

MSCDN – MP2B

Capacitor unbalance 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	R11 Document reformat due to rebrand
15/09/2004	R10 Corrected VTS Fuse Failure IEC event number Individual phase outputs for VTS removed to simplify relay setting. VTS Inhibit status input replaces 27 VTS & 50 VTS inputs.
25/08/2004	R9 VTS Alarm changed to simply VTS to signify that it is possible to alarm or trip from this function.
11/08/2004	R8 Voltage Transformer Supervision added, see pages 4, 6, 7, 9, 13, 17 and 18
19/02/2003	R7 50N and 51N steps should be in 0.05 steps and not 0.01 steps 50 minimum setting should be 0.1
11/02/2003	R6 Front page diagram moved to Description of Operation
05/02/2003	R5 Status inputs can now reset the Thermal elements to accelerate testing
19/12/2002	R4 U/V Guard now in output relay and led menu
18/12/2002	R3 Instruments for Primary, Secondary and Nominal values modified/added Allowed for up to 27 SI and 29 OR in various tables Inhibits added to tables and diagrams
13/11/2002	R2 59DT element added
23/10/2002	R1 Revision history added

Software Revision History

23/03/2006	2621H80003R9c	
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1 MSCDN-MP2B Relay Setting List

1.1 System Config Menu

Description	Range	Default	Setting
Active Group <i>Selects which settings group is currently activated</i>	1,2...4	1	
View/Edit Group <i>Selects which settings group is currently being displayed</i>	1,2...4	1	
Default Screens Timer <i>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</i>	OFF, 1,2,5,10,15,30,60 min	60 min	
Backlight timer <i>Controls when the LCD backlight turns off</i>	OFF, 1,2,5,10,15,30,60 min	5 Min	
Date	Date	1/1/1980	
Time	Time	00:00:00	
Clock Sync. From Status <i>Real time clock may be synchronised using a status input (See Clock Sync. in Status Input Menu)</i>	Disabled, Seconds, Minutes	Minutes	
Operating Mode <i>To allow access to change configuration files using Reylogic Toolbox the relay must be placed Out Of Service.</i>	Local, Remote, Local Or Remote, Out Of Service	Local Or Remote	
Change Password <i>Allows a 4 character alpha code to be entered as the password. Note that the display shows a password dependant encrypted code on the second line of the display</i>	AAAA...ZZZZ	"NONE" displayed as "NOT ACTIVE"	
Relay Identifier <i>An alphanumeric string shown on the LCD normally used to identifier the circuit the relay is attached to or the relays purpose</i>	Up to 16 characters	MSCDN-MP2B	

1.2 CT/VT Config Menu

Description	Range	Default	Setting
Reactor Input <i>Selects whether 1 or 5 Amp terminals are being used for the reactor thermal overload function</i>	1,5 A	1 A	
Reactor CT Ratio <i>Reactor thermal overload function CT ratio to scale primary current instruments</i>	1:0.2...5000:7	2000:1	
Overcurrent Input <i>Selects whether 1 or 5 Amp terminals are being used for the cap bank backup overcurrent function</i>	1,5 A	1 A	
Overcurrent CT Ratio <i>Cap bank backup overcurrent function CT ratio to scale primary current instruments</i>	1:0.2...5000:7	2000:1	
3P Nom Voltage Vn <i>Selects the nominal voltage setting for the three phase voltage inputs</i>	40,40.1...160 V	63.5 V	
3P VT Ratio <i>Three Phase VT ratio to scale primary voltage instruments</i>	3300:40...1000000:160	132000:110	
3P VT Connection <i>Selects whether phase to neutral or phase to phase voltages are connected at the three phase relay voltage input terminals to scale the primary line voltage instruments</i>	Vpn, Vpp	Vpn	
1P Nom Voltage Vn <i>Selects the nominal voltage setting for the single phase voltage input</i>	40,40.1...160 V	63.5 V	
1P VT Ratio <i>Single Phase VT ratio to scale primary voltage instrument</i>	3300:40...1000000:160	132000:110	
1P VT Connection <i>Selects whether phase to neutral or a phase to phase voltage is connected at the single phase relay voltage input terminals to scale the primary line voltage instruments</i>	Vpn, Vpp	Vpn	

1.3 VT Supervision Menu

Description	Range	Default	Setting
Gn 27 VTS Element¹ <i>Selects whether the VTS undervoltage element is enabled</i>	Disabled, Enabled	Disabled	
Gn 27 VTS Setting <i>Voltage level below which it may be assumed that a fuse has failed or the bank is not energised.</i>	0.10,0.11...1 xVn	0.75 xVn	
Gn 27 VTS Delay² <i>Pickup delay</i>	0,0.01...864000 s	0 s	
Gn 50 VTS Element¹ <i>Selects whether the VTS current check element is enabled</i>	Disabled, Enabled	Disabled	
Gn 50 VTS Setting <i>Current level above which the capacitor bank is deemed to be energised.</i>	0.01, 0.02...2.5 xIn	0.8 xIn	
Gn 50 VTS Delay² <i>Pickup delay</i>	0,0.01...864000 s	0 s	

1) Both elements must be enabled to perform VTS functions, capacitor bank energised with undervoltage operated signifies VTS Operated.

2) Normally use instantaneous setting; see also VTS Timer setting in Reylogic Elements Menu.

1.4 Thermal Menu

Description	Range	Default	Setting
Gn 49 Thermal Overload <i>Selects whether the thermal overload protection element is enabled</i>	Disabled, Enabled	Disabled	
Gn 49 Overload Setting <i>Pickup level</i>	0.1,0.2...3 xIn	1.05 xIn	
Gn 49 Time Constant <i>Thermal time constant</i>	1.0,1.5...1000 min	10 min	
Gn 49 Capacity Alarm <i>Selects whether thermal capacity alarm enabled</i>	Disabled, 50,51...100 %	Disabled	
49 Reset Therm State <i>Control that allows thermal state to be manually reset</i>	NO, YES	NO	

1.5 Overcurrent Menu

Description	Range	Default	Setting
Gn 51 Element <i>Selects whether the IDMTL Overcurrent element is enabled</i>	Disabled, Enabled	Disabled	
Gn 51 Setting <i>Pickup level</i>	0.05,0.10...2.5 xIn	1.5 xIn	
Gn 51 Char <i>Selects characteristic curve or DTL operation</i>	IEC-NI, IEC-VI, IEC-EI, IEC-LTI, ANSI-MI, ANSI-VI, ANSI-EI, DTL	IEC-NI	
Gn 51 Time Mult (IEC/ANSI) <i>Time multiplier (applicable to IEC and ANSI curves but not DTL selection)</i>	0.025, 0.050...1.600	1.000	
Gn 51 Delay (DTL) <i>Delay (applicable only when DTL is selected for characteristic)</i>	INST, 0.01, 0.02...20 s	5 s	
Gn 51 Reset <i>Selects between an ANSI decaying reset characteristic or a definite time reset</i>	(ANSI) Decaying, INST, 1,2,...60 s	INST	
Gn 50 Element <i>Selects whether the DTL Overcurrent element is enabled</i>	Disabled, Enabled	Disabled	
Gn 50 Setting <i>Pickup level</i>	0.05, 0.10...25 xIn	20 xIn	
Gn 50 Delay <i>Pickup delay</i>	0,0.01...864000 s	0.01	
Gn 51N Element <i>Selects whether the IDMTL derived Earth Fault element is enabled</i>	Disabled, Enabled	Disabled	
Gn 51N Setting <i>Pickup level</i>	0.10,0.15...2.5 xIn	1.0 xIn	
Gn 51N Char <i>Selects characteristic curve or DTL operation</i>	IEC-NI, IEC-VI, IEC-EI, IEC-LTI, ANSI-MI, ANSI-VI, ANSI-EI, DTL	IEC-NI	
Gn 51N Time Mult (IEC/ANSI)	0.025, 0.050...1.600	1.000	

Description	Range	Default	Setting
<i>Time multiplier (applicable to IEC and ANSI curves but not DTL selection)</i>			
Gn 51N Delay (DTL) <i>Delay (applicable only when DTL is selected for characteristic)</i>	INST, 0.01, 0.02...20 s	5 s	
Gn 51N Reset <i>Selects between an ANSI decaying reset characteristic or a definite time reset</i>	(ANSI) Decaying, INST, 1,2...60 s	INST	
Gn 50N Element <i>Selects whether the DTL derived Earth fault element is enabled</i>	Disabled, Enabled	Disabled	
Gn 50N Setting <i>Pickup level</i>	0.10, 0.15...25 xIn	0.5 xIn	
Gn 50N Delay <i>Pickup delay</i>	0,0.01...864000 s	0.02	

1.6 Voltage Menu

Description	Range	Default	Setting
Gn U/V Guard Element <i>Selects whether the under voltage guard element which can be applied to both the under voltage element is enabled</i>	Disabled, Enabled	Enabled	
Gn U/V Guard Setting <i>When the voltage drops below this level the element operates to provide a guard to prevent other elements operating.</i>	0.01,0.02...0.5 xVn	0.1 xVn	
Gn U/V Guard Delay <i>Pickup delay</i>	0,0.01...864000 s	0 s	
Gn 27 Element <i>Selects whether the Undervoltage element is enabled</i>	Disabled, Enabled	Disabled	
Gn 27 Setting <i>Undervoltage pickup level</i>	0.10,0.11...1 xVn	0.8 xVn	
Gn 27 Hysteresis <i>Sets the pickup to dropoff thresholds e.g. 3% on Underlevel picks up below setting and drops off above 103% of setting</i>	0,0.1...80 %	0.1 %	
Gn 27 Delay <i>Pickup delay</i>	0,0.01...864000 s	0.1 s	
Gn 59DT Element <i>Selects whether the INST/DTL overvoltage element is enabled</i>	Disabled, Enabled	Disabled	
Gn 59DT Setting <i>Overvoltage pickup level</i>	1.000,1.005...2 xVn	1.050 xVn	
Gn 59DT Delay <i>Overvoltage Pickup delay</i>	0,0.01...864000 s	0.2 s	
Gn 59IT Char <i>Selects whether the inverse time Overfluxing element is enabled</i>	Disabled, Enabled	Disabled	
Gn 59IT Reset <i>Selects between an INSTantaneous reset characteristic or a definite time reset</i>	INST, 1,2, ...1000 s	INST	
Gn 59IT X0 Pickup Setting <i>Initial user defined pickup level</i>	1.00,1.01...2.00	1.10 x	
Gn 59IT Y0 Point Setting <i>Initial user defined pickup delay</i>	0.1,0.2...20000 s	20000 s	
Gn 59IT X1 Point Setting <i>Next user defined pickup level</i>	1.00,1.01...2.00	1.14 x	
Gn 59IT Y1 Point Setting <i>Next user defined pickup delay</i>	0.1,0.2...20000 s	1200 s	
Gn 59IT X2 Point Setting <i>Next user defined pickup level</i>	1.00,1.01...2.00	1.16 x	
Gn 59IT Y2 Point Setting <i>Next user defined pickup delay</i>	0.1,0.2...20000 s	540 s	
Gn 59IT X3 Point Setting <i>Next user defined pickup level</i>	1.00,1.01...2.00	1.21 x	
Gn 59IT Y3 Point Setting <i>Next user defined pickup delay</i>	0.1,0.2...20000 s	240 s	
Gn 59IT X4 Point Setting <i>Next user defined pickup level</i>	1.00,1.01...2.00	1.24 x	
Gn 59IT Y4 Point Setting <i>Next user defined pickup delay</i>	0.1,0.2...20000 s	120 s	
Gn 59IT X5 Point Setting <i>Next user defined pickup level</i>	1.00,1.01...2.00	1.28 x	
Gn 59IT Y5 Point Setting <i>Next user defined pickup delay</i>	0.1,0.2...20000 s	60 s	
Gn 59IT X6 Point Setting	1.00,1.01...2.00	1.40 x	

Description	Range	Default	Setting
<i>Next user defined pickup level</i>			
Gn 59IT Y6 Point Setting <i>Next user defined pickup delay</i>	0.1,0.2...20000 s	20 s	

1.7 Status Input Menu

Description	Range	Default	Setting
Aux I/P 1 Pickup Delay <i>Delay on pickup of DC Status input 1</i>	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 3 Pickup 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 5 Pickup 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 7 Pickup 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 9 Pickup 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 11 Pickup 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 13 Pickup 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 15 Pickup 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 17 Pickup 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 19 Pickup Delay ¹	0.000,0.005...864000 s	0 s	
Aux I/P 20 Pickup Delay ¹	0.000,0.005...864000 s	0 s	
Aux I/P 21 Pickup Delay ¹	0.000,0.005...864000 s	0 s	
Aux I/P 22 Pickup Delay ¹	0.000,0.005...864000 s	0 s	
Aux I/P 23 Pickup Delay ¹	0.000,0.005...864000 s	0 s	
Aux I/P 24 Pickup Delay ¹	0.000,0.005...864000 s	0 s	
Aux I/P 25 Pickup Delay ¹	0.000,0.005...864000 s	0 s	
Aux I/P 26 Pickup Delay ¹	0.000,0.005...864000 s	0 s	
Aux I/P 27 Pickup Delay ¹	0.000,0.005...864000 s	0 s	
49 Inhibit <i>Selects which inputs inhibit the 49 element</i>	NONE, 1...27 ²	NONE	
49 Reset <i>Selects which inputs reset the 49 element (useful during testing)</i>	NONE, 1...27 ²	NONE	
50 Inhibit <i>Selects which inputs inhibit the 50 element</i>	NONE, 1...27 ²	NONE	
51 Inhibit <i>Selects which inputs inhibit the 51 element</i>	NONE, 1...27 ²	NONE	
50N Inhibit <i>Selects which inputs inhibit the 50N element</i>	NONE, 1...27 ²	NONE	
51N Inhibit <i>Selects which inputs inhibit the 51N element</i>	NONE, 1...27 ²	NONE	
U/V Guard Inhibit <i>Selects which inputs inhibit the U/V Guard element</i>	NONE, 1...27 ²	NONE	
27 Inhibit <i>Selects which inputs inhibit the 27 element</i>	NONE, 1...27 ²	NONE	
59DT Inhibit <i>Selects which inputs inhibit the 59DT element</i>	NONE, 1...27 ²	NONE	
59IT Inhibit <i>Selects which inputs inhibit the 59IT element</i>	NONE, 1...27 ²	NONE	
VTS Inhibit <i>Selects which inputs inhibit the VTS function</i>	NONE, 1...27 ²	NONE	
Trip Circuit Fail <i>Selects which inputs are monitoring trip circuits, inputs should normally also be selected as Inverted Inputs (see below)</i>	NONE, 1...27 ²	NONE	
Trigger Storage <i>Selects which inputs can trigger a waveform record</i>	NONE, 1...27 ²	NONE	
Clock Sync.	NONE, 1...27 ²	NONE	

Description	Range	Default	Setting
Selects which input is used to synchronise the real time clock			
Inverted Inputs Selects which inputs pickup when voltage is removed, often used when monitoring trip circuits.	NONE, 1...27 ²	NONE	

1) Only when fitted.

2) 27 status inputs represents maximum configuration.

1.8 Reylogic Control Menu

Description	Range	Default	Setting
General Logic Selects whether the logic diagram is enabled, if disabled then no outputs will be driven.	Enable, Disable	Enable	

1.9 Reylogic Element Menu

Description	Range	Default	Setting
VTS Delay Delay before a Voltage Transformer Supervision is output when the capacitor bank is known to be energised yet one or more phases indicates an undervoltage condition. Note this must be set longer than the maximum sustained fault operate time to prevent VTS during a fault.	0,1...60000 ms	10000 ms	
Trip Cct Fail Pickup Delay Delay before a Trip Circuit Failure is alarmed on the loss of voltage to the trip circuit.	0,1...60000 ms	400 ms	

1.10 Output Relay Menu

Description	Range	Default	Setting
49 Alarm Thermal capacity alarm operated	NONE, 1...29 ¹	2	
49 Trip Thermal capacity trip operated	NONE, 1...29 ¹	4,5	
50 DTL Overcurrent operated	NONE, 1...29 ¹	4,5	
51 IDMTL Overcurrent operated	NONE, 1...29 ¹	4,5	
50N DTL derived Earth Fault operated	NONE, 1...29 ¹	4,5	
51N IDMTL derived Earth Fault operated	NONE, 1...29 ¹	4,5	
U/V Guard Under voltage guard operated	NONE, 1...29 ¹	NONE	
27 DTL Undervoltage operated	NONE, 1...29 ¹	3	
59DT DTL Overvoltage operated	NONE, 1...29 ¹	6	
59IT IDMTL Overvoltage operated	NONE, 1...29 ¹	4,5	
VTS A VT fuse has failed	NONE, 1...29 ¹	NONE	
Phase A A phase A element operated	NONE, 1...29 ¹	NONE	
Phase B A phase B element operated	NONE, 1...29 ¹	NONE	
Phase C A phase C element operated	NONE, 1...29 ¹	NONE	
General Starter A starter element is picked up	NONE, 1...29 ¹	NONE	
General Trip An element has operated. Useful when testing individual functions!	NONE, 1...29 ¹	NONE	
Trip Circuit Fail A trip circuit has failed, look at status input Leds to find out which one	NONE, 1...29 ¹	NONE	
New Data Stored The waveform 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...29 ¹	NONE	
Aux I/P 2 Operated	NONE, 1...29 ¹	NONE	

Description	Range	Default	Setting
Aux I/P 3 Operated	NONE, 1...29 ¹	NONE	
Aux I/P 4 Operated ²	NONE, 1...29 ¹	NONE	
Aux I/P 5 Operated ²	NONE, 1...29 ¹	NONE	
Aux I/P 6 Operated ²	NONE, 1...29 ¹	NONE	
Aux I/P 7 Operated ²	NONE, 1...29 ¹	NONE	
Aux I/P 8 Operated ²	NONE, 1...29 ¹	NONE	
Aux I/P 9 Operated ²	NONE, 1...29 ¹	NONE	
Aux I/P 10 Operated ²	NONE, 1...29 ¹	NONE	
Aux I/P 11 Operated ²	NONE, 1...29 ¹	NONE	
Aux I/P 12 Operated ²	NONE, 1...29 ¹	NONE	
Aux I/P 13 Operated ²	NONE, 1...29 ¹	NONE	
Aux I/P 14 Operated ²	NONE, 1...29 ¹	NONE	
Aux I/P 15 Operated ²	NONE, 1...29 ¹	NONE	
Aux I/P 16 Operated ²	NONE, 1...29 ¹	NONE	
Aux I/P 17 Operated ²	NONE, 1...29 ¹	NONE	
Aux I/P 18 Operated ²	NONE, 1...29 ¹	NONE	
Aux I/P 19 Operated ²	NONE, 1...29 ¹	NONE	
Aux I/P 20 Operated ²	NONE, 1...29 ¹	NONE	
Aux I/P 21 Operated ²	NONE, 1...29 ¹	NONE	
Aux I/P 22 Operated ²	NONE, 1...29 ¹	NONE	
Aux I/P 23 Operated ²	NONE, 1...29 ¹	NONE	
Aux I/P 24 Operated ²	NONE, 1...29 ¹	NONE	
Aux I/P 25 Operated ²	NONE, 1...29 ¹	NONE	
Aux I/P 26 Operated ²	NONE, 1...29 ¹	NONE	
Aux I/P 27 Operated ²	NONE, 1...29 ¹	NONE	
Hand Reset Outputs <i>Relays selected, as Hand Reset will 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.</i>	NONE, 1...29 ¹	NONE	
Protection Healthy <i>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</i>	NONE, 1...29 ¹	1	

1) 29 output relays represents maximum configuration.

2) Only when fitted.

1.11 LED Menu

Description	Range	Default	Setting
49 Alarm <i>Thermal capacity alarm operated</i>	NONE, 1...32	17	
49 Trip <i>Thermal capacity trip operated</i>	NONE, 1...32	18	
50 <i>DTL Overcurrent operated</i>	NONE, 1...32	19	
51 <i>IDMTL Overcurrent operated</i>	NONE, 1...32	20	
50N <i>DTL derived Earth Fault operated</i>	NONE, 1...32	21	
51N <i>IDMTL derived Earth Fault operated</i>	NONE, 1...32	22	
U/V Guard <i>Under voltage guard operated</i>	NONE, 1...32	NONE	
27 <i>DTL Undervoltage operated</i>	NONE, 1...32	5	
59DT <i>DTL Overvoltage operated</i>	NONE, 1...32	7	
59IT <i>IDMTL Overvoltage operated</i>	NONE, 1...32	6	
VTS <i>A VT fuse has failed</i>	NONE, 1...32	24	
Phase A <i>A phase A element operated</i>	NONE, 1...32	2	

Description	Range	Default	Setting
Phase B <i>A phase B element operated</i>	NONE, 1...32	3	
Phase C <i>A phase C element operated</i>	NONE, 1...32	4	
General Starter <i>A starter element is picked up</i>	NONE, 1...32	1	
General Trip <i>An element has operated. Useful when testing individual functions!</i>	NONE, 1...32	1	
Trip Circuit Fail <i>A trip circuit has failed, look at status input Leds to find out which one</i>	NONE, 1...32	23	
New Data Stored <i>The waveform recorder has stored new information Note: this is a pulsed output</i>	NONE, 1...32	NONE	
Aux I/P 1 Operated <i>DC Status 1 has operated</i>	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	
Aux I/P 20 Operated ¹	NONE, 1...32	NONE	
Aux I/P 21 Operated ¹	NONE, 1...32	NONE	
Aux I/P 22 Operated ¹	NONE, 1...32	NONE	
Aux I/P 23 Operated ¹	NONE, 1...32	NONE	
Aux I/P 24 Operated ¹	NONE, 1...32	NONE	
Aux I/P 25 Operated ¹	NONE, 1...32	NONE	
Aux I/P 26 Operated ¹	NONE, 1...32	NONE	
Aux I/P 27 Operated ¹	NONE, 1...32	NONE	
Self Reset LEDs <i>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.</i>	NONE, 1...32	1	

1) Only when fitted.

1.12 Data Storage Menu

Description	Range	Default	Setting
Pre-Trigger Storage	10...90 %	20 %	
Data Record Duration <i>Waveform record length may be coordinated with the number of records that may be stored.</i>	4 Rec x 1 Sec, 2 Rec x 2 Sec, 1 Rec x 4 Sec	4 Rec x 1 Sec	

1.13 Communications Menu

Description	Range	Default	Setting
Station Address <i>IEC 60870-5-103 Station Address</i>	0...254	0	

Description	Range	Default	Setting
IEC870 On Port <i>Selects which port to use for IEC 60870-5-103 communications</i>	None, Com1, Com2, Auto	Com1	
Line Switch Time <i>When IEC870 On Port is selected to Auto the communications ports are scanned for valid IEC 60870-5-103 communications frames. Once valid frames are detected the com port will remain selected. Subsequently if there are no valid frames received for the Line Switch Time period then the driver will assume the communications circuit has failed and will resume scanning the com ports.</i>	1,2,...60 s	30 s	
Com1 Baud Rate <i>Sets the communications baud rate for com port 1 (Rear upper Fibre optic port)</i>	75, 110, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200	19200	
Com1 Parity <i>Selects whether parity information is used</i>	Even, Odd, None	Even	
Com1 Line Idle <i>Selects the communications line idle sense</i>	Light Off, Light On	Light Off	
Com1 Data Echo <i>Enables echoing of data from RX port to TX port when operating relays in a Fibre Optic ring configuration</i>	Off, On	Off	
Com2 Baud Rate <i>Sets the communications baud rate for com port 2 (Rear lower Fibre optic port AND Front Fascia RS232 port)</i>	75, 110, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200	19200	
Com2 Parity <i>Selects whether parity information is used</i>	Even, Odd, None	None	
Com2 Line Idle <i>Selects the communications line idle sense</i>	Light Off, Light On	Light Off	
Com2 Data Echo <i>Enables echoing of data from RX port to TX port when operating relays in a Fibre Optic ring configuration</i>	Off, On	Off	
Com2 Direction <i>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</i>	AUTO-DETECT, FRONT PORT, REAR PORT	AUTO-DETECT	

2 Instruments

INSTRUMENT	DESCRIPTION
[REACTOR METERS] --> press down <--	Start of reactor meters
Reactor Pr'y Current 0.0 0.0 0.0 kA	Reactor primary currents
Reac'r Sec'y Current 0.00 0.00 0.00 A	Reactor secondary currents
Reactor Nom Currents 0.00 0.00 0.00 xIn	Reactor nominal currents
Thermal Status 0.0 0.0 0.0 %	Reactor thermal status
[CAP BANK METERS] --> press down <--	Start of secondary meters
Primary Currents 0.0 0.0 0.0 kA	Capacitor Bank primary currents
Secondary Currents 0.00 0.00 0.00 A	Capacitor Bank secondary currents
Nominal Currents 0.00 0.00 0.00 xIn	Capacitor Bank nominal currents
C 51 Status 0 0 0 0 %	Operation progress meters for (51) IDMTL elements, phases A, B, C and residual E/F
3P Primary Voltage 0.0 0.0 0.0 kV	Capacitor Bank primary voltages (three phase)
3P Secondary Voltage 0.0 0.0 0.0 V	Capacitor Bank secondary voltages (three phase)
3P Nominal Voltage 0.00 0.00 0.00 xVn	Capacitor Bank nominal voltages (three phase)
1P Primary Voltage 0.0 kV	Capacitor Bank or Busbar primary voltage (single phase)
1P Secondary Voltage 0.0 V	Capacitor Bank or Busbar secondary voltage (single phase)
1P Nominal Voltage 0.00 xVn	Capacitor Bank or Busbar nominal voltage (single phase)
[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 17-27 -----	Displays the state of DC status inputs 17 to 27 ¹
Output Relays 1-16 -----	Displays the state of output relays 1 to 16 ²
Output Relays 17-29 -----	Displays the state of output relays 17 to 29 ²
Time & Date 13/08/2002 10:16:11	Time and Date

1) Display is different when fewer status inputs are fitted

2) Display is different when fewer output relays are fitted

3 IEC 60870-5-103 Communications Information

3.1 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
60	4	Remote Mode	x	1	1,9
60	5	Service Mode	x	1	1,9
60	6	Local Mode	x	1	1,9
60	7	Local & Remote	x	1	1,9
60	8	Real Time Clock Set	-	1	1
60	9	Real Time Clock Drift Corrected	-	1	1
60	10	Real Time Clock Not Synchronised	-	1	1
60	11	Real Time Clock Synchronised	-	1	1
60	128	Cold Start	-	1	1
60	129	Warm Start	-	1	1
60	130	Re-Start	-	1	1
60	135	Trigger Storage	-	1	1
70	1	Status Input 1	x	1	1,9
70	2	Status Input 2	x	1	1,9
70	3	Status Input 3	x	1	1,9
70	4	Status Input 4	x	1	1,9
70	5	Status Input 5	x	1	1,9
70	6	Status Input 6	x	1	1,9
70	7	Status Input 7	x	1	1,9
70	8	Status Input 8	x	1	1,9
70	9	Status Input 9	x	1	1,9
70	10	Status Input 10	x	1	1,9
70	11	Status Input 11	x	1	1,9
70	12	Status Input 12	x	1	1,9
70	13	Status Input 13	x	1	1,9
70	14	Status Input 14	x	1	1,9
70	15	Status Input 15	x	1	1,9
70	16	Status Input 16	x	1	1,9
70	17	Status Input 17	x	1	1,9
70	18	Status Input 18	x	1	1,9
70	19	Status Input 19	x	1	1,9
70	20	Status Input 20	x	1	1,9
70	21	Status Input 21	x	1	1,9
70	22	Status Input 22	x	1	1,9
70	23	Status Input 23	x	1	1,9
70	24	Status Input 24	x	1	1,9
70	25	Status Input 25	x	1	1,9
70	26	Status Input 26	x	1	1,9
70	27	Status Input 27	x	1	1,9

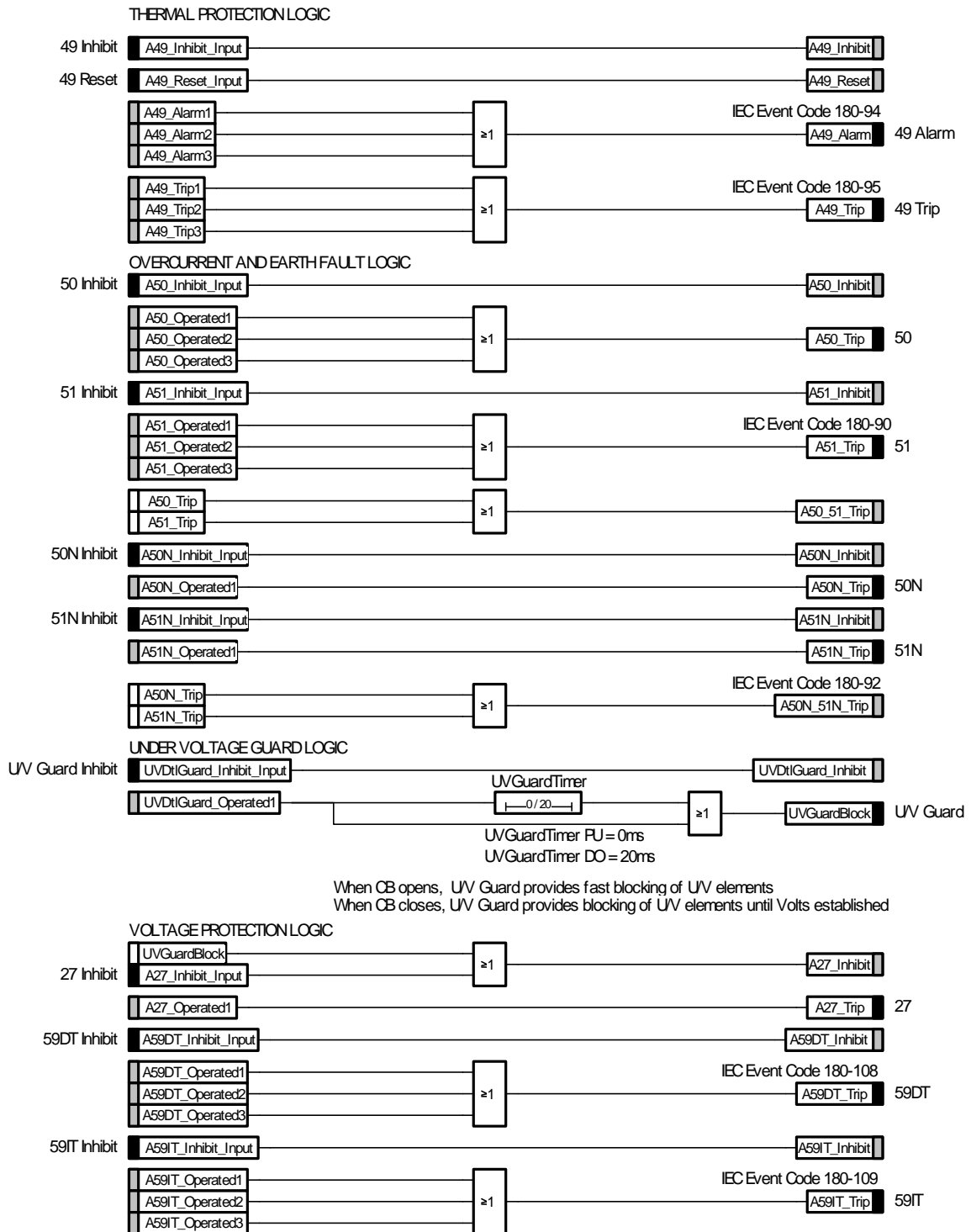
FUN	INF	Description	GI	TYP	COT
80	1	Plant Control Relay 1	x	1	1,9
80	2	Plant Control Relay 2	x	1	1,9
80	3	Plant Control Relay 3	x	1	1,9
80	4	Plant Control Relay 4	x	1	1,9
80	5	Plant Control Relay 5	x	1	1,9
80	6	Plant Control Relay 6	x	1	1,9
80	7	Plant Control Relay 7	x	1	1,9
80	8	Plant Control Relay 8	x	1	1,9
80	9	Plant Control Relay 9	x	1	1,9
80	10	Plant Control Relay 10	x	1	1,9
80	11	Plant Control Relay 11	x	1	1,9
80	12	Plant Control Relay 12	x	1	1,9
80	13	Plant Control Relay 13	x	1	1,9
80	14	Plant Control Relay 14	x	1	1,9
80	15	Plant Control Relay 15	x	1	1,9
80	16	Plant Control Relay 16	x	1	1,9
80	17	Plant Control Relay 17	x	1	1,9
80	18	Plant Control Relay 18	x	1	1,9
80	19	Plant Control Relay 19	x	1	1,9
80	20	Plant Control Relay 20	x	1	1,9
80	21	Plant Control Relay 21	x	1	1,9
80	22	Plant Control Relay 22	x	1	1,9
80	23	Plant Control Relay 23	x	1	1,9
80	24	Plant Control Relay 24	x	1	1,9
80	25	Plant Control Relay 25	x	1	1,9
80	26	Plant Control Relay 26	x	1	1,9
80	27	Plant Control Relay 27	x	1	1,9
80	28	Plant Control Relay 28	x	1	1,9
80	29	Plant Control Relay 29	x	1	1,9
180	0	GI End	-	8	10
180	0	Time Synchronisation	-	6	8
180	2	Reset FCB	-	2	3
180	3	Reset CU	-	2	4
180	4	Start/Restart	-	2	5
180	5	Power On	-	2	5
180	22	Settings changed	-	1	1
180	23	Setting G1 selected	x	1	1,9
180	24	Setting G2 selected	x	1	1,9
180	25	Setting G3 selected	x	1	1,9
180	26	Setting G4 selected	x	1	1,9
180	38	VT Fuse Failure	x	1	1,9
180	36	Trip Circuit Fail	x	1	1,9
180	64	Start/Pick-up L1	x	2	1,9
180	65	Start/Pick-up L2	x	2	1,9
180	66	Start/Pick-up L3	x	2	1,9
180	67	Start/Pick-up N	x	2	1,9
180	68	General Trip	-	2	1
180	69	Trip L1	-	2	1

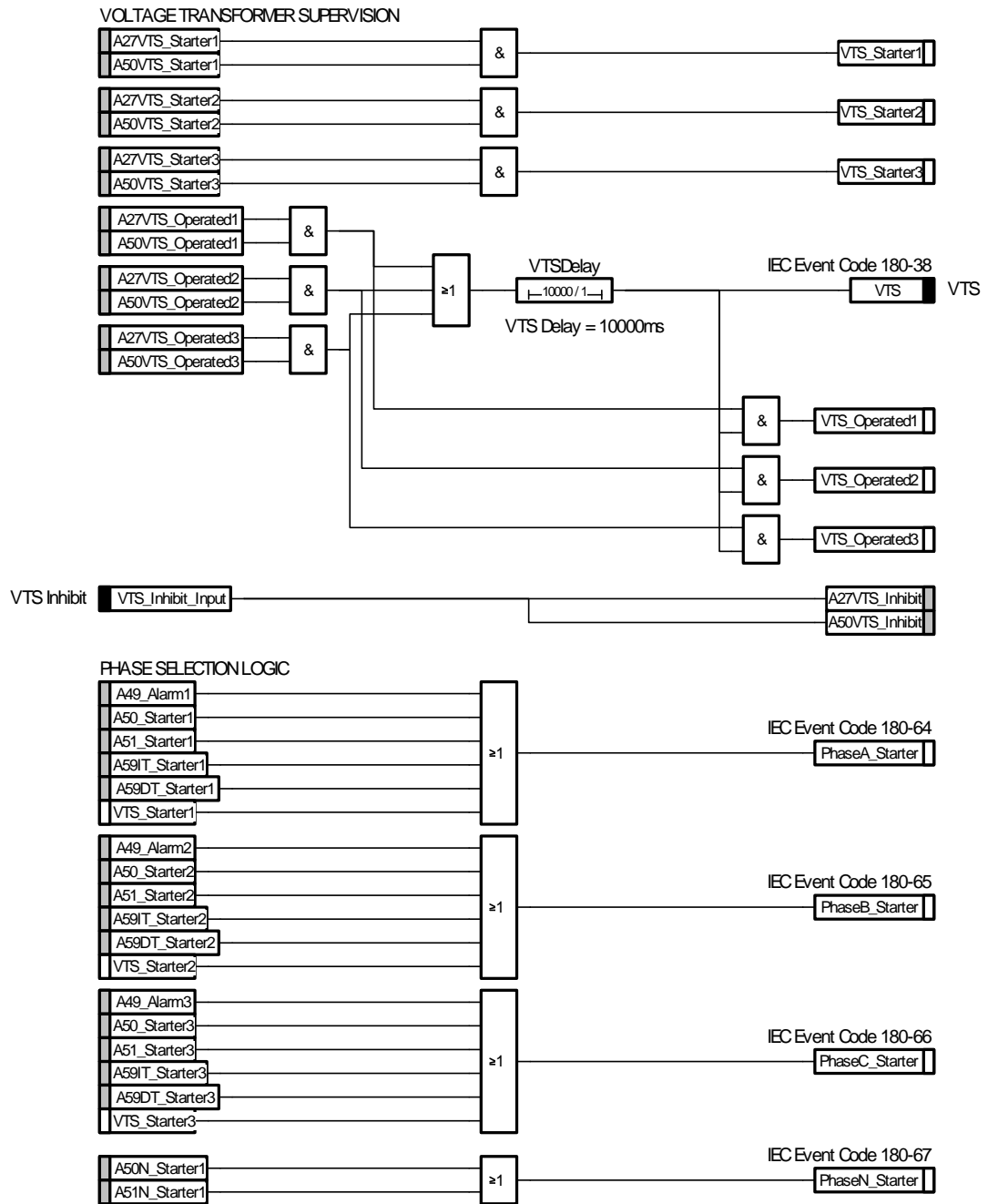
FUN	INF	Description	GI	TYP	COT
180	70	Trip L2	-	2	1
180	71	Trip L3	-	2	1
180	84	General Start/Pick-up	x	2	1,9
180	90	Trip I >	-	2	1
180	92	Trip In >	-	2	1
180	94	Thermal Alarm	-	2	1
180	95	Thermal Trip	-	2	1
180	100	Under Voltage	-	2	1
180	101	Over Voltage	-	2	1

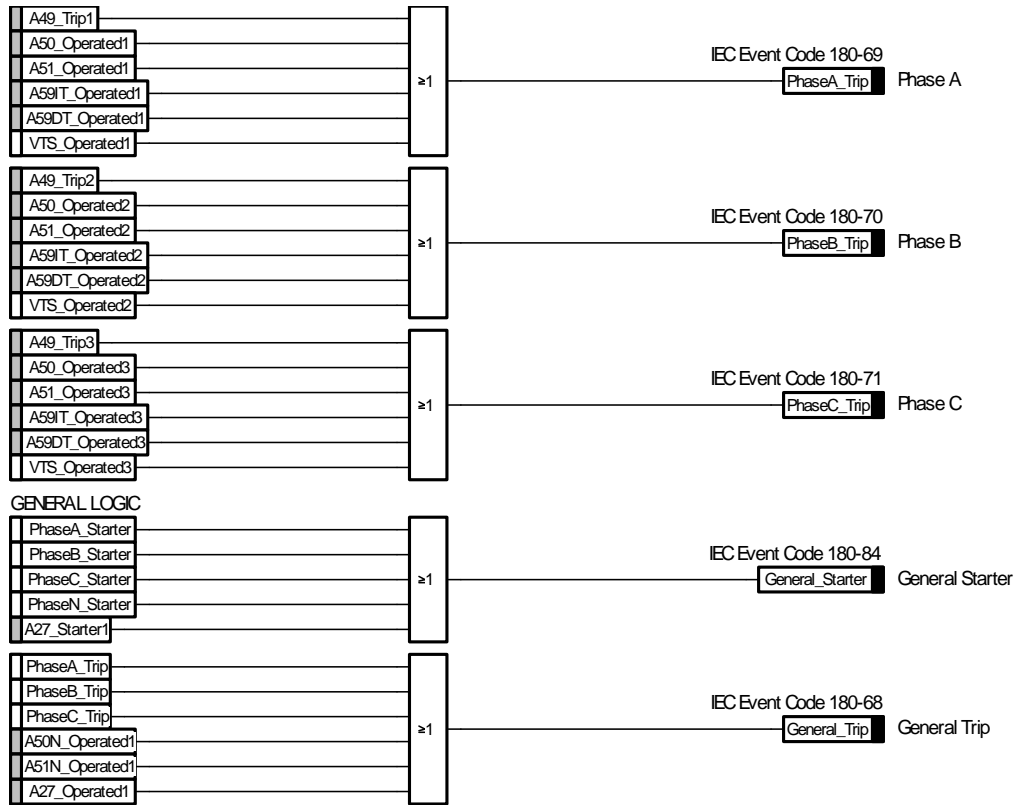
3.2 IEC 60870-5-103 Semantics in control direction

FUN	INF	Description	COM	TYP	COT
180	0	GI Initiation		7	9
180	0	Time Synchronisation		6	8
180	19	LED reset	ON	20	20

4 Relay Logic Diagrams

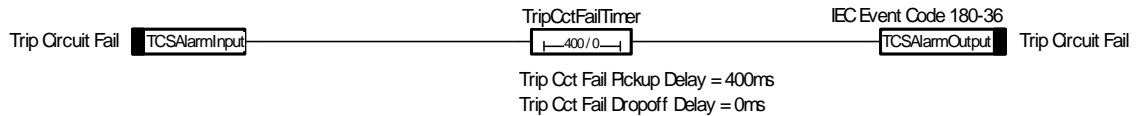






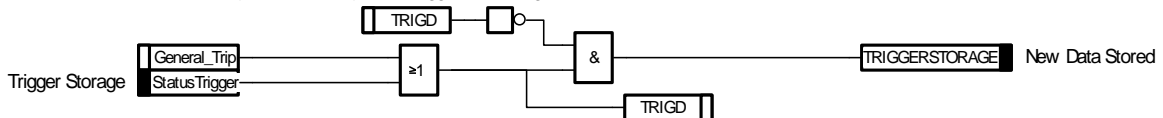
TRIP CIRCUIT FAILURE LOGIC

1. Trip CCT inputs should be programmed to be inverted
2. Individual Trip CCT Fail LED/ RELAYS can be achieved by programming/labelling via I/O matrix logic



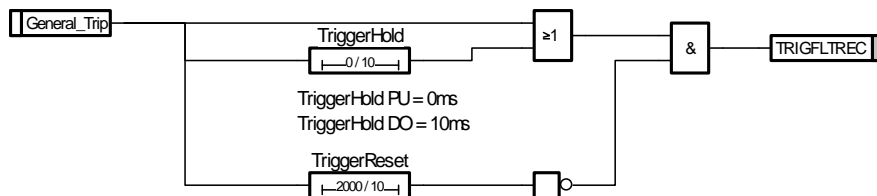
WAVEFORM RECORDER TRIGGERING LOGIC

A General Trip or a Status Input can trigger the storage of a waveform



FAULT RECORDER TRIGGERING LOGIC

The current fault is terminated when General Trip drops off or 2 seconds have elapsed. (To ensure fault recorder is not blocked during testing)



5 Label Inserts

	MSCDN-MP2B	MSCDN-MP2B	
	R9c	R9c	
	Left	Right	
	27/04/2010 15:48:00	27/04/2010 15:48:00	
1	GENERAL STARTER	(49) THERMAL ALARM	17
2	PHASE A	(49) THERMAL TRIP	18
3	PHASE B	(50) O/C	19
4	PHASE C	(51) O/C	20
5	UNDERVOLTAGE (27)	(50N) DERIVED E/F	21
6	OVERVOLTAGE (59IT)	(51N) DERIVED E/F	22
7	OVERVOLTAGE (59DT)	TRIP CIRCUIT FAIL	23
8		VTS	24
9	<i>AUX 1 I/P OPERATED</i>	<i>AUX 9 I/P OPERATED</i>	25
10	<i>AUX 2 I/P OPERATED</i>	<i>AUX 10 I/P OPERATED</i>	26
11	<i>AUX 3 I/P OPERATED</i>	<i>AUX 11 I/P OPERATED</i>	27
12	<i>AUX 4 I/P OPERATED</i>		28
13	<i>AUX 5 I/P OPERATED</i>		29
14	<i>AUX 6 I/P OPERATED</i>		30
15	<i>AUX 7 I/P OPERATED</i>		31
16	<i>AUX 8 I/P OPERATED</i>		32