

# 7SG12 DAD N

Numerical High Impedance Relay with CT Supervision

## Document Release History

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

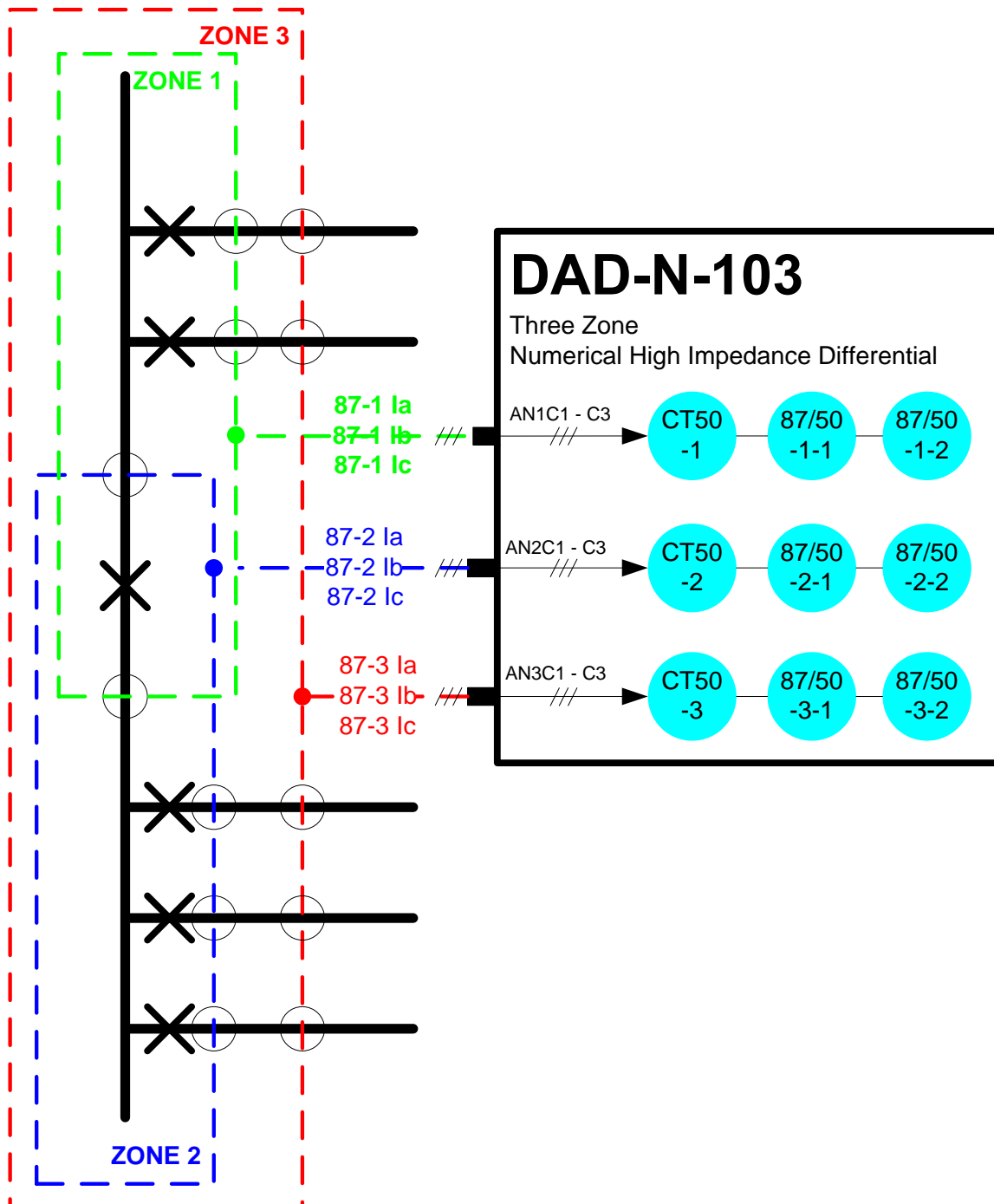
Revision	Date	Change
	2010/02	Document reformat due to rebrand
R4	25/01/2006	Corrected type on front page graphic
R3	15/08/2005	Corrected Status Input menu options. Zone 1, 2, 3, 1&2, 1&3, 2&3 Logic outputs added. Primary and Secondary metering resolution improved.
R2	23-06-2005	Zone 1,2 & 3 Measurands added. IEC Output Relay commands added. Corrected TCS events numbers. Min. setting value reduced to 0.005xIn for 87/50 and 0.001xIn for CT 50. Reduced to 5ms time steps on 87/50 elements.
R1	09-02-2005	First draft

## Software Revision History

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Model No  
DAD-N-103

Cat No  
DA1-103

Configuration No  
2414H80003R15

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# 1 DAD-N-103 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...8	1	
View/Edit Group <i>Selects which settings group is currently being displayed</i>	1,2...8	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	
Select Grp Mode <i>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.</i>	Edge triggered, Level triggered	Edge triggered	
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 identify the circuit the relay is attached to or the relays purpose</i>	Up to 16 characters	DAD-N-103	

## 1.2 CT/VT Config Menu

Description	Range	Default	Setting
CT Input <i>Selects whether 1 or 5 Amp terminals are being used</i>	1,5 A	1 A	
CT Ratio <i>CT ratio to scale primary current instruments</i>	5:0.2...5000:7	2000:1	

## 1.3 Differential 1 Menu

Description	Range	Default	Setting
87/50-1-1 Element	Disabled, Enabled	Disabled	

Description	Range	Default	Setting
87/50-1-1 Element <i>Selects whether the 87/50-1-1 Element is enabled.</i>			
87/50-1-1 Setting <i>Pickup level</i>	0.005,0.006...2.000 xIn	0.500 xIn	
87/50-1-1 Delay <i>Pickup delay</i>	0,0.005...60 s	0.00 s	
87/50-1-2 Element <i>Selects whether the 87/50-1-2 Element is enabled.</i>	Disabled, Enabled	Disabled	
87/50-1-2 Setting <i>Pickup level</i>	0.005,0.006...2.000 xIn	0.500 xIn	
87/50-1-2 Delay <i>Pickup delay</i>	0,0.005...60 s	0.00 s	

## 1.4 Differential 2 Menu

Description	Range	Default	Setting
87/50-2-1 Element <i>Selects whether the 87/50-2-1 Element is enabled.</i>	Disabled, Enabled	Disabled	
87/50-2-1 Setting <i>Pickup level</i>	0.005,0.006...2.000 xIn	0.500 xIn	
87/50-2-1 Delay <i>Pickup delay</i>	0,0.005...60 s	0.00 s	
87/50-2-2 Element <i>Selects whether the 87/50-2-2 Element is enabled.</i>	Disabled, Enabled	Disabled	
87/50-2-2 Setting <i>Pickup level</i>	0.005,0.006...2.000 xIn	0.500 xIn	
87/50-2-2 Delay <i>Pickup delay</i>	0,0.005...60 s	0.00 s	

## 1.5 Differential 3 Menu

Description	Range	Default	Setting
87/50-3-1 Element <i>Selects whether the 87/50-3-1 Element is enabled.</i>	Disabled, Enabled	Disabled	
87/50-3-1 Setting <i>Pickup level</i>	0.005,0.006...2.000 xIn	0.500 xIn	
87/50-3-1 Delay <i>Pickup delay</i>	0,0.005...60 s	0.00 s	
87/50-3-2 Element <i>Selects whether the 87/50-3-2 Element is enabled.</i>	Disabled, Enabled	Disabled	
87/50-3-2 Setting <i>Pickup level</i>	0.005,0.006...2.000 xIn	0.500 xIn	
87/50-3-2 Delay <i>Pickup delay</i>	0,0.005...60 s	0.00 s	

## 1.6 CT Supervision Menu

Description	Range	Default	Setting
CT 50 Element <i>Selects whether the CT supervision element is enabled.</i>	Disabled, Enabled	Disabled	
CT 50 Setting <i>Pickup level</i>	0.001,0.002...2.000 xIn	0.100 xIn	
CT 50 Delay <i>Pickup delay</i>	0.1,0.2...60 s	10.00 s	
CT 50-1 Element <i>Selects whether the CT-1 supervision element is enabled.</i>	Disabled, Enabled	Disabled	
CT 50-1 Setting <i>Pickup level</i>	0.001,0.002...2.000 xIn	0.100 xIn	

Description	Range	Default	Setting
CT 50-1 Delay <i>Pickup delay</i>	0.1,0.2...60 s	10.00 s	
CT 50-2 Element <i>Selects whether the CT-2 supervision element is enabled.</i>	Disabled, Enabled	Disabled	
CT 50-2 Setting <i>Pickup level</i>	0.001,0.002...2.000 xIn	0.100 xIn	
CT 50-2 Delay <i>Pickup delay</i>	0.1,0.2...60 s	10.00 s	
CT 50-3 Element <i>Selects whether the CT-2 supervision element is enabled.</i>	Disabled, Enabled	Disabled	
CT 50-3 Setting <i>Pickup level</i>	0.001,0.002...2.000 xIn	0.100 xIn	
CT 50-3 Delay <i>Pickup delay</i>	0.1,0.2...60 s	10.00 s	

## 1.7 Trip Circuit Supervision Menu

Description	Range	Default	Setting
Trip Cct Fail 1 <i>Selects if this trip circuit logic is enabled or disabled.</i>	Disabled, Enabled	Disabled	
Trip Cct Fail 1 PU Delay <i>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.</i>	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	

## 1.8 Status Input Menu

Description	Range	Default	Setting
87/50-1-1 Inhibit <i>Selects which inputs inhibit the 87/50-1-1 element</i>	NONE, 1...27 <sup>1</sup>	NONE	
87/50-1-2 Inhibit <i>Selects which inputs inhibit the 87/50-1-2 element</i>	NONE, 1...27 <sup>1</sup>	NONE	
CT 50-1 Inhibit <i>Selects which inputs inhibit the CT 50-1 element</i>	NONE, 1...27 <sup>1</sup>	NONE	
87/50-2-1 Inhibit <i>Selects which inputs inhibit the 87/50-2-1 element</i>	NONE, 1...27 <sup>1</sup>	NONE	
87/50-2-2 Inhibit <i>Selects which inputs inhibit the 87/50-2-1 element</i>	NONE, 1...27 <sup>1</sup>	NONE	
CT 50-2 Inhibit <i>Selects which inputs inhibit the CT 50-2 element</i>	NONE, 1...27 <sup>1</sup>	NONE	
87/50-3-1 Inhibit <i>Selects which inputs inhibit the 87/50-3-1 element</i>	NONE, 1...27 <sup>1</sup>	NONE	

Description	Range	Default	Setting
87/50-3-2 Inhibit <i>Selects which inputs inhibit the 87/50-3-1 element</i>	NONE, 1...27 <sup>1</sup>	NONE	
CT 50-3 Inhibit <i>Selects which inputs inhibit the CT 50-3 element</i>	NONE, 1...27 <sup>1</sup>	NONE	
Trip Cct Fail 1 <i>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.</i>	NONE, 1...27 <sup>1</sup>	NONE	
Trip Cct Fail 2 <i>Select which inputs block Trip Cct Fail 2 timer.</i>	NONE, 1...27 <sup>1</sup>	NONE	
Trip Cct Fail 3 <i>Select which inputs block Trip Cct Fail 3 timer.</i>	NONE, 1...27 <sup>1</sup>	NONE	
Trip Cct Fail 4 <i>Select which inputs block Trip Cct Fail 4 timer.</i>	NONE, 1...27 <sup>1</sup>	NONE	
Trip Cct Fail 5 <i>Select which inputs block Trip Cct Fail 5 timer.</i>	NONE, 1...27 <sup>1</sup>	NONE	
Trip Cct Fail 6 <i>Select which inputs block Trip Cct Fail 6 timer.</i>	NONE, 1...27 <sup>1</sup>	NONE	
Trigger Wave Rec <i>Selects which inputs can trigger a waveform record</i>	NONE, 1...27 <sup>1</sup>	NONE	
Trigger Data Rec <i>Selects which inputs can trigger a data record</i>	NONE, 1...27 <sup>1</sup>	NONE	
Select Group 1 <i>Switches active setting group to group 1</i>	NONE, 1...27 <sup>1</sup>	NONE	
Select Group 2 <i>Switches active setting group to group 2</i>	NONE, 1...27 <sup>1</sup>	NONE	
Select Group 3 <i>Switches active setting group to group 3</i>	NONE, 1...27 <sup>1</sup>	NONE	
Select Group 4 <i>Switches active setting group to group 4</i>	NONE, 1...27 <sup>1</sup>	NONE	
Select Group 5 <i>Switches active setting group to group 5</i>	NONE, 1...27 <sup>1</sup>	NONE	
Select Group 6 <i>Switches active setting group to group 6</i>	NONE, 1...27 <sup>1</sup>	NONE	
Select Group 7 <i>Switches active setting group to group 7</i>	NONE, 1...27 <sup>1</sup>	NONE	
Select Group 8 <i>Switches active setting group to group 8</i>	NONE, 1...27 <sup>1</sup>	NONE	
Clock Sync. <i>Selects which input is used to synchronise the real time clock</i>	NONE, 1...27 <sup>1</sup>	NONE	
Inverted Inputs <i>Selects which inputs pickup when voltage is removed, often used when monitoring trip circuits.</i>	NONE, 1...27 <sup>1</sup>	NONE	

1) 27 status inputs represents maximum configuration.

## 1.9 Status Input Timing 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 1 Dropoff Delay <i>Delay on dropoff 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	

Description	Range	Default	Setting
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 <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 4 Dropoff Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 5 Pickup Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 5 Dropoff Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 6 Pickup Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 6 Dropoff Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 7 Pickup Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 7 Dropoff Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 8 Pickup Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 8 Dropoff Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 9 Pickup Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 9 Dropoff Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 10 Pickup Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 10 Dropoff Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 11 Pickup Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 11 Dropoff Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 12 Pickup Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 12 Dropoff Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 13 Pickup Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 13 Dropoff Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 14 Pickup Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 14 Dropoff Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 15 Pickup Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 15 Dropoff Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 16 Pickup Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 16 Dropoff Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 17 Pickup Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 17 Dropoff Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 18 Pickup Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 18 Dropoff Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 19 Pickup Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 19 Dropoff Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 20 Pickup Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 20 Dropoff Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 21 Pickup Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 21 Dropoff Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 22 Pickup Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 22 Dropoff Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 23 Pickup Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 23 Dropoff Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 24 Pickup Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 24 Dropoff Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 25 Pickup Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 25 Dropoff Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 26 Pickup Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 26 Dropoff Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 27 Pickup Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	
Aux I/P 27 Dropoff Delay <sup>1</sup>	0.000,0.005...864000 s	0 s	

1) Only when fitted.

## 1.10 Reylogic Element Menu

Description	Range	Default	Setting
Max Data Rec Time <i>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.</i>	0,1...60000 ms	2000 ms	



## 1.11 Output Relay Menu

Description	Range	Default	Setting
87/50-1-1 Phase A <i>Differential Zone 1 INST/DTL Stage 1 Phase A element has operated.</i>	NONE, 1...29 <sup>1</sup>	NONE	
87/50-1-1 Phase B	NONE, 1...29 <sup>1</sup>	NONE	
87/50-1-1 Phase C	NONE, 1...29 <sup>1</sup>	NONE	
87/50-1-2 Phase A <i>Differential Zone 1 INST/DTL Stage 2 Phase A element has operated</i>	NONE, 1...29 <sup>1</sup>	NONE	
87/50-1-2 Phase B	NONE, 1...29 <sup>1</sup>	NONE	
87/50-1-2 Phase C	NONE, 1...29 <sup>1</sup>	NONE	
CT 50-1 Phase A <i>Differential Zone 1 CT Supervision INST/DTL Phase A element has operated</i>	NONE, 1...29 <sup>1</sup>	NONE	
CT 50-1 Phase B	NONE, 1...29 <sup>1</sup>	NONE	
CT 50-1 Phase C	NONE, 1...29 <sup>1</sup>	NONE	
87/50-2-1 Phase A <i>Differential Zone 2 INST/DTL Stage 1 Phase A element has operated.</i>	NONE, 1...29 <sup>1</sup>	NONE	
87/50-2-1 Phase B	NONE, 1...29 <sup>1</sup>	NONE	
87/50-2-1 Phase C	NONE, 1...29 <sup>1</sup>	NONE	
87/50-2-2 Phase A <i>Differential Zone 2 INST/DTL Stage 2 Phase A element has operated</i>	NONE, 1...29 <sup>1</sup>	NONE	
87/50-2-2 Phase B	NONE, 1...29 <sup>1</sup>	NONE	
87/50-2-2 Phase C	NONE, 1...29 <sup>1</sup>	NONE	
CT 50-2 Phase A <i>Differential Zone 2 CT Supervision INST/DTL Phase A element has operated</i>	NONE, 1...29 <sup>1</sup>	NONE	
CT 50-2 Phase B	NONE, 1...29 <sup>1</sup>	NONE	
CT 50-2 Phase C	NONE, 1...29 <sup>1</sup>	NONE	
87/50-3-1 Phase A <i>Differential Zone 3 INST/DTL Stage 1 Phase A element has operated.</i>	NONE, 1...29 <sup>1</sup>	NONE	
87/50-3-1 Phase B	NONE, 1...29 <sup>1</sup>	NONE	
87/50-3-1 Phase C	NONE, 1...29 <sup>1</sup>	NONE	
87/50-3-2 Phase A <i>Differential Zone 3 INST/DTL Stage 2 Phase A element has operated</i>	NONE, 1...29 <sup>1</sup>	NONE	
87/50-3-2 Phase B	NONE, 1...29 <sup>1</sup>	NONE	
87/50-3-2 Phase C	NONE, 1...29 <sup>1</sup>	NONE	
CT 50-3 Phase A <i>Differential Zone 3 CT Supervision INST/DTL Phase A element has operated</i>	NONE, 1...29 <sup>1</sup>	NONE	
CT 50-3 Phase B	NONE, 1...29 <sup>1</sup>	NONE	
CT 50-3 Phase C	NONE, 1...29 <sup>1</sup>	NONE	
Zone 1 Phase A <i>Differential Zone 1 Phase A element has operated. This is the logical OR of stages 1 and 2 for Zone 1 phase A.</i>	NONE, 1...29 <sup>1</sup>	NONE	
Zone 1 Phase B	NONE, 1...29 <sup>1</sup>	NONE	
Zone 1 Phase C	NONE, 1...29 <sup>1</sup>	NONE	
Zone 2 Phase A <i>Differential Zone 2 Phase A element has operated. This is the logical OR of stages 1 and 2 for Zone 2 phase A.</i>	NONE, 1...29 <sup>1</sup>	NONE	
Zone 2 Phase B	NONE, 1...29 <sup>1</sup>	NONE	
Zone 2 Phase C	NONE, 1...29 <sup>1</sup>	NONE	
Zone 3 Phase A <i>Differential Zone 3 Phase A element has</i>	NONE, 1...29 <sup>1</sup>	NONE	

<i>operated. This is the logical OR of stages 1 and 2 for Zone 3 phase A.</i>			
Zone 3 Phase B	NONE, 1...29 <sup>1</sup>	NONE	
Zone 3 Phase C	NONE, 1...29 <sup>1</sup>	NONE	
Zone 1&2 Phase A <i>Differential Zone 1 and Zone 2 Phase A elements have operated. This is the logical AND of Zone 1 and Zone 2 for phase A.</i>	NONE, 1...29 <sup>1</sup>	NONE	
Zone 1&2 Phase B	NONE, 1...29 <sup>1</sup>	NONE	
Zone 1&2 Phase C	NONE, 1...29 <sup>1</sup>	NONE	
Zone 1&3 Phase A <i>Differential Zone 1 and Zone 3 Phase A elements have operated. This is the logical AND of Zone 1 and Zone 3 for phase A.</i>	NONE, 1...29 <sup>1</sup>	NONE	
Zone 1&3 Phase B	NONE, 1...29 <sup>1</sup>	NONE	
Zone 1&3 Phase C	NONE, 1...29 <sup>1</sup>	NONE	
Zone 2&3 Phase A <i>Differential Zone 2 and Zone 3 Phase A elements have operated. This is the logical AND of Zone 2 and Zone 3 for phase A.</i>	NONE, 1...29 <sup>1</sup>	NONE	
Zone 2&3 Phase B	NONE, 1...29 <sup>1</sup>	NONE	
Zone 2&3 Phase C	NONE, 1...29 <sup>1</sup>	NONE	
General Starter <i>A starter element is picked up. Useful when testing individual functions!</i>	NONE, 1...29 <sup>1</sup>	5	
General Trip <i>An element has operated. Useful when testing individual functions!</i>	NONE, 1...29 <sup>1</sup>	4	
Trip Cct Fail 1 <i>Trip Circuit 1 has failed</i>	NONE, 1...29 <sup>1</sup>	NONE	
Trip Cct Fail 2 <i>Trip Circuit 2 has failed</i>	NONE, 1...29 <sup>1</sup>	NONE	
Trip Cct Fail 3 <i>Trip Circuit 3 has failed</i>	NONE, 1...29 <sup>1</sup>	NONE	
Trip Cct Fail 4 <i>Trip Circuit 4 has failed</i>	NONE, 1...29 <sup>1</sup>	NONE	
Trip Cct Fail 5 <i>Trip Circuit 5 has failed</i>	NONE, 1...29 <sup>1</sup>	NONE	
Trip Cct Fail 6 <i>Trip Circuit 6 has failed</i>	NONE, 1...29 <sup>1</sup>	NONE	
Trip Circuit Fail <i>A trip circuit has failed, look at status input Leds to find out which one</i>	NONE, 1...29 <sup>1</sup>	NONE	
New Data Stored <i>The waveform recorder has stored new information Note: this is a pulsed output</i>	NONE, 1...29 <sup>1</sup>	NONE	
Aux I/P 1 Operated <i>DC Status 1 has operated</i>	NONE, 1...29 <sup>1</sup>	NONE	
Aux I/P 2 Operated	NONE, 1...29 <sup>1</sup>	NONE	
Aux I/P 3 Operated	NONE, 1...29 <sup>1</sup>	NONE	
Aux I/P 4 Operated <sup>2</sup>	NONE, 1...29 <sup>1</sup>	NONE	
Aux I/P 5 Operated <sup>2</sup>	NONE, 1...29 <sup>1</sup>	NONE	
Aux I/P 6 Operated <sup>2</sup>	NONE, 1...29 <sup>1</sup>	NONE	
Aux I/P 7 Operated <sup>2</sup>	NONE, 1...29 <sup>1</sup>	NONE	
Aux I/P 8 Operated <sup>2</sup>	NONE, 1...29 <sup>1</sup>	NONE	
Aux I/P 9 Operated <sup>2</sup>	NONE, 1...29 <sup>1</sup>	NONE	
Aux I/P 10 Operated <sup>2</sup>	NONE, 1...29 <sup>1</sup>	NONE	
Aux I/P 11 Operated <sup>2</sup>	NONE, 1...29 <sup>1</sup>	NONE	
Aux I/P 12 Operated <sup>2</sup>	NONE, 1...29 <sup>1</sup>	NONE	
Aux I/P 13 Operated <sup>2</sup>	NONE, 1...29 <sup>1</sup>	NONE	
Aux I/P 14 Operated <sup>2</sup>	NONE, 1...29 <sup>1</sup>	NONE	
Aux I/P 15 Operated <sup>2</sup>	NONE, 1...29 <sup>1</sup>	NONE	

Aux I/P 16 Operated <sup>2</sup>	NONE, 1...29 <sup>1</sup>	NONE	
Aux I/P 17 Operated <sup>2</sup>	NONE, 1...29 <sup>1</sup>	NONE	
Aux I/P 18 Operated <sup>2</sup>	NONE, 1...29 <sup>1</sup>	NONE	
Aux I/P 19 Operated <sup>2</sup>	NONE, 1...29 <sup>1</sup>	NONE	
Aux I/P 20 Operated <sup>2</sup>	NONE, 1...29 <sup>1</sup>	NONE	
Aux I/P 21 Operated <sup>2</sup>	NONE, 1...29 <sup>1</sup>	NONE	
Aux I/P 22 Operated <sup>2</sup>	NONE, 1...29 <sup>1</sup>	NONE	
Aux I/P 23 Operated <sup>2</sup>	NONE, 1...29 <sup>1</sup>	NONE	
Aux I/P 24 Operated <sup>2</sup>	NONE, 1...29 <sup>1</sup>	NONE	
Aux I/P 25 Operated <sup>2</sup>	NONE, 1...29 <sup>1</sup>	NONE	
Aux I/P 26 Operated <sup>2</sup>	NONE, 1...29 <sup>1</sup>	NONE	
Aux I/P 27 Operated <sup>2</sup>	NONE, 1...29 <sup>1</sup>	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 <sup>1</sup>	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 <sup>1</sup>	1	

1) 29 output relays represents maximum configuration.

2) Only when fitted.

### 1.11.1 OP Relay Timing Menu

Description	Range	Default	Setting
Min Operate Time 1	0.02, 0.04...60 s	0.1 s	
Min Operate Time 2	0.02, 0.04...60 s	0.1 s	
Min Operate Time 3	0.02, 0.04...60 s	0.1 s	
Min Operate Time 4	0.02, 0.04...60 s	0.1 s	
Min Operate Time 5	0.02, 0.04...60 s	0.1 s	
Min Operate Time 6 <sup>1</sup>	0.02, 0.04...60 s	0.1 s	
Min Operate Time 7 <sup>1</sup>	0.02, 0.04...60 s	0.1 s	
Min Operate Time 8 <sup>1</sup>	0.02, 0.04...60 s	0.1 s	
Min Operate Time 9 <sup>1</sup>	0.02, 0.04...60 s	0.1 s	
Min Operate Time 10 <sup>1</sup>	0.02, 0.04...60 s	0.1 s	
Min Operate Time 11 <sup>1</sup>	0.02, 0.04...60 s	0.1 s	
Min Operate Time 12 <sup>1</sup>	0.02, 0.04...60 s	0.1 s	
Min Operate Time 13 <sup>1</sup>	0.02, 0.04...60 s	0.1 s	
Min Operate Time 14 <sup>1</sup>	0.02, 0.04...60 s	0.1 s	
Min Operate Time 15 <sup>1</sup>	0.02, 0.04...60 s	0.1 s	
Min Operate Time 16 <sup>1</sup>	0.02, 0.04...60 s	0.1 s	
Min Operate Time 17 <sup>1</sup>	0.02, 0.04...60 s	0.1 s	
Min Operate Time 18 <sup>1</sup>	0.02, 0.04...60 s	0.1 s	
Min Operate Time 19 <sup>1</sup>	0.02, 0.04...60 s	0.1 s	
Min Operate Time 20 <sup>1</sup>	0.02, 0.04...60 s	0.1 s	
Min Operate Time 21 <sup>1</sup>	0.02, 0.04...60 s	0.1 s	
Min Operate Time 22 <sup>1</sup>	0.02, 0.04...60 s	0.1 s	
Min Operate Time 23 <sup>1</sup>	0.02, 0.04...60 s	0.1 s	
Min Operate Time 24 <sup>1</sup>	0.02, 0.04...60 s	0.1 s	
Min Operate Time 25 <sup>1</sup>	0.02, 0.04...60 s	0.1 s	
Min Operate Time 26 <sup>1</sup>	0.02, 0.04...60 s	0.1 s	
Min Operate Time 27 <sup>1</sup>	0.02, 0.04...60 s	0.1 s	
Min Operate Time 28 <sup>1</sup>	0.02, 0.04...60 s	0.1 s	
Min Operate Time 29 <sup>1</sup>	0.02, 0.04...60 s	0.1 s	

1) Only when fitted.

## 1.12 LED Menu

Description	Range	Default	Setting
87/50-1-1 Phase A <i>Differential Zone 1 INST/DTL Stage 1 Phase A element has operated.</i>	NONE, 1...32	2,5,18	
87/50-1-1 Phase B	NONE, 1...32	3,5,18	
87/50-1-1 Phase C	NONE, 1...32	4,5,18	
87/50-1-2 Phase A <i>Differential Zone 1 INST/DTL Stage 2 Phase A element has operated</i>	NONE, 1...32	2,5,18	
87/50-1-2 Phase B	NONE, 1...32	3,5,18	
87/50-1-2 Phase C	NONE, 1...32	4,5,18	
CT 50-1 Phase A <i>Differential Zone 1 CT Supervision INST/DTL Phase A element has operated</i>	NONE, 1...32	2,6,18	
CT 50-1 Phase B	NONE, 1...32	3,6,18	
CT 50-1 Phase C	NONE, 1...32	4,6,18	
87/50-2-1 Phase A <i>Differential Zone 2 INST/DTL Stage 1 Phase A element has operated.</i>	NONE, 1...32	2,5,19	
87/50-2-1 Phase B	NONE, 1...32	3,5,19	
87/50-2-1 Phase C	NONE, 1...32	4,5,19	
87/50-2-2 Phase A <i>Differential Zone 2 INST/DTL Stage 2 Phase A element has operated</i>	NONE, 1...32	2,5,19	
87/50-2-2 Phase B	NONE, 1...32	3,5,19	
87/50-2-2 Phase C	NONE, 1...32	4,5,19	
CT 50-2 Phase A <i>Differential Zone 2 CT Supervision INST/DTL Phase A element has operated</i>	NONE, 1...32	2,6,19	
CT 50-2 Phase B	NONE, 1...32	3,6,19	
CT 50-2 Phase C	NONE, 1...32	4,6,19	
87/50-3-1 Phase A <i>Differential Zone 3 INST/DTL Stage 1 Phase A element has operated.</i>	NONE, 1...32	2,5,20	
87/50-3-1 Phase B	NONE, 1...32	3,5,20	
87/50-3-1 Phase C	NONE, 1...32	4,5,20	
87/50-3-2 Phase A <i>Differential Zone 3 INST/DTL Stage 2 Phase A element has operated</i>	NONE, 1...32	2,5,20	
87/50-3-2 Phase B	NONE, 1...32	3,5,20	
87/50-3-2 Phase C	NONE, 1...32	4,5,20	
CT 50-3 Phase A <i>Differential Zone 3 CT Supervision INST/DTL Phase A element has operated</i>	NONE, 1...32	2,6,20	
CT 50-3 Phase B	NONE, 1...32	3,6,20	
CT 50-3 Phase C	NONE, 1...32	4,6,20	
Zone 1 Phase A <i>Differential Zone 1 Phase A element has operated. This is the logical OR of stages 1 and 2 for Zone 1 phase A.</i>	NONE, 1...32	NONE	
Zone 1 Phase B	NONE, 1...32	NONE	
Zone 1 Phase C	NONE, 1...32	NONE	
Zone 2 Phase A <i>Differential Zone 2 Phase A element has operated. This is the logical OR of stages 1 and 2 for Zone 2 phase A.</i>	NONE, 1...32	NONE	
Zone 2 Phase B	NONE, 1...32	NONE	
Zone 2 Phase C	NONE, 1...32	NONE	
Zone 3 Phase A <i>Differential Zone 3 Phase A element has</i>	NONE, 1...32	NONE	

Description	Range	Default	Setting
<i>operated. This is the logical OR of stages 1 and 2 for Zone 3 phase A.</i>			
Zone 3 Phase B	NONE, 1...32	NONE	
Zone 3 Phase C	NONE, 1...32	NONE	
Zone 1&2 Phase A <i>Differential Zone 1 and Zone 2 Phase A elements have operated. This is the logical AND of Zone 1 and Zone 2 for phase A.</i>	NONE, 1...32	NONE	
Zone 1&2 Phase B	NONE, 1...32	NONE	
Zone 1&2 Phase C	NONE, 1...32	NONE	
Zone 1&3 Phase A <i>Differential Zone 1 and Zone 3 Phase A elements have operated. This is the logical AND of Zone 1 and Zone 3 for phase A.</i>	NONE, 1...32	NONE	
Zone 1&3 Phase B	NONE, 1...32	NONE	
Zone 1&3 Phase C	NONE, 1...32	NONE	
Zone 2&3 Phase A <i>Differential Zone 2 and Zone 3 Phase A elements have operated. This is the logical AND of Zone 2 and Zone 3 for phase A.</i>	NONE, 1...32	NONE	
Zone 2&3 Phase B	NONE, 1...32	NONE	
Zone 2&3 Phase C	NONE, 1...32	NONE	
General Starter <i>A starter element is picked up. Useful when testing individual functions!</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 inputs Leds to find out which one</i>	NONE, 1...32	7	
New Data Stored <i>The waveform recorder has stored new information</i>	NONE, 1...32	NONE	
Aux I/P 1 Operated <i>DC Status 1 has operated</i>	NONE, 1...32	NONE	
Aux I/P 2 Operated	NONE, 1...32	NONE	
Aux I/P 3 Operated	NONE, 1...32	NONE	
Aux I/P 4 Operated <sup>1</sup>	NONE, 1...32	NONE	
Aux I/P 5 Operated <sup>1</sup>	NONE, 1...32	NONE	
Aux I/P 6 Operated <sup>1</sup>	NONE, 1...32	NONE	
Aux I/P 7 Operated <sup>1</sup>	NONE, 1...32	NONE	
Aux I/P 8 Operated <sup>1</sup>	NONE, 1...32	NONE	
Aux I/P 9 Operated <sup>1</sup>	NONE, 1...32	NONE	
Aux I/P 10 Operated <sup>1</sup>	NONE, 1...32	NONE	
Aux I/P 11 Operated <sup>1</sup>	NONE, 1...32	NONE	
Aux I/P 12 Operated <sup>1</sup>	NONE, 1...32	NONE	
Aux I/P 13 Operated <sup>1</sup>	NONE, 1...32	NONE	
Aux I/P 14 Operated <sup>1</sup>	NONE, 1...32	NONE	
Aux I/P 15 Operated <sup>1</sup>	NONE, 1...32	NONE	
Aux I/P 16 Operated <sup>1</sup>	NONE, 1...32	NONE	
Aux I/P 17 Operated <sup>1</sup>	NONE, 1...32	NONE	
Aux I/P 18 Operated <sup>1</sup>	NONE, 1...32	NONE	
Aux I/P 19 Operated <sup>1</sup>	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.

## 1.13 Data Storage Menu

Description	Range	Default	Setting
Clear Faults <i>Clears the fault recorder</i>	NO, YES	NO	
Clear Events <i>Clears the event recorder</i>	NO, YES	NO	
Pre-Trigger Storage <i>Pre-trigger storage is that percentage of the waveform record that is recorded prior to the waveform recorder being triggered</i>	10...90 %	20 %	
Data Record Duration <sup>1</sup> <i>Selects the length of time for each waveform record</i>	5 Recs x 1 Seconds, 2 Recs x 2 Seconds, 1 Recs x 5 Seconds	5 Recs x 1 Second	
Trigger Waveform <i>Triggers the waveform recorder</i>	NO, YES	NO	
Clear Waveforms <i>Clears the waveform recorder</i>	NO, YES	NO	

1) Number of records and duration available is dependent upon relay model

## 1.14 Communications Menu

Description	Range	Default	Setting
Station Address <i>IEC 60870-5-103 Station Address</i>	0...254	0	
COM1 Protocol <i>Selects protocol to use for COM 1</i>	OFF, IEC60870-5-103, MODBUS-RTU	IEC60870-5-103	
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 Protocol <i>Selects protocol to use for COM 2</i>	OFF, IEC60870-5-103, MODBUS-RTU, ASCII	ASCII	
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	57600	
COM2 Parity <i>Selects whether parity information is used</i>	Even, Odd, None	Even	
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</i>	AUTO-DETECT, FRONT PORT, REAR PORT	AUTO-DETECT	

Description	Range	Default	Setting
IEC870 is on Com2 and Auto-detect is enabled			

## 2 Instruments

INSTRUMENT	DESCRIPTION
[ DIFF 1 METERS ] --> press down <--	Start of Differential Zone 1 current meters
Primary Currents 1 0.000 0.000 0.000 kA	Differential Zone 1 Primary currents
Secondary Currents 1 0.000 0.000 0.000 A	Differential Zone 1 Secondary currents
Nominal Currents 1 0.00 0.00 0.00 xIn	Differential Zone 1 Nominal currents
[ DIFF 2 METERS ] --> press down <--	Start of Differential Zone 2 current meters
Primary Currents 2 0.000 0.000 0.000 kA	Differential Zone 2 Primary currents
Secondary Currents 2 0.000 0.000 0.000 A	Differential Zone 2 Secondary currents
Nominal Currents 2 0.00 0.00 0.00 xIn	Differential Zone 2 Nominal currents
[ DIFF 3 METERS ] --> press down <--	Start of Differential Zone 3 current meters
Primary Currents 3 0.000 0.000 0.000 kA	Differential Zone 3 Primary currents
Secondary Currents 3 0.000 0.000 0.000 A	Differential Zone 3 Secondary currents
Nominal Currents 3 0.00 0.00 0.00 xIn	Differential Zone 3 Nominal currents
[ MISC METERS ] --> press down <--	Start of miscellaneous meters
Status Inputs 1-16 ----	Displays the state of DC status inputs 1 to 16 <sup>1</sup>
Status Inputs 17-27 ---	Displays the state of DC status inputs 17 to 27 <sup>1</sup>
Output Relays 1-16 ----	Displays the state of output relays 1 to 16 <sup>2</sup>
Output Relays 17-29 ----	Displays the state of output relays 17 to 29 <sup>2</sup>
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) 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
80	1	Plant Control Relay 1	x	1	1,9
80	2	Plant Control Relay 2	x	1	1,9



FUN	INF	Description	GI	TYP	COT
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
181	0	GI End	-	8	10
181	0	Time Synchronisation	-	6	8
181	2	Reset FCB	-	2	3
181	3	Reset CU	-	2	4
181	4	Start/Restart	-	2	5
181	22	Settings changed	-	1	1
181	23	Setting G1 selected	x	1	1,9
181	24	Setting G2 selected	x	1	1,9
181	25	Setting G3 selected	x	1	1,9
181	26	Setting G4 selected	x	1	1,9
181	36	Trip Circuit Fail	x	1	1,9
181	64	Start/Pick-up L1	x	2	1,9
181	65	Start/Pick-up L2	x	2	1,9
181	66	Start/Pick-up L3	x	2	1,9
181	67	Start/Pick-up N	x	2	1,9
181	68	General Trip	-	2	1
181	69	Trip L1	-	2	1
181	70	Trip L2	-	2	1
181	71	Trip L3	-	2	1
181	84	General Start/Pick-up	x	2	1,9
181	99	Overall Differential Zone 1-1	x	2	1,9

FUN	INF	Description	GI	TYP	COT
181	100	Overall Differential Zone 1-2	x	2	1,9
181	101	CT Supervision Zone 1	x	2	1,9
181	102	Overall Differential Zone 2-1	x	2	1,9
181	103	Overall Differential Zone 2-2	x	2	1,9
181	104	CT Supervision Zone 2	x	2	1,9
181	105	Overall Differential Zone 3-1	x	2	1,9
181	106	Overall Differential Zone 3-2	x	2	1,9
181	107	CT Supervision Zone 3	x	2	1,9
181	110	Setting G1 selected	x	1	1,9
181	111	Setting G2 selected	x	1	1,9
181	112	Setting G3 selected	x	1	1,9
181	113	Setting G4 selected	x	1	1,9
181	120	Trip Circuit Fail 1	x	1	1,9
181	121	Trip Circuit Fail 2	x	1	1,9
181	122	Trip Circuit Fail 3	x	1	1,9
181	123	Trip Circuit Fail 4	x	1	1,9
181	124	Trip Circuit Fail 5	x	1	1,9
181	125	Trip Circuit Fail 6	x	1	1,9
181	148	Measurand Z1 I <sub>L1,2,3</sub>  Z1 I <sub>L1</sub> (2.4 x) Z1 I <sub>L2</sub> (2.4 x) Z1 I <sub>L3</sub> (2.4 x)	-	9	2
181	149	Measurand Z2 I <sub>L1,2,3</sub>  Z2 I <sub>L1</sub> (2.4 x) Z2 I <sub>L2</sub> (2.4 x) Z2 I <sub>L3</sub> (2.4 x)	-	9	2
181	150	Measurand Z3 I <sub>L1,2,3</sub>  Z3 I <sub>L1</sub> (2.4 x) Z3 I <sub>L2</sub> (2.4 x) Z3 I <sub>L3</sub> (2.4 x)	-	9	2

### 3.2 IEC 60870-5-103 Semantics in control direction

FUN	INF	Description	COM	TYP	COT
80	1	Energise Output Relay 1	ON	20	20
80	2	Energise Output Relay 2	ON	20	20
80	3	Energise Output Relay 3	ON	20	20
80	4	Energise Output Relay 4	ON	20	20
80	5	Energise Output Relay 5	ON	20	20
80	6	Energise Output Relay 6	ON	20	20
80	7	Energise Output Relay 7	ON	20	20
80	8	Energise Output Relay 8	ON	20	20
80	9	Energise Output Relay 9	ON	20	20

<b>FUN</b>	<b>INF</b>	<b>Description</b>	<b>COM</b>	<b>TYP</b>	<b>COT</b>
80	10	Energise Output Relay 10	ON	20	20
80	11	Energise Output Relay 11	ON	20	20
80	12	Energise Output Relay 12	ON	20	20
80	13	Energise Output Relay 13	ON	20	20
80	14	Energise Output Relay 14	ON	20	20
80	15	Energise Output Relay 15	ON	20	20
80	16	Energise Output Relay 16	ON	20	20
80	17	Energise Output Relay 17	ON	20	20
80	18	Energise Output Relay 18	ON	20	20
80	19	Energise Output Relay 19	ON	20	20
80	20	Energise Output Relay 20	ON	20	20
80	21	Energise Output Relay 21	ON	20	20
80	22	Energise Output Relay 22	ON	20	20
80	23	Energise Output Relay 23	ON	20	20
80	24	Energise Output Relay 24	ON	20	20
80	25	Energise Output Relay 25	ON	20	20
80	26	Energise Output Relay 26	ON	20	20
80	27	Energise Output Relay 27	ON	20	20
80	28	Energise Output Relay 28	ON	20	20
80	29	Energise Output Relay 29	ON	20	20
181	0	GI Initiation		7	9
181	0	Time Synchronisation		6	8
181	19	LED reset	ON	20	20
181	23	Settings Group 1 Select	ON	20	20
181	24	Settings Group 2 Select	ON	20	20
181	25	Settings Group 3 Select	ON	20	20
181	26	Settings Group 4 Select	ON	20	20
181	110	Settings Group 5 Select	ON	20	20
181	111	Settings Group 6 Select	ON	20	20
181	112	Settings Group 7 Select	ON	20	20
181	113	Settings Group 8 Select	ON	20	20

## 4 MODBUS Semantics

### 4.1 Coils

Address	Description
00001	Energise O/P Relay 1
00002	Energise O/P Relay 2
00003	Energise O/P Relay 3
00004	Energise O/P Relay 4
00005	Energise O/P Relay 5
00006	Energise O/P Relay 6
00007	Energise O/P Relay 7
00008	Energise O/P Relay 8
00009	Energise O/P Relay 9
00010	Energise O/P Relay 10
00011	Energise O/P Relay 11
00012	Energise O/P Relay 12
00013	Energise O/P Relay 13
00014	Energise O/P Relay 14
00015	Energise O/P Relay 15
00016	Energise O/P Relay 16
00017	Energise O/P Relay 17
00018	Energise O/P Relay 18
00019	Energise O/P Relay 19
00020	Energise O/P Relay 20
00021	Energise O/P Relay 21
00022	Energise O/P Relay 22
00023	Energise O/P Relay 23
00024	Energise O/P Relay 24
00025	Energise O/P Relay 25
00026	Energise O/P Relay 26
00027	Energise O/P Relay 27
00028	Energise O/P Relay 28
00029	Energise O/P Relay 29

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

### 4.2 Inputs

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

Address	Description
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
10022	Status Input 22
10023	Status Input 23
10024	Status Input 24
10025	Status Input 25
10026	Status Input 26
10027	Status Input 27
10028	Status Input 28
10029	Status Input 29
10030	Status Input 30
10031	Status Input 31
10032	Status Input 32

Address	Description
10101	Front Port Override
10102	Remote mode
10103	Service mode
10104	Local mode
10105	Local & Remote
10111	Trip Circuit Fail
10112	A-Starter
10113	B-Starter
10114	C-Starter
10115	General Starter
10116	Overall Differential
10117	CT Supervision

Address	Description
10120	Overall Differential Zone 1-1
10121	Overall Differential Zone 1-2
10122	CT Supervision Zone 1

Address	Description
10220	Overall Differential Zone 2-1
10221	Overall Differential Zone 2-2
10222	CT Supervision Zone 2

Address	Description
10320	Overall Differential Zone 3-1
10321	Overall Differential Zone 3-2
10322	CT Supervision Zone 3

### 4.3 Registers

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
30028	Fault Records	UINT16 <sup>2</sup>
30029	Event Records	UINT16 <sup>2</sup>
30030	Waveform Records	UINT16 <sup>2</sup>

Address	Description	Format
30110	Zone 1, Ia Primary	FP_32BITS_3DP <sup>1</sup>
30112	Zone 1, Ib Primary	FP_32BITS_3DP <sup>1</sup>

Address	Description	Format
30114	Zone 1, Ic Primary	FP_32BITS_3DP <sup>1</sup>
30116	Zone 1, Ia Secondary	FP_32BITS_3DP <sup>1</sup>
30118	Zone 1, Ib Secondary	FP_32BITS_3DP <sup>1</sup>
30120	Zone 1, Ic Secondary	FP_32BITS_3DP <sup>1</sup>
30122	Zone 1, Ia Nominal	FP_32BITS_3DP <sup>1</sup>
30124	Zone 1, Ib Nominal	FP_32BITS_3DP <sup>1</sup>
30126	Zone 1, Ic Nominal	FP_32BITS_3DP <sup>1</sup>

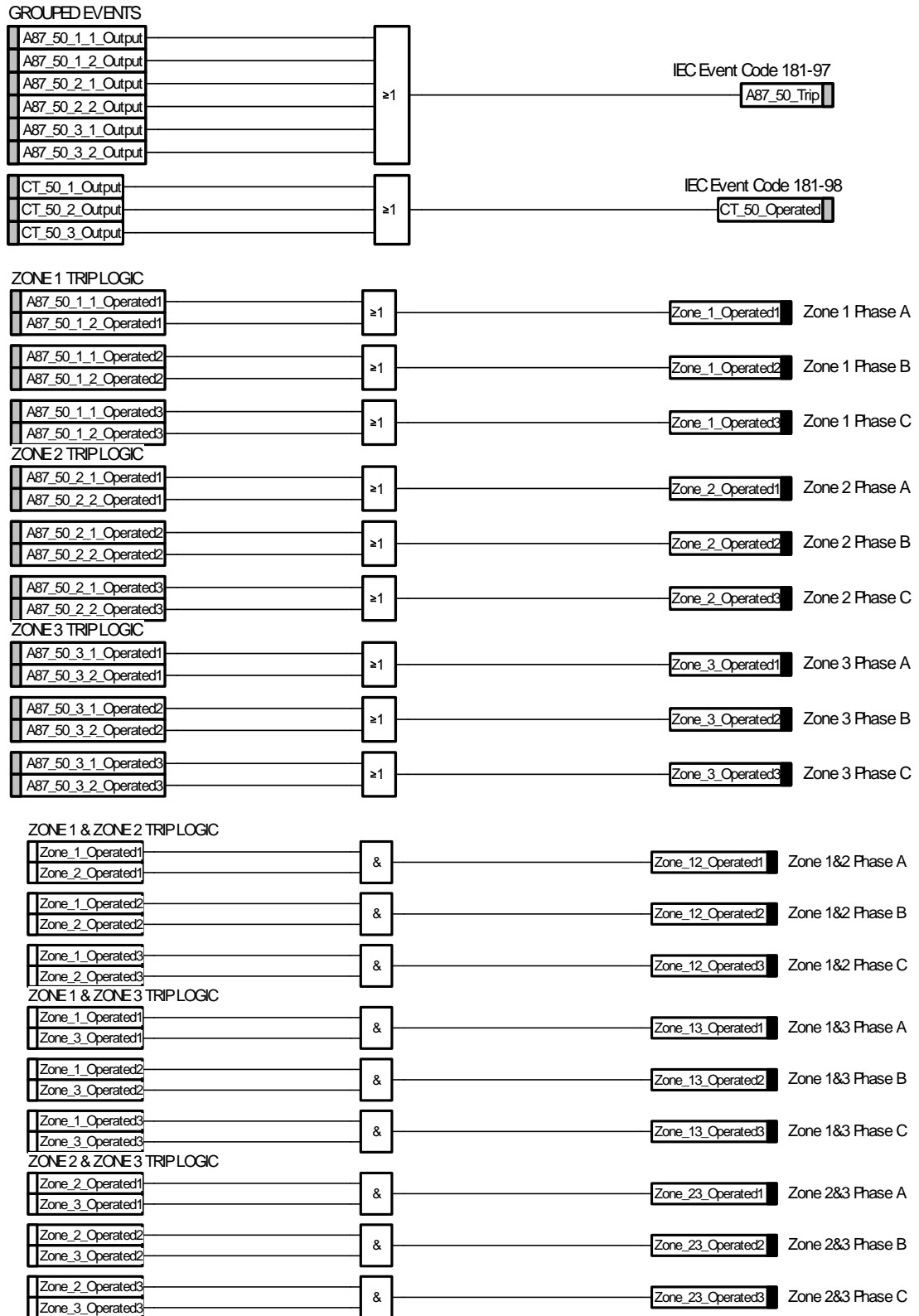
Address	Description	Format
30210	Zone 2, Ia Primary	FP_32BITS_3DP <sup>1</sup>
30212	Zone 2, Ib Primary	FP_32BITS_3DP <sup>1</sup>
30214	Zone 2, Ic Primary	FP_32BITS_3DP <sup>1</sup>
30216	Zone 2, Ia Secondary	FP_32BITS_3DP <sup>1</sup>
30218	Zone 2, Ib Secondary	FP_32BITS_3DP <sup>1</sup>
30220	Zone 2, Ic Secondary	FP_32BITS_3DP <sup>1</sup>
30222	Zone 2, Ia Nominal	FP_32BITS_3DP <sup>1</sup>
30224	Zone 2, Ib Nominal	FP_32BITS_3DP <sup>1</sup>
30226	Zone 2, Ic Nominal	FP_32BITS_3DP <sup>1</sup>

Address	Description	Format
30310	Zone 3, Ia Primary	FP_32BITS_3DP <sup>1</sup>
30312	Zone 3, Ib Primary	FP_32BITS_3DP <sup>1</sup>
30314	Zone 3, Ic Primary	FP_32BITS_3DP <sup>1</sup>
30316	Zone 3, Ia Secondary	FP_32BITS_3DP <sup>1</sup>
30318	Zone 3, Ib Secondary	FP_32BITS_3DP <sup>1</sup>
30320	Zone 3, Ic Secondary	FP_32BITS_3DP <sup>1</sup>
30322	Zone 3, Ia Nominal	FP_32BITS_3DP <sup>1</sup>
30324	Zone 3, Ib Nominal	FP_32BITS_3DP <sup>1</sup>
30326	Zone 3, Ic Nominal	FP_32BITS_3DP <sup>1</sup>

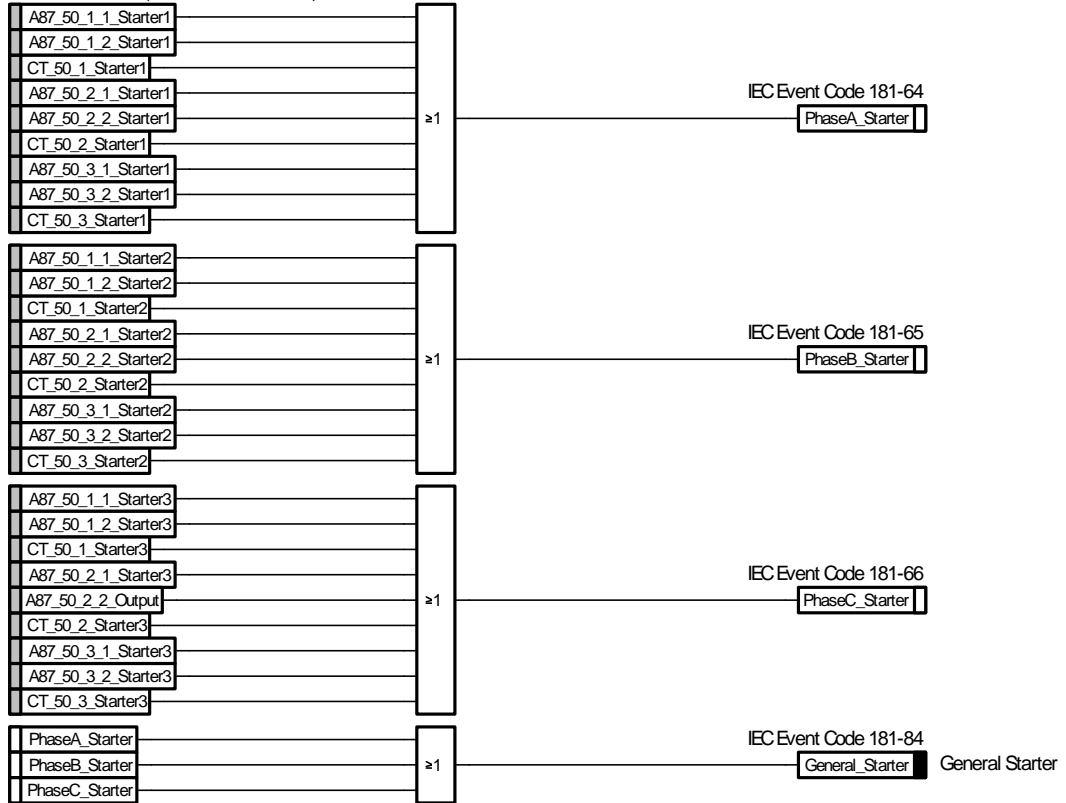
1) FP\_32BITS\_3DP: 2 registers - 32 bit fixed point, a 32 bit integer containing a value to 3 decimal places e.g. 50000 sent = 50.000

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

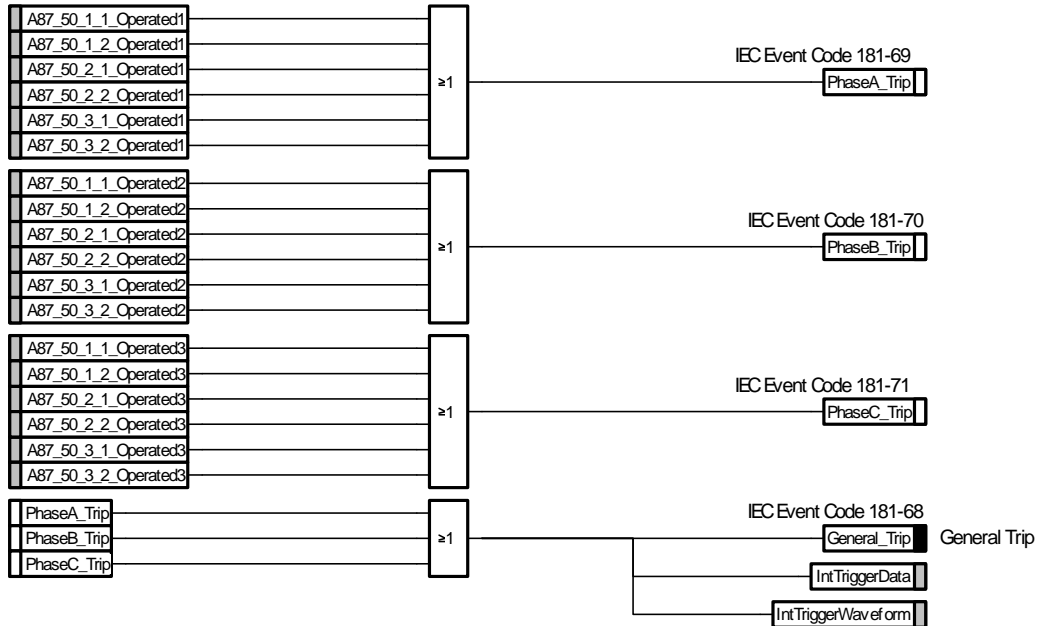
## 5 Reylogic Diagrams



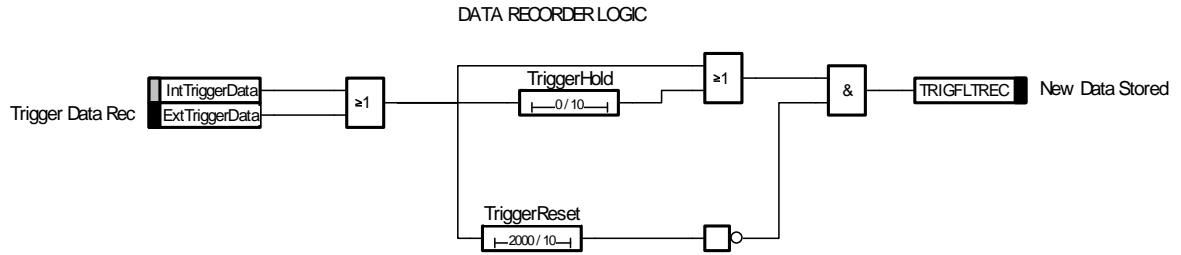
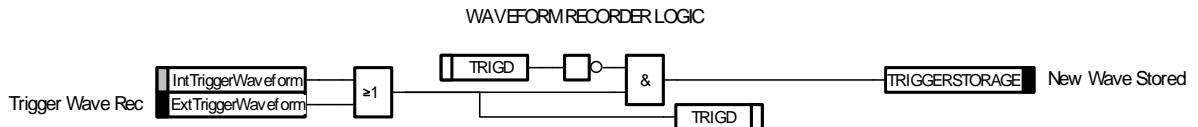
STARTER LOGIC (Includes CT elements)



GENERAL TRIP LOGIC







INPUTS TO SELECT A SETTING GROUP FROM A STATUS INPUT.



## 6 Label Inserts

	DA1-103-** E12/E16 Left 24/02/2010 12:58:00	DA1-103-** E12/E16 Right 24/02/2010 12:58:00	
1	GENERAL STARTER		17
2	PHASE A	ZONE 1	18
3	PHASE B	ZONE 2	19
4	PHASE C	ZONE 3	20
5	(87/50) DIFFERENTIAL		21
6	(CT/50) CT SUPERVISION		22
7	(74TC) TRIP CIRCUIT FAIL		23
8			24
9			25
10			26
11			27
12			28
13			29
14			30
15			31
16			32