |  | |  | 16 | Read / Write |
| 183 | Droop % | 0 | 100.00 | | 1 | | % | 16 | Read Only |
| 184-7 | Unimplemented |  |  | |  | |  |  |  |
|  | AVR Droop |  |  | |  | |  |  |  |
| 188 | Droop curve max (of nominal) | 90.00 | 110.00 | | 0.01 | | % | 16 | Read only |
| 189 | Droop curve min (of nominal) | 90.00 | 110.00 | | 0.01 | | % | 16 | Read only |
| 190 | Droop graph gradient | -20.0000 | 0.0000 | | 0.0001 | |  | 32s | Read only |
| 192 | Graph offset (% of nominal) | -20.00 | +20.00 | | 0.01 | | % | 16s | Read / Write |
| 193 | Ramp Rate | 0.1 | 100.0 | | 0.1 | | % | 16 | Read / Write |
| 194 | Proportional gain | 0 | 100 | | 1 | | % | 16 | Read / Write |
| 195 | Integral gain | 0 | 100 | | 1 | | % | 16 | Read / Write |
| 196 | Unimplemented | 0 | 100 | | 1 | | % | 16 | Read / Write |
| 197 | Droop % | 0 | 100.00 | | 1 | | % | 16 | Read Only |

Generic

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Current Limit** |  |  |  |  |  |  |
| 147 | Reserved |  |  |  |  |  |  |
| 148 | Reserved |  |  |  |  |  |  |
| 149 | Current limit | 0 | 5000 | 1 | A | 16s | R/W |
| 150-159 | Reserved |  |  |  |  |  |  |
|  | **Modbus Gateway** |  |  |  |  |  |  |
| 160 | DSENet Battery charger 0 Modbus ID | 0 | 247 |  |  | 16 | Read only |
| 161 | DSENet Battery charger 1 Modbus ID | 0 | 247 |  |  | 16 | Read only |
| 162 | DSENet Battery charger 2 Modbus ID | 0 | 247 |  |  | 16 | Read only |
| 163 | DSENet Battery charger 3 Modbus ID | 0 | 247 |  |  | 16 | Read only |
| 164-7 | Unimplemented |  |  |  |  | 16 | Read only |
| 172-255 | Reserved |  |  |  |  |  |  |

Exxx

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Governor Calibration and Target Speed** |  |  |  |  |  |  |
| 147 | Target Speed | 0 | 8000 | 1 | RPM | 16 | Read/Write |
| 148-255 | Reserved |  |  |  |  |  |  |

|  |  |
| --- | --- |
| Reactive power control mode | Description |
| 0 | Constant Power Factor mode |
| 1 | Voltage-Reactive Power mode |
| 2 | Power-Power Factor mode |
| 3 | Constant Reactive Power mode |
| 4- | Reserved |

|  |  |
| --- | --- |
| Power control mode | Description |
| 0 | Constant power mode |
| 1 | Frequency-Power mode |
| 2 | Voltage-Power Mode |
| 3- | 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 |

## Pages 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;

**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 (Flex sender A as digital input) | 0 | 15 | | | 13/16-16/16 |
|  | Unnamed digital input 10 (Flex sender B as digital input) | 0 | 15 | | | 9/16-12/16 |
|  | Unnamed digital input 11 (Flex sender C as digital input) | 0 | 15 | | | 5/16-8/16 |
|  | Unnamed digital input 12 (Flex sender D as digital input) | 0 | 15 | | | 1/16-4/16 |
| 4 | Unnamed digital input 13 (Flex sender E as digital input) | 0 | 15 | | | 13/16-16/16 |
|  | Unnamed digital input 14 (Flex sender F as 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 |
| 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 |  |  | | |  |
| 45 | Internal flexible sender A analogue input low | 0 | 15 | | 13/16-16/16 | |
|  | Internal flexible sender A 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 | | |
|  | Internal flexible sender A fault alarm | 0 | 15 | 9/16-12/16 | | |
|  | Internal flexible sender B analogue input low | 0 | 15 | 5/16-8/16 | | |
|  | Internal flexible sender B analogue input high | 0 | 15 | 1/16-4/16 | | |
| 52 | Internal flexible sender B fault alarm | 0 | 15 | 13/16-16/16 | | |
|  | Internal flexible sender C analogue input low | 0 | 15 | 9/16-12/16 | | |
|  | Internal flexible sender C analogue input high | 0 | 15 | 5/16-8/16 | | |
|  | Internal flexible sender C fault alarm | 0 | 15 | 1/16-4/16 | | |
| 53 | Internal flexible sender D analogue input low | 0 | 15 | 13/16-16/16 | | |
|  | Internal flexible sender D analogue input high | 0 | 15 | 9/16-12/16 | | |
|  | Internal flexible sender D fault alarm | 0 | 15 | 5/16-8/16 | | |
|  | Internal flexible sender E analogue input low | 0 | 15 | 1/16-4/16 | | |
| 54 | Internal flexible sender E analogue input high | 0 | 15 | 13/16-16/16 | | |
|  | Internal flexible sender E fault alarm | 0 | 15 | 9/16-12/16 | | |
|  | Internal flexible sender F analogue input low | 0 | 15 | 5/16-8/16 | | |
|  | Internal flexible sender F analogue input high | 0 | 15 | 1/16-4/16 | | |
| 55 | Internal flexible sender F fault alarm | 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 | | |
| 56 | 2133 expansion module 0 analogue input A low | 0 | 15 | 13/16-16/16 | | |
|  | 2133 expansion module 0 analogue input A high | 0 | 15 | 9/16-12/16 | | |
|  | 2133 expansion module 0 analogue input B low | 0 | 15 | 5/16-8/16 | | |
|  | 2133 expansion module 0 analogue input B high | 0 | 15 | 1/16-4/16 | | |
| 57 | 2133 expansion module 0 analogue input C low | 0 | 15 | 13/16-16/16 | | |
|  | 2133 expansion module 0 analogue input C high | 0 | 15 | 9/16-12/16 | | |
|  | 2133 expansion module 0 analogue input D low | 0 | 15 | 5/16-8/16 | | |
|  | 2133 expansion module 0 analogue input D high | 0 | 15 | 1/16-4/16 | | |
| 58 | 2133 expansion module 0 analogue input E low | 0 | 15 | 13/16-16/16 | | |
|  | 2133 expansion module 0 analogue input E high | 0 | 15 | 9/16-12/16 | | |
|  | 2133 expansion module 0 analogue input F low | 0 | 15 | 5/16-8/16 | | |
|  | 2133 expansion module 0 analogue input F high | 0 | 15 | 1/16-4/16 | | |
| 59 | 2133 expansion module 0 analogue input G low | 0 | 15 | 13/16-16/16 | | |
|  | 2133 expansion module 0 analogue input G high | 0 | 15 | 9/16-12/16 | | |
|  | 2133 expansion module 0 analogue input H low | 0 | 15 | 5/16-8/16 | | |
|  | 2133 expansion module 0 analogue input H high | 0 | 15 | 1/16-4/16 | | |
| 60 – 63 | 2133 expansion module 1 analogue input A – J |  |  |  | | |
| 64 - 67 | 2133 expansion module 2 analogue input A – J |  |  |  | | |
| 68 - 71 | 2133 expansion module 3 analogue input A – J |  |  |  | | |
| 72 | 2131 expansion module 0 analogue input A low | 0 | 15 | 13/16-16/16 | | |
|  | 2131 expansion module 0 analogue input A high | 0 | 15 | 9/16-12/16 | | |
|  | 2131 expansion module 0 analogue input B low | 0 | 15 | 5/16-8/16 | | |
|  | 2131 expansion module 0 analogue input B high | 0 | 15 | 1/16-4/16 | | |
| 73 | 2131 expansion module 0 analogue input C low | 0 | 15 | 13/16-16/16 | | |
|  | 2131 expansion module 0 analogue input C high | 0 | 15 | 9/16-12/16 | | |
|  | 2131 expansion module 0 analogue input D low | 0 | 15 | 5/16-8/16 | | |
|  | 2131 expansion module 0 analogue input D high | 0 | 15 | 1/16-4/16 | | |
| 74 | 2131 expansion module 0 analogue input E low | 0 | 15 | 13/16-16/16 | | |
|  | 2131 expansion module 0 analogue input E high | 0 | 15 | 9/16-12/16 | | |
|  | 2131 expansion module 0 analogue input F low | 0 | 15 | 5/16-8/16 | | |
|  | 2131 expansion module 0 analogue input F high | 0 | 15 | 1/16-4/16 | | |
| 75 | 2131 expansion module 0 analogue input G low | 0 | 15 | 13/16-16/16 | | |
|  | 2131 expansion module 0 analogue input G high | 0 | 15 | 9/16-12/16 | | |
|  | 2131 expansion module 0 analogue input H low | 0 | 15 | 5/16-8/16 | | |
|  | 2131 expansion module 0 analogue input H high | 0 | 15 | 1/16-4/16 | | |
| 76 | 2131 expansion module 0 analogue input I low | 0 | 15 | 13/16-16/16 | | |
|  | 2131 expansion module 0 analogue input I high | 0 | 15 | 9/16-12/16 | | |
|  | 2131 expansion module 0 analogue input J low | 0 | 15 | 5/16-8/16 | | |
|  | 2131 expansion module 0 analogue input J high | 0 | 15 | 1/16-4/16 | | |
| 77 – 81 | 2131 expansion module 1 analogue input A – H |  |  |  | | |
| 82 – 86 | 2131 expansion module 2 analogue input A - H |  |  |  | | |
| 87 – 91 | 2131 expansion module 3 analogue input A – H |  |  |  | | |
| 92 | 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 |
| 93 | 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 |
| 94 | 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 |
| 95 – 96 | 2131 expansion module 1 digital input C – H |  |  |  | | |
| 97 – 99 | 2131 expansion module 2 digital input A - H |  |  |  | | |
| 99 – 101 | 2131 expansion module 3 digital input A – H |  |  |  | | |
| 102 | DSENet Charger 0 Common Shutdown | 0 | 15 | | | 13/16-16/16 |
|  | DSENet Charger 0 Common Warning | 0 | 15 | | | 9/16-12/16 |
|  | DSENet Charger 1 Common Shutdown | 0 | 15 | | | 5/16-8/16 |
|  | DSENet Charger 1 Common Warning | 0 | 15 | | | 1/16-4/16 |
| 103 | DSENet Charger 2 Common Shutdown | 0 | 15 | | | 13/16-16/16 |
|  | DSENet Charger 2 Common Warning | 0 | 15 | | | 9/16-12/16 |
|  | DSENet Charger 3 Common Shutdown | 0 | 15 | | | 5/16-8/16 |
|  | DSENet Charger 3 Common Warning | 0 | 15 | | | 1/16-4/16 |
| 104 | Configurable CAN instrument 1 | 0 | 15 | | | 13/16-16/16 |
|  | Configurable CAN instrument 2 | 0 | 15 | | | 9/16-12/16 |
|  | Configurable CAN instrument 3 | 0 | 15 | | | 5/16-8/16 |
|  | Configurable CAN instrument 4 | 0 | 15 | | | 1/16-4/16 |
| 105 | Configurable CAN instrument 5 | 0 | 15 | | | 13/16-16/16 |
|  | Configurable CAN instrument 6 | 0 | 15 | | | 9/16-12/16 |
|  | Configurable CAN instrument 7 | 0 | 15 | | | 5/16-8/16 |
|  | Configurable CAN instrument 8 | 0 | 15 | | | 1/16-4/16 |
| 106 | Configurable CAN instrument 9 | 0 | 15 | | | 13/16-16/16 |
|  | Configurable CAN instrument 10 | 0 | 15 | | | 9/16-12/16 |
|  | Unimplemented | 0 | 15 | | | 5/16-8/16 |
|  | Unimplemented | 0 | 15 | | | 1/16-4/16 |
| 107-127 | Unimplemented | 0 | 15 | 16 | | |
| 128-255 | Reserved |  |  |  | | |

**8xxx 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 | Unimplemented |  |  | | |  |
| 5 | Analogue Input A (Digital) | 0 | 15 | | | 13/16-16/16 |
|  | Analogue Input B (Digital) | 0 | 15 | | | 9/16-12/16 |
|  | Analogue Input C (Digital) | 0 | 15 | | | 5/16-8/16 |
|  | Analogue Input D (Digital) | 0 | 15 | | | 1/16-4/16 |
| 6 - 8 | Unimplemented |  |  | | |  |
| 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 |  |  | | |  |
| 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 |  |  | | |  |
| 37-48 | Unimplemented |  |  | | |  |
| 49 | Internal Flexible Sensor A analogue input low | 0 | 15 | | 13/16-16/16 | |
|  | Internal Flexible Sensor A analogue input high | 0 | 15 | | 9/16-12/16 | |
|  | Internal Flexible Sensor B analogue input low | 0 | 15 | | 5/16-8/16 | |
|  | Internal Flexible Sensor B analogue input high | 0 | 15 | | 1/16-4/16 | |
| 50 | Internal Flexible Sensor C analogue input low | 0 | 15 | | 13/16-16/16 | |
|  | Internal Flexible Sensor C analogue input high | 0 | 15 | | 9/16-12/16 | |
|  | Internal Flexible Sensor D analogue input low | 0 | 15 | | 5/16-8/16 | |
|  | Internal Flexible Sensor D analogue input high | 0 | 15 | | 1/16-4/16 | |
| 51 | Unimplemented |  |  |  | | |
|  | Unimplemented |  |  |  | | |
|  | 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 | | |
|  | Low Load | 0 | 15 | 9/16-12/16 | | |
|  | Unimplemented |  |  |  | | |
|  | Unimplemented |  |  |  | | |
| 58-63 | Unimplemented |  |  |  | | |
| 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 | Charger ID0 Common Shutdown | 0 | 15 | 13/16-16/16 | | |
|  | Charger ID0 Common Warning | 0 | 15 | 9/16-12/16 | | |
|  | Charger ID1 Common Shutdown | 0 | 15 | 5/16-8/16 | | |
|  | Charger ID1 Common Warning | 0 | 15 | 1/16-4/16 | | |
| 101 | Charger ID2 Common Shutdown | 0 | 15 | 13/16-16/16 | | |
|  | Charger ID2 Common Warning | 0 | 15 | 9/16-12/16 | | |
|  | Charger ID3 Common Shutdown | 0 | 15 | 5/16-8/16 | | |
|  | Charger ID3 Common Warning | 0 | 15 | 1/16-4/16 | | |
| 102-255 | Reserved |  |  |  | | |

**74xx 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 |
|  | Unnamed digital input G | 0 | 15 | | | 5/16-8/16 |
|  | Unnamed digital input H | 0 | 15 | | | 1/16-4/16 |
| 3 | Flex sender A as digital input | 0 | 15 | | | 13/16-16/16 |
|  | Flex sender B as digital input | 0 | 15 | | | 9/16-12/16 |
|  | Flex sender C as digital input | 0 | 15 | | | 5/16-8/16 |
|  | Flex sender D as digital input | 0 | 15 | | | 1/16-4/16 |
| 4 | Flex sender E as digital input | 0 | 15 | | | 13/16-16/16 |
|  | Flex sender F as digital input | 0 | 15 | | | 9/16-12/16 |
|  | Flex sender G as digital input | 0 | 15 | | | 5/16-8/16 |
|  | Flex sender H as digital input | 0 | 15 | | | 1/16-4/16 |
| 5 | 2130 expansion module 0 digital input A | 0 | 15 | | | 13/16-16/16 |
|  | 2130 expansion module 0 digital input B | 0 | 15 | | | 9/16-12/16 |
|  | 2130 expansion module 0 digital input C | 0 | 15 | | | 5/16-8/16 |
|  | 2130 expansion module 0 digital input D | 0 | 15 | | | 1/16-4/16 |
| 6 | 2130 expansion module 0 digital input E | 0 | 15 | | | 13/16-16/16 |
|  | 2130 expansion module 0 digital input F | 0 | 15 | | | 9/16-12/16 |
|  | 2130 expansion module 0 digital input G | 0 | 15 | | | 5/16-8/16 |
|  | 2130 expansion module 0 digital input H | 0 | 15 | | | 1/16-4/16 |
| 7-8 | 2130 expansion module 1 digital input A-H |  |  | | |  |
| 9-10 | 2130 expansion module 2 digital input A-H |  |  | | |  |
| 11-12 | 2130 expansion module 3 digital input A-H |  |  | | |  |
| 13-24 | Reserved for expansion modules 4-9 |  |  | | |  |
| 25 | 2130 expansion module 0 analogue input E low | 0 | 15 | | 13/16-16/16 | |
|  | 2130 expansion module 0 analogue input E high | 0 | 15 | | 9/16-12/16 | |
|  | 2130 expansion module 0 analogue input F low | 0 | 15 | | 5/16-8/16 | |
|  | 2130 expansion module 0 analogue input F high | 0 | 15 | | 1/16-4/16 | |
| 26 | 2130 expansion module 0 analogue input G low | 0 | 15 | | 13/16-16/16 | |
|  | 2130 expansion module 0 analogue input G high | 0 | 15 | | 9/16-12/16 | |
|  | 2130 expansion module 0 analogue input H low | 0 | 15 | | 5/16-8/16 | |
|  | 2130 expansion module 0 analogue input H high | 0 | 15 | | 1/16-4/16 | |
| 27-28 | 2130 expansion module 1 analogue inputs E-H |  |  | | |  |
| 29-30 | 2130 expansion module 2 analogue inputs E-H |  |  | | |  |
| 31-32 | 2130 expansion module 3 analogue inputs E-H |  |  | | |  |
| 33-44 | Unimplemented | 15 | 15 | | | 16 |
| 45 | 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 | |
|  | Engine Maintenance alarm 1 | 0 | 15 | | 5/16-8/16 | |
|  | Engine Maintenance alarm 2 | 0 | 15 | | 1/16-4/16 | |
| 46 | 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 | |
| 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 | | |
| 48 | 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 | | |
|  | Internal flexible sender A fault alarm | 0 | 15 | 9/16-12/16 | | |
|  | Internal flexible sender B analogue input low | 0 | 15 | 5/16-8/16 | | |
|  | Internal flexible sender B analogue input high | 0 | 15 | 1/16-4/16 | | |
| 52 | Internal flexible sender B fault alarm | 0 | 15 | 13/16-16/16 | | |
|  | Internal flexible sender C analogue input low | 0 | 15 | 9/16-12/16 | | |
|  | Internal flexible sender C analogue input high | 0 | 15 | 5/16-8/16 | | |
|  | Internal flexible sender C fault alarm | 0 | 15 | 1/16-4/16 | | |
| 53 | Internal flexible sender D analogue input low | 0 | 15 | 13/16-16/16 | | |
|  | Internal flexible sender D analogue input high | 0 | 15 | 9/16-12/16 | | |
|  | Internal flexible sender D fault alarm | 0 | 15 | 5/16-8/16 | | |
|  | Internal flexible sender E analogue input low | 0 | 15 | 1/16-4/16 | | |
| 54 | Internal flexible sender E analogue input high | 0 | 15 | | | 13/16-16/16 |
|  | Internal flexible sender E fault alarm | 0 | 15 | | | 9/16-12/16 |
|  | Internal flexible sender F analogue input low | 0 | 15 | | | 5/16-8/16 |
|  | Internal flexible sender F analogue input high | 0 | 15 | | | 1/16-4/16 |
| 55 | Internal flexible sender F fault alarm | 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 |
| 56 | 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 | | |
| 57 | 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 | | |
| 58 | 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 | | |
| 59 | 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 | | |
| 60 – 63 | 2133 expansion module 1 analogue input A – H |  |  |  | | |
| 64 – 67 | 2133 expansion module 2 analogue input A - H |  |  |  | | |
| 68 – 71 | 2133 expansion module 3 analogue input A – H |  |  |  | | |
| 72 | 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 | | |
| 73 | 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 | | |
| 74 | 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 | | |
| 75 | 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 | | |
| 76 | 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 | | |
| 77 – 81 | 2131 expansion module 1 analogue input A – J |  |  |  | | |
| 82 – 86 | 2131 expansion module 2 analogue input A – J |  |  |  | | |
| 87 – 91 | 2131 expansion module 3 analogue input A – J |  |  |  | | |
| 92 | 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 |
| 93 | 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 |
| 94 | 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 |
| 95 | 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 |
| 96 | 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 |
| 97 | 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 |
| 98 | 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 |
| 99 | 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 |
| 100 | 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 |
| 101 | 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 |
| 102-255 | Reserved |  |  | | |  |

**7450 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 |
|  | Unimplemented |  |  | | |  |
| 4 | Unimplemented |  |  | | |  |
| 5 | Analogue Input B (Digital) | 0 | 15 | | | 13/16-16/16 |
|  | Analogue Input C (Digital) | 0 | 15 | | | 9/16-12/16 |
|  | Analogue Input D (Digital) | 0 | 15 | | | 5/16-8/16 |
|  | Unimplemented |  |  | | |  |
| 6 - 8 | Unimplemented |  |  | | |  |
| 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 |  |  | | |  |
| 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 |  |  | | |  |
| 37-48 | Unimplemented |  |  | | |  |
| 49 | Unimplemented |  |  | |  | |
|  | Unimplemented |  |  | |  | |
|  | Internal Flexible Sensor B analogue input low | 0 | 15 | | 5/16-8/16 | |
|  | Internal Flexible Sensor B analogue input high | 0 | 15 | | 1/16-4/16 | |
| 50 | Internal Flexible Sensor C analogue input low | 0 | 15 | | 13/16-16/16 | |
|  | Internal Flexible Sensor C analogue input high | 0 | 15 | | 9/16-12/16 | |
|  | Internal Flexible Sensor D analogue input low | 0 | 15 | | 5/16-8/16 | |
|  | Internal Flexible Sensor D analogue input high | 0 | 15 | | 1/16-4/16 | |
| 51 | Unimplemented |  |  |  | | |
|  | Unimplemented |  |  |  | | |
|  | 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 |  |  |  | | |
|  | Unimplemented |  |  |  | | |
|  | Unimplemented |  |  |  | | |
| 58-63 | Unimplemented |  |  |  | | |
| 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 | Battery Maintenance Alarm 1 |  |  |  | | |
|  | Battery Maintenance Alarm 2 |  |  |  | | |
|  | Battery Maintenance Alarm 3 |  |  |  | | |
|  | Unimplemented |  |  |  | | |
| 101 | Unimplemented |  |  |  | | |
|  | Unimplemented |  |  |  | | |
|  | Unimplemented |  |  |  | | |
|  | Unimplemented |  |  |  | | |
| 102-255 | 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 |  |  |  |  |  |  |
| 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 | E400 |
| 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 | Flexible Digital Input A | 0 | 15 | 13/16-16/16 |  |  |
|  | Flexible Digital Input B | 0 | 15 | 9/16-12/16 |  |  |
|  | Flexible Digital Input C | 0 | 15 | 5/16-8/16 |  |  |
|  | Flexible Digital Input D | 0 | 15 | 1/16-4/16 |  |  |
| 6 | Flexible Digital Input E | 0 | 15 | 13/16-16/16 |  |  |
|  | Flexible Digital Input F | 0 | 15 | 9/16-12/16 |  |  |
|  | Flexible Digital Input G | 0 | 15 | 5/16-8/16 |  |  |
|  | Flexible Digital Input H | 0 | 15 | 1/16-4/16 |  |  |
| 7 | Flexible Digital Input I | 0 | 15 | 13/16-16/16 |  |  |
|  | Flexible Digital Input J | 0 | 15 | 9/16-12/16 |  |  |
|  | Flexible Digital Input K | 0 | 15 | 5/16-8/16 |  |  |
|  | Flexible Digital Input L | 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 A analogue input low | 0 | 15 | 13/16-16/16 |  |
|  | Internal flexible sender A analogue input high | 0 | 15 | 9/16-12/16 |  |
|  | Internal flexible sender B analogue input low | 0 | 15 | 5/16-8/16 |  |
|  | Internal flexible sender B analogue input high | 0 | 15 | 1/16-4/16 |  |
| 40 | Internal flexible sender C analogue input low | 0 | 15 | 13/16-16/16 |  |
|  | Internal flexible sender C analogue input high | 0 | 15 | 9/16-12/16 |  |
|  | Internal flexible sender D analogue input low | 0 | 15 | 5/16-8/16 |  |
|  | Internal flexible sender D analogue input high | 0 | 15 | 1/16-4/16 |  |
| 41 | Internal flexible sender E analogue input low | 0 | 15 | 13/16-16/16 |  |
|  | Internal flexible sender E analogue input high | 0 | 15 | 9/16-12/16 |  |
|  | Internal flexible sender F analogue input low | 0 | 15 | 5/16-8/16 |  |
|  | Internal flexible sender F analogue input high | 0 | 15 | 1/16-4/16 |  |
| 42 | Internal flexible sender G analogue input low | 0 | 15 | 13/16-16/16 |  |
|  | Internal flexible sender G analogue input high | 0 | 15 | 9/16-12/16 |  |
|  | Internal flexible sender H analogue input low | 0 | 15 | 5/16-8/16 |  |
|  | Internal flexible sender H analogue input high | 0 | 15 | 1/16-4/16 |  |
| 43 | Internal flexible sender I analogue input low | 0 | 15 | 13/16-16/16 |  |
|  | Internal flexible sender I analogue input high | 0 | 15 | 9/16-12/16 |  |
|  | Internal flexible sender J analogue input low | 0 | 15 | 5/16-8/16 |  |
|  | Internal flexible sender J analogue input high | 0 | 15 | 1/16-4/16 |  |
| 44 | Internal flexible sender K analogue input low | 0 | 15 | 13/16-16/16 |  |
|  | Internal flexible sender K analogue input high | 0 | 15 | 9/16-12/16 |  |
|  | Internal flexible sender L analogue input low | 0 | 15 | 5/16-8/16 |  |
|  | Internal flexible sender L 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 | Internal Flexible Sensor A sensor fault | 0 | 15 | 13/16-16/16 |  |
|  | Internal Flexible Sensor B sensor fault | 0 | 15 | 9/16-12/16 |  |
|  | Internal Flexible Sensor C sensor fault | 0 | 15 | 5/16-8/16 |  |
|  | Internal Flexible Sensor D sensor fault | 0 | 15 | 1/16-4/16 |  |
| 52 | Internal Flexible Sensor E sensor fault | 0 | 15 | 13/16-16/16 |  |
|  | Internal Flexible Sensor F sensor fault | 0 | 15 | 9/16-12/16 |  |
|  | Internal Flexible Sensor G sensor fault | 0 | 15 | 5/16-8/16 |  |
|  | Internal Flexible Sensor H sensor fault | 0 | 15 | 1/16-4/16 |  |
| 53 | Internal Flexible Sensor I sensor fault | 0 | 15 | 13/16-16/16 |  |
|  | Internal Flexible Sensor J sensor fault | 0 | 15 | 9/16-12/16 |  |
|  | Internal Flexible Sensor K sensor fault | 0 | 15 | 5/16-8/16 |  |
|  | Internal Flexible Sensor L sensor fault | 0 | 15 | 1/16-4/16 |  |
| 54-63 | 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 |  |  |  |  |

**71xx/6xxx/L40x/4xxx/45xx MKII family register allocation**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| instrumentation |  |  |  |  |
| 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 |
|  | Unnamed analogue input A (Digital) | 0 | 15 | 5/16-8/16 |
|  | Unnamed analogue input B (Digital) | 0 | 15 | 1/16-4/16 |
| 3 | Unnamed analogue input C (Digital) | 0 | 15 | 13/16-16/16 |
|  | Reserved for analogue input D (Digital) | 0 | 15 | 9/16-12/16 |
|  | Reserved for analogue input E (Digital) | 0 | 15 | 5/16-8/16 |
|  | Reserved for analogue input F (Digital) | 0 | 15 | 1/16-4/16 |
| 4-44 | Unimplemented | 0 | 15 | 16 |
| 45 | Flexible Sensor C Low | 0 | 15 | 13/16-16/16 |
|  | Flexible Sensor C High | 0 | 15 | 9/16-12/16 |
|  | Oil Maintenance alarm | 0 | 15 | 5/16-8/16 |
|  | Air Maintenance alarm | 0 | 15 | 1/16-4/16 |
| 46 | Fuel Maintenance alarm | 0 | 15 | 13/16-16/16 |
|  | Flexible Sensor D Low | 0 | 15 | 9/16-12/16 |
|  | Flexible Sensor D High | 0 | 15 | 5/16-8/16 |
|  | Flexible Sensor A Low | 0 | 15 | 1/16-4/16 |
| 47 | Flexible Sensor A High | 0 | 15 | 13/16-16/16 |
|  | Flexible Sensor A Sender Fault | 0 | 15 | 9/16-12/16 |
|  | Unimplemented | 0 | 15 | 5/16-8/16 |
|  | Unimplemented | 0 | 15 | 1/16-4/16 |
| 48-255 | Reserved |  |  |  |

**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 |  |  | | |  |
| 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 | | |
|  | Low Load | 0 | 15 | 1/16-4/16 | | |
| 48-64 | Unimplemented | 0 | 15 | 16 | | |
| 65-255 | 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 | Controlled shutdown alarm | Active string |
| 6-7 | 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**

1. E800 v1.0 to v1.1 uses alarm condition code 4 as a “Controlled Shutdown alarm”

## 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 |
|  | kW overload alarm | 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 |
| 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 HEST (was ECU Electrical Trip) | 0 | 15 | 1/16-4/16 |
| 14 | Unimplemented (was 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 |
|  | DEF Level Low | 0 | 15 | 5/16-8/16 |
|  | SCR Inducement | 0 | 15 | 1/16-4/16 |
| 65-255 | Reserved |  |  |  |

**72xx/73xx/61xx/74xx MKII 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 |
| 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 |
|  | LCD Heater Low Voltage | 0 | 15 | 9/16-12/16 |
|  | LCD Heater High Voltage | 0 | 15 | 5/16-8/16 |
|  | DEF Level Low | 0 | 15 | 1/16-4/16 |
| 16 | SCR Inducement | 0 | 15 | 13/16-16/16 |
|  | MSC Old version | 0 | 15 | 9/16-12/16 |
|  | MSC ID alarm | 0 | 15 | 5/16-8/16 |
|  | MSC failure | 0 | 15 | 1/16-4/16 |
| 17 | MSC priority Error | 0 | 15 | 13/16-16/16 |
|  | Fuel Sender open circuit | 0 | 15 | 9/16-12/16 |
|  | Over speed runaway | 0 | 15 | 5/16-8/16 |
|  | Over frequency run away | 0 | 15 | 1/16-4/16 |
| 18 | Coolant sensor open circuit | 0 | 15 | 13/16-16/16 |
|  | Remote display link lost | 0 | 15 | 9/16-12/16 |
|  | Fuel tank bund level | 0 | 15 | 5/16-8/16 |
|  | Charge air temperature | 0 | 15 | 1/16-4/16 |
| 19 | Fuel level high | 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 |
| 20-64 | 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 |
| 65-255 | Reserved |  |  |  |

**8xxx family register allocation**

| Register offset | Name | Minimum value | Maximum value | Bits/ Sign |
| --- | --- | --- | --- | --- |
| 0 | Number of named alarms | 148 | 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 |
| 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 |
|  | Inlet 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 |  |  |  |
|  | Bus 1 Phase Rotation |  |  |  |
|  | Bus 2 Live |  |  |  |
|  | Bus 2 Phase Rotation |  |  |  |
| 23 | Unimplemented |  |  |  |
|  | ECU Protect | 0 | 15 | 9/16-12/16 |
|  | ECU Malfunction | 0 | 15 | 5/16-8/16 |
|  | Indication | 0 | 15 | 1/16-4/16 |
| 24 | Unimplemented | 0 | 15 | 13/16-16/16 |
|  | Unimplemented | 0 | 15 | 9/16-12/16 |
|  | HEST Active | 0 | 15 | 5/16-8/16 |
|  | DPTC Filter | 0 | 15 | 1/16-4/16 |
| 25 | Water In Fuel | 0 | 15 | 13/16-16/16 |
|  | ECU Heater | 0 | 15 | 9/16-12/16 |
|  | ECU Cooler | 0 | 15 | 5/16-8/16 |
|  | Unimplemented | 0 | 15 | 1/16-4/16 |
| 26 | Unimplemented |  |  |  |
|  | Unimplemented |  |  |  |
|  | Unimplemented |  |  |  |
|  | Unimplemented |  |  |  |
| 27 | Unimplemented |  |  |  |
|  | Unimplemented |  |  |  |
|  | Unimplemented |  |  |  |
|  | Unimplemented |  |  |  |
| 28 | High fuel level | 0 | 15 | 13/16-16/16 |
|  | Unimplemented |  |  |  |
|  | 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 |
|  | DEF Level Low | 0 | 15 | 5/16-8/16 |
|  | SCR Inducement | 0 | 15 | 1/16-4/16 |
| 31 | Heater Sensor Failure Alarm | 0 | 15 | 13/16-16/16 |
|  | Mains Over Zero Sequence Volts Alarm | 0 | 15 | 9/16-12/16 |
|  | Mains Under Positive Sequence Volts Alarm | 0 | 15 | 5/16-8/16 |
|  | Mains Over Negative Sequence Volts Alarm | 0 | 15 | 1/16-4/16 |
| 32 | Mains Asymmetry High Alarm | 0 | 15 | 13/16-16/16 |
|  | Bus Over Zero Sequence Volts Alarm | 0 | 15 | 9/16-12/16 |
|  | Bus Under Positive Sequence Volts Alarm | 0 | 15 | 5/16-8/16 |
|  | Bus Over Negative Sequence Volts Alarm | 0 | 15 | 1/16-4/16 |
| 33 | Bus Asymmetry High Alarm | 0 | 15 | 13/16-16/16 |
|  | E-Trip Stop Inhibited | 0 | 15 | 9/16-12/16 |
|  | Fuel Tank Bund Level High | 0 | 15 | 5/16 – 8/16 |
|  | MSC Link 1 Data Error | 0 | 15 | 1/16-4/16 |
| 34 | MSC Link 2 Data Error | 0 | 15 | 13/16-16/16 |
|  | Bus 2 Low Voltage | 0 | 15 | 9/16-12/16 |
|  | Bus 2 High Voltage | 0 | 15 | 5/16 – 8/16 |
|  | Bus 2 Low Frequency | 0 | 15 | 1/16-4/16 |
| 35 | Bus 2 High Frequency | 0 | 15 | 13/16-16/16 |
|  | MSC Link 1 Failure | 0 | 15 | 9/16-12/16 |
|  | MSC Link 2 Failure | 0 | 15 | 5/16-8/16 |
|  | MSC Link 1 Too Few Sets | 0 | 15 | 1/16-4/16 |
| 36 | MSC Link 2 Too Few Sets | 0 | 15 | 13/16-16/16 |
|  | MSC Link 1 and 2 Failure | 0 | 15 | 9/16-12/16 |
|  | Electrical Trip from 8660 | 0 | 15 | 5/16-8/16 |
|  | AVR CAN DM1 Red Stop Lamp Fault | 0 | 15 | 1/16-4/16 |
| 37 | Gen Over Zero Sequence Volts Alarm | 0 | 15 | 13/16-16/16 |
|  | Gen Under Positive Sequence Volts Alarm | 0 | 15 | 9/16-12/16 |
|  | Gen Over Negative Sequence Volts Alarm | 0 | 15 | 5/16-8/16 |
|  | Gen Asymmetry High Alarm | 0 | 15 | 1/16-4/16 |
| 38-255 | Reserved |  |  |  |

**7450 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 |
| 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 |
|  | Unimplemented | 0 | 15 | 5/16-8/16 |
|  | Unimplemented | 0 | 15 | 1/16-4/16 |
| 22 | 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 |
| 23 | Unimplemented |  |  |  |
|  | ECU Protect | 0 | 15 | 9/16-12/16 |
|  | ECU Malfunction | 0 | 15 | 5/16-8/16 |
|  | Indication | 0 | 15 | 1/16-4/16 |
| 24 | ECU Red | 0 | 15 | 13/16-16/16 |
|  | ECU Amber | 0 | 15 | 9/16-12/16 |
|  | Electrical Trip | 0 | 15 | 5/16-8/16 |
|  | Aftertreatment Exhaust | 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 |
| 28-64 | 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 |
|  | Unimplemented | 0 | 15 | 5/16-8/16 |
|  | Calibration Lost (335 only) | 0 | 15 | 1/16-4/16 |
| 4 | S2 Gen Under Frequency (335 only) | 0 | 15 | 13/16-16/16 |
|  | S2 Gen Over Frequency (335 only) | 0 | 15 | 9/16-12/16 |
|  | S2 Gen Low Voltage (335 only) | 0 | 15 | 5/16-8/16 |
|  | S2 Gen High Voltage (335 only) | 0 | 15 | 1/16-4/16 |
| 5 | S2 Mains Under Frequency (335 only) | 0 | 15 | 13/16-16/16 |
|  | S2 Mains Over Frequency (335 only) | 0 | 15 | 9/16-12/16 |
|  | S2 Mains Low Voltage (335 only) | 0 | 15 | 5/16-8/16 |
|  | S2 Mains Voltage (335 only) | 0 | 15 | 1/16-4/16 |
| 6 | S1 Mains Under Frequency (335 only) | 0 | 15 | 13/16-16/16 |
|  | S1 Mains Over Frequency (335 only) | 0 | 15 | 9/16-12/16 |
|  | S1 Mains Low Voltage (335 only) | 0 | 15 | 5/16-8/16 |
|  | S1 Mains High Voltage (335 only) | 0 | 15 | 1/16-4/16 |
| 7 | Load Scheding (335 only) | 0 | 15 | 13/16-16/16 |
|  | Load Return (335 only) | 0 | 15 | 9/16-12/16 |
|  | S1 Phase Rotation (335 only) | 0 | 15 | 5/16-8/16 |
|  | S2 Phase Rotation (335 only) | 0 | 15 | 1/16-4/16 |
| 8 | S1 Breaker Aux Fail (335 only) | 0 | 15 | 13/16-16/16 |
|  | S2 Breaker Aux Fail (335 only) | 0 | 15 | 9/16-12/16 |
|  | S1 Failed to Open (335 only) | 0 | 15 | 5/16-8/16 |
|  | S1 Failed to Close (335 only) | 0 | 15 | 1/16-4/16 |
| 9 | S2 Failed to Open (335 only) | 0 | 15 | 13/16-16/16 |
|  | S2 Failed to Close (335 only) | 0 | 15 | 9/16-12/16 |
|  | S1 and S2 Open (335 only) | 0 | 15 | 5/16-8/16 |
|  | S1 and S2 Closed (335 only) | 0 | 15 | 1/16-4/16 |
| 10-64 | 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 |
| Fuse Blown | 0 | 15 | 5/16-8/16 |
| Unimplemented | 0 | 15 | 1/16-4/16 |
| 6 | 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 |
| 6-64 | Unimplemented |  |  |  |
| 65-255 | Reserved |  |  |  |

| **Exxx register allocation** | | | | |
| --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Max  value | Bits/ Sign |
| 0 | Number of named alarms | 58 | 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 |
|  | DEF Level Low | 0 | 15 | 1/16-4/16 |
| 14 | SCR Inducement | 0 | 15 | 13/16-16/16 |
|  | PWM(i) 1 Active | 0 | 15 | 9/16-12/16 |
|  | PWM(i) 2 Active | 0 | 15 | 5/16-8/16 |
|  | PWM(i) 3 Active | 0 | 15 | 1/16-4/16 |
| 15 | PWM(i) 4 Active | 0 | 15 | 13/16-16/16 |
|  | Incorrect Speed | 0 | 15 | 9/16-12/16 |
|  | Unimplemented | 0 | 15 | 5/16-8/16 |
|  | Unimplemented | 0 | 15 | 1/16-4/16 |
| 16-64 | 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 stage 1 | 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 | Boot in tripped mode | 0 | 15 | 13/16-16/16 |
|  | Breaker failed to open | 0 | 15 | 9/16-12/16 |
|  | Low voltage stage 3 | 0 | 15 | 5/16-8/16 |
|  | Low voltage stage 4 | 0 | 15 | 1/16-4/16 |
| 7 | Low voltage stage 5 | 0 | 15 | 13/16-16/16 |
|  | High voltage stage 3 | 0 | 15 | 9/16-12/16 |
|  | High voltage stage 4 | 0 | 15 | 5/16-8/16 |
|  | High voltage stage 5 | 0 | 15 | 1/16-4/16 |
| 8 | ROCOF stage 2 | 0 | 15 | 13/16-16/16 |
|  | ROCOF stage 3 | 0 | 15 | 9/16-12/16 |
|  | Remote Mains Failure | 0 | 15 | 5/16-8/16 |
|  | Unimplemented | 0 | 15 | 1/16-4/16 |
| 9-64 | Unimplemented |  |  |  |
| 65-255 | Reserved |  |  |  |

**71xx/66xx/60xx/L40x/4xxx/45xx MKII family register allocation**

1. The “Water in Fuel” alarm and onwards are only implemented in the 45xx MKII currently.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 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 Mag Pickup signal | 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 |
|  | Unimplemented | 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 alarm | 0 | 15 | 1/16-4/16 |
| 9 | Earth fault trip | 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 |
|  | Unimplemented | 0 | 15 | 1/16-4/16 |
| 10 | Temperature sensor open circuit | 0 | 15 | 13/16-16/16 |
|  | Low fuel level | 0 | 15 | 9/16-12/16 |
|  | High fuel level | 0 | 15 | 5/16-8/16 |
|  | Water in Fuel | 0 | 15 | 1/16-4/16 |
| 11 | DEF Level Low | 0 | 15 | 13/16-16/16 |
|  | SCR Inducement | 0 | 15 | 9/16-12/16 |
|  | Hest Active | 0 | 15 | 5/16-8/16 |
|  | DPTC Filter | 0 | 15 | 1/16-4/16 |
| 11-64 | Unimplemented |  |  |  |
| 36-255 | 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 | Active string |
| 5 | Controlled Shutdown alarm | Active string |
| 6-7 | 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**

1. E800 v1.0 to v1.1 uses alarm condition code 4 as a “Controlled Shutdown alarm ”

## 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 73xx MKII currently only supports the 2130, 2131, 2133, 2157, 2548, 2152, 2510/2520, DSENet chargers.
5. The 335 currently only supports the 2130, 2157 and 2548.
6. False = 0, True =1.
7. These registers are Read-Only
8. 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 | 2510/20 Expansion module 0 enable | NO | YES |  |  | 16 |  |  |  |
| 43 | 2510/20 Expansion module 1 enable | NO | YES |  |  | 16 |  |  |  |
| 44 | 2510/20 Expansion module 2 enable | NO | YES |  |  | 16 |  |  |  |
| 45 | DSENet Charger 0 Enable | False | True |  |  | 16 |  |  |  |
| 46 | DSENet Charger 1 Enable | False | True |  |  | 16 |  |  |  |
| 47 | DSENet Charger 2 Enable | False | True |  |  | 16 |  |  |  |
| 48 | DSENet Charger 3 Enable | False | True |  |  | 16 |  |  |  |
| 49-255 | 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 | 2510/20 Expansion module 0 comms failure | False | True |  |  | 16 |  |  |  |
| 43 | 2510/20 Expansion module 1 comms failure | False | True |  |  | 16 |  |  |  |
| 44 | 2510/20 Expansion module 2 comms failure | False | True |  |  | 16 |  |  |  |
| 45 | DSENet charger module 0 comms failure | False | True |  |  | 16 |  |  |  |
| 46 | DSENet charger module 1 comms failure | False | True |  |  | 16 |  |  |  |
| 47 | DSENet charger module 2 comms failure | False | True |  |  | 16 |  |  |  |
| 48 | DSENet charger module 3 comms failure | False | True |  |  | 16 |  |  |  |
| 49-255 | 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
10. The 73xx MKI does not have registers 9-13

**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 | Low Load | 0 | 65535 | 16 |
| 188-255 | 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 | Flex Sensor A Digital input function | 0 | 65535 | 16 |
| 9 | Flex Sensor B Digital input function | 0 | 65535 | 16 |
| 10 | Flex Sensor C Digital input function | 0 | 65535 | 16 |
| 11 | Flex Sensor D Digital input function | 0 | 65535 | 16 |
| 12 | Flex Sensor E Digital input function | 0 | 65535 | 16 |
| 13 | Flex Sensor F Digital input function | 0 | 65535 | 16 |
| 14-15 | 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 A input (low) | 0 | 65535 | 16 |
| 177 | Internal flexible sender A 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 |
| 198 | PLC function 18 | 0 | 65535 | 16 |
| 199 | PLC function 19 | 0 | 65535 | 16 |
| 200 | PLC function 20 | 0 | 65535 | 16 |
| 201 | Internal flexible sender A input Open circuit | 0 | 65535 | 16 |
| 202 | Internal flexible sender B input (low) | 0 | 65535 | 16 |
| 203 | Internal flexible sender B input (high) | 0 | 65535 | 16 |
| 204 | Internal flexible sender B input Open circuit | 0 | 65535 | 16 |
| 205 | Internal flexible sender C input (low) | 0 | 65535 | 16 |
| 206 | Internal flexible sender C input (high) | 0 | 65535 | 16 |
| 207 | Internal flexible sender C input Open circuit | 0 | 65535 | 16 |
| 208 | Internal flexible sender D input (low) | 0 | 65535 | 16 |
| 209 | Internal flexible sender D input (high) | 0 | 65535 | 16 |
| 210 | Internal flexible sender D input Open circuit | 0 | 65535 | 16 |
| 211 | Internal flexible sender E input (low) | 0 | 65535 | 16 |
| 212 | Internal flexible sender E input (high) | 0 | 65535 | 16 |
| 213 | Internal flexible sender E input Open circuit | 0 | 65535 | 16 |
| 214 | Internal flexible sender F input (low) | 0 | 65535 | 16 |
| 215 | Internal flexible sender F input (high) | 0 | 65535 | 16 |
| 216 | Internal flexible sender F input Open circuit | 0 | 65535 | 16 |
| 217 | Low kW load function | 0 | 65535 | 16 |
| 218-219 | Unimplemented | 65535 | 65535 | 10 |
| 220 | 2133 Expansion module 0 analogue input A (low) | 0 | 65535 | 16 |
| 221 | 2133 Expansion module 0 analogue input A (high) | 0 | 65535 | 16 |
| 222 | 2133 Expansion module 0 analogue input B (low) | 0 | 65535 | 16 |
| 223 | 2133 Expansion module 0 analogue input B (high) | 0 | 65535 | 16 |
| 224 | 2133 Expansion module 0 analogue input C (low) | 0 | 65535 | 16 |
| 225 | 2133 Expansion module 0 analogue input C (high) | 0 | 65535 | 16 |
| 226 | 2133 Expansion module 0 analogue input D (low) | 0 | 65535 | 16 |
| 227 | 2133 Expansion module 0 analogue input D (high) | 0 | 65535 | 16 |
| 228 | 2133 Expansion module 0 analogue input E (low) | 0 | 65535 | 16 |
| 229 | 2133 Expansion module 0 analogue input E (high) | 0 | 65535 | 16 |
| 230 | 2133 Expansion module 0 analogue input F (low) | 0 | 65535 | 16 |
| 231 | 2133 Expansion module 0 analogue input F (high) | 0 | 65535 | 16 |
| 232 | 2133 Expansion module 0 analogue input G (low) | 0 | 65535 | 16 |
| 233 | 2133 Expansion module 0 analogue input G (high) | 0 | 65535 | 16 |
| 234 | 2133 Expansion module 0 analogue input H (low) | 0 | 65535 | 16 |
| 235 | 2133 Expansion module 0 analogue input H (high) | 0 | 65535 | 16 |
| 236-251 | 2133 Expansion module 1 analogue input A-H | 0 | 65535 | 16 |
| 252-255 | 2133 Expansion module 2 analogue input A-B | 0 | 65535 | 16 |

**8xxx MKI / 74xx MKI 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 |  |  |  |
| 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 |
| 224 | PLC function 20 | 0 | 65535 | 16 |
| 225 | Low kW Load | 0 | 65535 | 16 |
| 226 | Under Loaded | 0 | 65535 | 16 |
| 227-255 | Reserved |  |  |  |

**86xx MKII 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 | |
| 12-15 | Unimplemented digital input function |  | |  | | 16 | |
| 16 | Flex Sender A Digital input function | 0 | | 65535 | | 16 | |
| 17 | Flex Sender B Digital input function | 0 | | 65535 | | 16 | |
| 18 | Flex Sender C Digital input function | 0 | | 65535 | | 16 | |
| 19 | Flex Sender D Digital input function | 0 | | 65535 | | 16 | |
| 20-31 | Unimplemented digital input function |  | |  | | 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 | |  | |  | |  |
| 112 | 2130 Expansion module 0 analogue input E (low) function | | 0 | | 65535 | | 16 |
| 113 | 2130 Expansion module 0 analogue input E (high) function | | 0 | | 65535 | | 16 |
| 114 | 2130 Expansion module 0 analogue input F (low) function | | 0 | | 65535 | | 16 |
| 115 | 2130 Expansion module 0 analogue input F (high) function | | 0 | | 65535 | | 16 |
| 116 | 2130 Expansion module 0 analogue input G (low) function | | 0 | | 65535 | | 16 |
| 117 | 2130 Expansion module 0 analogue input G (high) function | | 0 | | 65535 | | 16 |
| 118 | 2130 Expansion module 0 analogue input H (low) function | | 0 | | 65535 | | 16 |
| 119 | 2130 Expansion module 0 analogue input H (high) function | | 0 | | 65535 | | 16 |
| 120-127 | 2130 Expansion module 1 analogue inputs E-H function | |  | |  | |  |
| 128-135 | 2130 Expansion module 2 analogue inputs E-H function | |  | |  | |  |
| 136-143 | 2130 Expansion module 3 analogue inputs E-H function | |  | |  | |  |
| 144-191 | Reserved for 2130 Expansion module 4-9 analogue inputs E-H functions | |  | |  | |  |
| 192 | Internal flexible sender 1 input (low) function | | 0 | | 65535 | | 16 |
| 193 | Internal flexible sender 1 input (high) function | | 0 | | 65535 | | 16 |
| 194 | Internal flexible sender 2 input (low) function | | 0 | | 65535 | | 16 |
| 195 | Internal flexible sender 2 input (high) function | | 0 | | 65535 | | 16 |
| 196 | Internal flexible sender 3 input (low) function | | 0 | | 65535 | | 16 |
| 197 | Internal flexible sender 3 input (high) function | | 0 | | 65535 | | 16 |
| 198 | Internal flexible sender 4 input (low) function | | 0 | | 65535 | | 16 |
| 199 | Internal flexible sender 4 input (high) function | | 0 | | 65535 | | 16 |
| 200-201 | Unimplemented Internal flexible sender | |  | |  | | 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 |
| 224 | PLC function 20 | | 0 | | 65535 | | 16 |
| 225 | Low kW Load alarm function | | 0 | | 65535 | | 16 |
| 226 | Unimplemented | |  | |  | | 16 |
| 227-251 | Reserved | |  | |  | |  |
| 252 | 2131 Expansion module 0 analogue input A (low) function | | 0 | | 65535 | | 16 |
| 253 | 2131 Expansion module 0 analogue input A (high) function | | 0 | | 65535 | | 16 |
| 254 | 2131 Expansion module 0 analogue input B (low) function | | 0 | | 65535 | | 16 |
| 255 | 2131 Expansion module 0 analogue input B (high) function | | 0 | | 65535 | | 16 |

**74xx 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 | Digital input G function | 0 | 65535 | 16 |
| 7 | Digital input H function | 0 | 65535 | 16 |
| 8 | Flex Sensor A Digital input function | 0 | 65535 | 16 |
| 9 | Flex Sensor B Digital input function | 0 | 65535 | 16 |
| 10 | Flex Sensor C Digital input function | 0 | 65535 | 16 |
| 11 | Flex Sensor D Digital input function | 0 | 65535 | 16 |
| 12 | Flex Sensor E Digital input function | 0 | 65535 | 16 |
| 13 | Flex Sensor F Digital input function | 0 | 65535 | 16 |
| 14 | Flex Sensor G Digital input function | 0 | 65535 | 16 |
| 15 | Flex Sensor H Digital input function | 0 | 65535 | 16 |
| 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 A input (low) | 0 | 65535 | 16 |
| 177 | Internal flexible sender A 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 |
|  |  |  |  |  |
| 198 | PLC function 18 | 0 | 65535 | 16 |
| 199 | PLC function 19 | 0 | 65535 | 16 |
| 200 | PLC function 20 | 0 | 65535 | 16 |
| 201 | Internal flexible sender A input Open circuit | 0 | 65535 | 16 |
| 202 | Internal flexible sender B input (low) | 0 | 65535 | 16 |
| 203 | Internal flexible sender B input (high) | 0 | 65535 | 16 |
| 204 | Internal flexible sender B input Open circuit | 0 | 65535 | 16 |
| 205 | Internal flexible sender C input (low) | 0 | 65535 | 16 |
| 206 | Internal flexible sender C input (high) | 0 | 65535 | 16 |
| 207 | Internal flexible sender C input Open circuit | 0 | 65535 | 16 |
| 208 | Internal flexible sender D input (low) | 0 | 65535 | 16 |
| 209 | Internal flexible sender D input (high) | 0 | 65535 | 16 |
| 210 | Internal flexible sender D input Open circuit | 0 | 65535 | 16 |
| 211 | Internal flexible sender E input (low) | 0 | 65535 | 16 |
| 212 | Internal flexible sender E input (high) | 0 | 65535 | 16 |
| 213 | Internal flexible sender E input Open circuit | 0 | 65535 | 16 |
| 214 | Internal flexible sender F input (low) | 0 | 65535 | 16 |
| 215 | Internal flexible sender F input (high) | 0 | 65535 | 16 |
| 216 | Internal flexible sender F input Open circuit | 0 | 65535 | 16 |
| 217-219 | Reserved |  |  |  |
| 220 | 2133 Expansion module 0 analogue input A (low) | 0 | 65535 | 16 |
| 221 | 2133 Expansion module 0 analogue input A (high) | 0 | 65535 | 16 |
| 222 | 2133 Expansion module 0 analogue input B (low) | 0 | 65535 | 16 |
| 223 | 2133 Expansion module 0 analogue input B (high) | 0 | 65535 | 16 |
| 224 | 2133 Expansion module 0 analogue input C (low) | 0 | 65535 | 16 |
| 225 | 2133 Expansion module 0 analogue input C (high) | 0 | 65535 | 16 |
| 226 | 2133 Expansion module 0 analogue input D (low) | 0 | 65535 | 16 |
| 227 | 2133 Expansion module 0 analogue input D (high) | 0 | 65535 | 16 |
| 228 | 2133 Expansion module 0 analogue input E (low) | 0 | 65535 | 16 |
| 229 | 2133 Expansion module 0 analogue input E (high) | 0 | 65535 | 16 |
| 230 | 2133 Expansion module 0 analogue input F (low) | 0 | 65535 | 16 |
| 231 | 2133 Expansion module 0 analogue input F (high) | 0 | 65535 | 16 |
| 232 | 2133 Expansion module 0 analogue input G (low) | 0 | 65535 | 16 |
| 233 | 2133 Expansion module 0 analogue input G (high) | 0 | 65535 | 16 |
| 234 | 2133 Expansion module 0 analogue input H (low) | 0 | 65535 | 16 |
| 235 | 2133 Expansion module 0 analogue input H (high) | 0 | 65535 | 16 |
| 236-251 | 2133 Expansion module 1 analogue input A-H | 0 | 65535 | 16 |
| 252 | 2133 Expansion module 2 analogue input A (low) | 0 | 65535 | 16 |
| 253 | 2133 Expansion module 2 analogue input A (high) | 0 | 65535 | 16 |
| 254 | 2133 Expansion module 2 analogue input B (low) | 0 | 65535 | 16 |
| 255 | 2133 Expansion module 2 analogue input B (high) | 0 | 65535 | 16 |

**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 |  |  |  |  |  |  |  |  |  |
| 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 family 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 Sensor Digital input A function | 0 | 65535 | 16 |  |
| 17 | Flexible Sensor Digital input B function | 0 | 65535 | 16 |  |
| 18 | Flexible Sensor Digital input C function | 0 | 65535 | 16 |  |
| 19 | Flexible Sensor Digital input D function | 0 | 65535 | 16 |  |
| 20 | Flexible Sensor Digital input E function | 0 | 65535 | 16 |  |
| 21 | Flexible Sensor Digital input F function | 0 | 65535 | 16 |  |
| 22 | Flexible Sensor Digital input G function | 0 | 65535 | 16 |  |
| 23 | Flexible Sensor Digital input H function | 0 | 65535 | 16 |  |
| 24 | Flexible Sensor Digital input I function | 0 | 65535 | 16 |  |
| 25 | Flexible Sensor Digital input J function | 0 | 65535 | 16 |  |
| 26 | Flexible Sensor Digital input K function | 0 | 65535 | 16 |  |
| 27 | Flexible Sensor Digital input L 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 |  |  |  |  |
| 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 |  |  |  |  |
| 144-151 | Unimplemented |  |  |  |  |
| 152 | Internal flexible Sensor A input (low) | 0 | 65535 | 16 |  |
| 153 | Internal flexible Sensor A input (high) | 0 | 65535 | 16 |  |
| 154 | Internal flexible Sensor B input (low) | 0 | 65535 | 16 |  |
| 155 | Internal flexible Sensor B input (high) | 0 | 65535 | 16 |  |
| 156 | Internal flexible Sensor C input (low) | 0 | 65535 | 16 |  |
| 157 | Internal flexible Sensor C input (high) | 0 | 65535 | 16 |  |
| 158 | Internal flexible Sensor D input (low) | 0 | 65535 | 16 |  |
| 159 | Internal flexible Sensor D input (high) | 0 | 65535 | 16 |  |
| 160 | Internal flexible Sensor E input (low) | 0 | 65535 | 16 |  |
| 161 | Internal flexible Sensor E input (high) | 0 | 65535 | 16 |  |
| 162 | Internal flexible Sensor F input (low) | 0 | 65535 | 16 |  |
| 163 | Internal flexible Sensor F input (high) | 0 | 65535 | 16 |  |
| 164 | Internal flexible Sensor G input (low) | 0 | 65535 | 16 |  |
| 165 | Internal flexible Sensor G input (high) | 0 | 65535 | 16 |  |
| 166 | Internal flexible Sensor H input (low) | 0 | 65535 | 16 |  |
| 167 | Internal flexible Sensor H input (high) | 0 | 65535 | 16 |  |
| 168 | Internal flexible Sensor I input (low) | 0 | 65535 | 16 |  |
| 169 | Internal flexible Sensor I input (high) | 0 | 65535 | 16 |  |
| 170 | Internal flexible Sensor J input (low) | 0 | 65535 | 16 |  |
| 171 | Internal flexible Sensor J input (high) | 0 | 65535 | 16 |  |
| 172 | Internal flexible Sensor K input (low) | 0 | 65535 | 16 |  |
| 173 | Internal flexible Sensor K input (high) | 0 | 65535 | 16 |  |
| 174 | Internal flexible Sensor L input (low) | 0 | 65535 | 16 |  |
| 175 | Internal flexible Sensor L input (high) | 0 | 65535 | 16 |  |
| 176 | Engine Maintenance alarm 1 function | 0 | 65535 | 16 |  |
| 177 | Engine Maintenance alarm 2 function | 0 | 65535 | 16 |  |
| 178 | Engine Maintenance alarm 3 function | 0 | 65535 | 16 |  |
| 179 | Unimplemented |  |  |  |  |
| 180 | PLC function 1 | 0 | 65535 | 16 |  |
| 181 | PLC function 2 | 0 | 65535 | 16 |  |
| 182 | PLC function 3 | 0 | 65535 | 16 |  |
| 183 | PLC function 4 | 0 | 65535 | 16 |  |
| 184 | PLC function 5 | 0 | 65535 | 16 |  |
| 185 | PLC function 6 | 0 | 65535 | 16 |  |
| 186 | PLC function 7 | 0 | 65535 | 16 |  |
| 187 | PLC function 8 | 0 | 65535 | 16 |  |
| 188 | PLC function 9 | 0 | 65535 | 16 |  |
| 189 | PLC function 10 | 0 | 65535 | 16 |  |
| 190 | PLC function 11 | 0 | 65535 | 16 |  |
| 191 | PLC function 12 | 0 | 65535 | 16 |  |
| 192 | PLC function 13 | 0 | 65535 | 16 |  |
| 193 | PLC function 14 | 0 | 65535 | 16 |  |
| 194 | PLC function 15 | 0 | 65535 | 16 |  |
| 195 | PLC function 16 | 0 | 65535 | 16 |  |
| 196 | PLC function 17 | 0 | 65535 | 16 |  |
| 197 | PLC function 18 | 0 | 65535 | 16 |  |
| 198 | PLC function 19 | 0 | 65535 | 16 |  |
| 199 | PLC function 20 | 0 | 65535 | 16 |  |
| 200 | Internal flexible sensor A sensor fault | 0 | 65535 | 16 |  |
| 201 | Internal flexible sensor B sensor fault | 0 | 65535 | 16 |  |
| 202 | Internal flexible sensor C sensor fault | 0 | 65535 | 16 |  |
| 203 | Internal flexible sensor D sensor fault | 0 | 65535 | 16 |  |
| 204 | Internal flexible sensor E sensor fault | 0 | 65535 | 16 |  |
| 205 | Internal flexible sensor F sensor fault | 0 | 65535 | 16 |  |
| 206 | Internal flexible sensor G sensor fault | 0 | 65535 | 16 |  |
| 207 | Internal flexible sensor H sensor fault | 0 | 65535 | 16 |  |
| 208 | Internal flexible sensor I sensor fault | 0 | 65535 | 16 |  |
| 209 | Internal flexible sensor J sensor fault | 0 | 65535 | 16 |  |
| 210 | Internal flexible sensor K sensor fault | 0 | 65535 | 16 |  |
| 211 | Internal flexible sensor L sensor fault | 0 | 65535 | 16 |  |
| 212-255 | 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 | Remote mains failure function | 0 | 65535 | 16 |
| 6-255 | Reserved |  |  |  |

**71xx/6xxx/L40x/4xxx family register allocation**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Register offset | Name | Minimum value | Maximum value | Bits/ Sign |
| 0 | Digital input A | 0 | 65535 | 16 |
| 1 | Digital input B | 0 | 65535 | 16 |
| 2 | Digital input C | 0 | 65535 | 16 |
| 3 | Digital input D | 0 | 65535 | 16 |
| 4 | Digital input E | 0 | 65535 | 16 |
| 5 | Digital input F | 0 | 65535 | 16 |
| 6 | Analogue input A (Digital) | 0 | 65535 | 16 |
| 7 | Analogue input B (Digital) | 0 | 65535 | 16 |
| 8 | Analogue input C (Digital) | 0 | 65535 | 16 |
| 9 | Reserved for analogue input D (Digital) |  |  |  |
| 10 | Reserved for analogue input E (Digital) |  |  |  |
| 11 | Reserved for analogue input F (Digital) |  |  |  |
| 12-175 | Unimplemented |  |  |  |
| 176 | Internal flexible sender C input (low) | 0 | 65535 | 16 |
| 177 | Internal flexible sender C input (high) | 0 | 65535 | 16 |
| 178 | Oil Maintenance alarm | 0 | 65535 | 16 |
| 179 | Air Maintenance alarm | 0 | 65535 | 16 |
| 180 | Fuel Maintenance alarm | 0 | 65535 | 16 |
| 181 | Internal flexible sender D input (low) | 0 | 65535 | 16 |
| 182 | Internal flexible sender D input (high) | 0 | 65535 | 16 |
| 183 | Internal flexible sender A input (low) | 0 | 65535 | 16 |
| 184 | Internal flexible sender A input (high) | 0 | 65535 | 16 |
| 183-255 | 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) 86xx /74xx
7. Registers 0 to 144 are used for expansion modules analogue inputs (see page 153 registers 71 to 101) 73xx MKII V3.0
8. Registers 0 to 147 are used for expansion modules analogue inputs (see page 153 registers 65 to 101) 74xx MKII

**73xx MKII family register allocation**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Max value | Bits/ sign |
| 0-11 | 2133 Expansion module 2 analogue input C-H | 0 | 65535 | 16 |
| 12-27 | 2133 Expansion module 3 analogue input A-H | 0 | 65535 | 16 |
| 28-47 | 2131 Expansion module 0 analogue input A-J | 0 | 65535 | 16 |
| 48-67 | 2131 Expansion module 1 analogue input A-J | 0 | 65535 | 16 |
| 68-87 | 2131 Expansion module 2 analogue input A-J | 0 | 65535 | 16 |
| 88-107 | 2131 Expansion module 3 analogue input A-J | 0 | 65535 | 16 |
| 108 | 2131 Expansion module 0 digital input A | 0 | 65535 | 16 |
| 109 | 2131 Expansion module 0 digital input B | 0 | 65535 | 16 |
| 110 | 2131 Expansion module 0 digital input C | 0 | 65535 | 16 |
| 111 | 2131 Expansion module 0 digital input D | 0 | 65535 | 16 |
| 112 | 2131 Expansion module 0 digital input E | 0 | 65535 | 16 |
| 113 | 2131 Expansion module 0 digital input F | 0 | 65535 | 16 |
| 114 | 2131 Expansion module 0 digital input G | 0 | 65535 | 16 |
| 115 | 2131 Expansion module 0 digital input H | 0 | 65535 | 16 |
| 116 | 2131 Expansion module 0 digital input I | 0 | 65535 | 16 |
| 117 | 2131 Expansion module 0 digital input J | 0 | 65535 | 16 |
| 118-127 | 2131 Expansion module 1 digital inputs A-J | 0 | 65535 | 16 |
| 128-137 | 2131 Expansion module 2 digital inputs A-J | 0 | 65535 | 16 |
| 138-147 | 2131 Expansion module 3 digital inputs A-J | 0 | 65535 | 16 |
| 148 | DSENet Charger 0 Common Shutdown Alarm | 0 | 65535 | 16 |
| 149 | DSENet Charger 0 Common Warning Alarm | 0 | 65535 | 16 |
| 150 | DSENet Charger 1 Common Shutdown Alarm | 0 | 65535 | 16 |
| 151 | DSENet Charger 1 Common Warning Alarm | 0 | 65535 | 16 |
| 152 | DSENet Charger 2 Common Shutdown Alarm | 0 | 65535 | 16 |
| 153 | DSENet Charger 2 Common Warning Alarm | 0 | 65535 | 16 |
| 154 | DSENet Charger 3 Common Shutdown Alarm | 0 | 65535 | 16 |
| 155 | DSENet Charger 3 Common Warning Alarm | 0 | 65535 | 16 |
| 156 | Configurable CAN instrument 1 Alarm | 0 | 65535 | 16 |
| 157 | Configurable CAN instrument 2 Alarm | 0 | 65535 | 16 |
| 158 | Configurable CAN instrument 3 Alarm | 0 | 65535 | 16 |
| 159 | Configurable CAN instrument 4 Alarm | 0 | 65535 | 16 |
| 160 | Configurable CAN instrument 5 Alarm | 0 | 65535 | 16 |
| 161 | Configurable CAN instrument 6 Alarm | 0 | 65535 | 16 |
| 162 | Configurable CAN instrument 7 Alarm | 0 | 65535 | 16 |
| 163 | Configurable CAN instrument 8 Alarm | 0 | 65535 | 16 |
| 164 | Configurable CAN instrument 9 Alarm | 0 | 65535 | 16 |
| 165 | Configurable CAN instrument 10 Alarm | 0 | 65535 | 16 |
| 166-255 | Reserved for future unnamed alarms |  |  |  |

**8xxx / 74xx MKI 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 |  |  |  |

**86xx MKII family register allocation**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Max value | Bits/ sign |
| 0 | 2131 Expansion module 0 analogue input C (low) function | 0 | 65535 | 16 |
| 1 | 2131 Expansion module 0 analogue input C (high) function | 0 | 65535 | 16 |
| 2 | 2131 Expansion module 0 analogue input D (low) function | 0 | 65535 | 16 |
| 3 | 2131 Expansion module 0 analogue input D (high) function | 0 | 65535 | 16 |
| 4 | 2131 Expansion module 0 analogue input E (low) function | 0 | 65535 | 16 |
| 5 | 2131 Expansion module 0 analogue input E (high) function | 0 | 65535 | 16 |
| 6 | 2131 Expansion module 0 analogue input F (low) function | 0 | 65535 | 16 |
| 7 | 2131 Expansion module 0 analogue input F (high) function | 0 | 65535 | 16 |
| 8 | 2131 Expansion module 0 analogue input G (low) function | 0 | 65535 | 16 |
| 9 | 2131 Expansion module 0 analogue input G (high) function | 0 | 65535 | 16 |
| 10 | 2131 Expansion module 0 analogue input H (low) function | 0 | 65535 | 16 |
| 11 | 2131 Expansion module 0 analogue input H (high) function | 0 | 65535 | 16 |
| 12 | 2131 Expansion module 0 analogue input I (low) function | 0 | 65535 | 16 |
| 13 | 2131 Expansion module 0 analogue input I (high) function | 0 | 65535 | 16 |
| 14 | 2131 Expansion module 0 analogue input J (low) function | 0 | 65535 | 16 |
| 15 | 2131 Expansion module 0 analogue input J (high) function | 0 | 65535 | 16 |
| 16-35 | 2131 Expansion module 1 analogue inputs A-J functions |  |  |  |
| 36-55 | 2131 Expansion module 2 analogue inputs A-J functions |  |  |  |
| 56-75 | 2131 Expansion module 3 analogue inputs A-J functions |  |  |  |
| 76 | 2133 Expansion module 0 analogue input A (low) function | 0 | 65535 | 16 |
| 77 | 2133 Expansion module 0 analogue input A (high) function | 0 | 65535 | 16 |
| 78-91 | 2133 Expansion module 0 analogue input B-H functions | 0 | 65535 | 16 |
| 92-107 | 2133 Expansion module 1 analogue input A-H functions | 0 | 65535 | 16 |
| 108-123 | 2133 Expansion module 2 analogue input A-H functions | 0 | 65535 | 16 |
| 124-139 | 2133 Expansion module 3 analogue input A-H functions | 0 | 65535 | 16 |
| 140-255 | Reserved for future unnamed alarms |  |  |  |

**74xx MKII family register allocation**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Max value | Bits/ sign |
| 0 | 2133 Expansion module 2 analogue input C (low) | 0 | 65535 | 16 |
| 1 | 2133 Expansion module 2 analogue input C (high) | 0 | 65535 | 16 |
| 2 | 2133 Expansion module 2 analogue input D (low) | 0 | 65535 | 16 |
| 3 | 2133 Expansion module 2 analogue input D (high) | 0 | 65535 | 16 |
| 4 | 2133 Expansion module 2 analogue input E (low) | 0 | 65535 | 16 |
| 5 | 2133 Expansion module 2 analogue input E (high) | 0 | 65535 | 16 |
| 6 | 2133 Expansion module 2 analogue input F (low) | 0 | 65535 | 16 |
| 7 | 2133 Expansion module 2 analogue input F (high) | 0 | 65535 | 16 |
| 8 | 2133 Expansion module 2 analogue input G (low) | 0 | 65535 | 16 |
| 9 | 2133 Expansion module 2 analogue input G (high) | 0 | 65535 | 16 |
| 10 | 2133 Expansion module 2 analogue input H (low) | 0 | 65535 | 16 |
| 11 | 2133 Expansion module 2 analogue input H (high) | 0 | 65535 | 16 |
| 12-27 | 2133 Expansion module 3 analogue input A-H | 0 | 65535 | 16 |
| 28-47 | 2131 Expansion module 0 analogue input A-J | 0 | 65535 | 16 |
| 48-67 | 2131 Expansion module 1 analogue input A-J | 0 | 65535 | 16 |
| 68-87 | 2131 Expansion module 2 analogue input A-J | 0 | 65535 | 16 |
| 88-107 | 2131 Expansion module 3 analogue input A-J | 0 | 65535 | 16 |
| 108 | 2131 Expansion module 0 digital input A | 0 | 65535 | 16 |
| 109 | 2131 Expansion module 0 digital input B | 0 | 65535 | 16 |
| 110 | 2131 Expansion module 0 digital input C | 0 | 65535 | 16 |
| 111 | 2131 Expansion module 0 digital input D | 0 | 65535 | 16 |
| 112 | 2131 Expansion module 0 digital input E | 0 | 65535 | 16 |
| 113 | 2131 Expansion module 0 digital input F | 0 | 65535 | 16 |
| 114 | 2131 Expansion module 0 digital input G | 0 | 65535 | 16 |
| 115 | 2131 Expansion module 0 digital input H | 0 | 65535 | 16 |
| 116 | 2131 Expansion module 0 digital input I | 0 | 65535 | 16 |
| 117 | 2131 Expansion module 0 digital input J | 0 | 65535 | 16 |
| 118-127 | 2131 Expansion module 1 digital inputs A-J | 0 | 65535 | 16 |
| 128-137 | 2131 Expansion module 2 digital inputs A-J | 0 | 65535 | 16 |
| 138-147 | 2131 Expansion module 3 digital inputs A-J | 0 | 65535 | 16 |
| 148-255 | 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 (and some others) are indeed all duplicated. This was because originally page 170 lined up with the unnamed alarm list (page 153 etc). Since analogues have ‘low’ and ‘high’ alarm entries, there are duplicated entries in this page for the values for the ‘low’ and ‘high’ analogues (which will be the same). The same reason explains why some analogues have three entries – to match with low, high and sender fault alarms.
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
17. The 73xx MKII supports 6 flex sensors, (registers 12 to 27), these are not available in the 73xx MKI

**71xx/6xxx/L40x/4xxx 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 | Unimplemented |  |  |  |
| 19 | Unimplemented |  |  |  |
| 20-255 | Reserved |  |  |  |

**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 | Flex Sender A Digital input raw status | 0 | 1 | 16 |
| 17 | Flex Sender A Digital input processed status | 0 | 1 | 16 |
| 18 | Flex Sender A Digital input raw status | 0 | 1 | 16 |
| 19 | Flex Sender A Digital input processed status | 0 | 1 | 16 |
| 20 | Flex Sender A Digital input raw status | 0 | 1 | 16 |
| 21 | Flex Sender A Digital input processed status | 0 | 1 | 16 |
| 22 | Flex Sender A Digital input raw status | 0 | 1 | 16 |
| 23 | Flex Sender A Digital input processed status | 0 | 1 | 16 |
| 24 | Flex Sender A Digital input raw status | 0 | 1 | 16 |
| 25 | Flex Sender A Digital input processed status | 0 | 1 | 16 |
| 26 | Flex Sender A Digital input raw status | 0 | 1 | 16 |
| 27 | Flex Sender A Digital input processed status | 0 | 1 | 16 |
| 28-31 | 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 MKI family register allocation**

| Register offset | Name | Min value | Max value | Bits/ sign |
| --- | --- | --- | --- | --- |
| 0 | Digital input A raw status | 0 | 1 | 16 |
| 1 | Digital input A processed status | 0 | 1 | 16 |
| 2 | Digital input B raw status | 0 | 1 | 16 |
| 3 | Digital input B processed status | 0 | 1 | 16 |
| 4 | Digital input C raw status | 0 | 1 | 16 |
| 5 | Digital input C processed status | 0 | 1 | 16 |
| 6 | Digital input D raw status | 0 | 1 | 16 |
| 7 | Digital input D processed status | 0 | 1 | 16 |
| 8 | Digital input E raw status | 0 | 1 | 16 |
| 9 | Digital input E processed status | 0 | 1 | 16 |
| 10 | Digital input F raw status | 0 | 1 | 16 |
| 11 | Digital input F processed status | 0 | 1 | 16 |
| 12 | Digital input G raw status | 0 | 1 | 16 |
| 13 | Digital input G processed status | 0 | 1 | 16 |
| 14 | Digital input H raw status | 0 | 1 | 16 |
| 15 | Digital input H processed status | 0 | 1 | 16 |
| 16 | Digital input I raw status | 0 | 1 | 16 |
| 17 | Digital input I processed status | 0 | 1 | 16 |
| 18 | Digital input J raw status | 0 | 1 | 16 |
| 19 | Digital input J processed status | 0 | 1 | 16 |
| 20 | Digital input K raw status | 0 | 1 | 16 |
| 21 | Digital input K processed status | 0 | 1 | 16 |
| 22 | Digital input L raw status | 0 | 1 | 16 |
| 23 | Digital input L processed status | 0 | 1 | 16 |
| 24 | Digital input M raw status | 0 | 1 | 16 |
| 25 | Digital input M processed status | 0 | 1 | 16 |
| 26 | Digital input N raw status | 0 | 1 | 16 |
| 27 | Digital input N processed status | 0 | 1 | 16 |
| 28 | Digital input O raw status | 0 | 1 | 16 |
| 29 | Digital input O processed status | 0 | 1 | 16 |
| 30 | Digital input P raw status | 0 | 1 | 16 |
| 31 | Digital input P processed status | 0 | 1 | 16 |
| 32 | Digital input Q / Flex sensor as Digital input raw status | 0 | 1 | 16 |
| 33 | Digital input Q / Flex sensor as Digital input processed status | 0 | 1 | 16 |
| 34 | Digital input R / Flex sensor as Digital input raw status | 0 | 1 | 16 |
| 35 | Digital input R / Flex sensor as Digital input processed status | 0 | 1 | 16 |
| 36 | Digital input S / Flex sensor as Digital input raw status | 0 | 1 | 16 |
| 37 | Digital input S / Flex sensor as Digital input processed status | 0 | 1 | 16 |
| 38 | Digital input T / Flex sensor as Digital input aw status | 0 | 1 | 16 |
| 39 | Digital input T / Flex sensor as Digital input processed status | 0 | 1 | 16 |
| 40 | Digital input U / Flex sensor as Digital input raw status | 0 | 1 | 16 |
| 41 | Digital input U / Flex sensor as Digital input 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 |  |  |  |
| 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 | 4 | 16 |
| 225 | 2130 Expansion module 0 analogue input E input reading |  |  | 16S |
| 226 | 2130 Expansion module 0 analogue input E sender category | 0 | 4 | 16 |
| 227 | 2130 Expansion module 0 analogue input E input reading |  |  | 16S |
| 228 | 2130 Expansion module 0 analogue input F sender category | 0 | 4 | 16 |
| 229 | 2130 Expansion module 0 analogue input F input reading |  |  | 16S |
| 230 | 2130 Expansion module 0 analogue input F sender category | 0 | 4 | 16 |
| 231 | 2130 Expansion module 0 analogue input F input reading |  |  | 16S |
| 232 | 2130 Expansion module 0 analogue input G sender category | 0 | 4 | 16 |
| 233 | 2130 Expansion module 0 analogue input G input reading |  |  | 16S |
| 234 | 2130 Expansion module 0 analogue input G sender category | 0 | 4 | 16 |
| 235 | 2130 Expansion module 0 analogue input G input reading |  |  | 16S |
| 236 | 2130 Expansion module 0 analogue input H sender category | 0 | 4 | 16 |
| 237 | 2130 Expansion module 0 analogue input H input reading |  |  | 16S |
| 238 | 2130 Expansion module 0 analogue input H sender category | 0 | 4 | 16 |
| 239 | 2130 Expansion module 0 analogue input H input reading |  |  | 16S |
| 240-255 | 2130 Expansion module 1 analogue inputs E-H |  |  |  |

**74xx 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 | 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 | Flex Sender A Digital input raw status | 0 | 1 | 16 |
| 17 | Flex Sender A Digital input processed status | 0 | 1 | 16 |
| 18 | Flex Sender B Digital input raw status | 0 | 1 | 16 |
| 19 | Flex Sender B Digital input processed status | 0 | 1 | 16 |
| 20 | Flex Sender C Digital input raw status | 0 | 1 | 16 |
| 21 | Flex Sender C Digital input processed status | 0 | 1 | 16 |
| 22 | Flex Sender D Digital input raw status | 0 | 1 | 16 |
| 23 | Flex Sender D Digital input processed status | 0 | 1 | 16 |
| 24 | Flex Sender E Digital input raw status | 0 | 1 | 16 |
| 25 | Flex Sender E Digital input processed status | 0 | 1 | 16 |
| 26 | Flex Sender F Digital input raw status | 0 | 1 | 16 |
| 27 | Flex Sender F Digital input processed status | 0 | 1 | 16 |
| 28 | Flex Sender G Digital input raw status | 0 | 1 | 16 |
| 29 | Flex Sender G Digital input processed status | 0 | 1 | 16 |
| 30 | Flex Sender H Digital input raw status | 0 | 1 | 16 |
| 31 | Flex Sender H Digital input processed status | 0 | 1 | 16 |
| 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 |  |  |  |

**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 |  |  |  |  |  |  |
| 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 family 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 |  |
| 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 | 4 | 16 |  |
| 225 | 2130 Expansion module 0 analogue input E input reading |  |  | 16S |  |
| 226 | 2130 Expansion module 0 analogue input E sender category | 0 | 4 | 16 |  |
| 227 | 2130 Expansion module 0 analogue input E input reading |  |  | 16S |  |
| 228 | 2130 Expansion module 0 analogue input F sender category | 0 | 4 | 16 |  |
| 229 | 2130 Expansion module 0 analogue input F input reading |  |  | 16S |  |
| 230 | 2130 Expansion module 0 analogue input F sender category | 0 | 4 | 16 |  |
| 231 | 2130 Expansion module 0 analogue input F input reading |  |  | 16S |  |
| 232 | 2130 Expansion module 0 analogue input G sender category | 0 | 4 | 16 |  |
| 233 | 2130 Expansion module 0 analogue input G input reading |  |  | 16S |  |
| 234 | 2130 Expansion module 0 analogue input G sender category | 0 | 4 | 16 |  |
| 235 | 2130 Expansion module 0 analogue input G input reading |  |  | 16S |  |
| 236 | 2130 Expansion module 0 analogue input H sender category | 0 | 4 | 16 |  |
| 237 | 2130 Expansion module 0 analogue input H input reading |  |  | 16S |  |
| 238 | 2130 Expansion module 0 analogue input H sender category | 0 | 4 | 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 | Remote Mains Failure raw status | 0 | 1 | 16 |
| 11 | Remote Mains Failure processed status | 0 | 1 | 16 |
| 12-255 | 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 | Digital |  |  |  |  |
| 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 B analogue input sender category | 0 | 1 | 16 |
| 99 | Flexible sender B analogue input reading | 0 | 1 | 16 |
| 100 | Flexible sender C analogue input sender category | 0 | 1 | 16 |
| 101 | Flexible sender C analogue input reading | 0 | 1 | 16 |
| 102 | Flexible sender D analogue input sender category | 0 | 1 | 16 |
| 103 | Flexible sender D analogue input reading | 0 | 1 | 16 |
| 104 | Unimplemented U16 | 0 | 1 | 16 |
| 105 | Unimplemented U16 | 0 | 1 | 16 |
| 106 | Unimplemented U16 | 0 | 1 | 16 |
| 107 | Unimplemented U16 | 0 | 1 | 16 |
| 108 | Unimplemented U16 | 0 | 1 | 16 |
| 109 | Unimplemented U16 | 0 | 1 | 16 |
| 110-255 | 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 A analogue input sender category | 0 | 1 | 16 |
| 97 | Internal flexible sender A analogue input reading | 0 | 1 | 16 |
| 98 | Internal flexible sender A analogue input sender category | 0 | 1 | 16 |
| 99 | Internal flexible sender A 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 | PLC Function 1 (Raw) | 0 | 1 | 16 |
| 107 | PLC Function 1 (processed) | 0 | 1 | 16 |
| 108 | PLC Function 2 (Raw) | 0 | 1 | 16 |
| 109 | PLC Function 2 (processed) | 0 | 1 | 16 |
| 110-145 | PLC Functions 3 to 20 |  |  |  |
| 146 | Internal flexible sender A Fault raw | 0 | 1 | 16 |
| 147 | Internal flexible sender A Fault processed | 0 | 1 | 16 |
| 148 | Internal flexible sender B analogue input sender category | 0 | 1 | 16 |
| 149 | Internal flexible sender B analogue input reading | 0 | 1 | 16 |
| 150 | Internal flexible sender B analogue input sender category | 0 | 1 | 16 |
| 151 | Internal flexible sender B analogue input reading | 0 | 1 | 16 |
| 152 | Internal flexible sender B Fault raw | 0 | 1 | 16 |
| 153 | Internal flexible sender B Fault processed | 0 | 1 | 16 |
| 154 | Internal flexible sender C analogue input sender category | 0 | 1 | 16 |
| 155 | Internal flexible sender C analogue input reading | 0 | 1 | 16 |
| 156 | Internal flexible sender C analogue input sender category | 0 | 1 | 16 |
| 157 | Internal flexible sender C analogue input reading | 0 | 1 | 16 |
| 158 | Internal flexible sender C Fault raw | 0 | 1 | 16 |
| 159 | Internal flexible sender C Fault processed | 0 | 1 | 16 |
| 160 | Internal flexible sender D analogue input sender category | 0 | 1 | 16 |
| 161 | Internal flexible sender D analogue input reading | 0 | 1 | 16 |
| 162 | Internal flexible sender D analogue input sender category | 0 | 1 | 16 |
| 163 | Internal flexible sender D analogue input reading | 0 | 1 | 16 |
| 164 | Internal flexible sender D Fault raw | 0 | 1 | 16 |
| 165 | Internal flexible sender D Fault processed | 0 | 1 | 16 |
| 166 | Internal flexible sender E analogue input sender category | 0 | 1 | 16 |
| 167 | Internal flexible sender E analogue input reading | 0 | 1 | 16 |
| 168 | Internal flexible sender E analogue input sender category | 0 | 1 | 16 |
| 169 | Internal flexible sender E analogue input reading | 0 | 1 | 16 |
| 170 | Internal flexible sender E Fault raw | 0 | 1 | 16 |
| 171 | Internal flexible sender E Fault processed | 0 | 1 | 16 |
| 172 | Internal flexible sender F analogue input sender category | 0 | 1 | 16 |
| 173 | Internal flexible sender F analogue input reading | 0 | 1 | 16 |
| 174 | Internal flexible sender F analogue input sender category | 0 | 1 | 16 |
| 175 | Internal flexible sender F analogue input reading | 0 | 1 | 16 |
| 176 | Internal flexible sender F Fault raw | 0 | 1 | 16 |
| 177 | Internal flexible sender F Fault processed | 0 | 1 | 16 |
| 178 | Low KW load raw | 0 | 1 | 16 |
| 179 | Low KW load processed | 0 | 1 | 16 |
| 180-255 | Reserved |  |  |  |

**8xxx / 74xx MKI 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 | 4 | 16 |
| 33 | 2131 Expansion module 0 analogue input A input reading |  |  | 16S |
| 34 | 2131 Expansion module 0 analogue input B sender category | 0 | 4 | 16 |
| 35 | 2131 Expansion module 0 analogue input B input reading |  |  | 16S |
| 36 | 2131 Expansion module 0 analogue input C sender category | 0 | 4 | 16 |
| 37 | 2131 Expansion module 0 analogue input C input reading |  |  | 16S |
| 38 | 2131 Expansion module 0 analogue input D sender category | 0 | 4 | 16 |
| 39 | 2131 Expansion module 0 analogue input D input reading |  |  | 16S |
| 40 | 2131 Expansion module 0 analogue input E sender category | 0 | 4 | 16 |
| 41 | 2131 Expansion module 0 analogue input E input reading |  |  | 16S |
| 42 | 2131 Expansion module 0 analogue input F sender category | 0 | 4 | 16 |
| 43 | 2131 Expansion module 0 analogue input F input reading |  |  | 16S |
| 44 | 2131 Expansion module 0 analogue input G sender category | 0 | 4 | 16 |
| 45 | 2131 Expansion module 0 analogue input G input reading |  |  | 16S |
| 46 | 2131 Expansion module 0 analogue input H sender category | 0 | 4 | 16 |
| 47 | 2131 Expansion module 0 analogue input H input reading |  |  | 16S |
| 48 | 2131 Expansion module 0 analogue input I sender category | 0 | 4 | 16 |
| 49 | 2131 Expansion module 0 analogue input I input reading |  |  | 16S |
| 50 | 2131 Expansion module 0 analogue input J sender category | 0 | 4 | 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 |  |  |  |
| 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 |
| 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 |  |  |  |

**74xx MKII family register allocation**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 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 A analogue input sensor category | 0 | 1 | 16 |
| 97 | Internal flexible sender A analogue input reading | 0 | 1 | 16 |
| 98 | Internal flexible sender A analogue input sensor category | 0 | 1 | 16 |
| 99 | Internal flexible sender A 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 | PLC alarm 1 trigger | 0 | 1 | 16 |
| 107 | PLC alarm 1 condition | 0 | 1 | 16 |
| 108 | PLC alarm 2 trigger | 0 | 1 | 16 |
| 109 | PLC alarm 2 condition | 0 | 1 | 16 |
| 110-145 | PLC alarms 3 to 20 |  |  |  |
| 146 | Internal flexible sender A Fault raw | 0 | 1 | 16 |
| 147 | Internal flexible sender A Fault processed | 0 | 1 | 16 |
| 148 | Internal flexible sender B analogue input sensor category | 0 | 1 | 16 |
| 149 | Internal flexible sender B analogue input reading | 0 | 1 | 16 |
| 150 | Internal flexible sender B analogue input sensor category | 0 | 1 | 16 |
| 151 | Internal flexible sender B analogue input reading | 0 | 1 | 16 |
| 152 | Internal flexible sender B Fault raw | 0 | 1 | 16 |
| 153 | Internal flexible sender B Fault processed | 0 | 1 | 16 |
| 154 | Internal flexible sender C analogue input sensor category | 0 | 1 | 16 |
| 155 | Internal flexible sender C analogue input reading | 0 | 1 | 16 |
| 156 | Internal flexible sender C analogue input sensor category | 0 | 1 | 16 |
| 157 | Internal flexible sender C analogue input reading | 0 | 1 | 16 |
| 158 | Internal flexible sender C Fault raw | 0 | 1 | 16 |
| 159 | Internal flexible sender C Fault processed | 0 | 1 | 16 |
| 160 | Internal flexible sender D analogue input sensor category | 0 | 1 | 16 |
| 161 | Internal flexible sender D analogue input reading | 0 | 1 | 16 |
| 162 | Internal flexible sender D analogue input sensor category | 0 | 1 | 16 |
| 163 | Internal flexible sender D analogue input reading | 0 | 1 | 16 |
| 164 | Internal flexible sender D Fault raw | 0 | 1 | 16 |
| 165 | Internal flexible sender D Fault processed | 0 | 1 | 16 |
| 166 | Internal flexible sender E analogue input sensor category | 0 | 1 | 16 |
| 167 | Internal flexible sender E analogue input reading | 0 | 1 | 16 |
| 168 | Internal flexible sender E analogue input sensor category | 0 | 1 | 16 |
| 169 | Internal flexible sender E analogue input reading | 0 | 1 | 16 |
| 170 | Internal flexible sender E Fault raw | 0 | 1 | 16 |
| 171 | Internal flexible sender E Fault processed | 0 | 1 | 16 |
| 172 | Internal flexible sender F analogue input sensor category | 0 | 1 | 16 |
| 173 | Internal flexible sender F analogue input reading | 0 | 1 | 16 |
| 174 | Internal flexible sender F analogue input sensor category | 0 | 1 | 16 |
| 175 | Internal flexible sender F analogue input reading | 0 | 1 | 16 |
| 176 | Internal flexible sender F Fault raw | 0 | 1 | 16 |
| 177 | Internal flexible sender F Fault processed | 0 | 1 | 16 |
| 178-255 | 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 |  |  |  |  |  |  |
| 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 family register allocation continued**

| 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 | 4 | 16 |  |
| 33 | 2131 Expansion module 0 analogue input A input reading |  |  | 16S |  |
| 34 | 2131 Expansion module 0 analogue input B sender category | 0 | 4 | 16 |  |
| 35 | 2131 Expansion module 0 analogue input B input reading |  |  | 16S |  |
| 36 | 2131 Expansion module 0 analogue input C sender category | 0 | 4 | 16 |  |
| 37 | 2131 Expansion module 0 analogue input C input reading |  |  | 16S |  |
| 38 | 2131 Expansion module 0 analogue input D sender category | 0 | 4 | 16 |  |
| 39 | 2131 Expansion module 0 analogue input D input reading |  |  | 16S |  |
| 40 | 2131 Expansion module 0 analogue input E sender category | 0 | 4 | 16 |  |
| 41 | 2131 Expansion module 0 analogue input E input reading |  |  | 16S |  |
| 42 | 2131 Expansion module 0 analogue input F sender category | 0 | 4 | 16 |  |
| 43 | 2131 Expansion module 0 analogue input F input reading |  |  | 16S |  |
| 44 | 2131 Expansion module 0 analogue input G sender category | 0 | 4 | 16 |  |
| 45 | 2131 Expansion module 0 analogue input G input reading |  |  | 16S |  |
| 46 | 2131 Expansion module 0 analogue input H sender category | 0 | 4 | 16 |  |
| 47 | 2131 Expansion module 0 analogue input H input reading |  |  | 16S |  |
| 48 | 2131 Expansion module 0 analogue input I sender category | 0 | 4 | 16 |  |
| 49 | 2131 Expansion module 0 analogue input I input reading |  |  | 16S |  |
| 50 | 2131 Expansion module 0 analogue input J sender category | 0 | 4 | 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 |  |  |  |  |
| 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 |  |  |  |  |
| 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 |  |
| 230-237 | 2133 Expansion module 1 analogue inputs A-H input readings |  |  | 16S |  |
| 238-245 | 2133 Expansion module 2 analogue inputs A-H input readings |  |  | 16S |  |
| 246-253 | 2133 Expansion module 3 analogue inputs A-H input readings |  |  | 16S |  |
| 254-255 | Reserved |  |  |  |  |

**71xx/66xx/61xx/L40x/4xxx family register allocation**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Register offset | Name | Minimum value | Maximum value | Bits/ sign |
| 0-15 | Unimplemented |  |  |  |
| 16 | Oil pressure transducer category | 0 | 4 | 16 |
| 17 | Engine Temperature transducer category | 0 | 4 | 16 |
| 18 | Internal flexible sender C category | 0 | 1 | 16 |
| 19 | Internal flexible sender C reading | 0 | 1 | 16 |
| 20 | Internal flexible sender D category | 0 | 1 | 16 |
| 21 | Internal flexible sender D reading | 0 | 1 | 16 |
| 22-255 | 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 | Digital |  |  |  |  |
| 4-65535 | Reserved |  |  |  |  |

## Page 172 – Unnamed input status continued

1. This page is a continuation of page 170/171; refer to that page for notes.
2. Each family has different register allocations.
3. These registers are Read-Only

| **Exxx Page172 register allocation** | | | | |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Max value | Bits/ sign | E800 | E400 |
| 0 | Internal flexible sensor A sensor fault raw | 0 | 1 | 16 |  |  |
| 1 | Internal flexible sensor A sensor fault processed | 0 | 1 | 16 |  |  |
| 2 | Internal flexible sensor B sensor fault raw | 0 | 1 | 16 |  |  |
| 3 | Internal flexible sensor B sensor fault processed | 0 | 1 | 16 |  |  |
| 4 | Internal flexible sensor C sensor fault raw | 0 | 1 | 16 |  |  |
| 5 | Internal flexible sensor C sensor fault processed | 0 | 1 | 16 |  |  |
| 6 | Internal flexible sensor D sensor fault raw | 0 | 1 | 16 |  |  |
| 7 | Internal flexible sensor D sensor fault processed | 0 | 1 | 16 |  |  |
| 8 | Internal flexible sensor E sensor fault raw | 0 | 1 | 16 |  |  |
| 9 | Internal flexible sensor E sensor fault processed | 0 | 1 | 16 |  |  |
| 10 | Internal flexible sensor F sensor fault raw | 0 | 1 | 16 |  |  |
| 11 | Internal flexible sensor F sensor fault processed | 0 | 1 | 16 |  |  |
| 12 | Internal flexible sensor G sensor fault raw | 0 | 1 | 16 |  |  |
| 13 | Internal flexible sensor G sensor fault processed | 0 | 1 | 16 |  |  |
| 14 | Internal flexible sensor H sensor fault raw | 0 | 1 | 16 |  |  |
| 15 | Internal flexible sensor H sensor fault processed | 0 | 1 | 16 |  |  |
| 16 | Internal flexible sensor I sensor fault raw | 0 | 1 | 16 |  |  |
| 17 | Internal flexible sensor I sensor fault processed | 0 | 1 | 16 |  |  |
| 18 | Internal flexible sensor J sensor fault raw | 0 | 1 | 16 |  |  |
| 19 | Internal flexible sensor J sensor fault processed | 0 | 1 | 16 |  |  |
| 20 | Internal flexible sensor K sensor fault raw | 0 | 1 | 16 |  |  |
| 21 | Internal flexible sensor K sensor fault processed | 0 | 1 | 16 |  |  |
| 22 | Internal flexible sensor L sensor fault raw | 0 | 1 | 16 |  |  |
| 23 | Internal flexible sensor L sensor fault processed | 0 | 1 | 16 |  |  |

**73xx MKII**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Max value | Bits/ sign |
| 0-111 | Reserved |  |  |  |
| 112 | 2131 Expansion module 0 digital input A raw status | 0 | 1 | 16 |
| 113 | 2131 Expansion module 0 digital input A processed status | 0 | 1 | 16 |
| 114 | 2131 Expansion module 0 digital input B raw status | 0 | 1 | 16 |
| 115 | 2131 Expansion module 0 digital input B processed status | 0 | 1 | 16 |
| 116 | 2131 Expansion module 0 digital input C raw status | 0 | 1 | 16 |
| 117 | 2131 Expansion module 0 digital input C processed status | 0 | 1 | 16 |
| 118 | 2131 Expansion module 0 digital input D raw status | 0 | 1 | 16 |
| 119 | 2131 Expansion module 0 digital input D processed status | 0 | 1 | 16 |
| 120 | 2131 Expansion module 0 digital input E raw status | 0 | 1 | 16 |
| 121 | 2131 Expansion module 0 digital input E processed status | 0 | 1 | 16 |
| 122 | 2131 Expansion module 0 digital input F raw status | 0 | 1 | 16 |
| 123 | 2131 Expansion module 0 digital input F processed status | 0 | 1 | 16 |
| 124 | 2131 Expansion module 0 digital input G raw status | 0 | 1 | 16 |
| 125 | 2131 Expansion module 0 digital input G processed status | 0 | 1 | 16 |
| 126 | 2131 Expansion module 0 digital input H raw status | 0 | 1 | 16 |
| 127 | 2131 Expansion module 0 digital input H processed status | 0 | 1 | 16 |
| 128 | 2131 Expansion module 0 digital input I raw status | 0 | 1 | 16 |
| 129 | 2131 Expansion module 0 digital input I processed status | 0 | 1 | 16 |
| 130 | 2131 Expansion module 0 digital input J raw status | 0 | 1 | 16 |
| 131 | 2131 Expansion module 0 digital input J processed status | 0 | 1 | 16 |
| 132-151 | 2131 Expansion module 1 digital inputs A-H raw & processed status | 0 | 1 | 16 |
| 152-171 | 2131 Expansion module 2 digital inputs A-H raw & processed status | 0 | 1 | 16 |
| 172-191 | 2131 Expansion module 3 digital inputs A-H raw & processed status | 0 | 1 | 16 |
| 192 | DSENet charger 0 Common shutdown raw status | 0 | 1 | 16 |
| 193 | DSENet charger 0 Common shutdown processed status | 0 | 1 | 16 |
| 194 | DSENet charger 0 Common warning raw status | 0 | 1 | 16 |
| 195 | DSENet charger 0 Common warning processed status | 0 | 1 | 16 |
| 196 | DSENet charger 1 Common shutdown raw status | 0 | 1 | 16 |
| 197 | DSENet charger 1 Common shutdown processed status | 0 | 1 | 16 |
| 198 | DSENet charger 1 Common warning raw status | 0 | 1 | 16 |
| 199 | DSENet charger 1 Common warning processed status | 0 | 1 | 16 |
| 200 | DSENet charger 2 Common shutdown raw status | 0 | 1 | 16 |
| 201 | DSENet charger 2 Common shutdown processed status | 0 | 1 | 16 |
| 202 | DSENet charger 2 Common warning raw status | 0 | 1 | 16 |
| 203 | DSENet charger 2 Common warning processed status | 0 | 1 | 16 |
| 204 | DSENet charger 3 Common shutdown raw status | 0 | 1 | 16 |
| 205 | DSENet charger 3 Common shutdown processed status | 0 | 1 | 16 |
| 206 | DSENet charger 3 Common warning raw status | 0 | 1 | 16 |
| 207 | DSENet charger 3 Common warning processed status | 0 | 1 | 16 |
| 208-255 | Reserved |  |  |  |

**74xx MKII family register allocation**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Max value | Bits/ sign |
| 0 | 2133 Expansion module 0 digital input A input reading |  |  | 16S |
| 1 | 2133 Expansion module 0 digital input B input reading |  |  | 16S |
| 2 | 2133 Expansion module 0 digital input C input reading |  |  | 16S |
| 3 | 2133 Expansion module 0 digital input D input reading |  |  | 16S |
| 4 | 2133 Expansion module 0 digital input E input reading |  |  | 16S |
| 5 | 2133 Expansion module 0 digital input F input reading |  |  | 16S |
| 6 | 2133 Expansion module 0 digital input G input reading |  |  | 16S |
| 7 | 2133 Expansion module 0 digital input H input reading |  |  | 16S |
| 8-15 | 2133 Expansion module 1 digital inputs A-H input reading |  |  |  |
| 16-23 | 2133 Expansion module 2 digital inputs A-H input reading |  |  |  |
| 24-31 | 2133 Expansion module 3 digital inputs A-H input reading |  |  |  |
| 32 | 2131 Expansion module 0 analogue input A sensor category | 0 | 3 | 16 |
| 33 | 2131 Expansion module 0 analogue input A input reading |  |  | 16S |
| 34 | 2131 Expansion module 0 analogue input B sensor category | 0 | 3 | 16 |
| 35 | 2131 Expansion module 0 analogue input B input reading |  |  | 16S |
| 36 | 2131 Expansion module 0 analogue input C sensor category | 0 | 3 | 16 |
| 37 | 2131 Expansion module 0 analogue input C input reading |  |  | 16S |
| 38 | 2131 Expansion module 0 analogue input D sensor category | 0 | 3 | 16 |
| 39 | 2131 Expansion module 0 analogue input D input reading |  |  | 16S |
| 40 | 2131 Expansion module 0 analogue input E sensor category | 0 | 3 | 16 |
| 41 | 2131 Expansion module 0 analogue input E input reading |  |  | 16S |
| 42 | 2131 Expansion module 0 analogue input F sensor category | 0 | 3 | 16 |
| 43 | 2131 Expansion module 0 analogue input F input reading |  |  | 16S |
| 44 | 2131 Expansion module 0 analogue input G sensor category | 0 | 3 | 16 |
| 45 | 2131 Expansion module 0 analogue input G input reading |  |  | 16S |
| 46 | 2131 Expansion module 0 analogue input H sensor category | 0 | 3 | 16 |
| 47 | 2131 Expansion module 0 analogue input H input reading |  |  | 16S |
| 48 | 2131 Expansion module 0 analogue input I sensor category | 0 | 3 | 16 |
| 49 | 2131 Expansion module 0 analogue input I input reading |  |  | 16S |
| 50 | 2131 Expansion module 0 analogue input J sensor category | 0 | 3 | 16 |
| 51 | 2131 Expansion module 0 analogue input J input reading |  |  | 16S |
| 52-71 | 2131 Expansion module 1 digital inputs A-J category & input reading |  |  |  |
| 72-91 | 2131 Expansion module 2 digital inputs A-J category & input reading |  |  |  |
| 92-111 | 2131 Expansion module 3 digital inputs A-J category & input reading |  |  |  |
| 112 | 2131 Expansion module 0 digital input A raw status | 0 | 1 | 16 |
| 113 | 2131 Expansion module 0 digital input A processed status | 0 | 1 | 16 |
| 114 | 2131 Expansion module 0 digital input B raw status | 0 | 1 | 16 |
| 115 | 2131 Expansion module 0 digital input B processed status | 0 | 1 | 16 |
| 116 | 2131 Expansion module 0 digital input C raw status | 0 | 1 | 16 |
| 117 | 2131 Expansion module 0 digital input C processed status | 0 | 1 | 16 |
| 118 | 2131 Expansion module 0 digital input D raw status | 0 | 1 | 16 |
| 119 | 2131 Expansion module 0 digital input D processed status | 0 | 1 | 16 |
| 120 | 2131 Expansion module 0 digital input E raw status | 0 | 1 | 16 |
| 121 | 2131 Expansion module 0 digital input E processed status | 0 | 1 | 16 |
| 122 | 2131 Expansion module 0 digital input F raw status | 0 | 1 | 16 |
| 123 | 2131 Expansion module 0 digital input F processed status | 0 | 1 | 16 |
| 124 | 2131 Expansion module 0 digital input G raw status | 0 | 1 | 16 |
| 125 | 2131 Expansion module 0 digital input G processed status | 0 | 1 | 16 |
| 126 | 2131 Expansion module 0 digital input H raw status | 0 | 1 | 16 |
| 127 | 2131 Expansion module 0 digital input H processed status | 0 | 1 | 16 |
| 128 | 2131 Expansion module 0 digital input I raw status | 0 | 1 | 16 |
| 129 | 2131 Expansion module 0 digital input I processed status | 0 | 1 | 16 |
| 130 | 2131 Expansion module 0 digital input J raw status | 0 | 1 | 16 |
| 131 | 2131 Expansion module 0 digital input J processed status | 0 | 1 | 16 |
| 132-151 | 2131 Expansion module 1 digital inputs A-H raw & processed status | 0 | 1 | 16 |
| 152-171 | 2131 Expansion module 2 digital inputs A-H raw & processed status | 0 | 1 | 16 |
| 172-191 | 2131 Expansion module 3 digital inputs A-H raw & processed status | 0 | 1 | 16 |
| 192-255 | 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 | Digital |  |  |  |  |
| 4-65535 | Reserved |  |  |  |  |

## Page 173 – Unnamed input status continued

1. This page is a continuation of page 170/171/172; refer to that page for notes.
2. Each family has different register allocations.
3. These registers are Read-Only

**73xx MKII**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Max value | Bits/ sign |
| 0-55 | Unimplemented |  |  |  |
| 56 | Configurable CAN instrument 1 raw status | 0 | 1 | 16 |
| 57 | Configurable CAN instrument 1 processed status | 0 | 1 | 16 |
| 58 | Configurable CAN instrument 2 raw status | 0 | 1 | 16 |
| 59 | Configurable CAN instrument 2 processed status | 0 | 1 | 16 |
| 60 | Configurable CAN instrument 3 raw status | 0 | 1 | 16 |
| 61 | Configurable CAN instrument 3 processed status | 0 | 1 | 16 |
| 62 | Configurable CAN instrument 4 raw status | 0 | 1 | 16 |
| 63 | Configurable CAN instrument 4 processed status | 0 | 1 | 16 |
| 64 | Configurable CAN instrument 5 raw status | 0 | 1 | 16 |
| 65 | Configurable CAN instrument 5 processed status | 0 | 1 | 16 |
| 66 | Configurable CAN instrument 6 raw status | 0 | 1 | 16 |
| 67 | Configurable CAN instrument 6 processed status | 0 | 1 | 16 |
| 68 | Configurable CAN instrument 7 raw status | 0 | 1 | 16 |
| 69 | Configurable CAN instrument 7 processed status | 0 | 1 | 16 |
| 70 | Configurable CAN instrument 8 raw status | 0 | 1 | 16 |
| 71 | Configurable CAN instrument 8 processed status | 0 | 1 | 16 |
| 72 | Configurable CAN instrument 9 raw status | 0 | 1 | 16 |
| 73 | Configurable CAN instrument 9 processed status | 0 | 1 | 16 |
| 74 | Configurable CAN instrument 10 raw status | 0 | 1 | 16 |
| 75 | Configurable CAN instrument 10 processed status | 0 | 1 | 16 |
| 76-255 | Reserved |  |  |  |

## Page 175 – Configurable CAN Receive Instruments Description

**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.

**61xx MKII (v2.0 & later), 73xx MKII (v4.0 & later), 74xx MKII, 86xxMKII**

**Registers**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Register offset | Name | Minimum value | Maximum value | Bits | Read/ write |
| 0 | CAN Instrument 1 Title String | UNICODE | UNICODE | 512 | Read only |
| 32 | CAN Instrument 2 Title String | UNICODE | UNICODE | 512 | Read only |
| 64 | CAN Instrument 3 Title String | UNICODE | UNICODE | 512 | Read only |
| 96 | CAN Instrument 4 Title String | UNICODE | UNICODE | 512 | Read only |
| 128 | CAN Instrument 5 Title String | UNICODE | UNICODE | 512 | Read only |
| 160 | CAN Instrument 6 Title String | UNICODE | UNICODE | 512 | Read only |
| 192 | CAN Instrument 7 Title String | UNICODE | UNICODE | 512 | Read only |
| 224 | CAN Instrument 8 Title String | UNICODE | UNICODE | 512 | Read only |

**86xxMKII V4.2 only**

**Notes:**

1. The reading of strings from this page is different from other most pages in this document.
2. All reads must be function number 03, if more than 1 character is to be read this must be a multi register read.
3. The first register read will select the instrument that is read.
4. After the first register the following registers of a single read will be the contents of that string
5. A new transaction (Modbus) read will return the characters of a different string, indexed by the first register read.
6. Any number of registers can be read, but only the first 32 registers (characters) are implemented, further or unused charactes will be returned as space ‘ ‘
7. To read a character part way through the string, the string must be read starting at the register that indexs that string.

Eg. A multi register read from register 12, of length 32 will return the contents of the string,

A read of single register read from register 13 will return the first character of instrument 14.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Read Register offset | Name | String length | Minimum value | Maximum value | Bits | Read/ write |
| 0 | CAN Instrument 1 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 1 | CAN Instrument 2 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 2 | CAN Instrument 3 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 3 | CAN Instrument 4 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 4 | CAN Instrument 5 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 5 | CAN Instrument 6 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 6 | CAN Instrument 7 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 7 | CAN Instrument 8 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 8 | CAN Instrument 9 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 9 | CAN Instrument 10 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 10 | CAN Instrument 11 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 11 | CAN Instrument 12 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 12 | CAN Instrument 13 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 13 | CAN Instrument 14 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 14 | CAN Instrument 15 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 15 | CAN Instrument 16 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 16 | CAN Instrument 17 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 17 | CAN Instrument 18 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 18 | CAN Instrument 19 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 19 | CAN Instrument 20 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 20 | CAN Instrument 21 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 21 | CAN Instrument 22 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 22 | CAN Instrument 23 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 23 | CAN Instrument 24 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 24 | CAN Instrument 25 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 25 | CAN Instrument 26 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 26 | CAN Instrument 27 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 27 | CAN Instrument 28 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 28 | CAN Instrument 29 Title String | 32 | UNICODE | UNICODE | 512 | Read only |
| 29 | CAN Instrument 30 Title String | 32 | UNICODE | UNICODE | 512 | Read only |

## Page 176 – Configurable CAN Receive Instruments Description (cont)

**61xx MKII (v2.0 & later), 73xx MKII (v4.0 & later), 74xx MKII, 86MKII**

**Registers**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Register offset | Name | Minimum value | Maximum value | Bits | Read/ write |
| 0 | CAN Instrument 9 Title String | UNICODE | UNICODE | 512 | Read only |
| 32 | CAN Instrument 10 Title String | UNICODE | UNICODE | 512 | Read only |
| 64 | CAN Instrument 11 Title String | UNICODE | UNICODE | 512 | Read only |
| 96 | CAN Instrument 12 Title String | UNICODE | UNICODE | 512 | Read only |
| 128 | CAN Instrument 13 Title String | UNICODE | UNICODE | 512 | Read only |
| 160 | CAN Instrument 14 Title String | UNICODE | UNICODE | 512 | Read only |
| 192 | CAN Instrument 15 Title String | UNICODE | UNICODE | 512 | Read only |
| 224 | CAN Instrument 16 Title String | UNICODE | UNICODE | 512 | Read only |

61xx and 74xx use only descriptions 1..10

Descriptions are continued further on page 194

## Page 177 – Configurable CAN Receive Instrument Values

**Notes:**

1. These are read only registers.
2. When a can instrumentation item is not configured, the register should return the S32 ‘unimplemented’ sentinel value.
3. The value is the processed scaled value, not the raw CAN value.

**61xx MKII (v2.0 & later), 73xx MKII (v4.0 & later), 86xx MKII**

**Registers**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Register offset | Name | Minimum value | Maximum value | Scaling Factor | Bits / sign | Read/ write |
| 0-1 | Value for CAN Instrument 1 | Any | Any | 1 | 32S | Read only |
| 2-3 | Value for CAN Instrument 2 | Any | Any | 1 | 32S | Read only |
| 4-5 | Value for CAN Instrument 3 | Any | Any | 1 | 32S | Read only |
| 6-7 | Value for CAN Instrument 4 | Any | Any | 1 | 32S | Read only |
| 8-9 | Value for CAN Instrument 5 | Any | Any | 1 | 32S | Read only |
| … |  |  |  |  |  |  |
| 58-59 | Value for CAN Instrument 30 | Any | Any | 1 | 32S | Read only |
| 60-255 | Reserved |  |  |  |  |  |

**74xx MKII**

| Register offset | Name | | Min Value | | Max Value | Bits/ sign | Read/write |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0-1 | Value for CAN Instrument 1 | | Any | | Any | 32S | Read only |
| 2-3 | Value for CAN Instrument 2 | | Any | | Any | 32S | Read only |
| 4-5 | Value for CAN Instrument 3 | | Any | | Any | 32S | Read only |
| 6-7 | Value for CAN Instrument 4 | | Any | | Any | 32S | Read only |
| 8-9 | Value for CAN Instrument 5 | | Any | | Any | 32S | Read only |
| 10-11 | Value for CAN Instrument 6 | | Any | | Any | 32S | Read only |
| 12-13 | Value for CAN Instrument 7 | | Any | | Any | 32S | Read only |
| 14-15 | Value for CAN Instrument 8 | | Any | | Any | 32S | Read only |
| 16-17 | Value for CAN Instrument 9 | | Any | | Any | 32S | Read only |
| 18-19 | Value for CAN Instrument 10 | | Any | | Any | 32S | Read only |
| 20-31 | Reserved | | - | | - | - | - |
| 32 | CAN Instrument 1– Category | | 0xffff (‘User defined’) | | |  | Read only |
| 33 | CAN Instrument 1– Multiplier | | -128 | | 127 | 16S | Read only |
| 34 | CAN Instrument 1– Precision | | 1 | | 1 |  | Read only |
| 35-36 | CAN Instrument 1– Range Min | | Any | | Any | 32S | Read only |
| 37-38 | CAN Instrument 1– Range Max | | Any | | Any | 32S | Read only |
| 39-48 | CAN Instrument 1– Unit suffix string | | UNICODE | | UNICODE |  | Read only |
| 49 | CAN Instrument 2– Category | | 0xffff (‘User defined’) | | |  | Read only |
| 50 | CAN Instrument 2– Multiplier | | -128 | | 127 | 16S | Read only |
| 51 | CAN Instrument 2– Precision | | 1 | | 1 |  | Read only |
| 52-53 | CAN Instrument 2– Range Min | | Any | | Any | 32S | Read only |
| 54-55 | CAN Instrument 2– Range Max | | Any | | Any | 32S | Read only |
| 56-65 | CAN Instrument 2– Unit suffix string | | UNICODE | | UNICODE |  | Read only |
| 66 | CAN Instrument 3– Category | | 0xffff (‘User defined’) | | |  | Read only |
| 67 | CAN Instrument 3– Multiplier | | -128 | | 127 | 16S | Read only |
| 68 | CAN Instrument 3– Precision | | 1 | | 1 |  | Read only |
| 69-70 | CAN Instrument 3– Range Min | | Any | | Any | 32S | Read only |
| 71-72 | CAN Instrument 3– Range Max | | Any | | Any | 32S | Read only |
| 73-82 | CAN Instrument 3– Unit suffix string | | UNICODE | | UNICODE |  | Read only |
| 83 | CAN Instrument 4– Category | | 0xffff (‘User defined’) | | |  | Read only |
| 84 | CAN Instrument 4– Multiplier | | -128 | | 127 | 16S | Read only |
| 85 | CAN Instrument 4– Precision | | 1 | | 1 |  | Read only |
| 86-87 | CAN Instrument 4– Range Min | | Any | | Any | 32S | Read only |
| 88-89 | CAN Instrument 4– Range Max | | Any | | Any | 32S | Read only |
| 90-99 | CAN Instrument 4– Unit suffix string | | UNICODE | | UNICODE |  | Read only |
| 100 | CAN Instrument 5– Category | | 0xffff (‘User defined’) | | |  | Read only |
| 101 | CAN Instrument 5– Multiplier | | -128 | | 127 | 16S | Read only |
| 102 | CAN Instrument 5– Precision | | 1 | | 1 |  | Read only |
| 103-104 | CAN Instrument 5– Range Min | | Any | | Any | 32S | Read only |
| 105-106 | CAN Instrument 5– Range Max | | Any | | Any | 32S | Read only |
| 107-116 | CAN Instrument 5– Unit suffix string | | UNICODE | | UNICODE |  | Read only |
| 117 | CAN Instrument 6– Category | | 0xffff (‘User defined’) | | |  | Read only |
| 118 | CAN Instrument 6– Multiplier | | -128 | | 127 | 16S | Read only |
| 119 | CAN Instrument 6– Precision | | 1 | | 1 |  | Read only |
| 120-121 | CAN Instrument 6– Range Min | | Any | | Any | 32S | Read only |
| 122-123 | CAN Instrument 6– Range Max | | Any | | Any | 32S | Read only |
| 124-133 | CAN Instrument 6– Unit suffix string | | UNICODE | | UNICODE |  | Read only |
| 134 | CAN Instrument 7– Category | | 0xffff (‘User defined’) | | |  | Read only |
| 135 | CAN Instrument 7– Multiplier | | -128 | | 127 | 16S | Read only |
| 136 | CAN Instrument 7– Precision | | 1 | | 1 |  | Read only |
| 137-138 | CAN Instrument 7– Range Min | | Any | | Any | 32S | Read only |
| 139-140 | CAN Instrument 7– Range Max | | Any | | Any | 32S | Read only |
| 141-150 | CAN Instrument 7– Unit suffix string | | UNICODE | | UNICODE |  | Read only |
| 151 | CAN Instrument 8– Category | | 0xffff (‘User defined’) | | |  | Read only |
| 152 | CAN Instrument 8– Multiplier | | -128 | | 127 | 16S | Read only |
| 153 | CAN Instrument 8– Precision | | 1 | | 1 |  | Read only |
| 154-155 | CAN Instrument 8– Range Min | | Any | | Any | 32S | Read only |
| 156-157 | CAN Instrument 8– Range Max | | Any | | Any | 32S | Read only |
| 158-167 | CAN Instrument 8– Unit suffix string | | UNICODE | | UNICODE |  | Read only |
| 168 | CAN Instrument 9– Category | | 0xffff (‘User defined’) | | |  | Read only |
| 169 | CAN Instrument 9– Multiplier | | -128 | | 127 | 16S | Read only |
| 170 | CAN Instrument 9– Precision | | 1 | | 1 |  | Read only |
| 171-172 | CAN Instrument 9– Range Min | | Any | | Any | 32S | Read only |
| 173-174 | CAN Instrument 9– Range Max | | Any | | Any | 32S | Read only |
| 175-184 | CAN Instrument 9– Unit suffix string | | UNICODE | | UNICODE |  | Read only |
| 185 | CAN Instrument 10– Category | | 0xffff (‘User defined’) | | |  | Read only |
| 186 | CAN Instrument 10– Multiplier | | -128 | | 127 | 16S | Read only |
| 187 | CAN Instrument 10– Precision | | 1 | | 1 |  | Read only |
| 188-189 | CAN Instrument 10– Range Min | | Any | | Any | 32S | Read only |
| 190-191 | CAN Instrument 10– Range Max | | Any | | Any | 32S | Read only |
| 192-201 | CAN Instrument 10– Unit suffix string | | UNICODE | | UNICODE |  | Read only |
| 202- 255 | | Reserved | | - | - | - | - |

## Page 178 – Internal Analogue Sensor Readings and Unit Info

1. These registers are Read-Only
2. This page provides the values and the unit details for each of the user defined analogue inputs.
3. The unit information is extracted from the analogue input configuration data.
4. Note that the Unit ID enumeration is **NOT** the same as the Category enumeration used in Page 170/171/172

| Register offset | Name | | Min Value | | Max Value | Bits/ sign | Read/write |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | Internal Analogue Input A – Input Reading | | -32750 | | 32750 | 16 S | Read only |
| 1 | Internal Analogue Input B – Input Reading | | -32750 | | 32750 | 16 S | Read only |
| 2 | Internal Analogue Input C – Input Reading | | -32750 | | 32750 | 16 S | Read only |
| 3 | Internal Analogue Input D – Input Reading | | -32750 | | 32750 | 16 S | Read only |
| 4 | Internal Analogue Input E – Input Reading | | -32750 | | 32750 | 16 S | Read only |
| 5 | Internal Analogue Input F – Input Reading | | -32750 | | 32750 | 16 S | Read only |
| 6 | Internal Analogue Input G – Input Reading | | -32750 | | 32750 | 16 S | Read only |
| 7 | Internal Analogue Input H – Input Reading | | -32750 | | 32750 | 16 S | Read only |
| 8 | Internal Analogue Input I – Input Reading | | -32750 | | 32750 | 16 S | Read only |
| 9 | Internal Analogue Input J – Input Reading | | -32750 | | 32750 | 16 S | Read only |
| 10 | Internal Analogue Input K – Input Reading | | -32750 | | 32750 | 16 S | Read only |
| 11 | Internal Analogue Input L – Input Reading | | -32750 | | 32750 | 16 S | Read only |
| 12 - 15 | Reserved | | - | | - | - | - |
| 16 | Internal Analogue Input A – Unit ID | | See Unit ID table below | | | 16 | Read only |
| 17 | Internal Analogue Input A - Multiplier | | -128 | | 127 | 16 S | Read only |
| 18 | Internal Analogue Input A - Precision | | 0 | | 65535 | 16 | Read only |
| 19 | Internal Analogue Input A – Range Min | | -32750 | | 32750 | 16 S | Read only |
| 20 | Internal Analogue Input A – Range Max | | -32750 | | 32750 | 16 S | Read only |
| 21 - 30 | Internal Analogue Input A – Suffix | | UNICODE | | UNICODE | 160 | Read only |
| 31 | Internal Analogue Input B - Unit ID | | See Unit ID table below | | | 16 | Read only |
| 32 | Internal Analogue Input B - Multiplier | | -128 | | 127 | 16 S | Read only |
| 33 | Internal Analogue Input B - Precision | | 0 | | 65535 | 16 | Read only |
| 34 | Internal Analogue Input B – Range Min | | -32750 | | 32750 | 16 S | Read only |
| 35 | Internal Analogue Input B – Range Max | | -32750 | | 32750 | 16 S | Read only |
| 36 - 45 | Internal Analogue Input B – Suffix | | UNICODE | | UNICODE | 160 | Read only |
| 46 | Internal Analogue Input C - Unit ID | | See Unit ID table below | | | 16 | Read only |
| 47 | Internal Analogue Input C - Multiplier | | -128 | | 127 | 16 S | Read only |
| 48 | Internal Analogue Input C - Precision | | 0 | | 65535 | 16 | Read only |
| 49 | Internal Analogue Input C – Range Min | | -32750 | | 32750 | 16 S | Read only |
| 50 | Internal Analogue Input C – Range Max | | -32750 | | 32750 | 16 S | Read only |
| 51 - 60 | Internal Analogue Input C – Suffix | | UNICODE | | UNICODE | 160 | Read only |
| 61 | Internal Analogue Input D - Unit ID | | See Unit ID table below | | | 16 | Read only |
| 62 | Internal Analogue Input D - Multiplier | | -128 | | 127 | 16 S | Read only |
| 63 | Internal Analogue Input D - Precision | | 0 | | 65535 | 16 | Read only |
| 64 | Internal Analogue Input D – Range Min | | -32750 | | 32750 | 16 S | Read only |
| 65 | Internal Analogue Input D – Range Max | | -32750 | | 32750 | 16 S | Read only |
| 66 - 75 | Internal Analogue Input D – Suffix | | UNICODE | | UNICODE | 160 | Read only |
| 76 | Internal Analogue Input E – Unit ID | | See Unit ID table below | | | 16 | Read only |
| 77 | Internal Analogue Input E - Multiplier | | -128 | | 127 | 16 S | Read only |
| 78 | Internal Analogue Input E - Precision | | 0 | | 65535 | 16 | Read only |
| 79 | Internal Analogue Input E – Range Min | | -32750 | | 32750 | 16 S | Read only |
| 80 | Internal Analogue Input E – Range Max | | -32750 | | 32750 | 16 S | Read only |
| 81 - 90 | Internal Analogue Input E – Suffix | | UNICODE | | UNICODE | 160 | Read only |
| 91 | Internal Analogue Input F – Unit ID | | See Unit ID table below | | | 16 | Read only |
| 92 | Internal Analogue Input F - Multiplier | | -128 | | 127 | 16 S | Read only |
| 93 | Internal Analogue Input F - Precision | | 0 | | 65535 | 16 | Read only |
| 94 | Internal Analogue Input F – Range Min | | -32750 | | 32750 | 16 S | Read only |
| 95 | Internal Analogue Input F – Range Max | | -32750 | | 32750 | 16 S | Read only |
| 96 - 105 | Internal Analogue Input F – Suffix | | UNICODE | | UNICODE | 160 | Read only |
| 106 | Internal Analogue Input G – Unit ID | | See Unit ID table below | | | 16 | Read only |
| 107 | Internal Analogue Input G - Multiplier | | -128 | | 127 | 16 S | Read only |
| 108 | Internal Analogue Input G - Precision | | 0 | | 65535 | 16 | Read only |
| 109 | Internal Analogue Input G – Range Min | | -32750 | | 32750 | 16 S | Read only |
| 110 | Internal Analogue Input G – Range Max | | -32750 | | 32750 | 16 S | Read only |
| 111 - 120 | Internal Analogue Input G – Suffix | | UNICODE | | UNICODE | 160 | Read only |
| 121 | Internal Analogue Input H – Unit ID | | See Unit ID table below | | | 16 | Read only |
| 122 | Internal Analogue Input H - Multiplier | | -128 | | 127 | 16 S | Read only |
| 123 | Internal Analogue Input H - Precision | | 0 | | 65535 | 16 | Read only |
| 124 | Internal Analogue Input H – Range Min | | -32750 | | 32750 | 16 S | Read only |
| 125 | Internal Analogue Input H – Range Max | | -32750 | | 32750 | 16 S | Read only |
| 126 - 135 | Internal Analogue Input H – Suffix | | UNICODE | | UNICODE | 160 | Read only |
| 136 | Internal Analogue Input I – Unit ID | | See Unit ID table below | | | 16 | Read only |
| 137 | Internal Analogue Input I - Multiplier | | -128 | | 127 | 16 S | Read only |
| 138 | Internal Analogue Input I - Precision | | 0 | | 65535 | 16 | Read only |
| 139 | Internal Analogue Input I – Range Min | | -32750 | | 32750 | 16 S | Read only |
| 140 | Internal Analogue Input I – Range Max | | -32750 | | 32750 | 16 S | Read only |
| 141 - 150 | Internal Analogue Input I – Suffix | | UNICODE | | UNICODE | 160 | Read only |
| 151 | Internal Analogue Input J – Unit ID | | See Unit ID table below | | | 16 | Read only |
| 152 | Internal Analogue Input J - Multiplier | | -128 | | 127 | 16 S | Read only |
| 153 | Internal Analogue Input J - Precision | | 0 | | 65535 | 16 | Read only |
| 154 | Internal Analogue Input J – Range Min | | -32750 | | 32750 | 16 S | Read only |
| 155 | Internal Analogue Input J – Range Max | | -32750 | | 32750 | 16 S | Read only |
| 156 - 165 | Internal Analogue Input J – Suffix | | UNICODE | | UNICODE | 160 | Read only |
| 166 | Internal Analogue Input K – Unit ID | | See Unit ID table below | | | 16 | Read only |
| 167 | Internal Analogue Input K - Multiplier | | -128 | | 127 | 16 S | Read only |
| 168 | Internal Analogue Input K - Precision | | 0 | | 65535 | 16 | Read only |
| 169 | Internal Analogue Input K – Range Min | | -32750 | | 32750 | 16 S | Read only |
| 170 | Internal Analogue Input K – Range Max | | -32750 | | 32750 | 16 S | Read only |
| 171 - 180 | Internal Analogue Input K – Suffix | | UNICODE | | UNICODE | 160 | Read only |
| 181 | Internal Analogue Input L – Unit ID | | See Unit ID table below | | | 16 | Read only |
| 182 | Internal Analogue Input L - Multiplier | | -128 | | 127 | 16 S | Read only |
| 183 | Internal Analogue Input L - Precision | | 0 | | 65535 | 16 | Read only |
| 184 | | Internal Analogue Input L – Range Min | | -32750 | 32750 | 16 S | Read only |
| 185 | | Internal Analogue Input L – Range Max | | -32750 | 32750 | 16 S | Read only |
| 186 - 195 | | Internal Analogue Input L – Suffix | | UNICODE | UNICODE | 160 | Read only |
| 196- 255 | | Reserved | | - | - | - | - |

| **Unit ID** | |
| --- | --- |
| **Value** | **Meaning** |
| 0 | Not used |
| 1 | Temperature |
| 2 | Pressure |
| 3 | Percentage |
| 0xFFFE | Digital Input |
| 0xFFFF | User Defined |

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|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Max value | Bits/ sign |
| 0 | Flex Sensor A reading | 0 | 65535 | 16 |
| 1 | Flex Sensor B reading | 0 | 65535 | 16 |
| 2 | Flex Sensor C reading | 0 | 65535 | 16 |
| 3 | Flex Sensor D reading | 0 | 65535 | 16 |
| 4 | Flex Sensor E reading | 0 | 65535 | 16 |
| 5 | Flex Sensor F reading | 0 | 65535 | 16 |
| 6-11 | Unimplemented |  |  |  |
| 12-15 | Reserved |  |  |  |
| 16 | Flex Sensor A Category | 0 | 3 | 16 |
| 17 | Flex Sensor A Multiplier – Currently not implemented | -128 | 127 | S8 |
| 18 | Flex Sensor A Precision – Currently not implemented | 0 | 65535 | 16 |
| 19 | Flex Sensor A Minimum Range | 0 | 65535 | 16 |
| 20 | Flex Sensor A Maximum Range | 0 | 65535 | 16 |
| 21-31 | Flex Sensor A Suffix – Currently not implemented | Unicode | Unicode | 16 |
| 32-47 | Flex Sensor B (category/multiplier/precision/min/max/suffix) |  |  |  |
| 48-63 | Flex Sensor C (category/multiplier/precision/min/max/suffix) |  |  |  |
| 64-79 | Flex Sensor D (category/multiplier/precision/min/max/suffix) |  |  |  |
| 80-95 | Flex Sensor E (category/multiplier/precision/min/max/suffix) |  |  |  |
| 96-111 | Flex Sensor F (category/multiplier/precision/min/max/suffix) |  |  |  |
| 196-255 | Reserved |  |  |  |

## Page 179 – Expansion Module Analogue Sensor Limits

1. These registers are Read-Only
2. This page provides the min and max ranges for the expansion modules values
3. The expansion modules will not use user defined units.
4. Range Min + Max will need to be available for the SCADA suite to set the range for Gauge/Dials

| Register offset | Name | Min Value | Max Value | Bits/ sign | Read/write |
| --- | --- | --- | --- | --- | --- |
| 0 | 2130 Expansion Module 0 – E Range Min |  |  | 16 S | Read only |
| 1 | 2130 Expansion Module 0 – E Range Max |  |  | 16 S | Read only |
| 2 | 2130 Expansion Module 0 – F Range Min |  |  | 16 S | Read only |
| 3 | 2130 Expansion Module 0 – F Range Max |  |  | 16 S | Read only |
| 4 | 2130 Expansion Module 0 – G Range Min |  |  | 16 S | Read only |
| 5 | 2130 Expansion Module 0 – G Range Max |  |  | 16 S | Read only |
| 6 | 2130 Expansion Module 0 – H Range Min |  |  | 16 S | Read only |
| 7 | 2130 Expansion Module 0 – H Range Max |  |  | 16 S | Read only |
| 8-15 | 2130 Expansion Module 1 – E- H (Range Min + Max) |  |  | 16 S | Read only |
| 16-23 | 2130 Expansion Module 2 – E- H (Range Min + Max) |  |  | 16 S | Read only |
| 24-31 | 2130 Expansion Module 3 – E- H (Range Min + Max) |  |  | 16 S | Read only |
| 32-51 | 2131 Expansion Module 0 – A- J (Range Min + Max) |  |  | 16 S | Read only |
| 52-71 | 2131 Expansion Module 1 – A- J (Range Min + Max) |  |  | 16 S | Read only |
| 72-91 | 2131 Expansion Module 2 – A- J (Range Min + Max) |  |  | 16 S | Read only |
| 92-111 | 2131 Expansion Module 3 – A- J (Range Min + Max) |  |  | 16 S | Read only |
| 112-127 | 2133 Expansion Module 0 – A- H (Range Min + Max) |  |  | 16 S | Read only |
| 128-143 | 2133 Expansion Module 1 – A- H (Range Min + Max) |  |  | 16 S | Read only |
| 144-159 | 2133 Expansion Module 2 – A- H (Range Min + Max) |  |  | 16 S | Read only |
| 160-175 | 2133 Expansion Module 3 – A- H (Range Min + Max) |  |  | 16 S | Read only |
| 176-255 | Reserved |  |  |  |  |

Where:-

|  |  |
| --- | --- |
| ***Name*** | ***Additional Info*** |
| Range Min | This is used by SCADA Suite for Gauge/Dial range. The value used will be the Y Axis Min Range set in the configuration. |
| Range Max | This is used by SCADA Suite for Gauge/Dial range. The value used will be the Y Axis Max Range set in the configuration. |

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|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Register offset | Name | Min value | Max value | Bits/ sign |
| 0 | 2130 Expansion module 0 analogue input E sensor Min value | 0 | 65535 | 16 |
| 1 | 2130 Expansion module 0 analogue input E sensor Max value | 0 | 65535 | 16 |
| 2 | 2130 Expansion module 0 analogue input F sensor Min value | 0 | 65535 | 16 |
| 3 | 2130 Expansion module 0 analogue input F sensor Max value | 0 | 65535 | 16 |
| 4 | 2130 Expansion module 0 analogue input G sensor Min value | 0 | 65535 | 16 |
| 5 | 2130 Expansion module 0 analogue input G sensor Max value | 0 | 65535 | 16 |
| 6 | 2130 Expansion module 0 analogue input H sensor Min value | 0 | 65535 | 16 |
| 7 | 2130 Expansion module 0 analogue input H sensor Max value | 0 | 65535 | 16 |
| 8-15 | 2130 Expansion module 1 analogue inputs A-H sensor Min & Max |  |  |  |
| 16-23 | 2130 Expansion module 2 analogue inputs A-H sensor Min & Max |  |  |  |
| 24-31 | 2130 Expansion module 3 analogue inputs A-H sensor Min & Max |  |  |  |
| 32 | 2131 Expansion module 0 analogue input A sensor Min value | 0 | 65535 | 16 |
| 33 | 2131 Expansion module 0 analogue input A sensor Max value | 0 | 65535 | 16 |
| 34 | 2131 Expansion module 0 analogue input B sensor Min value | 0 | 65535 | 16 |
| 35 | 2131 Expansion module 0 analogue input B sensor Max value | 0 | 65535 | 16 |
| 36 | 2131 Expansion module 0 analogue input C sensor Min value | 0 | 65535 | 16 |
| 37 | 2131 Expansion module 0 analogue input C sensor Max value | 0 | 65535 | 16 |
| 38 | 2131 Expansion module 0 analogue input D sensor Min value | 0 | 65535 | 16 |
| 39 | 2131 Expansion module 0 analogue input D sensor Max value | 0 | 65535 | 16 |
| 40 | 2131 Expansion module 0 analogue input E sensor Min value | 0 | 65535 | 16 |
| 41 | 2131 Expansion module 0 analogue input E sensor Max value | 0 | 65535 | 16 |
| 42 | 2131 Expansion module 0 analogue input F sensor Min value | 0 | 65535 | 16 |
| 43 | 2131 Expansion module 0 analogue input F sensor Max value | 0 | 65535 | 16 |
| 44 | 2131 Expansion module 0 analogue input G sensor Min value | 0 | 65535 | 16 |
| 45 | 2131 Expansion module 0 analogue input G sensor Max value | 0 | 65535 | 16 |
| 46 | 2131 Expansion module 0 analogue input H sensor Min value | 0 | 65535 | 16 |
| 47 | 2131 Expansion module 0 analogue input H sensor Max value | 0 | 65535 | 16 |
| 48 | 2131 Expansion module 0 analogue input I sensor Min value | 0 | 65535 | 16 |
| 49 | 2131 Expansion module 0 analogue input I sensor Max value | 0 | 65535 | 16 |
| 50 | 2131 Expansion module 0 analogue input J sensor Min value | 0 | 65535 | 16 |
| 51 | 2131 Expansion module 0 analogue input J sensor Max value | 0 | 65535 | 16 |
| 52-71 | 2131 Expansion module 1 analogue inputs A-J sensor Min & Max |  |  |  |
| 72-71 | 2131 Expansion module 2 analogue inputs A-J sensor Min & Max |  |  |  |
| 92-111 | 2131 Expansion module 3 analogue inputs A-J sensor Min & Max |  |  |  |
| 112 | 2133 Expansion module 0 analogue input A sensor Min value | 0 | 65535 | 16 |
| 113 | 2133 Expansion module 0 analogue input A sensor Max value | 0 | 65535 | 16 |
| 114 | 2133 Expansion module 0 analogue input B sensor Min value | 0 | 65535 | 16 |
| 115 | 2133 Expansion module 0 analogue input B sensor Max value | 0 | 65535 | 16 |
| 116 | 2133 Expansion module 0 analogue input C sensor Min value | 0 | 65535 | 16 |
| 117 | 2133 Expansion module 0 analogue input C sensor Max value | 0 | 65535 | 16 |
| 118 | 2133 Expansion module 0 analogue input D sensor Min value | 0 | 65535 | 16 |
| 119 | 2133 Expansion module 0 analogue input D sensor Max value | 0 | 65535 | 16 |
| 120 | 2133 Expansion module 0 analogue input E sensor Min value | 0 | 65535 | 16 |
| 121 | 2133 Expansion module 0 analogue input E sensor Max value | 0 | 65535 | 16 |
| 122 | 2133 Expansion module 0 analogue input F sensor Min value | 0 | 65535 | 16 |
| 123 | 2133 Expansion module 0 analogue input F sensor Max value | 0 | 65535 | 16 |
| 124 | 2133 Expansion module 0 analogue input G sensor Min value | 0 | 65535 | 16 |
| 125 | 2133 Expansion module 0 analogue input G sensor Max value | 0 | 65535 | 16 |
| 126 | 2133 Expansion module 0 analogue input H sensor Min value | 0 | 65535 | 16 |
| 127 | 2133 Expansion module 0 analogue input H sensor Max value | 0 | 65535 | 16 |
| 128-143 | 2133 Expansion module 1 analogue inputs A-H sensor Min & Max |  |  |  |
| 144-159 | 2133 Expansion module 2 analogue inputs A-H sensor Min & Max |  |  |  |
| 160-175 | 2133 Expansion module 3 analogue inputs A-H sensor Min & Max |  |  |  |
| 176-255 | 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 |  |  |  |  |

**71xx/72xx/73xx/6xxx/L40x/4xxx 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 | Digital output I source | 0 | 65535 | 16 | Read only |
| 41 | Digital output I polarity | 0 | 1 | 16 | Read only |
| 42 | Digital output J source | 0 | 65535 | 16 | Read only |
| 43 | Digital output J polarity | 0 | 1 | 16 | Read only |
| 44-63 | Reserved |  |  |  |  |

**8xxx/74xx/L401 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 | 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 – Expansion 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 – Internal 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.

| **Page 185 Exxx Registers** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Register offset | Name | Minimum value | Maximum value | Scaling Factor | Units | Bits/ sign | Read/write |
| 0 | PWM 1 output control type | 0,2,3,4 (See **Analogue Output Control Type Table** below) | | 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 range type | 0,1 (See **Analogue Output Range Table** below) | | 1 | - | 16 | Read only |
| 4 | PWM 2 output control type | 0,2,3,4 (See **Analogue Output Control Type Table** below) | | 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 range type | 0,1 (See **Analogue Output Range Table** below) | | 1 | - | 16 | Read only |
| 8 | PWM 3 output control type | 0,2,3,4 (See **Analogue Output Control Type Table** below) | | 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 range type | 0,1 (See **Analogue Output Range Table** below) | | 1 | - | 16 | Read only |
| 12 | PWM 4 output control type | 0,2,3,4 (See **Analogue Output Control Type Table** below) | | 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 range type | 0,1 (See **Analogue Output Range Table** below) | | 1 | - | 16 | Read only |
| 16-31 | Reserved |  |  |  |  |  | Read only |
| 32 | PWM 1 analogue output value | See **Analogue Output Table** below | |  |  | 16 | Read only |
| 33 | PWM 2 analogue output value | See **Analogue Output Table** below | |  |  | 16 | Read only |
| 34 | PWM 3 analogue output value | See **Analogue Output Table** below | |  |  | 16 | Read only |
| 35 | PWM 4 analogue output value | See **Analogue Output Table** below | |  |  | 16 | Read only |
| 36-40 | Reserved |  |  |  |  |  |  |
| 41 | Analogue Output 1 control type | 0,1,5 (See **Analogue Output Control Table** below) | | 1 | - | 16 | Read only |
| 42 | Analogue Output 1 Output Type/Range | 2,3,4 (See **Analogue Output Table** below) | | 1 | - | 16 | Read only |
| 43 | Analogue Output 1 Source | 0 | 65535 | 1 | - | 16 | Read only |
| 44 | Analogue Output 1 Value | See **Analogue Output Table** below | | 1 | - | 16S | Read only |
| 45-255 | Reserved |  |  |  |  |  |  |

| **Analogue Output Control types** | |
| --- | --- |
| **Type code** | **Type** |
| 0 | Not Used |
| 1 | Flexible Analogue |
| 2 | Digital output |
| 3 | PWM Analogue output |
| 4 | PWMi Analogue output |
| 5 | Governor |
| 6-65535 | Reserved |

| **Analogue Output Ranges** | |
| --- | --- |
| **Range code** | **Range** |
| 0 | 0-2A Current |
| 1 | 0-4A Current |
| 2 | -10-0 Volts |
| 3 | 0-10 Volts |
| 4 | 0-20mA |
| 5-65535 | Reserved |

| **Analogue Output Table** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Type code** | **Range Code** | **Type** | **Value** | | **Scaling factor** | **Units** | **Notes** |
| **Min** | **Max** |
| 2 |  | Digital Output |  |  |  |  | PWM / PWMi |
| 3 | - | Duty Cycle Percentage | 0 | 1000 | 0.1 | % | PWM |
| 4 | 0 | 0-2A Current | 0 | 200 | 1 | mA \* 10 | PWMi actual/feedback current |
| 4 | 1 | 0-4A Current | 0 | 400 | 1 | mA \* 10 | PWMi actual/feedback current |
| 5 | 2 | -10 -0 Volts | -10000 | 0 | 0.001 | V | Analogue Output - Gov |
| 5 | 3 | 0-10 Volts | 0 | 10000 | 0.001 | V | Analogue Output - Gov |
| 1 | 3 | 0-10V | 0 | 10000 | 0.001 | V | Analogue Output - Flex Output |
| 1 | 4 | 0-20mA | 0 | 2000 | 0.01 | mA | Analogue Output - Flex Output |
| 0 |  | Not used | -- |  |  |  | PWM / PWMi / Gov |
| 6-65535 |  | 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 |  |  |  |

**71xx/72xx/73xx/6xxx/L40x/4xxx 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 | Digital output I status | 0 | 1 | 16 |
| 21 | Digital output J status | 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 |  |  |  |

**6xxx 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 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 |
| 6-7 | Reserved |  |  |  |
| 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 | Digital output I status | 0 | 1 | 16 |
| 21 | Digital output J status | 0 | 1 | 16 |
| 20-31 | 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.
2. This page is not used on the 73xx MKII, 74xx MKII and 86xx MKII. It has been replaced by the following…
   1. PLC Data Stores – now page 70.
   2. PLC Data Registers – now page 72.
   3. PLC Timers – now page 74.
   4. PLC Counters – now page 76.

**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.
2. The P100 only supports remote control sources 1-5. Sources 1-4 are read write but 5 is read only and can only be controlled by writing control keys.

**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 194 – Configurable CAN Receive Instruments Description (cont from p176)

**(86MKII)**

**Registers**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Register offset | Name | Minimum value | Maximum value | Bits | Read/ write |
| 0 | CAN Instrument 17 Title String | UNICODE | UNICODE | 512 | Read only |
| 32 | CAN Instrument 18 Title String | UNICODE | UNICODE | 512 | Read only |
| 64 | CAN Instrument 19 Title String | UNICODE | UNICODE | 512 | Read only |
| 96 | CAN Instrument 20 Title String | UNICODE | UNICODE | 512 | Read only |
| 128 | CAN Instrument 21 Title String | UNICODE | UNICODE | 512 | Read only |
| 160 | CAN Instrument 22 Title String | UNICODE | UNICODE | 512 | Read only |
| 192 | CAN Instrument 23 Title String | UNICODE | UNICODE | 512 | Read only |
| 224 | CAN Instrument 24 Title String | UNICODE | UNICODE | 512 | Read only |

## Page 195 – Configurable CAN Receive Instruments Description (cont from p176)

**(86MKII)**

**Registers**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Register offset | Name | Minimum value | Maximum value | Bits | Read/ write |
| 0 | CAN Instrument 25 Title String | UNICODE | UNICODE | 512 | Read only |
| 32 | CAN Instrument 26 Title String | UNICODE | UNICODE | 512 | Read only |
| 64 | CAN Instrument 27 Title String | UNICODE | UNICODE | 512 | Read only |
| 96 | CAN Instrument 28 Title String | UNICODE | UNICODE | 512 | Read only |
| 128 | CAN Instrument 29 Title String | UNICODE | UNICODE | 512 | Read only |
| 160 | CAN Instrument 30 Title String | UNICODE | UNICODE | 512 | Read only |
| 192 | CAN Instrument 31 Title String | UNICODE | UNICODE | 512 | Read only |
| 224 | CAN Instrument 32 Title String | UNICODE | UNICODE | 512 | Read only |

## Pages 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 |
| 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 | Low Load | 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/74xx 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 | Digital input G active string | UNICODE | UNICODE | 512 |
|  | 224 | Digital input H active string | UNICODE | UNICODE | 512 |
| 201 | 0 | Digital input (Flex Sensor A) active string | UNICODE | UNICODE | 512 |
|  | 32 | Digital input (Flex Sensor B) active string | UNICODE | UNICODE | 512 |
|  | 64 | Digital input (Flex Sensor C) active string | UNICODE | UNICODE | 512 |
|  | 96 | Digital input (Flex Sensor D) active string | UNICODE | UNICODE | 512 |
|  | 128 | Digital input (Flex Sensor E) active string | UNICODE | UNICODE | 512 |
|  | 160 | Digital input (Flex Sensor F) active string | UNICODE | UNICODE | 512 |
|  | 192 | Digital input (Flex Sensor G) active string | UNICODE | UNICODE | 512 |
|  | 224 | Digital input (Flex Sensor H) active string | UNICODE | UNICODE | 512 |
| 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 |
| 222 | 0 | Internal flexible sender A input (low) string | UNICODE | UNICODE | 512 |
|  | 32 | Internal flexible sender A 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 | Internal flexible sender A open circuit string | UNICODE | UNICODE | 512 |
| 64 | Internal flexible sender B input (low) string | UNICODE | UNICODE | 512 |
| 96 | Internal flexible sender B input (high) string | UNICODE | UNICODE | 512 |
| 128 | Internal flexible sender B open circuit string | UNICODE | UNICODE | 512 |
| 160 | Internal flexible sender C input (low) string | UNICODE | UNICODE | 512 |
| 192 | Internal flexible sender C input (high) string | UNICODE | UNICODE | 512 |
| 224 | Internal flexible sender C open circuit string | UNICODE | UNICODE | 512 |
| 226 | 0 | Internal flexible sender D input (low) string | UNICODE | UNICODE | 512 |
|  | 32 | Internal flexible sender D input (high) string | UNICODE | UNICODE | 512 |
| 64 | Internal flexible sender D open circuit string | UNICODE | UNICODE | 512 |
| 96 | Internal flexible sender E input (low) string | UNICODE | UNICODE | 512 |
| 128 | Internal flexible sender E input (high) string | UNICODE | UNICODE | 512 |
| 160 | Internal flexible sender E open circuit string | UNICODE | UNICODE | 512 |
| 192 | Internal flexible sender F input (low) string | UNICODE | UNICODE | 512 |
| 224 | Internal flexible sender F input (high) string | UNICODE | UNICODE | 512 |
| 227 | 0 | Internal flexible sender F open circuit string | UNICODE | UNICODE | 512 |
|  | 32 | Low kW load string | 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 |
| 228 | 0 | DSENet charger 0 common shutdown | UNICODE | UNICODE | 512 |
|  | 32 | DSENet charger 0 common warning | UNICODE | UNICODE | 512 |
| 64 | DSENet charger 1 common shutdown | UNICODE | UNICODE | 512 |
| 96 | DSENet charger 1 common warning | UNICODE | UNICODE | 512 |
| 128 | DSENet charger 2 common shutdown | UNICODE | UNICODE | 512 |
| 160 | DSENet charger 2 common warning | UNICODE | UNICODE | 512 |
| 192 | DSENet charger 3 common shutdown | UNICODE | UNICODE | 512 |
| 224 | DSENet charger 3 common warning | UNICODE | UNICODE | 512 |
| 229-239 |  | 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 |
| 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 | Low load string | UNICODE | UNICODE | 512 |
|  | 64 | Generator Under loaded 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 |
| 229-231 |  | Reserved for future PLC function strings | UNICODE | UNICODE | 512 |
| 232 | 0 | Plant Battery Maintenance alarm 1 string (7450) | UNICODE | UNICODE | 512 |
|  | 32 | Plant Battery Maintenance alarm 2 string (7450) | UNICODE | UNICODE | 512 |
|  | 64 | Plant Battery Maintenance alarm 3 string (7450) | 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 |  |  |  |
| 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 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 | 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 A input (low) string | UNICODE | UNICODE | 512 |
|  | 32 | Internal flexible sender A input (high) string | UNICODE | UNICODE | 512 |
|  | 64 | Internal flexible sender B input (low) string | UNICODE | UNICODE | 512 |
|  | 96 | Internal flexible sender B input (high) string | UNICODE | UNICODE | 512 |
|  | 128 | Internal flexible sender C input (low) string | UNICODE | UNICODE | 512 |
|  | 160 | Internal flexible sender C input (high) string | UNICODE | UNICODE | 512 |
|  | 192 | Internal flexible sender D input (low) string | UNICODE | UNICODE | 512 |
|  | 224 | Internal flexible sender D input (high) string | UNICODE | UNICODE | 512 |
| 225 | 0 | Internal flexible sender E input (low) string | UNICODE | UNICODE | 512 |
|  | 32 | Internal flexible sender E input (high) string | UNICODE | UNICODE | 512 |
|  | 64 | Internal flexible sender F input (low) string | UNICODE | UNICODE | 512 |
|  | 96 | Internal flexible sender F input (high) string | UNICODE | UNICODE | 512 |
|  | 128 | Internal flexible sender G input (low) string | UNICODE | UNICODE | 512 |
|  | 160 | Internal flexible sender G input (high) string | UNICODE | UNICODE | 512 |
|  | 192 | Internal flexible sender H input (low) string | UNICODE | UNICODE | 512 |
|  | 224 | Internal flexible sender H input (high) string | UNICODE | UNICODE | 512 |
| 226 | 0 | Internal flexible sender I input (low) string | UNICODE | UNICODE | 512 |
|  | 32 | Internal flexible sender I input (high) string | UNICODE | UNICODE | 512 |
|  | 64 | Internal flexible sender J input (low) string | UNICODE | UNICODE | 512 |
|  | 96 | Internal flexible sender J input (high) string | UNICODE | UNICODE | 512 |
|  | 128 | Internal flexible sender K input (low) string | UNICODE | UNICODE | 512 |
|  | 160 | Internal flexible sender K input (high) string | UNICODE | UNICODE | 512 |
|  | 192 | Internal flexible sender L input (low) string | UNICODE | UNICODE | 512 |
|  | 224 | Internal flexible sender L 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 | Reserved | UNICODE | UNICODE | 512 |
|  | 128 | PLC function1 string | UNICODE | UNICODE | 512 |
|  | 160 | PLC function 2 string | UNICODE | UNICODE | 512 |
|  | 192 | PLC function 3 string | UNICODE | UNICODE | 512 |
|  | 224 | PLC function 4 string | UNICODE | UNICODE | 512 |
| 228 | 0 | PLC function 5 string | UNICODE | UNICODE | 512 |
|  | 32 | PLC function 6 string | UNICODE | UNICODE | 512 |
|  | 64 | PLC function 7 string | UNICODE | UNICODE | 512 |
|  | 96 | PLC function 8 string | UNICODE | UNICODE | 512 |
|  | 128 | PLC function 9 string | UNICODE | UNICODE | 512 |
|  | 160 | PLC function 10 string | UNICODE | UNICODE | 512 |
|  | 192 | PLC function 11 string | UNICODE | UNICODE | 512 |
|  | 224 | PLC function 12 string | UNICODE | UNICODE | 512 |
| 229 | 0 | PLC function 13 string | UNICODE | UNICODE | 512 |
|  | 32 | PLC function 14 string | UNICODE | UNICODE | 512 |
|  | 64 | PLC function 15 string | UNICODE | UNICODE | 512 |
|  | 96 | PLC function 16 string | UNICODE | UNICODE | 512 |
|  | 128 | PLC function 17 string | UNICODE | UNICODE | 512 |
|  | 160 | PLC function 18 string | UNICODE | UNICODE | 512 |
|  | 192 | PLC function 19 string | UNICODE | UNICODE | 512 |
|  | 224 | PLC function 20 string | UNICODE | UNICODE | 512 |
| 230 | 0 | Internal Flexible Sensor A Sensor Fault string | UNICODE | UNICODE | 512 |
|  | 32 | Internal Flexible Sensor B Sensor Fault string | UNICODE | UNICODE | 512 |
|  | 64 | Internal Flexible Sensor C Sensor Fault string | UNICODE | UNICODE | 512 |
|  | 96 | Internal Flexible Sensor D Sensor Fault string | UNICODE | UNICODE | 512 |
|  | 128 | Internal Flexible Sensor E Sensor Fault string | UNICODE | UNICODE | 512 |
|  | 160 | Internal Flexible Sensor F Sensor Fault string | UNICODE | UNICODE | 512 |
|  | 192 | Internal Flexible Sensor G Sensor Fault string | UNICODE | UNICODE | 512 |
|  | 224 | Internal Flexible Sensor H Sensor Fault string | UNICODE | UNICODE | 512 |
| 231 | 0 | Internal Flexible Sensor I Sensor Fault string | UNICODE | UNICODE | 512 |
|  | 32 | Internal Flexible Sensor J Sensor Fault string | UNICODE | UNICODE | 512 |
|  | 64 | Internal Flexible Sensor K Sensor Fault string | UNICODE | UNICODE | 512 |
|  | 96 | Internal Flexible Sensor L Sensor Fault string | UNICODE | UNICODE | 512 |
|  | 128 | Reserved | UNICODE | UNICODE | 512 |
|  | 160 | Reserved | UNICODE | UNICODE | 512 |
|  | 192 | Reserved | UNICODE | UNICODE | 512 |
|  | 224 | Reserved | UNICODE | UNICODE | 512 |
| 232-239 |  | 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 |

## Pages 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.

**61xx MkII 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 module 4-9 input E-H name strings |  |  |  |
| 245 | 0 | Flexible sender A name string | UNICODE | UNICODE | 512 |
|  | 32 | Flexible sender B name string | UNICODE | UNICODE | 512 |
|  | 64 | Flexible sender C name string | UNICODE | UNICODE | 512 |
|  | 96 | Flexible sender D name string | UNICODE | UNICODE | 512 |
|  | 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 |  |  |  |

**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 | Flexible sender A name string | UNICODE | UNICODE | 512 |
|  | 32 | Flexible sender B name string | UNICODE | UNICODE | 512 |
|  | 64 | Flexible sender C name string | UNICODE | UNICODE | 512 |
|  | 96 | Flexible sender D name string | UNICODE | UNICODE | 512 |
|  | 128 | Flexible sender E name string | UNICODE | UNICODE | 512 |
|  | 160 | Flexible sender F name string | UNICODE | UNICODE | 512 |
|  | 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 | Reserved |  |  |  |
|  | 192 | Reserved |  |  |  |
|  | 224 | Reserved |  |  |  |
| 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 | Onboard Analogue Output string | 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 |

**Automatic Voltage Regulator A106 Registers**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Page | Register offset | Name | Minimum value | Maximum value | Bits |
| 250 | 0 | Configuration 1 name string | UNICODE | UNICODE | 512 |
|  | 32 | Configuration 2 name string | UNICODE | UNICODE | 512 |
|  | 64 | Configuration 3 name string | UNICODE | UNICODE | 512 |
|  | 96 | Configuration 4 name string | UNICODE | UNICODE | 512 |
|  | 128 | Reserved | UNICODE | UNICODE | 512 |
|  | 160 | Reserved | UNICODE | UNICODE | 512 |
|  | 192 | Reserved | UNICODE | UNICODE | 512 |
|  | 224 | Reserved | UNICODE | UNICODE | 512 |

**Automatic Voltage Regulator A108 Registers**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Page | Register offset | Name | Minimum value | Maximum value | Bits |
| 250 | 0 | Voltage and Frequency configuration name string | UNICODE | UNICODE | 512 |
|  | 32 | Stability configuration name string | 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 |