7SG14 Duobias-M

Transformer Protection

Document Release History

This document is issue 2010/02. The list of revisions up to and including this issue is:
Pre release

2010/02	Document reformat due to rebrand
03/11/2005	R10 Deleted duplicate “Standby E/F 2 Stage 2” lines in event list
24/10/2005	R9 Corrected duplicate meters in instrument list
10-05-2005	R8 Corrected placement of TCS menu to before SI Menu
11-04-2005	R7 Corrected number of settings groups is now 8 Phase N outputs added Removed voltage Modbus registers Added overcurrent and thermal Modbus registers Updated logic diagrams.
08-04-2005	R6 Trip Circuit Fail n FAIL IEC Events added
08-04-2005	R5 5W features transferred to 4W Added Dual Stack IEC 60870-5-103 Communications Added IEC 60870-5-103 Measurands per winding Added Modbus-RTU Communications Added Setting Group change via Status Input Logic suitable for H4,H5,H6 or H7 trip circuit supervision schemes added Reylogic control menu removed because it is empty. Status input PU/DO Timers and sub-menu added Relay Dwell timers and sub-menu added. W1,W2,W3,W4,W5 measurands added.
20-10-2004	R4 Software number added
06-10-2004	R3 OC1, OC2, OC3 Measurands added
14-06-2004	R2 Settings, Instruments, Events and Logic diagrams brought up to date
28-05-2004	R1 First Version

Software Revision History

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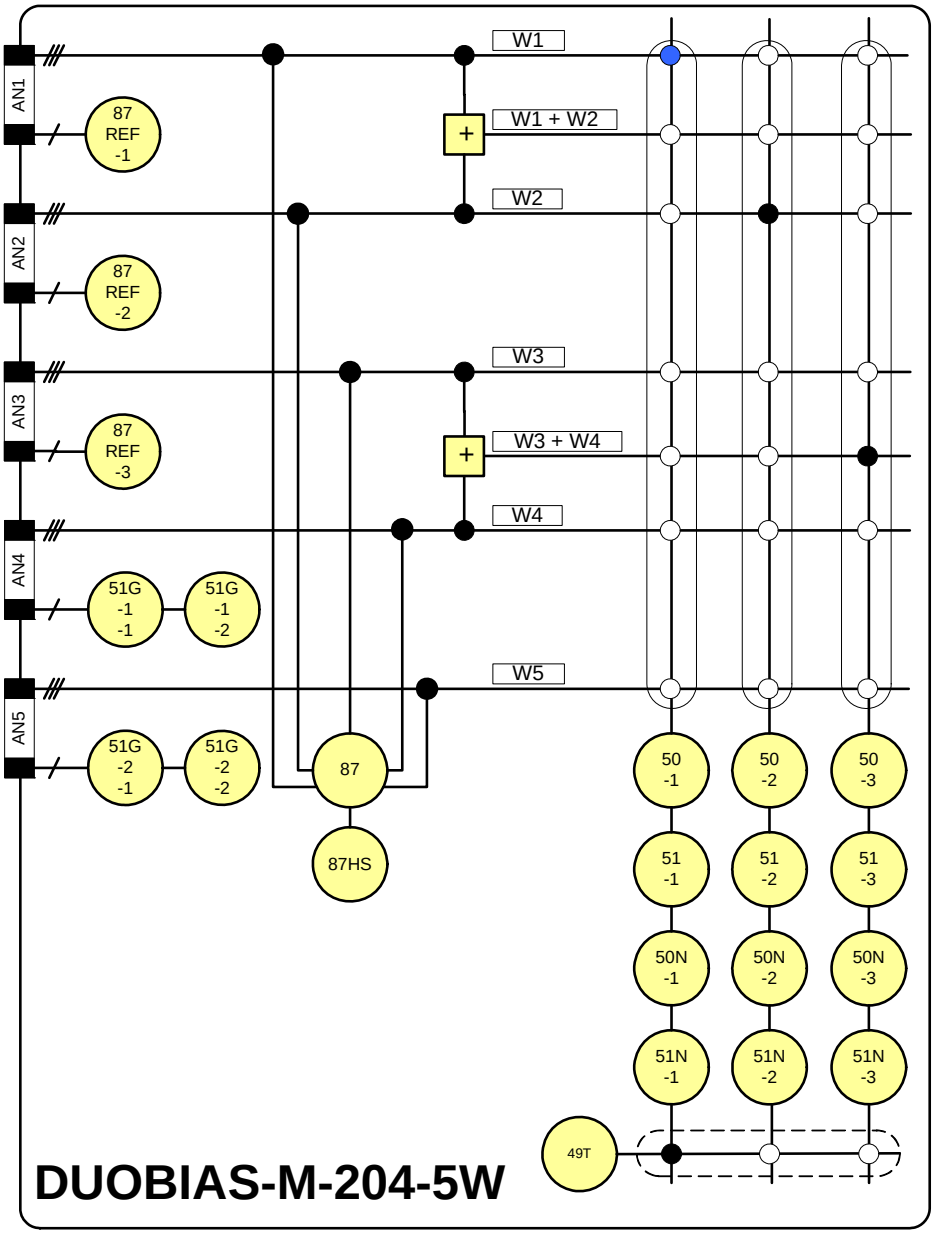
1 Introduction

This relay settings section covers the following Duobias-M models:-

Model No	Cat No	Configuration No
Duobias-M-204-4W	DU3-405	2661H80034R14
Duobias-M-204-5W	DU3-505	2661H80056R14



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2 DUOBIAS-M-204-4W/5W Relay Setting List

2.1 System Config Menu

Description	Range	Default	Setting
Active Group *Selects which settings group is currently activated*	1,2…8	1	
View/Edit Group *Selects which settings group is currently being displayed*	1,2…8	1	
Default Screens Timer *Selects the time delay after which, if no key presses have been detected, the relay will begin to poll through any screens which have been selected as default instruments screens*	OFF, 1,2,5,10,15,30,60 min	60 min	
Backlight timer *Controls when the LCD backlight turns off*	OFF, 1,2,5,10,15,30,60 min	5 Min	
Date	Date	1/1/1980	
Time	Time	00:00:00	
Select Grp Mode *Mode of operation of group change from status input. Edge triggered ignores the status input once it has changed to the relevant group, where as with Level triggered the relay will only stay in the group it has changed to whilst the status input is being driven, after which it returns to the previous group.*	Edge triggered, Level triggered	Edge triggered	
Clock Sync. From Status *Real time clock may be synchronised using a status input (See Clock Sync. in Status Input Menu)*	Disabled, Seconds, Minutes	Minutes	
Operating Mode *To allow access to change configuration files using Reylogic Toolbox the relay must be placed Out Of Service.*	Local, Remote, Local Or Remote, Out Of Service	Local Or Remote	
Change Password *Allows a 4 character alphanumeric code to be entered as the password. Note that the display shows a password dependant encrypted code on the second line of the display*	AAAA…ZZZZ	“NONE” displayed as “NOT ACTIVE”	
Relay Identifier *An alphanumeric string shown on the LCD normally used to identifier the circuit the relay is attached to or the relays purpose*	Up to 16 characters	DUOBIAS-M-204-4W/5W	

2.2 CT/VT Config Menu

Description	Range	Default	Setting
W1 Input *Selects whether 1 or 5 Amp terminals are being used for winding 1*	1,5 A	1 A	
W1 CT Ratio *Winding 1 CT ratio to scale primary current instruments*	5:0.2…5000:7	2000:1	
W2 Input *Selects whether 1 or 5 Amp terminals are being used for winding 2*	1,5 A	1 A	
W2 CT Ratio *Winding 2 CT ratio to scale primary*	5:0.2…5000:7	2000:1	

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Description	Range	Default	Setting
current instruments			
W3 Input *Selects whether 1 or 5 Amp terminals are being used for winding 3*	1,5 A	1 A	
W3 CT Ratio *Winding 3 CT ratio to scale primary current instruments*	5:0.2…5000:7	2000:1	
W4 Input *Selects whether 1 or 5 Amp terminals are being used for winding 4*	1,5 A	1 A	
W4 CT Ratio *Winding 4 CT ratio to scale primary current instruments*	5:0.2…5000:7	2000:1	
W5 Input[2] *Selects whether 1 or 5 Amp terminals are being used for winding 5*	1,5 A	1 A	
W5 CT Ratio[2] *Winding 5 CT ratio to scale primary current instruments*	5:0.2…5000:7	2000:1	
REF 1 Input *Selects whether 1 or 5 Amp terminals are being used for REF element 1*	1,5 A	1 A	
REF 2 Input *Selects whether 1 or 5 Amp terminals are being used for REF element 2*	1,5 A	1 A	
REF 3 Input *Selects whether 1 or 5 Amp terminals are being used for REF element 3*	1,5 A	1 A	
E/F Input[1] *Selects whether 1 or 5 Amp terminals are being used for standby earth fault input*	1,5 A	1 A	
E/F CT Ratio[1] *Earth fault CT ratio to scale primary current instruments*	5:0.2…5000:7	2000:1	
E/F 1 Input[2] *Selects whether 1 or 5 Amp terminals are being used for standby earth fault 1 input*	1,5 A	1 A	
E/F 1 CT Ratio[2] *Earth fault 1 CT ratio to scale primary current instruments*	5:0.2…5000:7	2000:1	
E/F 2 Input2[2] *Selects whether 1 or 5 Amp terminals are being used for standby earth fault 2 input*	1,5 A	1 A	
E/F 2 CT Ratio[2] *Earth fault 2 CT ratio to scale primary current instruments*	5:0.2…5000:7	2000:1	

1) 4W Only

2) 5W Only

2.3 Biased Differential Menu

Description	Range	Default	Setting
W1 Interposing CT Multiplier *Winding 1 scaling factor*	0.25,0.26…3.00 x	1.00 x	
W1 Interposing CT Connection *Winding 1 transformer vector group compensation and/or zero sequence filtering*	Yy0, Yd1, Yy2, Yd3, Yy4, Yd5, Yy6, Yd7, Yy8, Yd9, Yy10, Yd11, Ydy0	Yy0, 0°	
W2 Interposing CT Multiplier *Winding 2 scaling factor*	0.25,0.26…3.00 x	1.00 x	
W2 Interposing CT Connection *Winding 2 transformer vector group*	Yy0, Yd1, Yy2, Yd3, Yy4, Yd5, Yy6, Yd7, Yy8, Yd9,	Yy0, 0°	

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Description	Range	Default	Setting
compensation and/or zero sequence filtering	Yy10, Yd11, Ydy0		
W3 Interposing CT Multiplier *Winding 3 scaling factor*	0.25,0.26…3.00 x	1.00 x	
W3 Interposing CT Connection *Winding 3 transformer vector group compensation and/or zero sequence filtering*	Yy0, Yd1, Yy2, Yd3, Yy4, Yd5, Yy6, Yd7, Yy8, Yd9, Yy10, Yd11, Ydy0	Yy0, 0°	
W4 Interposing CT Multiplier *Winding 4 scaling factor*	0.25,0.26…3.00 x	1.00 x	
W4 Interposing CT Connection *Winding 4 transformer vector group compensation and/or zero sequence filtering*	Yy0, Yd1, Yy2, Yd3, Yy4, Yd5, Yy6, Yd7, Yy8, Yd9, Yy10, Yd11, Ydy0	Yy0, 0°	
W5 Interposing CT Multiplier[1] *Winding 5 scaling factor*	0.25,0.26…3.00 x	1.00 x	
W5 Interposing CT Connection[1] *Winding 5 transformer vector group compensation and/or zero sequence filtering*	Yy0, Yd1, Yy2, Yd3, Yy4, Yd5, Yy6, Yd7, Yy8, Yd9, Yy10, Yd11, Ydy0	Yy0, 0°	
87 Inrush Inhibit *Selects whether the biased differential characteristic is inhibited from operating when magnetising inrush is detected*	Disabled, Enabled	Enabled	
87 Inrush Bias *Selects the bias method used for magnetising inrush* *Phase – Segregated, each phase blocks itself.* *Cross – Blocked, each phase can block the operation of other phases (Modular 1 method).* *Sum - Of Squares, each phase blocks itself using the square root of the sum of squares of the even harmonics.(Improves SOTF performance when REF not applied).*	Phase, Cross, Sum	Cross	
87 Inrush Setting *The magnetising inrush detector operates when the even harmonics in the differential operate current exceed a set percentage of the differential operate current*	0.1,0.11…0.50 xId	0.20 xId	
87 Biased Differential *Selects whether the transformer differential protection element is enabled*	Disabled, Enabled	Disabled	
87 Initial Setting *The initial unbiased pickup level*	0.1,0.15…2.00 xIn	0.20 xIn	
87 Bias Slope *The bias slope varies the pickup level to compensates for CT measuring errors and tap changer not mid tap errors as the through current (bias) increases*	0,0.05…0.7 x	0.20 x	
87 Bias Slope Limit *At this point in the characteristics the bias slope increases tot provide increased security when additional measuring errors are introduced due to CT saturation effects.*	1,2…20 xIn	4 xIn	
87 Delay *The operation of the differential may be delayed to cater for special system conditions e.g. for use on cable circuits a delay of 5ms is recommended*	0.005,0.010…1 s	0.005 s	
87HS Differential Highset	Disabled, Enabled	Disabled	

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Description	Range	Default	Setting
Selects whether the differential Highset element is enabled. Note this element is never blocked by magnetising inrush			
87HS Setting *the differential setting pickup setting*	1,2…30 xIn	4 xIn	
87HS Delay *the operation of the differential may be delayed to cater for special system conditions e.g. for use on cable circuits a delay of 5ms is recommended*	0.005,0.010…1 s	0.005 s	

1) 5W Only

2.4 Overcurrent Relay 1 Menu

Description	Range	Default	Setting
G*n* O/C 1 Winding Group Select *Selects which winding group this overcurrent relay is connected.*	W1, W2, W1+W2, W3, W4, W3+W4, W5	W1	
G*n* 51-1 Element *Selects whether this IDMTL/DTL overcurrent element is enabled*	Disabled, Enabled	Disabled	
G*n* 51-1 Setting *Pickup level*	0.10,0.15…2.5 xIn	1.5 xIn	
G*n* 51-1 Char *Selects characteristic curve or DTL operation*	IEC-NI, IEC-VI, IEC-EI, IEC-LTI, ANSI-MI, ANSI-VI, ANSI-EI, DTL	IEC-NI	
G*n* 51-1 Time Mult (IEC/ANSI) *Time multiplier (applicable to IEC and ANSI curves but not DTL selection)*	0.025, 0.050…1.600	1.000	
G*n* 51-1 Delay (DTL) *Delay (applicable only when DTL is selected for characteristic)*	0, 0.01…20 s	5 s	
G*n* 51-1 Reset *Selects between an ANSI decaying reset characteristic or a definite time reset*	(ANSI) Decaying, INST, 1,2,…60 s	INST	
G*n* 50-1 Element *Selects whether this INST/DTL overcurrent element is enabled*	Disabled, Enabled	Disabled	
G*n* 50-1 Setting *Pickup level*	0.01, 0.02…25 xIn	20 xIn	
G*n* 50-1 Delay *Pickup delay*	0,0.01…864000 s	0.01	
G*n* 51N-1 Element *Selects whether this IDMTL/DTL residual earth fault element is enabled*	Disabled, Enabled	Disabled	
G*n* 51N-1 Setting *Pickup level*	0.25,0.26…2.5 xIn	1.0 xIn	
G*n* 51N-1 Char *Selects characteristic curve or DTL operation*	IEC-NI, IEC-VI, IEC-EI, IEC-LTI, ANSI-MI, ANSI-VI, ANSI-EI, DTL	IEC-NI	
G*n* 51N-1 Time Mult (IEC/ANSI) *Time multiplier (applicable to IEC and ANSI curves but not DTL selection)*	0.025, 0.050…1.600	1.000	
G*n* 51N-1 Delay (DTL) *Delay (applicable only when DTL is selected for characteristic)*	0, 0.01…20 s	5 s	
G*n* 51N-1 Reset *Selects between an ANSI decaying reset characteristic or a definite time reset*	(ANSI) Decaying, INST, 1,2…60 s	INST	
G*n* 50N-1 Element *Selects whether this INST/DTL residual earth fault element is enabled*	Disabled, Enabled	Disabled	
G*n* 50N-1 Setting *Pickup level*	0.25, 0.26…25 xIn	0.5 xIn	
G*n* 50N-1 Delay	0,0.01…864000 s	0.02	

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Description	Range	Default	Setting
Pickup delay			

2.5 Overcurrent Relay 2 Menu

Description	Range	Default	Setting
G*n* O/C 2 Winding Group Select *Selects which winding group this overcurrent relay is connected.*	W1, W2, W1+W2, W3, W4, W3+W4, W5	W1	
G*n* 51-2 Element *Selects whether this IDMTL/DTL overcurrent element is enabled*	Disabled, Enabled	Disabled	
G*n* 51-2 Setting *Pickup level*	0.10,0.15…2.5 xIn	1.5 xIn	
G*n* 51-2 Char *Selects characteristic curve or DTL operation*	IEC-NI, IEC-VI, IEC-EI, IEC-LTI, ANSI-MI, ANSI-VI, ANSI-EI, DTL	IEC-NI	
G*n* 51-2 Time Mult (IEC/ANSI) *Time multiplier (applicable to IEC and ANSI curves but not DTL selection)*	0.025, 0.050…1.600	1.000	
G*n* 51-2 Delay (DTL) *Delay (applicable only when DTL is selected for characteristic)*	0, 0.01…20 s	5 s	
G*n* 51-2 Reset *Selects between an ANSI decaying reset characteristic or a definite time reset*	(ANSI) Decaying, INST, 1,2…60 s	INST	
G*n* 50-2 Element *Selects whether this INST/DTL overcurrent element is enabled*	Disabled, Enabled	Disabled	
G*n* 50-2 Setting *Pickup level*	0.01, 0.02…25 xIn	20 xIn	
G*n* 50-2 Delay *Pickup delay*	0,0.01…864000 s	0.01	
G*n* 51N-2 Element *Selects whether this IDMTL/DTL residual earth fault element is enabled*	Disabled, Enabled	Disabled	
G*n* 51N-2 Setting *Pickup level*	0.25,0.26…2.5 xIn	1.0 xIn	
G*n* 51N-2 Char *Selects characteristic curve or DTL operation*	IEC-NI, IEC-VI, IEC-EI, IEC-LTI, ANSI-MI, ANSI-VI, ANSI-EI, DTL	IEC-NI	
G*n* 51N-2 Time Mult (IEC/ANSI) *Time multiplier (applicable to IEC and ANSI curves but not DTL selection)*	0.025, 0.050…1.600	1.000	
G*n* 51N-2 Delay (DTL) *Delay (applicable only when DTL is selected for characteristic)*	0, 0.01…20 s	5 s	
G*n* 51N-2 Reset *Selects between an ANSI decaying reset characteristic or a definite time reset*	(ANSI) Decaying, INST, 1,2…60 s	INST	
G*n* 50N-2 Element *Selects whether this INST/DTL residual earth fault element is enabled*	Disabled, Enabled	Disabled	
G*n* 50N-2 Setting *Pickup level*	0.25, 0.26…25 xIn	0.5 xIn	
G*n* 50N-2 Delay *Pickup delay*	0,0.01…864000 s	0.02	

2.6 Overcurrent Relay 3 Menu

Description	Range	Default	Setting
G*n* O/C 3 Winding Group Select *Selects which winding group this overcurrent relay is connected.*	W1, W2, W1+W2, W3, W4, W3+W4, W5	W1	
G*n* 51-3 Element *Selects whether this IDMTL/DTL*	Disabled, Enabled	Disabled	

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Description	Range	Default	Setting
overcurrent element is enabled			
G*n* 51-3 Setting *Pickup level*	0.10,0.15…2.5 xIn	1.5 xIn	
G*n* 51-3 Char *Selects characteristic curve or DTL operation*	IEC-NI, IEC-VI, IEC-EI, IEC-LTI, ANSI-MI, ANSI-VI, ANSI-EI, DTL	IEC-NI	
G*n* 51-3 Time Mult (IEC/ANSI) *Time multiplier (applicable to IEC and ANSI curves but not DTL selection)*	0.025, 0.050…1.600	1.000	
G*n* 51-3 Delay (DTL) *Delay (applicable only when DTL is selected for characteristic)*	0, 0.01…20 s	5 s	
G*n* 51-3 Reset *Selects between an ANSI decaying reset characteristic or a definite time reset*	(ANSI) Decaying, INST, 1,2…60 s	INST	
G*n* 50-3 Element *Selects whether this INST/DTL overcurrent element is enabled*	Disabled, Enabled	Disabled	
G*n* 50-3 Setting *Pickup level*	0.01, 0.02…25 xIn	20 xIn	
G*n* 50-3 Delay *Pickup delay*	0,0.01…864000 s	0.01	
G*n* 51N-3 Element *Selects whether this IDMTL/DTL residual earth fault element is enabled*	Disabled, Enabled	Disabled	
G*n* 51N-3 Setting *Pickup level*	0.25,0.26…2.5 xIn	1.0 xIn	
G*n* 51N-3 Char *Selects characteristic curve or DTL operation*	IEC-NI, IEC-VI, IEC-EI, IEC-LTI, ANSI-MI, ANSI-VI, ANSI-EI, DTL	IEC-NI	
G*n* 51N-3 Time Mult (IEC/ANSI) *Time multiplier (applicable to IEC and ANSI curves but not DTL selection)*	0.025, 0.050…1.600	1.000	
G*n* 51N-3 Delay (DTL) *Delay (applicable only when DTL is selected for characteristic)*	0, 0.01…20 s	5 s	
G*n* 51N-3 Reset *Selects between an ANSI decaying reset characteristic or a definite time reset*	(ANSI) Decaying, INST, 1,2…60 s	INST	
G*n* 50N-3 Element *Selects whether this INST/DTL residual earth fault element is enabled*	Disabled, Enabled	Disabled	
G*n* 50N-3 Setting *Pickup level*	0.25, 0.26…25 xIn	0.5 xIn	
G*n* 50N-3 Delay *Pickup delay*	0,0.01…864000 s	0.02	

2.7 Restricted E/F 1 Menu

Description	Range	Default	Setting
Gn 87REF-1 Element *High impedance restricted earth fault current element 1*	Disabled, Enabled	Disabled	
Gn 87REF-1 Setting *Pickup level*	0.020,0.025…0.960 xIn	0.200 xIn	
G*n* 87REF-1 Delay *Pickup delay*	0,0.0025…864000 s	0.0000	

2.8 Restricted E/F 2 Menu

Description	Range	Default	Setting
Gn 87REF-2 Element *High impedance restricted earth fault current element 2*	Disabled, Enabled	Disabled	

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Gn 87REF-2 Setting *Pickup level*	0.020,0.025…0.960 xIn	0.200 xIn	
G*n* 87REF-2 Delay *Pickup delay*	0,0.0025…864000 s	0.0000	

2.9 Restricted Restricted E/F 3 Menu

Description	Range	Default	Setting
Gn 87REF-3 Element *High impedance restricted earth fault current element 3*	Disabled, Enabled	Disabled	
Gn 87REF-3 Setting *Pickup level*	0.020,0.025…0.960 xIn	0.200 xIn	
G*n* 87REF-3 Delay *Pickup delay*	0,0.0025…864000 s	0.0000	

2.10 Standby E/F Menu[1]

Description	Range	Default	Setting
G*n* 51G-1 Element *Selects whether the IDMTL/DTL Standby Earth Fault Stage 1 element is enabled*	Disabled, Enabled	Disabled	
G*n* 51G-1 Setting *Pickup level*	0.10,0.15…2.5 xIn	0.5 xIn	
G*n* 51G-1 Char *Selects characteristic curve or DTL operation*	IEC-NI, IEC-VI, IEC-EI, IEC-LTI, ANSI-MI, ANSI-VI, ANSI-EI, DTL	IEC-NI	
G*n* 51G-1 Time Mult (IEC/ANSI) *Time multiplier (applicable to IEC and ANSI curves but not DTL selection)*	0.025, 0.050…1.600	1.000	
G*n* 51G-1 Delay (DTL) *Delay (applicable only when DTL is selected for characteristic)*	0, 0.01…20 s	5 s	
G*n* 51G-1 Reset *Selects between an ANSI decaying reset characteristic or a definite time reset*	(ANSI) Decaying, INST, 1,2…60 s	INST	
G*n* 51G-2 Element *Selects whether the IDMTL/DTL Standby Earth Fault Stage 2 element is enabled*	Disabled, Enabled	Disabled	
G*n* 51G-2 Setting *Pickup level*	0.10,0.15…2.5 xIn	0.6 xIn	
G*n* 51G-2 Char *Selects characteristic curve or DTL operation*	IEC-NI, IEC-VI, IEC-EI, IEC-LTI, ANSI-MI, ANSI-VI, ANSI-EI, DTL	IEC-NI	
G*n* 51G-2 Time Mult (IEC/ANSI) *Time multiplier (applicable to IEC and ANSI curves but not DTL selection)*	0.025, 0.050…1.600	1.000	
G*n* 51G-2 Delay (DTL) *Delay (applicable only when DTL is selected for characteristic)*	0, 0.01…20 s	5 s	
G*n* 51G-2 Reset *Selects between an ANSI decaying reset characteristic or a definite time reset*	(ANSI) Decaying, INST, 1,2…60 s	INST	

1) 4W Only

2.11 Standby E/F 1 Menu[1]

Description	Range	Default	Setting
G*n* 51G-1-1 Element *Selects whether the IDMTL/DTL Standby Earth Fault 1 Stage 1 element is enabled*	Disabled, Enabled	Disabled	
G*n* 51G-1-1 Setting *Pickup level*	0.10,0.15…2.5 xIn	0.5 xIn	
G*n* 51G-1-1 Char *Selects characteristic curve or DTL operation*	IEC-NI, IEC-VI, IEC-EI, IEC-LTI, ANSI-MI, ANSI-VI, ANSI-EI, DTL	IEC-NI	

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Description	Range	Default	Setting
G*n* 51G-1-1 Time Mult (IEC/ANSI) *Time multiplier (applicable to IEC and ANSI curves but not DTL selection)*	0.025, 0.050…1.600	1.000	
G*n* 51G-1-1 Delay (DTL) *Delay (applicable only when DTL is selected for characteristic)*	0, 0.01…20 s	5 s	
G*n* 51G-1-1 Reset *Selects between an ANSI decaying reset characteristic or a definite time reset*	(ANSI) Decaying, INST, 1,2…60 s	INST	
G*n* 51G-1-2 Element *Selects whether the IDMTL/DTL Standby Earth Fault 1 Stage 2 element is enabled*	Disabled, Enabled	Disabled	
G*n* 51G-1-2 Setting *Pickup level*	0.10,0.15…2.5 xIn	0.6 xIn	
G*n* 51G-1-2 Char *Selects characteristic curve or DTL operation*	IEC-NI, IEC-VI, IEC-EI, IEC-LTI, ANSI-MI, ANSI-VI, ANSI-EI, DTL	IEC-NI	
G*n* 51G-1-2 Time Mult (IEC/ANSI) *Time multiplier (applicable to IEC and ANSI curves but not DTL selection)*	0.025, 0.050…1.600	1.000	
G*n* 51G-1-2 Delay (DTL) *Delay (applicable only when DTL is selected for characteristic)*	0, 0.01…20 s	5 s	
G*n* 51G-1-2 Reset *Selects between an ANSI decaying reset characteristic or a definite time reset*	(ANSI) Decaying, INST, 1,2…60 s	INST	

1) 5W Only

2.12 Standby E/F 2 Menu[1]

Description	Range	Default	Setting
G*n* 51G-2-1 Element *Selects whether the IDMTL/DTL Standby Earth Fault 2 Stage 1 element is enabled*	Disabled, Enabled	Disabled	
G*n* 51G-2-1 Setting *Pickup level*	0.10,0.15…2.5 xIn	0.5 xIn	
G*n* 51G-2-1 Char *Selects characteristic curve or DTL operation*	IEC-NI, IEC-VI, IEC-EI, IEC-LTI, ANSI-MI, ANSI-VI, ANSI-EI, DTL	IEC-NI	
G*n* 51G-2-1 Time Mult (IEC/ANSI) *Time multiplier (applicable to IEC and ANSI curves but not DTL selection)*	0.025, 0.050…1.600	1.000	
G*n* 51G-2-1 Delay (DTL) *Delay (applicable only when DTL is selected for characteristic)*	0, 0.01…20 s	5 s	
G*n* 51G-2-1 Reset *Selects between an ANSI decaying reset characteristic or a definite time reset*	(ANSI) Decaying, INST, 1,2…60 s	INST	
G*n* 51G-2-2 Element *Selects whether the IDMTL/DTL Standby Earth Fault 2 Stage 2 element is enabled*	Disabled, Enabled	Disabled	
G*n* 51G-2-2 Setting *Pickup level*	0.10,0.15…2.5 xIn	0.6 xIn	
G*n* 51G-2-2 Char *Selects characteristic curve or DTL operation*	IEC-NI, IEC-VI, IEC-EI, IEC-LTI, ANSI-MI, ANSI-VI, ANSI-EI, DTL	IEC-NI	
G*n* 51G-2-2 Time Mult (IEC/ANSI) *Time multiplier (applicable to IEC and ANSI curves but not DTL selection)*	0.025, 0.050…1.600	1.000	
G*n* 51G-2-2 Delay (DTL) *Delay (applicable only when DTL is selected for characteristic)*	0, 0.01…20 s	5 s	
G*n* 51G-2-2 Reset *Selects between an ANSI decaying reset characteristic or a definite time reset*	(ANSI) Decaying, INST, 1,2…60 s	INST	

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1) 5W Only

2.13 Thermal Menu

Description	Range	Default	Setting
G*n* 49 Group Select *Selects which winding the thermal element is applied*	O/C Relay 1, O/C Relay 2, O/C Relay 3	O/C Relay 1	
G*n* 49 Thermal Overload *Selects whether the thermal overload protection element is enabled*	Disabled, Enabled	Disabled	
G*n* 49 Overload Setting *Pickup level*	0.1,0.2…10 xIn	3 xIn	
G*n* 49 Time Constant *Thermal time constant*	1.0,1.5…1000 min	10 min	
G*n* 49 Capacity Alarm *Selects whether thermal capacity alarm enabled*	Disabled, 50,51…100 %	Disabled	
49 Reset Therm State *Control that allows thermal state to be manually reset*	NO, YES	NO	

2.14 Trip Circuit Supervision Menu

Description	Range	Default	Setting
Trip Cct Fail 1 *Selects if this trip circuit logic is enabled or disabled.*	Disabled, Enabled	Disabled	
Trip Cct Fail 1 PU Delay *Delay before trip circuit failure picks up. Use in conjunction with STATUS INPUT MENU/Trip Cct Fail 1 setting to configure which status inputs prevent this timer from operating.*	0,1…60000 ms	400 ms	
Trip Cct Fail 2	Disabled, Enabled	Disabled	
Trip Cct Fail 2 PU Delay	0,1…60000 ms	400 ms	
Trip Cct Fail 3	Disabled, Enabled	Disabled	
Trip Cct Fail 3 PU Delay	0,1…60000 ms	400 ms	
Trip Cct Fail 4	Disabled, Enabled	Disabled	
Trip Cct Fail 4 PU Delay	0,1…60000 ms	400 ms	
Trip Cct Fail 5	Disabled, Enabled	Disabled	
Trip Cct Fail 5 PU Delay	0,1…60000 ms	400 ms	
Trip Cct Fail 6	Disabled, Enabled	Disabled	
Trip Cct Fail 6 PU Delay	0,1…60000 ms	400 ms	
Trip Cct Fail 7	Disabled, Enabled	Disabled	
Trip Cct Fail 7 PU Delay	0,1…60000 ms	400 ms	
Trip Cct Fail 8	Disabled, Enabled	Disabled	
Trip Cct Fail 8 PU Delay	0,1…60000 ms	400 ms	
Trip Cct Fail 9	Disabled, Enabled	Disabled	
Trip Cct Fail 9 PU Delay	0,1…60000 ms	400 ms	
Trip Cct Fail 10	Disabled, Enabled	Disabled	
Trip Cct Fail 10 PU Delay	0,1…60000 ms	400 ms	

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2.15 Status Input Menu

Description	Range	Default	Setting
Inhibit 87 *Selects which inputs inhibit the 87 element*	NONE, 1…19[2]	NONE	
Inhibit 87HS *Selects which inputs inhibit the 87HS element*	NONE, 1…19[2]	NONE	
Inhibit 51-1 *Selects which inputs inhibit the 51-1 element*	NONE, 1…19[2]	NONE	
Inhibit 50-1 *Selects which inputs inhibit the 50-1 element*	NONE, 1…19[2]	NONE	
Inhibit 51N-1 *Selects which inputs inhibit the 51N-1 element*	NONE, 1…19[2]	NONE	
Inhibit 50N-1 *Selects which inputs inhibit the 50N-1 element*	NONE, 1…19[2]	NONE	
Inhibit 51-2 *Selects which inputs inhibit the 51-2 element*	NONE, 1…19[2]	NONE	
Inhibit 50-2 *Selects which inputs inhibit the 50-2 element*	NONE, 1…19[2]	NONE	
Inhibit 51N-2 *Selects which inputs inhibit the 51N-2 element*	NONE, 1…19[2]	NONE	
Inhibit 50N-2 *Selects which inputs inhibit the 50N-2 element*	NONE, 1…19[2]	NONE	
Inhibit 51-3 *Selects which inputs inhibit the 51-3 element*	NONE, 1…19[2]	NONE	
Inhibit 50-3 *Selects which inputs inhibit the 50-3 element*	NONE, 1…19[2]	NONE	
Inhibit 51N-3 *Selects which inputs inhibit the 51N-3 element*	NONE, 1…19[2]	NONE	
Inhibit 50N-3 *Selects which inputs inhibit the 50N-3 element*	NONE, 1…19[2]	NONE	
Inhibit 87REF-1 *Selects which inputs inhibit the 87REF-1 element*	NONE, 1…19[2]	NONE	
Inhibit 87REF-2 *Selects which inputs inhibit the 87REF-2 element*	NONE, 1…19[2]	NONE	
Inhibit 87REF-3 *Selects which inputs inhibit the 87REF-3 element*	NONE, 1…19[2]	NONE	
Inhibit 51G-1[3] *Selects which inputs inhibit the 51G-1 standby earth fault element*	NONE, 1…19[2]	NONE	
Inhibit 51G-2[3] *Selects which inputs inhibit the 51G-2 standby earth fault element*	NONE, 1…19[2]	NONE	
Inhibit 51G-1-1[4] *Selects which inputs inhibit the 51G-1-1 standby earth fault element*	NONE, 1…19[2]	NONE	
Inhibit 51G-1-2[4] *Selects which inputs inhibit the 51G-1-2*	NONE, 1…19[2]	NONE	

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Description	Range	Default	Setting
standby earth fault element			
Inhibit 51G-2-1[4] *Selects which inputs inhibit the 51G-2-1 standby earth fault element*	NONE, 1…19[2]	NONE	
Inhibit 51G-2-2[4] *Selects which inputs inhibit the 51G-2-2 standby earth fault element*	NONE, 1…19[2]	NONE	
Inhibit 49 *Selects which inputs inhibit the 49 thermal element*	NONE, 1…19[2]	NONE	
Reset 49 *Selects which inputs reset the 49 thermal element (useful during testing)*	NONE, 1…19[2]	NONE	
Trip Cct Fail 1 *Select which inputs block Trip Cct Fail 1 timer.* *If any of the selected inputs is energised then the trip circuit timer 1 is blocked.*	NONE, 1…19[2]	NONE	
Trip Cct Fail 2 *Select which inputs block Trip Cct Fail 2 timer.*	NONE, 1…19[2]	NONE	
Trip Cct Fail 3 *Select which inputs block Trip Cct Fail 3 timer.*	NONE, 1…19[2]	NONE	
Trip Cct Fail 4 *Select which inputs block Trip Cct Fail 4 timer.*	NONE, 1…19[2]	NONE	
Trip Cct Fail 5 *Select which inputs block Trip Cct Fail 5 timer.*	NONE, 1…19[2]	NONE	
Trip Cct Fail 6 *Select which inputs block Trip Cct Fail 6 timer.*	NONE, 1…19[2]	NONE	
Trip Cct Fail 7 *Select which inputs block Trip Cct Fail 7 timer.*	NONE, 1…19[2]	NONE	
Trip Cct Fail 8 *Select which inputs block Trip Cct Fail 8 timer.*	NONE, 1…19[2]	NONE	
Trip Cct Fail 9 *Select which inputs block Trip Cct Fail 9 timer.*	NONE, 1…19[2]	NONE	
Trip Cct Fail 10 *Select which inputs block Trip Cct Fail 10 timer.*	NONE, 1…19[2]	NONE	
Trigger Wave Rec *Selects which inputs can trigger a waveform record*	NONE, 1…19[2]	NONE	
Trigger Data Rec *Selects which inputs can trigger a data record*	NONE, 1…19[2]	NONE	
Select Group 1 *Switches active setting group to group 1*	NONE, 1…19[2]	NONE	
Select Group 2 *Switches active setting group to group 2*	NONE, 1…19[2]	NONE	
Select Group 3 *Switches active setting group to group 3*	NONE, 1…19[2]	NONE	
Select Group 4 *Switches active setting group to group 4*	NONE, 1…19[2]	NONE	
Select Group 5 *Switches active setting group to group 5*	NONE, 1…19[2]	NONE	
Select Group 6 *Switches active setting group to group 6*	NONE, 1…19[2]	NONE	
Select Group 7 *Switches active setting group to group 7*	NONE, 1…19[2]	NONE	

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Description	Range	Default	Setting
Select Group 8 *Switches active setting group to group 8*	NONE, 1…19[2]	NONE	
Clock Sync. *Selects which input is used to synchronise the real time clock*	NONE, 1…19[2]	NONE	
Inverted Inputs *Selects which inputs pickup when voltage is removed, often used when monitoring trip circuits.*	NONE, 1…19[2]	NONE	

1) Only when fitted.

2) 19 status inputs represents maximum configuration.

3) 4W Only

4) 5W Only

2.16 Status Input Timing Menu

Description	Range	Default	Setting
Aux I/P 1 Pickup Delay *Delay on pickup of DC Status input 1*	0.000,0.005…864000 s	0 s	
Aux I/P 1 Dropoff Delay *Delay on dropoff of DC Status input 1*	0.000,0.005…864000 s	0 s	
Aux I/P 2 Pickup Delay	0.000,0.005…864000 s	0 s	
Aux I/P 2 Dropoff Delay	0.000,0.005…864000 s	0 s	
Aux I/P 3 Pickup Delay	0.000,0.005…864000 s	0 s	
Aux I/P 3 Dropoff Delay	0.000,0.005…864000 s	0 s	
Aux I/P 4 Pickup Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 4 Dropoff Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 5 Pickup Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 5 Dropoff Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 6 Pickup Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 6 Dropoff Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 7 Pickup Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 7 Dropoff Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 8 Pickup Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 8 Dropoff Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 9 Pickup Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 9 Dropoff Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 10 Pickup Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 10 Dropoff Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 11 Pickup Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 11 Dropoff Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 12 Pickup Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 12 Dropoff Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 13 Pickup Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 13 Dropoff Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 14 Pickup Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 14 Dropoff Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 15 Pickup Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 15 Dropoff Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 16 Pickup Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 16 Dropoff Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 17 Pickup Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 17 Dropoff Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 18 Pickup Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 18 Dropoff Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 19 Pickup Delay[1]	0.000,0.005…864000 s	0 s	
Aux I/P 19 Dropoff Delay[1]	0.000,0.005…864000 s	0 s	

1) 19 status inputs represents maximum configuration.

2.17 Reylogic Element Menu

Description	Range	Default	Setting
Max Data Rec Time	0,1…60000 ms	2000 ms	

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Description	Range	Default	Setting
When a data record is triggered by a fault condition the relay stops recording information when either the triggering condition is removed or this timer expires whichever happens first.			

2.18 Output Relay Menu

Description	Range	Default	Setting
87 *Biased Differential operated*	NONE, 1…21[2]	4,5	
87HS *Differential Highset operated*	NONE, 1…21[2]	4,5	
51-1 *51-1 IDMTL Overcurrent operated*	NONE, 1…21[2]	4,5	
50-1 *50-1 DTL Overcurrent operated*	NONE, 1…21[2]	4,5	
51N-1 *51N-1 IDMTL derived Earth Fault operated*	NONE, 1…21[2]	4,5	
50N-1 *50N-1 DTL derived Earth Fault operated*	NONE, 1…21[2]	4,5	
51-2 *51-2 IDMTL Overcurrent operated*	NONE, 1…21[2]	4,5	
50-2 *50-2 DTL Overcurrent operated*	NONE, 1…21[2]	4,5	
51N-2 *51N-2 IDMTL derived Earth Fault operated*	NONE, 1…21[2]	4,5	
50N-2 *50N-2 DTL derived Earth Fault operated*	NONE, 1…21[2]	4,5	
51-3 *51-3 IDMTL Overcurrent operated*	NONE, 1…21[2]	4,5	
50-3 *50-3 DTL Overcurrent operated*	NONE, 1…21[2]	4,5	
51N-3 *51N-3 IDMTL derived Earth Fault operated*	NONE, 1…21[2]	4,5	
50N-3 *50N-3 DTL derived Earth Fault operated*	NONE, 1…21[2]	4,5	
87REF-1 *High Impedance Restricted Earth Fault 1 operated*	NONE, 1…21[2]	4,5	
87REF-2 *High Impedance Restricted Earth Fault 2 operated*	NONE, 1…21[2]	4,5	
87REF-3 *High Impedance Restricted Earth Fault 3 operated*	NONE, 1…21[2]	4,5	
51G-1-1 *IDMTL Standby Earth Fault 1 Stage 1 operated*	NONE, 1…21[2]	4,5	
51G-1-2 *IDMTL Standby Earth Fault 1 Stage 2 operated*	NONE, 1…21[2]	4,5	
51G-2-1 *IDMTL Standby Earth Fault 2 Stage 1 operated*	NONE, 1…21[2]	4,5	
51G-2-2 *IDMTL Standby Earth Fault 2 Stage 2 operated*	NONE, 1…21[2]	4,5	
49 Alarm *Thermal capacity alarm operated*	NONE, 1…21[2]	NONE	
49 Trip *Thermal capacity trip operated*	NONE, 1…21[2]	NONE	

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Description	Range	Default	Setting
Phase A *A phase A element operated*	NONE, 1…21[2]	NONE	
Phase B *A phase B element operated*	NONE, 1…21[2]	NONE	
Phase C *A phase C element operated*	NONE, 1…21[2]	NONE	
Phase N *A phase N element operated*	NONE, 1…21[2]	NONE	
General Starter *A starter element is picked up*	NONE, 1…21[2]	NONE	
General Trip *An element has operated. Useful when testing individual functions!*	NONE, 1…21[2]	NONE	
Trip Cct Fail 1 *Trip Circuit 1 has failed*	NONE, 1…21[2]	NONE	
Trip Cct Fail 2 *Trip Circuit 2 has failed*	NONE, 1…21[2]	NONE	
Trip Cct Fail 3 *Trip Circuit 3 has failed*	NONE, 1…21[2]	NONE	
Trip Cct Fail 4 *Trip Circuit 4 has failed*	NONE, 1…21[2]	NONE	
Trip Cct Fail 5 *Trip Circuit 5 has failed*	NONE, 1…21[2]	NONE	
Trip Cct Fail 6 *Trip Circuit 6 has failed*	NONE, 1…21[2]	NONE	
Trip Cct Fail 7 *Trip Circuit 7 has failed*	NONE, 1…21[2]	NONE	
Trip Cct Fail 8 *Trip Circuit 8 has failed*	NONE, 1…21[2]	NONE	
Trip Cct Fail 9 *Trip Circuit 9 has failed*	NONE, 1…21[2]	NONE	
Trip Cct Fail 10 *Trip Circuit 10 has failed*	NONE, 1…21[2]	NONE	
Trip Circuit Fail *A trip circuit has failed*	NONE, 1…21[2]	NONE	
New Wave Stored *The waveform recorder has stored new information Note: this is a pulsed output*	NONE, 1…29[1]	NONE	
New Data Stored *The data recorder has stored new information Note: this is a pulsed output*	NONE, 1…29[1]	NONE	
Aux I/P 1 Operated *DC Status 1 has operated*	NONE, 1…21[2]	NONE	
Aux I/P 2 Operated	NONE, 1…21[2]	NONE	
Aux I/P 3 Operated	NONE, 1…21[2]	NONE	
Aux I/P 4 Operated[1]	NONE, 1…21[2]	NONE	
Aux I/P 5 Operated[1]	NONE, 1…21[2]	NONE	
Aux I/P 6 Operated[1]	NONE, 1…21[2]	NONE	
Aux I/P 7 Operated[1]	NONE, 1…21[2]	NONE	
Aux I/P 8 Operated[1]	NONE, 1…21[2]	NONE	
Aux I/P 9 Operated[1]	NONE, 1…21[2]	NONE	
Aux I/P 10 Operated[1]	NONE, 1…21[2]	NONE	
Aux I/P 11 Operated[1]	NONE, 1…21[2]	NONE	
Aux I/P 12 Operated[1]	NONE, 1…21[2]	NONE	
Aux I/P 13 Operated[1]	NONE, 1…21[2]	NONE	
Aux I/P 14 Operated[1]	NONE, 1…21[2]	NONE	
Aux I/P 15 Operated[1]	NONE, 1…21[2]	NONE	
Aux I/P 16 Operated[1]	NONE, 1…21[2]	NONE	
Aux I/P 17 Operated[1]	NONE, 1…21[2]	NONE	
Aux I/P 18 Operated[1]	NONE, 1…21[2]	NONE	
Aux I/P 19 Operated[1]	NONE, 1…21[2]	NONE	
Hand Reset Outputs *Relays selected, as Hand Reset will*	NONE, 1…21[2]	NONE	

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Description	Range	Default	Setting
remain latched until manually reset from front panel or via communications link or by removing DC Supply. By default relays are Self Resetting and will reset when the driving signal is removed.			
Protection Healthy *Relays selected are energised whilst relay self-monitoring does NOT detect any hardware or software errors and DC Supply is healthy. A changeover contact or normally closed contact may be used to generate Protection Defective from this output*	NONE, 1…21[2]	1	

1) Only when fitted.

2) 21 output relays represents maximum configuration.

2.19 OP Relay Timing Menu

Description	Range	Default	Setting
Min Operate Time 1 *Minimum operate time of output relay 1*	0.02, 0.04…60 s	0.1 s	
Min Operate Time 2 *Minimum operate time of output relay 2*	0.02, 0.04…60 s	0.1 s	
Min Operate Time 3 *Minimum operate time of output relay 3*	0.02, 0.04…60 s	0.1 s	
Min Operate Time 4 *Minimum operate time of output relay 4*	0.02, 0.04…60 s	0.1 s	
Min Operate Time 5 *Minimum operate time of output relay 5*	0.02, 0.04…60 s	0.1 s	
Min Operate Time 6[1] *Minimum operate time of output relay 6*	0.02, 0.04…60 s	0.1 s	
Min Operate Time 7[1] *Minimum operate time of output relay 7*	0.02, 0.04…60 s	0.1 s	
Min Operate Time 8[1] *Minimum operate time of output relay 8*	0.02, 0.04…60 s	0.1 s	
Min Operate Time 9[1] *Minimum operate time of output relay 9*	0.02, 0.04…60 s	0.1 s	
Min Operate Time 10[1] *Minimum operate time of output relay 10*	0.02, 0.04…60 s	0.1 s	
Min Operate Time 11[1] *Minimum operate time of output relay 11*	0.02, 0.04…60 s	0.1 s	
Min Operate Time 12[1] *Minimum operate time of output relay 12*	0.02, 0.04…60 s	0.1 s	
Min Operate Time 13[1] *Minimum operate time of output relay 13*	0.02, 0.04…60 s	0.1 s	
Min Operate Time 14[1] *Minimum operate time of output relay 14*	0.02, 0.04…60 s	0.1 s	
Min Operate Time 15[1] *Minimum operate time of output relay 15*	0.02, 0.04…60 s	0.1 s	
Min Operate Time 16[1] *Minimum operate time of output relay 16*	0.02, 0.04…60 s	0.1 s	
Min Operate Time 17[1] *Minimum operate time of output relay 17*	0.02, 0.04…60 s	0.1 s	
Min Operate Time 18[1] *Minimum operate time of output relay 18*	0.02, 0.04…60 s	0.1 s	
Min Operate Time 19[1] *Minimum operate time of output relay 19*	0.02, 0.04…60 s	0.1 s	
Min Operate Time 20[1] *Minimum operate time of output relay 20*	0.02, 0.04…60 s	0.1 s	
Min Operate Time 21[1] *Minimum operate time of output relay 22*	0.02, 0.04…60 s	0.1 s	

1) 21 output relays represents maximum configuration.

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2.20 LED Menu

Description	Range	Default	Setting
87 *Biased Differential operated*	NONE, 1…32	17	
87HS *Differential Highset operated*	NONE, 1…32	18	
51-1 *51-1 IDMTL Overcurrent operated*	NONE, 1…32	5,20	
50-1 *50-1 DTL Overcurrent operated*	NONE, 1…32	5,20	
51N-1 *51N-1 IDMTL derived Earth Fault operated*	NONE, 1…32	5,21	
50N-1 *50N-1 DTL derived Earth Fault operated*	NONE, 1…32	5,21	
51-2 *51-2 IDMTL Overcurrent operated*	NONE, 1…32	6,20	
50-2 *50-2 DTL Overcurrent operated*	NONE, 1…32	6,20	
51N-2 *51N-2 IDMTL derived Earth Fault operated*	NONE, 1…32	6,21	
50N-2 *50N-2 DTL derived Earth Fault operated*	NONE, 1…32	6,21	
51-3 *51-3 IDMTL Overcurrent operated*	NONE, 1…32	7,20	
50-3 *50-3 DTL Overcurrent operated*	NONE, 1…32	7,20	
51N-3 *51N-3 IDMTL derived Earth Fault operated*	NONE, 1…32	7,21	
50N-3 *50N-3 DTL derived Earth Fault operated*	NONE, 1…32	7,21	
87REF-1 *High Impedance Restricted Earth Fault 1 operated*	NONE, 1…32	5,19	
87REF-2 *High Impedance Restricted Earth Fault 2 operated*	NONE, 1…32	6,19	
87REF-3 *High Impedance Restricted Earth Fault 3 operated*	NONE, 1…32	7,19	
51G-1-1 *IDMTL Standby Earth Fault 1 Stage 1 operated*	NONE, 1…32	5,22	
51G-1-2 *IDMTL Standby Earth Fault 1 Stage 2 operated*	NONE, 1…32	5,22	
51G-2-1 *IDMTL Standby Earth Fault 2 Stage 1 operated*	NONE, 1…32	6,22	
51G-2-2 *IDMTL Standby Earth Fault 2 Stage 2 operated*	NONE, 1…32	6,22	
49 Alarm *Thermal capacity alarm operated*	NONE, 1…32	24	
49 Trip *Thermal capacity trip operated*	NONE, 1…32	24	
Phase A *A phase A element operated*	NONE, 1…32	2	
Phase B *A phase B element operated*	NONE, 1…32	3	
Phase C *A phase C element operated*	NONE, 1…32	4	

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Description	Range	Default	Setting
Phase N *A phase N element operated*	NONE, 1…32	NONE	
General Starter *A starter element is picked up. Useful when testing individual functions!*	NONE, 1…32	1	
General Trip *An element has operated. Useful when testing individual functions!*	NONE, 1…32	1	
Trip Cct Fail 1 *Trip Circuit 1 has failed*	NONE, 1…32	NONE	
Trip Cct Fail 2 *Trip Circuit 2 has failed*	NONE, 1…32	NONE	
Trip Cct Fail 3 *Trip Circuit 3 has failed*	NONE, 1…32	NONE	
Trip Cct Fail 4 *Trip Circuit 4 has failed*	NONE, 1…32	NONE	
Trip Cct Fail 5 *Trip Circuit 5 has failed*	NONE, 1…32	NONE	
Trip Cct Fail 6 *Trip Circuit 6 has failed*	NONE, 1…32	NONE	
Trip Cct Fail 7 *Trip Circuit 7 has failed*	NONE, 1…32	NONE	
Trip Cct Fail 8 *Trip Circuit 8 has failed*	NONE, 1…32	NONE	
Trip Cct Fail 9 *Trip Circuit 9 has failed*	NONE, 1…32	NONE	
Trip Cct Fail 10 *Trip Circuit 10 has failed*	NONE, 1…32	NONE	
Trip Circuit Fail *A trip circuit has failed, look at status inputs Leds to find out which one*	NONE, 1…32	23	
New Data Stored *The waveform recorder has stored new information*	NONE, 1…32	NONE	
Aux I/P 1 Operated *DC Status 1 has operated*	NONE, 1…32	9	
Aux I/P 2 Operated	NONE, 1…32	10	
Aux I/P 3 Operated	NONE, 1…32	11	
Aux I/P 4 Operated[1]	NONE, 1…32	12	
Aux I/P 5 Operated[1]	NONE, 1…32	13	
Aux I/P 6 Operated[1]	NONE, 1…32	14	
Aux I/P 7 Operated[1]	NONE, 1…32	15	
Aux I/P 8 Operated[1]	NONE, 1…32	16	
Aux I/P 9 Operated[1]	NONE, 1…32	25	
Aux I/P 10 Operated[1]	NONE, 1…32	26	
Aux I/P 11 Operated[1]	NONE, 1…32	27	
Aux I/P 12 Operated[1]	NONE, 1…32	NONE	
Aux I/P 13 Operated[1]	NONE, 1…32	NONE	
Aux I/P 14 Operated[1]	NONE, 1…32	NONE	
Aux I/P 15 Operated[1]	NONE, 1…32	NONE	
Aux I/P 16 Operated[1]	NONE, 1…32	NONE	
Aux I/P 17 Operated[1]	NONE, 1…32	NONE	
Aux I/P 18 Operated[1]	NONE, 1…32	NONE	
Aux I/P 19 Operated[1]	NONE, 1…32	NONE	
Self Reset LEDs *LEDs selected, as Self Reset will automatically reset when the driving signal is removed. By default all LEDs are Hand Reset and must be manually reset either locally via the front fascia or remotely via communications.*	NONE, 1…32	1	

1) Only when fitted.

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2.21 Data Storage Menu

Description	Range	Default	Setting
Clear Faults *Clears the fault recorder*	NO, YES	NO	
Clear Events *Clears the event recorder*	NO, YES	NO	
Pre-Trigger Storage *Pre-trigger storage is that percentage of the waveform record that is recorded prior to the waveform recorder being triggered*	10…90 %	20 %	
Data Record Duration[1] *Selects the length of time for each waveform record*	3 Recs x 1 Seconds, 1 Recs x 3 Seconds	3 Recs x 1 Second	
Trigger Waveform *Triggers the waveform recorder*	NO, YES	NO	
Clear Waveforms *Clears the waveform recorder*	NO, YES	NO	

1) Number of records and duration available is dependent upon relay model and number of channels recorded.

2.22 Communications Menu

Description	Range	Default	Setting
Station Address *IEC 60870-5-103 Station Address*	0…254	0	
COM1 Protocol *Selects protocol to use for COM 1*	OFF, IEC60870-5-103, MODBUS-RTU	IEC60870-5-103	
COM1 Baud Rate *Sets the communications baud rate for com port 1 (Rear upper Fibre optic port)*	75, 110, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200	19200	
COM1 Parity *Selects whether parity information is used*	Even, Odd, None	Even	
COM1 Line Idle *Selects the communications line idle sense*	Light Off, Light On	Light Off	
COM1 Data Echo *Enables echoing of data from RX port to TX port when operating relays in a Fibre Optic ring configuration*	Off, On	Off	
COM2 Protocol *Selects protocol to use for COM 2*	OFF, IEC60870-5-103, MODBUS-RTU, ASCII	ASCII	
COM2 Baud Rate *Sets the communications baud rate for com port 2 (Rear lower Fibre optic port AND Front Fascia RS232 port)*	75, 110, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200	57600	
COM2 Parity *Selects whether parity information is used*	Even, Odd, None	Even	
COM2 Line Idle *Selects the communications line idle sense*	Light Off, Light On	Light Off	
COM2 Data Echo *Enables echoing of data from RX port to TX port when operating relays in a Fibre Optic ring configuration*	Off, On	Off	
COM2 Direction *Selects how Com2 is shared between the front fascia port and the rear fibre optic port. This allows interlocking to prevent remote access whilst an engineer is attached locally on site if IEC870 is on Com2 and Auto-detect is enabled*	AUTO-DETECT, FRONT PORT, REAR PORT	AUTO-DETECT	

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3 Instruments

INSTRUMENT	DESCRIPTION
[WINDING 1 METERS] --> press down <--	Start of winding 1 meters
W1 Primary Currents 0.0 0.0 0.0 kA	Winding 1 primary currents
W1 Sec'y Currents 0.00 0.00 0.00 A	Winding 1 secondary currents
W1 Nom Currents 0.00 0.00 0.00 xIn	Winding 1 nominal currents
[WINDING 2 METERS] --> press down <--	Start of winding 2 meters
W2 Primary Currents 0.00 0.00 0.00 kA	Winding 2 primary currents
W2 Sec'y Currents 0.00 0.00 0.00 A	Winding 2 secondary currents
W2 Nom Currents 0.00 0.00 0.00 xIn	Winding 2 nominal currents
[WINDING 3 METERS] --> press down <--	Start of winding 3 meters
W3 Primary Currents 0.00 0.00 0.00 kA	Winding 3 primary currents
W3 Sec'y Currents 0.00 0.00 0.00 A	Winding 3 secondary currents
W3 Nom Currents 0.00 0.00 0.00 xIn	Winding 3 nominal currents
[WINDING 4 METERS] --> press down <--	Start of winding 4 meters
W4 Primary Currents 0.00 0.00 0.00 kA	Winding 4 primary currents
W4 Sec'y Currents 0.00 0.00 0.00 A	Winding 4 secondary currents
W4 Nom Currents 0.00 0.00 0.00 xIn	Winding 4 nominal currents
[WINDING 5 METERS] --> press down <--	Start of winding 5 meters[3]
W5 Primary Currents 0.00 0.00 0.00 kA	Winding 5 primary currents[3]
W5 Sec'y Currents 0.00 0.00 0.00 A	Winding 5 secondary currents[3]
W5 Nom Currents 0.00 0.00 0.00 xIn	Winding 5 nominal currents[3]
[BIAS DIFF METERS] --> press down <--	Start of (87) Biased Differential meters
W1 Line Currents 0.00 0.00 0.00 xIn	Winding 1 measured currents
W2 Line Currents 0.00 0.00 0.00 xIn	Winding 2 measured currents
W3 Line Currents 0.00 0.00 0.00 xIn	Winding 3 measured currents
W4 Line Currents 0.00 0.00 0.00 xIn	Winding 4 measured currents
W5 Line Currents 0.00 0.00 0.00 xIn	Winding 5 measured currents
W1 Relay Currents 0.00 0.00 0.00 xIn	Winding 1 currents after Interposing CT correction factors applied
W2 Relay Currents 0.00 0.00 0.00 xIn	Winding 2 currents after Interposing CT correction factors applied
W3 Relay Currents 0.00 0.00 0.00 xIn	Winding 3 currents after Interposing CT correction factors applied
W4 Relay Currents 0.00 0.00 0.00 xIn	Winding 4 currents after Interposing CT correction factors applied
W5 Relay Currents 0.00 0.00 0.00 xIn	Winding 5 currents after Interposing CT correction factors applied

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INSTRUMENT	DESCRIPTION
Operate Currents 0.00 0.00 0.00 xIn	Differential operate currents
Restrain Currents 0.00 0.00 0.00 xIn	Differential restrain currents
Mag Inrush Currents 0.00 0.00 0.00 xIn	Differential magnetising inrush currents (even harmonic content of operate currents but mainly 2nd harmonic content)
[O/C 1 METERS] --> press down <--	Start of overcurrent relay 1 meters
OC1 Nom Currents 0.00 0.00 0.00 xIn	Overcurrent relay 1 nominal currents
OC1 Res Nom Current 0.00 xIn	Overcurrent relay 1 residual nominal current
51-1 Status 0 0 0 0 %	Operation progress meters for overcurrent relay 1 IDMTL elements (51-1 & 51N-1), phases A, B, C and residual
[O/C 2 METERS] --> press down <--	Start of overcurrent relay 2 meters
OC2 Nom Currents 0.00 0.00 0.00 xIn	Overcurrent relay 2 nominal currents
OC2 Res Nom Current 0.00 xIn	Overcurrent relay 2 residual nominal current
51-2 Status 0 0 0 0 %	Operation progress meters for overcurrent relay 2 IDMTL elements (51-2 & 51N-2), phases A, B, C and residual
[O/C 3 METERS] --> press down <--	Start of overcurrent relay 3 meters
OC3 Nom Currents 0.00 0.00 0.00 xIn	Overcurrent relay 3 nominal currents
OC3 Res Nom Current 0.00 xIn	Overcurrent relay 3 residual nominal current
51-3 Status 0 0 0 0 %	Operation progress meters for overcurrent relay 3 IDMTL elements (51-3 & 51N-3), phases A, B, C and residual
[REF 1 METERS] --> press down <--	Start of restricted earth fault 1 meters
REF 1 Sec Current 0.00 A	Winding 1 secondary restricted earth fault current
REF 1 Nom Current 0.00 xIn	Winding 1 nominal restricted earth fault current
[REF 2 METERS] --> press down <--	Start of restricted earth fault 2 meters
REF 2 Sec Current 0.00 A	Winding 2 secondary restricted earth fault current
REF 2 Nom Current 0.00 xIn	Winding 2 nominal restricted earth fault current
[REF 3 METERS] --> press down <--	Start of restricted earth fault 3 meters
REF 3 Sec Current 0.00 A	Winding 3 secondary restricted earth fault current
REF 3 Nom Current 0.00 xIn	Winding 3 nominal restricted earth fault current
[ST'BY E/F METERS] --> press down <--	Start of standby earth fault meters[2]
E/F Prim'y Current 0.0 kA	E/F 1 primary current[2]
E/F Sec'y Current 0.00 A	E/F 1 secondary current[2]
E/F Nom Current 0.00 xIn	E/F nominal currents[2]
51G Status 0 0 %	Operation progress meters for (51G-1,51G-2) IDMTL elements[2]
[ST'BY E/F 1 METERS] --> press down <--	Start of standby earth fault 1 meters[3]
E/F 1 Prim'y Current 0.0 kA	E/F 1 primary current[3]
E/F 1 Sec'y Current 0.00 A	E/F 1 secondary current[3]
E/F 1 Nom Current	E/F nominal currents[3]

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INSTRUMENT	DESCRIPTION
0.00 xIn	
51G-1 Status 0 0 %	Operation progress meters for (51G-1-1,51G-1-2) IDMTL elements[3]
[ST'BY E/F 2 METERS] --> press down <--	Start of standby earth fault 2 meters[3]
E/F 2 Prim'y Current 0.0 kA	E/F 2 primary current[3]
E/F 2 Sec'y Current 0.00 A	E/F 2 secondary current[3]
E/F 2 Nom Current 0.00 xIn	E/F nominal currents[3]
51G-2 Status 0 0 %	Operation progress meters for (51G-2-1,51G-2-2) IDMTL elements[3]
[THERMAL METERS] --> press down <--	Start of thermal meters
Thermal Nom Current 0.00 xIn	Thermal element nominal current
Thermal Status 0.0 %	Operation progress meters for thermal element
[MISC METERS] --> press down <--	Start of miscellaneous meters
Status Inputs 1-16 ---- ---- ---- ----	Displays the state of DC status inputs 1 to 16[1]
Status Inputs 17-19 ---	Displays the state of DC status inputs 17 to 19[1]
Output Relays 1-16 ---- ---- ---- ----	Displays the state of output relays 1 to 16[1]
Output Relays 17-21 ---- -	Displays the state of output relays 17 to 21[1]
Time & Date 13/08/2002 10:16:11	Time and Date
Fault Records 0	Number of fault data records stored
Event Records 0	Number of stored event records
Waveform Records 0	Number of disturbance waveform records

1) Only when fitted.

2) 4W Only

3) 5W Only

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4 IEC 60870-5-103 Communications Information

4.1 IEC 60870-5-103 Semantics in monitor direction

FUN	INF	Description	GI	TYP	COT
60	1	IEC870 Active Com1	x	1	1,9
60	2	IEC870 Active Com2	x	1	1,9
60	3	Front Port OverRide	x	1	1,9
176	0	GI End	-	8	10
176	0	Time Synchronisation	-	6	8
176	2	Reset FCB	-	2	3
176	3	Reset CU	-	2	4
176	4	Start/Restart	-	2	5
176	22	Settings changed	-	1	1
176	23	Setting G1 selected	x	1	1,9
176	24	Setting G2 selected	x	1	1,9
176	25	Setting G3 selected	x	1	1,9
176	26	Setting G4 selected	x	1	1,9
176	27	Status Input 1	x	1	1,9
176	28	Status Input 2	x	1	1,9
176	29	Status Input 3	x	1	1,9
176	30	Status Input 4	x	1	1,9
176	36	Trip Circuit Fail	x	1	1,9
176	64	Start/Pick-up L1	x	2	1,9
176	65	Start/Pick-up L2	x	2	1,9
176	66	Start/Pick-up L3	x	2	1,9
176	67	Start/Pick-up N	x	2	1,9
176	68	General Trip	-	2	1
176	69	Trip L1	-	2	1
176	70	Trip L2	-	2	1
176	71	Trip L3	-	2	1
176	84	General Start/Pick-up	x	2	1,9
178	7	Biased Differential	-	2	1
178	8	Differential Highset	-	2	1
178	80	Thermal Alarm	-	2	1
178	81	Thermal Trip	-	2	1
178	104	Standby E/F 1 Stage 1	-	2	1
178	105	Standby E/F 1 Stage 2	-	2	1
178	106	Standby E/F 2 Stage 1	-	2	1
178	107	Standby E/F 2 Stage 2	-	2	1
178	114	Phase Fault 1	-	2	1
178	115	Phase Fault 2	-	2	1
178	116	Phase Fault 3	-	2	1
178	119	Residual Earth Fault 1	-	2	1
178	119	Residual Earth Fault 2	-	2	1
178	119	Residual Earth Fault 3	-	2	1
178	124	Restricted Earth Fault 1	-	2	1
178	125	Restricted Earth Fault 2	-	2	1
178	126	Restricted Earth Fault 3	-	2	1

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FUN	INF	Description	GI	TYP	COT
178	128	Cold Start	-	1	1
178	129	Warm Start	-	1	1
178	130	Re-Start	-	1	1
178	135	Trigger Storage	-	1	1
178	145	Status Input 5	x	1	1,9
178	146	Status Input 6	x	1	1,9
178	147	Status Input 7	x	1	1,9
178	148	Status Input 8	x	1	1,9
178	149	Status Input 9	x	1	1,9
178	150	Status Input 10	x	1	1,9
178	151	Status Input 11	x	1	1,9
178	152	Status Input 12	x	1	1,9
178	153	Status Input 13	x	1	1,9
178	154	Status Input 14	x	1	1,9
178	155	Status Input 15	x	1	1,9
178	156	Status Input 16	x	1	1,9
178	157	Status Input 17	x	1	1,9
178	158	Status Input 18	x	1	1,9
178	159	Status Input 19	x	1	1,9
178	181	Plant Control Relay 1	x	1	1,9
178	182	Plant Control Relay 2	x	1	1,9
178	183	Plant Control Relay 3	x	1	1,9
178	184	Plant Control Relay 4	x	1	1,9
178	185	Plant Control Relay 5	x	1	1,9
178	186	Plant Control Relay 6	x	1	1,9
178	187	Plant Control Relay 7	x	1	1,9
178	188	Plant Control Relay 8	x	1	1,9
178	189	Plant Control Relay 9	x	1	1,9
178	190	Plant Control Relay 10	x	1	1,9
178	191	Plant Control Relay 11	x	1	1,9
178	192	Plant Control Relay 12	x	1	1,9
178	193	Plant Control Relay 13	x	1	1,9
178	194	Plant Control Relay 14	x	1	1,9
178	195	Plant Control Relay 15	x	1	1,9
178	196	Plant Control Relay 16	x	1	1,9
178	197	Plant Control Relay 17	x	1	1,9
178	198	Plant Control Relay 18	x	1	1,9
178	199	Plant Control Relay 19	x	1	1,9
178	200	Plant Control Relay 20	x	1	1,9
178	201	Plant Control Relay 21	x	1	1,9
178	230	Measurand W1 $I_{L1,2,3}$ W1 I_{L1} (2.4 x) W1 I_{L2} (2.4 x) W1 I_{L3} (2.4 x)	-	9	2

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FUN	INF	Description	GI	TYP	COT
178	231	Measurand W2 $I_{L1,2,3}$ W2 I_{L1} (2.4 x) W2 I_{L2} (2.4 x) W2 I_{L3} (2.4 x)	-	9	2
178	232	Measurand W3 $I_{L1,2,3}$ W3 I_{L1} (2.4 x) W3 I_{L2} (2.4 x) W3 I_{L3} (2.4 x)	-	9	2
178	233	Measurand W4 $I_{L1,2,3}$ W4 I_{L1} (2.4 x) W4 I_{L2} (2.4 x) W4 I_{L3} (2.4 x)	-	9	2
178	234	Measurand W5 $I_{L1,2,3}$ W5 I_{L1} (2.4 x) W5 I_{L2} (2.4 x) W5 I_{L3} (2.4 x)	-	9	2
178	240	Measurand OC1 $I_{L1,2,3}$ OC1 I_{L1} (2.4 x) OC1 I_{L2} (2.4 x) OC1 I_{L3} (2.4 x)	-	9	2
178	241	Measurand OC2 $I_{L1,2,3}$ OC2 I_{L1} (2.4 x) OC2 I_{L2} (2.4 x) OC2 I_{L3} (2.4 x)	-	9	2
178	242	Measurand OC3 $I_{L1,2,3}$ OC3 I_{L1} (2.4 x) OC3 I_{L2} (2.4 x) OC3 I_{L3} (2.4 x)	-	9	2
178	244	Trip Circuit Fail 1	x	1	1,9
178	245	Trip Circuit Fail 2	x	1	1,9
178	246	Trip Circuit Fail 3	x	1	1,9
178	247	Trip Circuit Fail 4	x	1	1,9
178	248	Trip Circuit Fail 5	x	1	1,9
178	249	Trip Circuit Fail 6	x	1	1,9
178	250	Trip Circuit Fail 7	x	1	1,9

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FUN	INF	Description	GI	TYP	COT
178	251	Trip Circuit Fail 8	x	1	1,9
178	252	Trip Circuit Fail 9	x	1	1,9
178	253	Trip Circuit Fail 10	x	1	1,9

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4.2 IEC 60870-5-103 Semantics in control direction

FUN	INF	Description	COM	TYP	COT
176	0	GI Initiation		7	9
176	0	Time Synchronisation		6	8
176	19	LED reset	ON	20	20
176	23	Settings Group 1 Select	ON	20	20
176	24	Settings Group 2 Select	ON	20	20
176	25	Settings Group 3 Select	ON	20	20
176	26	Settings Group 4 Select	ON	20	20
178	110	Settings Group 5 Select	ON	20	20
178	111	Settings Group 6 Select	ON	20	20
178	112	Settings Group 7 Select	ON	20	20
178	113	Settings Group 8 Select	ON	20	20

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5 MODBUS Semantics

5.1 Coils (0xxxx)

Address	Description
00101	Settings Group 1
00102	Settings Group 2
00103	Settings Group 3
00104	Settings Group 4
00105	Settings Group 5
00106	Settings Group 6
00107	Settings Group 7
00108	Settings Group 8

5.2 Input Status (1xxxx)

Address	Description
10001	Status Input 1
10002	Status Input 2
10003	Status Input 3
10004	Status Input 4
10005	Status Input 5
10006	Status Input 6
10007	Status Input 7
10008	Status Input 8
10009	Status Input 9
10010	Status Input 10
10011	Status Input 11
10012	Status Input 12
10013	Status Input 13
10014	Status Input 14
10015	Status Input 15
10016	Status Input 16
10017	Status Input 17
10018	Status Input 18
10019	Status Input 19
10020	Status Input 20
10021	Status Input 21

Address	Description
10101	General Starter
10102	General Trip
10103	Phase A Starter
10104	Phase B Starter
10105	Phase C Starter
10106	Phase N Starter
10107	Phase A Trip
10108	Phase B Trip
10109	Phase C Trip
10110	Phase N Trip
10111	TCSAlarmOutput

Address	Description
10120	Relay Mode LOCAL
10121	Relay Mode REMOTE
10122	Relay Mode SERVICE

Address	Description
10130	Trip Cct Fail 1

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Address	Description
10131	Trip Cct Fail 2
10132	Trip Cct Fail 3
10133	Trip Cct Fail 4
10134	Trip Cct Fail 5
10135	Trip Cct Fail 6
10136	Trip Cct Fail 7
10137	Trip Cct Fail 8
10138	Trip Cct Fail 9
10139	Trip Cct Fail 10

Address	Description
10200	87 Differential Phase A
10201	87 Differential Phase B
10202	87 Differential Phase C
10203	87HD Phase A Inhibited
10204	87HD Phase B Inhibited
10205	87HD Phase C Inhibited
10206	87 Trip
10207	87HS Differential Phase A
10208	87HS Differential Phase B
10209	87HS Differential Phase C
10210	87HS Trip

Address	Description
10220	87REF-1 Operated
10221	87REF-1 Starter
10223	87REF-2 Operated
10224	87REF-2 Starter
10226	87REF-3 Operated
10227	87REF-3 Starter

Address	Description
10230	51G-1 Starter
10231	51G-1 Operated
10232	51G-1 Trip
10233	51G-2 Starter
10234	51G-2 Operated
10235	51G-2 Trip

Address	Description
10290	49 Trip
10291	49 Alarm

Address	Description
12100	51-1 Starter A
12101	51-1 Starter B
12102	51-1 Starter C
12103	51-1 Operated A
12104	51-1 Operated B
12105	51-1 Operated C
12106	51-1 Trip
12107	50-1 Starter A
12108	50-1 Starter B
12109	50-1 Starter C
12110	50-1 Operated A
12111	50-1 Operated B
12112	50-1 Operated C
12113	50-1 Trip
12114	51N-1 Starter
12115	51N-1 Operated
12116	51N-1 Trip
12117	50N-1 Starter
12118	50N-1 Operated

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Address	Description
12119	50N-1 Trip

Address	Description
12200	51-2 Starter A
12201	51-2 Starter B
12202	51-2 Starter C
12203	51-2 Operated A
12204	51-2 Operated B
12205	51-2 Operated C
12206	51-2 Trip
12207	50-2 Starter A
12208	50-2 Starter B
12209	50-2 Starter C
12210	50-2 Operated A
12211	50-2 Operated B
12212	50-2 Operated C
12213	50-2 Trip
12214	51N-2 Starter
12215	51N-2 Operated
12216	51N-2 Trip
12217	50N-2 Starter
12218	50N-2 Operated
12219	50N-2 Trip

Address	Description
12300	51-3 Starter A
12301	51-3 Starter B
12302	51-3 Starter C
12303	51-3 Operated A
12304	51-3 Operated B
12305	51-3 Operated C
12306	51-3 Trip
12307	50-3 Starter A
12308	50-3 Starter B
12309	50-3 Starter C
12310	50-3 Operated A
12311	50-3 Operated B
12312	50-3 Operated C
12313	50-3 Trip
12314	51N-3 Starter
12315	51N-3 Operated
12316	51N-3 Trip
12317	50N-3 Starter
12318	50N-3 Operated
12319	50N-3 Trip

5.3 Input Registers (3xxxx)

Address	Description	Format
30001	No. of Events In Store (See 434/TIR/15)	1 Register
30002	Latest Event Record (See 434/TIR/15)	8 Registers

Address	Description	Format
30010	Number of fault records	UINT16[2]
30012	Number of event records	UINT16[2]
30014	Number of waveform records	UINT16[2]
30016	Number of CPU re-starts	UINT16[2]
30018	Number of CPU warm starts	UINT16[2]

Address	Description	Format
30100	Operate Current Ia x In	FP_32BITS_3DP[1]

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Address	Description	Format
30102	Operate Current Ib x In	FP_32BITS_3DP[1]
30104	Operate Current Ic x In	FP_32BITS_3DP[1]
30106	Restrain Current Ia x In	FP_32BITS_3DP[1]
30108	Restrain Current Ib x In	FP_32BITS_3DP[1]
30110	Restrain Current Ic x In	FP_32BITS_3DP[1]
30112	Mag Inrush Current Ia x In	FP_32BITS_3DP[1]
30114	Mag Inrush Current Ib x In	FP_32BITS_3DP[1]
30115	Mag Inrush Current Ic x In	FP_32BITS_3DP[1]

Address	Description	Format
30200	87REF-1 Primary Current kA	FP_32BITS_3DP[1]
30202	87REF-1 Secondary Current A	FP_32BITS_3DP[1]
30204	87REF-1 Nominal Current xIn	FP_32BITS_3DP[1]
30206	87REF-2 Primary Current kA	FP_32BITS_3DP[1]
30208	87REF-2 Secondary Current A	FP_32BITS_3DP[1]
30210	87REF-2 Nominal Current xIn	FP_32BITS_3DP[1]
30212	87REF-3 Primary Current kA	FP_32BITS_3DP[1]
30214	87REF-3 Secondary Current A	FP_32BITS_3DP[1]
30216	87REF-3 Nominal Current xIn	FP_32BITS_3DP[1]

Address	Description	Format
30300	E/F Primary Current kA	FP_32BITS_3DP[1]
30302	E/F Secondary Current kA	FP_32BITS_3DP[1]
30304	E/F Nominal Current kA	FP_32BITS_3DP[1]
30306	51G-1 Status %	UINT16[2]
30307	51G-2 Status %	UINT16[2]

Address	Description	Format
30600	Thermal Nom Current xIn	FP_32BITS_3DP[1]
30602	Thermal Status %	UINT16[2]

Address	Description	Format
31100	W1 Primary Ia kA	FP_32BITS_3DP[1]
31102	W1 Primary Ib kA	FP_32BITS_3DP[1]
31104	W1 Primary Ic kA	FP_32BITS_3DP[1]
31106	W1 Sec'y Ia A	FP_32BITS_3DP[1]
31108	W1 Sec'y Ib A	FP_32BITS_3DP[1]
31110	W1 Sec'y Ic A	FP_32BITS_3DP[1]
31112	W1 Nom Ia xIn	FP_32BITS_3DP[1]
31114	W1 Nom Ib xIn	FP_32BITS_3DP[1]
31116	W1 Nom Ic xIn	FP_32BITS_3DP[1]
31118	W1 Line Ia xIn	FP_32BITS_3DP[1]
31120	W1 Line Ib xIn	FP_32BITS_3DP[1]
31122	W1 Line Ic xIn	FP_32BITS_3DP[1]
31124	W1 Relay Ia xIn	FP_32BITS_3DP[1]
31126	W1 Relay Ib xIn	FP_32BITS_3DP[1]
31128	W1 Relay Ic xIn	FP_32BITS_3DP[1]

Address	Description	Format
31200	W2 Primary Ia kA	FP_32BITS_3DP[1]
31202	W2 Primary Ib kA	FP_32BITS_3DP[1]
31204	W2 Primary Ic kA	FP_32BITS_3DP[1]
31206	W2 Sec'y Ia A	FP_32BITS_3DP[1]
31208	W2 Sec'y Ib A	FP_32BITS_3DP[1]
31210	W2 Sec'y Ic A	FP_32BITS_3DP[1]
31212	W2 Nom Ia xIn	FP_32BITS_3DP[1]
31214	W2 Nom Ib xIn	FP_32BITS_3DP[1]
31216	W2 Nom Ic xIn	FP_32BITS_3DP[1]
31218	W3 Line Ia xIn	FP_32BITS_3DP[1]
31220	W2 Line Ib xIn	FP_32BITS_3DP[1]
31222	W2 Line Ic xIn	FP_32BITS_3DP[1]
31224	W2 Relay Ia xIn	FP_32BITS_3DP[1]
31226	W2 Relay Ib xIn	FP_32BITS_3DP[1]

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Address	Description	Format
31228	W2 Relay Ic xIn	FP_32BITS_3DP[1]

Address	Description	Format
31300	W3 Primary Ia kA	FP_32BITS_3DP[1]
31302	W3 Primary Ib kA	FP_32BITS_3DP[1]
31304	W3 Primary Ic kA	FP_32BITS_3DP[1]
31306	W3 Sec'y Ia A	FP_32BITS_3DP[1]
31308	W3 Sec'y Ib A	FP_32BITS_3DP[1]
31310	W3 Sec'y Ic A	FP_32BITS_3DP[1]
31312	W3 Nom Ia xIn	FP_32BITS_3DP[1]
31314	W3 Nom Ib xIn	FP_32BITS_3DP[1]
31316	W3 Nom Ic xIn	FP_32BITS_3DP[1]
31318	W3 Line Ia xIn	FP_32BITS_3DP[1]
31320	W3 Line Ib xIn	FP_32BITS_3DP[1]
31322	W3 Line Ic xIn	FP_32BITS_3DP[1]
31324	W3 Relay Ia xIn	FP_32BITS_3DP[1]
31326	W3 Relay Ib xIn	FP_32BITS_3DP[1]
31328	W3 Relay Ic xIn	FP_32BITS_3DP[1]

Address	Description	Format
31400	W4 Primary Ia kA	FP_32BITS_3DP[1]
31402	W4 Primary Ib kA	FP_32BITS_3DP[1]
31404	W4 Primary Ic kA	FP_32BITS_3DP[1]
31406	W4 Sec'y Ia A	FP_32BITS_3DP[1]
31408	W4 Sec'y Ib A	FP_32BITS_3DP[1]
31410	W4 Sec'y Ic A	FP_32BITS_3DP[1]
31412	W4 Nom Ia xIn	FP_32BITS_3DP[1]
31414	W4 Nom Ib xIn	FP_32BITS_3DP[1]
31416	W4 Nom Ic xIn	FP_32BITS_3DP[1]
31418	W4 Line Ia xIn	FP_32BITS_3DP[1]
31420	W4 Line Ib xIn	FP_32BITS_3DP[1]
31422	W4 Line Ic xIn	FP_32BITS_3DP[1]
31424	W4 Relay Ia xIn	FP_32BITS_3DP[1]
31426	W4 Relay Ib xIn	FP_32BITS_3DP[1]
31428	W4 Relay Ic xIn	FP_32BITS_3DP[1]

Address	Description	Format
31500	W5 Primary Ia kA[3]	FP_32BITS_3DP[1]
31502	W5 Primary Ib kA[3]	FP_32BITS_3DP[1]
31504	W5 Primary Ic kA	FP_32BITS_3DP[1]
31506	W5 Sec'y Ia A[3]	FP_32BITS_3DP[1]
31508	W5 Sec'y Ib A[3]	FP_32BITS_3DP[1]
31510	W5 Sec'y Ic A[3]	FP_32BITS_3DP[1]
31512	W5 Nom Ia xIn[3]	FP_32BITS_3DP[1]
31514	W5 Nom Ib xIn[3]	FP_32BITS_3DP[1]
31516	W5 Nom Ic xIn[3]	FP_32BITS_3DP[1]
31518	W5 Line Ia xIn[3]	FP_32BITS_3DP[1]
31520	W5 Line Ib xIn[3]	FP_32BITS_3DP[1]
31522	W5 Line Ic xIn[3]	FP_32BITS_3DP[1]
31524	W5 Relay Ia xIn[3]	FP_32BITS_3DP[1]
31526	W5 Relay Ib xIn[3]	FP_32BITS_3DP[1]
31528	W5 Relay Ic xIn[3]	FP_32BITS_3DP[1]

Address	Description	Format
32100	OC1 Ia xIn	FP_32BITS_3DP[1]
32102	OC1 Ib xIn	FP_32BITS_3DP[1]
32104	OC1 Ic xIn	FP_32BITS_3DP[1]
32106	OC1 In xIn	FP_32BITS_3DP[1]
32108	51-1 Phase A Status %	UINT16[2]
32109	51-1 Phase B Status %	UINT16[2]
32110	51-1 Phase C Status %	UINT16[2]
32111	51-1 Phase N Status %	UINT16[2]

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Address	Description	Format
32200	OC1 Ia xIn	FP_32BITS_3DP[1]
32202	OC1 Ib xIn	FP_32BITS_3DP[1]
32204	OC1 Ic xIn	FP_32BITS_3DP[1]
32206	OC1 In xIn	FP_32BITS_3DP[1]
32208	51-2 Phase A Status %	UINT16[2]
32209	51-2 Phase B Status %	UINT16[2]
32210	51-2 Phase C Status %	UINT16[2]
32211	51-2 Phase N Status %	UINT16[2]

Address	Description	Format
32300	OC1 Ia xIn	FP_32BITS_3DP[1]
32302	OC1 Ib xIn	FP_32BITS_3DP[1]
32304	OC1 Ic xIn	FP_32BITS_3DP[1]
32306	OC1 In xIn	FP_32BITS_3DP[1]
32308	51-3 Phase A Status %	UINT16[2]
32309	51-3 Phase B Status %	UINT16[2]
32310	51-3 Phase C Status %	UINT16[2]
32311	51-3 Phase N Status %	UINT16[2]

1) FP_32BITS_3DP: 2 registers - 32 bit fixed point, a 32 bit integer containing a value to 3 decimal places e.g. 50000 sent = 50.000

2) UINT16: 1 register - standard 16 bit unsigned integer

3) 5W only

5.4 Holding Registers (4xxxx)

Address	Description	Format
40001	Time	

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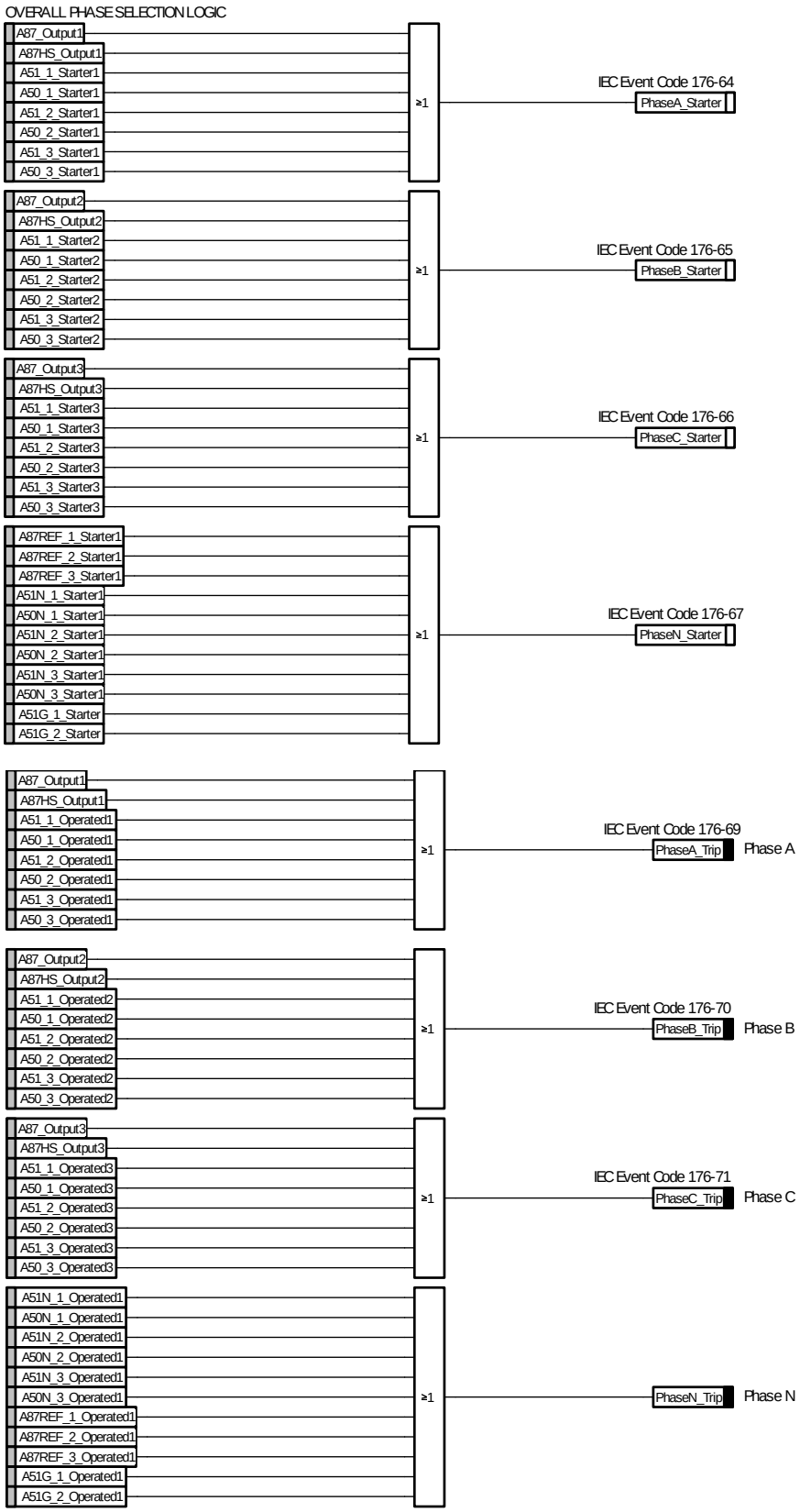
6 Reylogic Diagrams

6.1 204-4W



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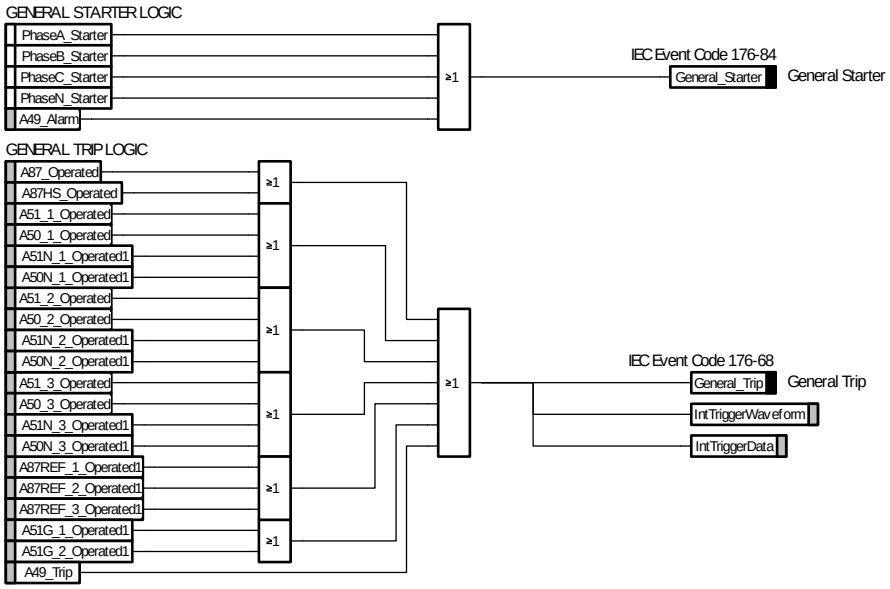
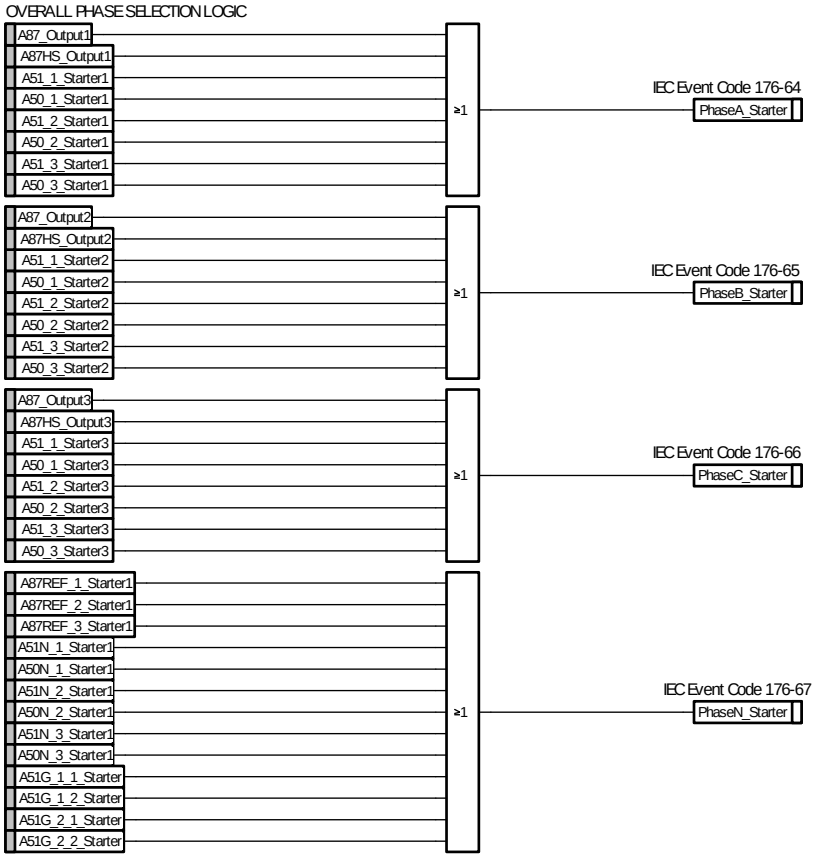


6.2 204-5W



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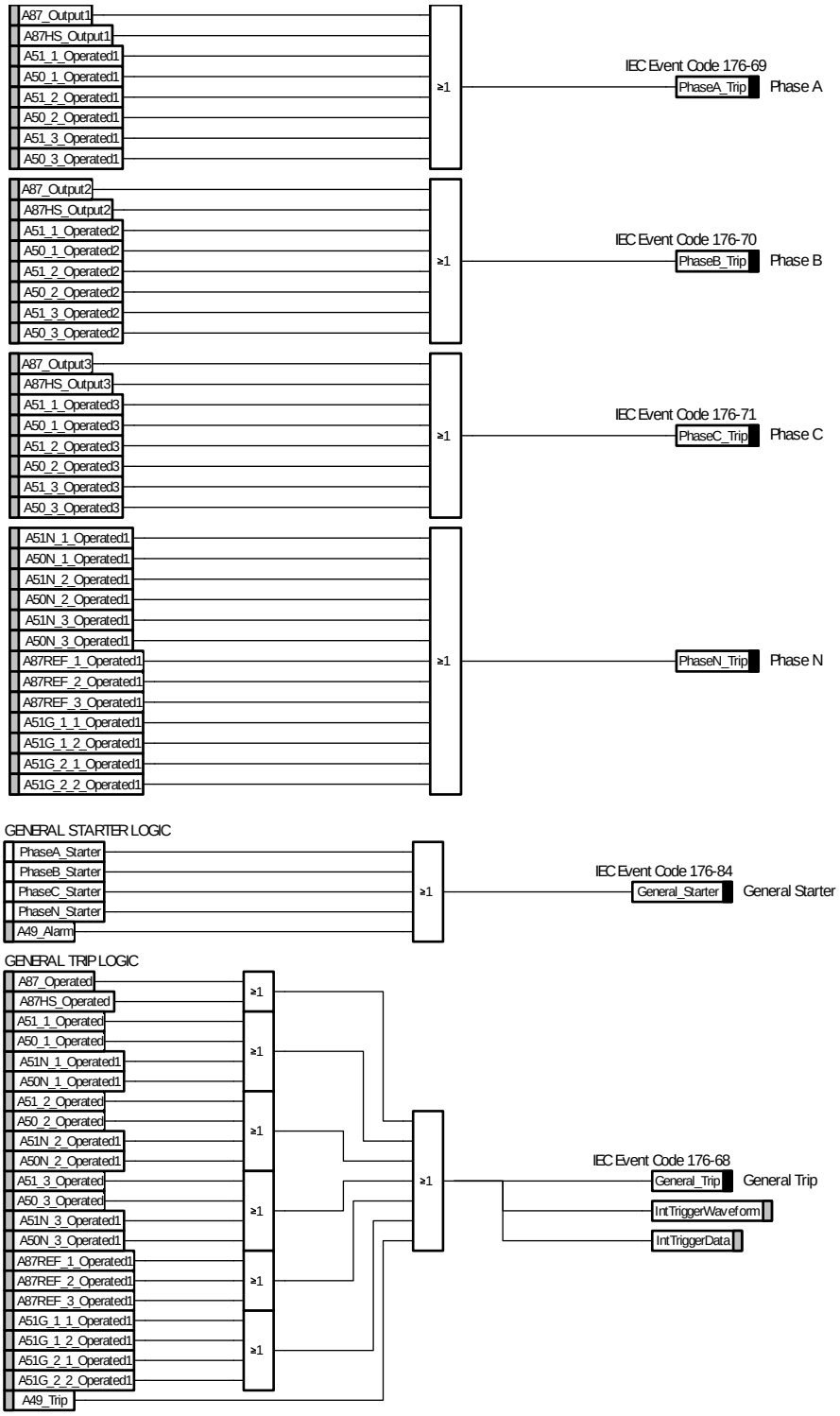

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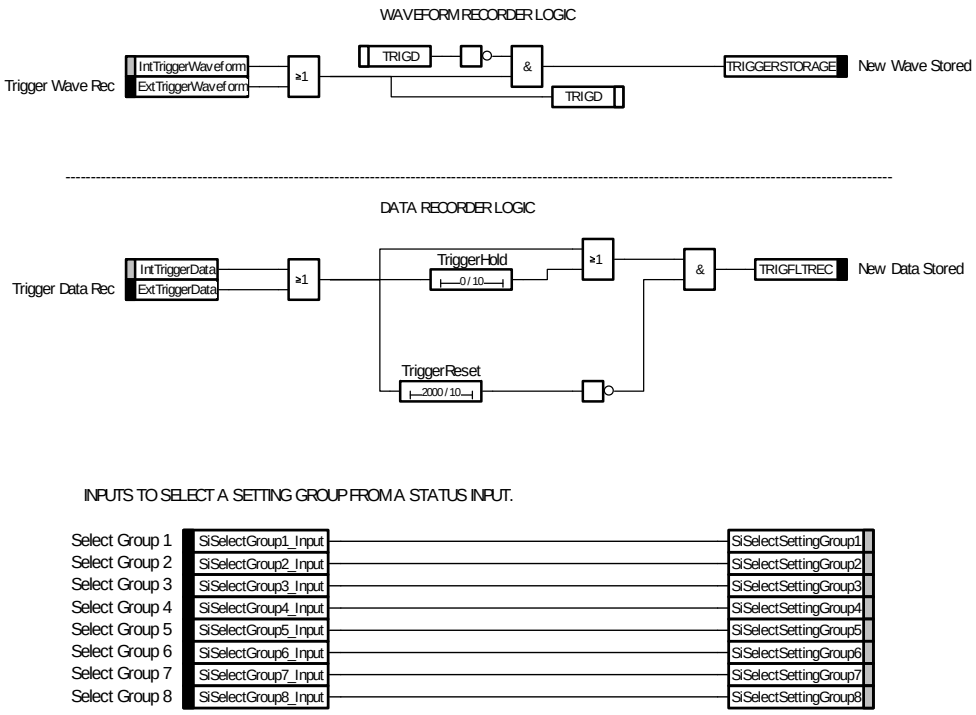
6.3 Common



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7 Label Inserts

	DUOBIAS-M-204-4W	DUOBIAS-M-204-4W	
	DU3-405-**	DU3-405-**	
	Left	Right	
	09/02/2010 09:33:00	09/02/2010 09:33:00	
1	GENERAL STARTER	(87) BIAS. DIFFERENTIAL	17
2	PHASE A	(87HS) DIFF. HIGHSET	18
3	PHASE B	(87REF) RESTRICTED E/F	19
4	PHASE C	(50/51) O/C	20
5	RELAY 1	(50N/51N) DERIVED E/F	21
6	RELAY 2	(51G) STANDBY E/F	22
7	RELAY 3	(74TC) TRIP CIRCUIT FAIL	23
8		(49) THERMAL O/L	24
9	AUX 1 I/P OPERATED	AUX 9 I/P OPERATED	25
10	AUX 2 I/P OPERATED	AUX 10 I/P OPERATED	26
11	AUX 3 I/P OPERATED	AUX 11 I/P OPERATED	27
12	AUX 4 I/P OPERATED		28
13	AUX 5 I/P OPERATED		29
14	AUX 6 I/P OPERATED		30
15	AUX 7 I/P OPERATED		31
16	AUX 8 I/P OPERATED		32

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	DUOBIAS-M-204-5W	DUOBIAS-M-204-5W	
	DU3-505-**	DU3-505-**	
	Left	Right	
	09/02/2010 09:33:00	09/02/2010 09:33:00	
1	GENERAL STARTER	(87) BIAS. DIFFERENTIAL	17
2	PHASE A	(87HS) DIFF. HIGHSET	18
3	PHASE B	(87REF) RESTRICTED E/F	19
4	PHASE C	(50/51) O/C	20
5	RELAY 1	(50N/51N) DERIVED E/F	21
6	RELAY 2	(51G) STANDBY E/F	22
7	RELAY 3	(74TC) TRIP CIRCUIT FAIL	23
8		(49) THERMAL O/L	24
9	AUX 1 I/P OPERATED	AUX 9 I/P OPERATED	25
10	AUX 2 I/P OPERATED	AUX 10 I/P OPERATED	26
11	AUX 3 I/P OPERATED	AUX 11 I/P OPERATED	27
12	AUX 4 I/P OPERATED		28
13	AUX 5 I/P OPERATED		29
14	AUX 6 I/P OPERATED		30
15	AUX 7 I/P OPERATED		31
16	AUX 8 I/P OPERATED		32

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