

Relay Model: Ohmega 308-50 &
Ohmega 308-60

Software Revisions:

308-50 2615H80024R9

308-60 2615H80025R9

OHMEGA 308

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1 OVERVIEW

- 3 Zone Mho Distance Protection (PF - Mho, EF - Mho or Quad)
- Schemes (PUR, POR1, POR2, Acceleration, Loss of Load, Time Stepped).
- Power Swing Blocking
- Switch On To Fault Protection
- Voltage Transformer Supervision
- Power Swing Blocking
- Switch On To Fault Protection
- Directional Earth Fault (Single direction IDMTL)
- High Set Overcurrent Protection
- Sensitive Earth Fault Protection
- Under/Over Voltage
- Single Shot Auto-Reclose
- Synchronism Check
- Trip Circuit Supervision
- Upto 27 Status Inputs
- Upto 29 Output Relays
- 32 Programmable Leds plus Protection Healthy led
- R16 Case

2 OHMEGA 308 RELAY SETTING LIST

SYSTEM CONFIG MENU

Setting	Range	Default	Setting
Active Group <i>Selects which settings group is currently activated</i>	1, 2, ... 8	1	
Alternate Setting Group <i>Selects which settings group is activated by Status Input</i>	1, 2, ... 8	1	
CT Ratio <i>CT ratio to scale primary current instruments</i>	0, 100, ..., 5000: 1,2,5	2000:1	
VT Ratio <i>VT ratio to scale primary current instruments</i>	1000, 1100, ..., 10000, 11000, ..., 600000: 90, 95, ..., 130	132000:110	
CVT in use	NO, YES	NO	
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	
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		1/ 1/1980	
Time		21:34:16	
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	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	OHMEGA-308-XX (XX = 50 or 60)	

DISTANCE PROTECTION MENU

Setting	Range	Default	Setting
Gn Active Scheme <i>Selects the active protection scheme</i>	PUR, POR1, POR2, Acceleration, Time Stepped, Loss Of Load	PUR	
Gn Carrier Guard	Enabled, Disabled	Enabled	
CT Secondary <i>Selects whether 1, 2 or 5 Amp terminals are being used</i>	1, 2, 5 A	1 A	
Gn Line Angle	0, 5, ..., 90°	75 deg	
Gn EF Comp Z0/Z1 ratio	0, 0.01, ..., 10.00	2.50	
Gn EF Comp Z0 angle	0, 5, ..., 355°	75 deg	
Gn Reactive Drop Angle	Enabled, Disabled	-3 deg	
Gn Z1 Phase Fault	Enabled, Disabled	Enabled	
Gn Z1 PF Impedance	0.5, 0.51, ..., 9.99, 10.1, 10.2, ..., 100, 101, ..., 250 Ω	8.00 Ohms	
Gn Z1 PF Time Delay	0.5, 0.51, ..., 9.99, 10.1, 10.2, ..., 100, 101, ..., 250 Ω	0 ms	
Gn Z1 Earth Fault	Enabled, Disabled	Enabled	
Gn Z1 EF Type	Fwd Mho, Fwd Quad	Fwd Mho	
Gn Z1 EF Impedance	0.5, 0.51, ..., 9.99, 10.1, 10.2, ..., 100, 101, ..., 250 Ω	8.00 Ohms	
Gn Z1 EF Resistance	0.5, 0.51, ..., 9.99, 10.1, 10.2, ..., 100, 101, ..., 250 Ω	4.00 Ohms	
Gn Z1 EF Time Delay	0, 10, ..., 10000 ms	0 ms	
Gn Z2 Phase Fault	Enabled, Disabled	Enabled	
Gn Z2 PF Impedance	0.5, 0.51, ..., 9.99, 10.1, 10.2, ..., 100, 101, ..., 250 Ω	16.00 Ohms	
Gn Z2 PF Time Delay	0, 10, ..., 10000 ms	1000 ms	
Gn Z2 Earth Fault	Enabled, Disabled	Enabled	
Gn Z2 EF Type	Fwd Mho, Fwd Quad	Fwd Mho	
Gn Z2 EF Impedance	0.5, 0.51, ..., 9.99, 10.1, 10.2, ..., 100, 101, ..., 250 Ω	16.00 Ohms	
Gn Z2 EF Resistance	0.5, 0.51, ..., 9.99, 10.1, 10.2, ..., 100, 101, ..., 250 Ω	8.00 Ohms	
Gn Z2 EF Time Delay	0, 10, ..., 10000 ms	1000 ms	
Gn Z3 Phase Fault	Enabled, Disabled	Enabled	
Gn Z3 PF Type	Fwd Mho, Rev Mho, Offset Mho	Offset Mho	
Gn Z3 PF Impedance (Fwd)	0.5, 0.51, ..., 9.99, 10.1, 10.2, ..., 100, 101, ..., 250 Ω	24.00 Ohms	

Setting	Range	Default	Setting
Gn Z3 PF Impedance (Rev)	0.5, 0.51, ..., 9.99, 10.1, 10.2, ..., 100, 101, ..., 250 Ω	8.00 Ohms	
Gn Z3 PF Time Delay	0, 10, ..., 10000 ms	2000 ms	
Gn Z3 Earth Fault	Enabled, Disabled	Enabled	
Z3 EF Type	Fwd Mho, Rev Mho, Offset Mho, Fwd Quad, Rev Quad, Offset Quad	Offset Mho	
Gn Z3 EF Impedance (Fwd)	0.5, 0.51, ..., 9.99, 10.1, 10.2, ..., 100, 101, ..., 250 Ω	24.00 Ohms	
Gn Z3 EF Resistance (Fwd)	0.5, 0.51, ..., 9.99, 10.1, 10.2, ..., 100, 101, ..., 250 Ω	12.00 Ohms	
Gn Z3 EF Impedance (Rev)	0.5, 0.51, ..., 9.99, 10.1, 10.2, ..., 100, 101, ..., 250 Ω	8.00 Ohms	
Gn Z3 EF Resistance (Rev)	0.5, 0.51, ..., 9.99, 10.1, 10.2, ..., 100, 101, ..., 250 Ω	4.00 Ohms	
Gn Z3 EF Time Delay	0, 10, ..., 10000 ms	2000 ms	
Gn POR Weak Infeed Tripping	Enabled, Disabled	Disabled	
Gn WI Voltage Level	5.0, 5.5... 85.0	54.0 V	
Gn POR Current Rev Reset	0, 1, ..., 1000, 1010, ..., 10000, 10100, ..., 60000ms	200 ms	
Gn POR CB Echo Pulse	0, 1, ..., 1000, 1010, ..., 10000, 10100, ..., 60000ms	250 ms	
Gn LOL Level	0.1, 0.15, ... 0.9 xIn	0.50 xIn	
Gn LOL CB Op Delay	0, 1, ..., 1000, 1010, ..., 10000, 10100, ..., 60000ms	20 ms	
Gn LOL Time Limit	0, 1, ..., 1000, 1010, ..., 10000, 10100, ..., 60000ms	40 ms	
Gn Power Swing Detector	Enabled, Disabled	ENABLE	
Gn PSD Zone blocking	Zone1 Zone 2 Zone 3	Zone2-3	
Gn PSD Shape	Circular, Rectangular	CIRCULAR	
Gn PSD Blinders	Enabled, Disabled	DISABLE	
Gn PSD Inner Fwd Impedance	0.1, 0.2, ... 250Ω	24.0 Ohms	
Gn PSD Inner Rev Impedance	0.1, 0.2, ... 250Ω	8.0 Ohms	
Gn PSD Inner Fwd Blinder	0.1, 0.2, ... 250Ω	16.0 Ohms	
Gn PSD Inner Rev Blinder	0.1, 0.2, ... 250Ω	16.0 Ohms	
Gn PSD Outer Multiplier	1.05, 1.06, ... 2.00x	1.50 x	
Gn PSD Transit Time	0, 5, ... 1000ms	50 ms	

AUX PROTECTION MENU

Setting	Range	Default	Setting
<i>Gn</i> High Set	Enabled, Disabled	Enabled	
<i>Gn</i> HS Level	4, 4.25, ..., 35 xIn	4.00 xIn	
<i>Gn</i> HS Time Delay	0, 1, ..., 1000ms	0 ms	
<i>Gn</i> SEF Protection	Enabled, Disabled	Enabled	
<i>Gn</i> SEF Current Setting	0.02, 0.03, ... 0.95xIn	0.10 xIn	
<i>Gn</i> SEF Alarm Delay	0.00, 0.01, ... 60.00s	1.00 s	
<i>Gn</i> SEF Trip Delay	0.00, 0.01, ... 60.00s	1.00 s	
<i>Gn</i> Overvoltage Prot.	Enabled, Disabled	Enabled	
<i>Gn</i> OV Alarm Level	1.00, 1.01, ... 1.50xVn	1.07 xVn	
<i>Gn</i> OV Alarm Time Delay	0, 1, ... 1000ms	0 ms	
<i>Gn</i> OV Trip Level	1.00, 1.01, ... 1.50xVn	1.15 xVn	
<i>Gn</i> OV Trip Time Delay	0, 1, ... 1000ms	0 ms	
<i>Gn</i> Undervoltage Prot.	Enabled, Disabled	Enabled	
<i>Gn</i> UV Block Level	Disabled, 1.0, 1.5, ..., 60.0 V	3.0 V	
<i>Gn</i> UV1 Level	5.0, 5.5, ..., 80.0 V	55.0 V	
<i>Gn</i> UV1 Time Delay	0.00, 0.01, ..., 1.00, 1.10, ..., 60, 61, ..., 600 s	5.00 s	
<i>Gn</i> UV1 Hysteresis	1, 2, ..., 90 %	2 %	
<i>Gn</i> UV1 O/P Phases	Any 1, All	Any 1	
<i>Gn</i> UV1 Tripping	Enabled, Disabled	Disabled	
<i>Gn</i> UV2 Level	5.0, 5.5, ..., 80.0 V	55.0 V	
<i>Gn</i> UV2 Time Delay	0.00, 0.01, ..., 1.00, 1.10, ..., 60, 61, ..., 600 s	10.00 s	
<i>Gn</i> UV2 Hysteresis	1, 2, ..., 90 %	2 %	
<i>Gn</i> UV2 O/P Phases	Any 1, All	Any 1	
<i>Gn</i> UV2 Tripping	Enabled, Disabled	Disabled	
<i>Gn</i> SOTF	Enabled, Disabled	Enabled	
<i>Gn</i> SOTF Mode	AC SOTF, DC SOTF	AC SOTF	
<i>Gn</i> SOTF O/C Operate Level	Enabled, Disabled	0.30 xIn	
<i>Gn</i> AC SOTF Pickup Delay	0, 1, ..., 1000, 1010, ..., 10000, 10100, ..., 60000ms	10000 ms	
<i>Gn</i> Min AUX DC SOTF Dead Time	0, 1, ..., 1000, 1010, ..., 10000, 10100, ..., 60000ms	10000 ms	
<i>Gn</i> VT Supervision	Enabled, Disabled	Enabled	
<i>Gn</i> VT Latched Operation	ENABLED, DISABLED	ENABLED	
<i>Gn</i> VTS Mode	Alarm Only, Alarm & Inhibit	Alarm & Inhibit	
<i>Gn</i> VTS Phase Fault Inhibit	Enabled, Disabled	Enabled	
<i>Gn</i> VTS Input Source	RES I/V, NPS I/V	RES I/V	
<i>Gn</i> VTS Ires Level	0.05, 0.1, ..., 2 xIn	0.30 xIn	
<i>Gn</i> VTS Vop Level	1, 2, ..., 100 V	20 V	

Setting	Range	Default	Setting
<i>Gn</i> VTS Alarm PU Delay	0, 1, ..., 1000, 1010, ..., 10000, 10100, ..., 60000ms	100 ms	
<i>Gn</i> VTS Latch PU Delay	0, 1, ..., 1000, 1010, ..., 10000, 10100, ..., 60000ms	5000 ms	
<i>Gn</i> DEF Protection	Enabled, Disabled	Enabled	
<i>Gn</i> DEF Active Scheme	DEF POR, DEF Direct Trip	DEF POR	
<i>Gn</i> DEF Char Angle	-15, -10, ... 95°	-45 deg	
<i>Gn</i> DEF Direction	Forward, Reverse	Forward	
<i>Gn</i> DEF IDMTL Setting	0.05, 0.10, ... 4.00 xIn	1.00 xIn	
<i>Gn</i> DEF IDMTL Char	IEC-NI, IEC-VI, IEC-EI, IEC-LTI, ANSI-MI, ANSI-VI, ANSI-EI, DTL	IEC-NI	
<i>Gn</i> DEF IDMTL Time Mult (IEC/ANSI)	0.025, 0.050, ..., 1.600	1.000	
<i>Gn</i> DEF IDMTL Delay (DTL)	INST, 0.01, 0.02, ..., 20.00s	5.00 s	
<i>Gn</i> DEF IDMTL Reset	(ANSI) DECAYING, INST, 1, 2, ..., 60s	INST s	
<i>Gn</i> DEF WI Res OV Setting	0, 1, ..., 1000, 1010, ..., 10000, 10100, ..., 60000ms	1 V	
<i>Gn</i> DEF Current Rev Reset	0, 1, ..., 1000, 1010, ..., 10000, 10100, ..., 60000ms	200 ms	
<i>Gn</i> CB Echo Pulse Width	0, 1, ..., 1000, 1010, ..., 10000, 10100, ..., 60000ms	250 ms	
<i>Gn</i> Trip Circuit Fail	Enabled, Disabled	Disabled	

AUTORECLOSE MENU

Setting	Range	Default	Setting
<i>Gn</i> A/R In Service	In, Out	Out	
<i>Gn</i> Dead Bar Charge	Enabled, Disabled	Disabled	
<i>Gn</i> Dead Line Charge	Enabled, Disabled	Disabled	
<i>Gn</i> Dead Line & Dead Bar Close	Enabled, Disabled	Disabled	
<i>Gn</i> Check Sync Close	Enabled, Disabled	Enabled	
<i>Gn</i> Unconditional Close	Enabled, Disabled	Disabled	
<i>Gn</i> Manual Close DBC	Enabled, Disabled	Disabled	
<i>Gn</i> Manual Close DLC	Enabled, Disabled	Disabled	
<i>Gn</i> Manual Close DLDB	Enabled, Disabled	Disabled	
<i>Gn</i> Manual Close CS	Enabled, Disabled	Enabled	
<i>Gn</i> Deadtime	0.1, 0.2, ... 120.0, 121.0, ... 900.0s	5.0 s	
<i>Gn</i> Live Line Check	Enabled, Disabled	Enabled	
<i>Gn</i> Check Sync During Deadtime	Enabled, Disabled	Enabled	
<i>Gn</i> VT Fail Lockout	Enabled, Disabled	Disabled	
<i>Gn</i> CB Close Pulse	0.2, 0.3, ... 20.0s	2.0 s	
<i>Gn</i> Reclaim Time	OFF, 1, 2, ...600s	5 s	
<i>Gn</i> Dead Line Charge Delay	0, 1, 2, ...60s	0 s	
<i>Gn</i> Dead Bar Charge Delay	0, 1, 2, ...60s	0 s	
<i>Gn</i> Reclose Blocked Delay	0, 1, 2, ...600s	60 s	
<i>Gn</i> Sync Close Delay	OFF, 1, 2, ...900s	30 s	
<i>Gn</i> Sequence Fail Timer	OFF, 1, 2, ...600s	Off s	
<i>Gn</i> CB Fail To Open Delay	50, 60 ...2000ms	100 ms	
<i>Gn</i> Minimum LO Timer	0, 1, ...60s	2 s	
<i>Gn</i> Reset LO By Timer	Enabled, Disabled	Disabled	
<i>Gn</i> Z2 AR Start	Enabled, Disabled	Disabled	
<i>Gn</i> Z3 AR Start	Enabled, Disabled	Disabled	
<i>Gn</i> DEF AR Start	Enabled, Disabled	Disabled	
<i>Gn</i> DEF Aided AR Start	Enabled, Disabled	Disabled	
<i>Gn</i> Fault Type AR Start	(2P,1P), ALL	(2P,1P)	

SYNC MENU

Setting	Range	Default	Setting
Sync Connection	Phase B-Earth, Phase A-Phase B	Phase B-Earth	
Check Sync Vnom	63.5, 110V	63.5V	
Gn Bus : Dead Live	5, 6, ...150% 10, 11, ... 155%	20% 90 %	
Gn Line: Dead Live	5, 6, ...150% 10, 11, ... 155%	20% 90 %	
Gn Bus Undervolts	OFF, 5, 6, ... 150%	90 %	
Gn Line Undervolts	OFF, 5, 6, ... 150%	90 %	
Gn Voltage Differential	OFF, 1, 2, ... 100%	10 %	
Gn Split Angle	OFF, 95, 96, ... 175°	175 deg	
Gn MC Split Action	System Sync, Check Sync	System Sync	
Gn ARC Split Action	Lockout, System Sync	Lockout	
Gn Check Sync Angle	5, 6, ... 90°	20 deg	
Gn Check Sync Slip	OFF, 10, 15, ... 2000mHz	50 mHz	
Gn Check Sync Timer	OFF, 0.1, 0.2, ... 100.0s	OFF s	
Gn System Sync Angle	5, 6, ... 90°	10 deg	
Gn System Sync Slip	OFF, 10, 15, ... 2000mHz	125 mHz	
Gn System Sync Timer	OFF, 0.1, 0.2, ... 100.0s	OFF s	

REYLOGIC CONFIG MENU

Setting	Range	Default	Setting
Gn SR Dropoff	0, 1, ..., 1000, 1010, ..., 10000, 10100, ..., 60000ms	1 ms	
Gn SS Dropoff	0, 1, ..., 1000, 1010, ..., 10000, 10100, ..., 60000ms	1 ms	
Gn SR2 Dropoff	0, 1, ..., 1000, 1010, ..., 10000, 10100, ..., 60000ms	1 ms	
Gn SS2 Dropoff	0, 1, ..., 1000, 1010, ..., 10000, 10100, ..., 60000ms	1 ms	
Gn Timer 1 Pickup Delay	0, 1, ..., 1000, 1010, ..., 10000, 10100, ..., 60000ms	1 ms	
Gn Timer 1 Dropoff Delay	0, 1, ..., 1000, 1010, ..., 10000, 10100, ..., 60000ms	0 ms	
Gn Timer 2 Pickup Delay	0, 1, ..., 1000, 1010, ..., 10000, 10100, ..., 60000ms	1 ms	
Gn Timer 2 Dropoff Delay	0, 1, ..., 1000, 1010, ..., 10000, 10100, ..., 60000ms	0 ms	
Gn Counter 1 Target	1, 2, ..., 60000	1	
Gn Counter 2 Target	1, 2, ..., 60000	1	

STATUS CONFIG MENU

Setting	Range	Default	Setting
Signal Receive 1	NONE, 1...27 ¹	1	
Carrier Guard	NONE, 1...27 ¹	NONE	
Signal Receive 2	NONE, 1...27 ¹	2	
Block DEF	NONE, 1...27 ¹	16	
DC SOTF Manual Close	NONE, 1...27 ¹	8	
Start AUX DC SOTF	NONE, 1...27 ¹	NONE	
VT Circuits Isolated	NONE, 1...27 ¹	NONE	
Trigger Storage	NONE, 1...27 ¹	NONE	
Increment Trip Count	NONE, 1...27 ¹	NONE	
Reset Total Trip Cnt	NONE, 1...27 ¹	NONE	
Reset Delta Trip Cnt	NONE, 1...27 ¹	NONE	
Reset Total CB Close	NONE, 1...27 ¹	NONE	
Use Alt Setting Grp	NONE, 1...27 ¹	NONE	
Block Reclose	NONE, 1...27 ¹	7	
A/R Out	NONE, 1...27 ¹	13	
A/R In	NONE, 1...27 ¹	12	
Go Direct To Lockout	NONE, 1...27 ¹	15	
Trip And Reclose	NONE, 1...27 ¹	14	
External A/R Start	NONE, 1...27 ¹	6	
Reset Lockout	NONE, 1...27 ¹	5	
Sync Override	NONE, 1...27 ¹	NONE	
Manual Sync Override	NONE, 1...27 ¹	NONE	
CB Phase A Closed	NONE, 1...27 ¹	3	
CB Phase B Closed	NONE, 1...27 ¹	3	
CB Phase C Closed	NONE, 1...27 ¹	3	
CB Phase A Open	NONE, 1...27 ¹	4	
CB Phase B Open	NONE, 1...27 ¹	4	
CB Phase C Open	NONE, 1...27 ¹	4	
Manual Close	NONE, 1...27 ¹	NONE	
Reset Delta CB Close	NONE, 1...27 ¹	NONE	
Input 1	NONE, 1...27 ¹	1	
Input 2	NONE, 1...27 ¹	2	
Input 3	NONE, 1...27 ¹	3	
Input 4	NONE, 1...27 ¹	4	
Input 5a	NONE, 1...27 ¹	NONE	
Input 5b	NONE, 1...27 ¹	NONE	
Input 5c	NONE, 1...27 ¹	NONE	
Input 5d	NONE, 1...27 ¹	NONE	
Input 6a	NONE, 1...27 ¹	NONE	
Input 6b	NONE, 1...27 ¹	NONE	
Input 6c	NONE, 1...27 ¹	NONE	
Input 6d	NONE, 1...27 ¹	NONE	
Timer 1	NONE, 1...27 ¹	NONE	

Setting	Range	Default	Setting
Timer 2	NONE, 1...27 ¹	NONE	
Counter 1 Count	NONE, 1...27 ¹	NONE	
Counter 1 Reset	NONE, 1...27 ¹	NONE	
Counter 2 Count	NONE, 1...27 ¹	NONE	
Counter 2 Reset	NONE, 1...27 ¹	NONE	
Trip Circuit Fail	NONE, 1...27 ¹	NONE	
Clock Sync.	NONE, 1...27 ¹	NONE	

1) 27 Status Inputs represents the maximum configuration.

OUTPUT CONFIG MENU

Setting	Range	Default	Setting
Protection Healthy	NONE, 1...29 ¹	1	
Signal Send 1	NONE, 1...29 ¹	6	
POR Weak Infeed	NONE, 1...29 ¹	NONE	
DEF Aided Trip	NONE, 1...29 ¹	NONE	
Signal Send 2	NONE, 1...29 ¹	7	
DEF Protection	NONE, 1...29 ¹	17	
Sig Recvd 2 Flag	NONE, 1...29 ¹	NONE	
UV1 Alarm	NONE, 1...29 ¹	NONE	
UV2 Alarm	NONE, 1...29 ¹	NONE	
UV Trip	NONE, 1...29 ¹	NONE	
SOTF Operated	NONE, 1...29 ¹	12	
VTS Alarm	NONE, 1...29 ¹	11	
Trip Output	NONE, 1...29 ¹	4,14	
Trip Reset	NONE, 1...29 ¹	NONE	
Phase A Fault	NONE, 1...29 ¹	NONE	
Phase B Fault	NONE, 1...29 ¹	NONE	
Phase C Fault	NONE, 1...29 ¹	NONE	
Earth Fault	NONE, 1...29 ¹	NONE	
Zone 1	NONE, 1...29 ¹	8	
Zone 2	NONE, 1...29 ¹	9	
Zone 3	NONE, 1...29 ¹	10	
Aided Trip	NONE, 1...29 ¹	NONE	
Sig Recvd 1 Flag	NONE, 1...29 ¹	NONE	
Carrier Guard	NONE, 1...29 ¹	NONE	
Power Swing Alarm	NONE, 1...29 ¹	15	
Delta Trip Cnt Alarm	NONE, 1...29 ¹	NONE	
Total Trip Cnt Alarm	NONE, 1...29 ¹	NONE	
High Set	NONE, 1...29 ¹	13	
Overvoltage Alarm	NONE, 1...29 ¹	NONE	
Overvoltage	NONE, 1...29 ¹	20	
SEF Alarm	NONE, 1...29 ¹	NONE	
SEF Protection	NONE, 1...29 ¹	19	
Close Pulse	NONE, 1...29 ¹	5	
Trip Relay Reset	NONE, 1...29 ¹	NONE	
Lockout	NONE, 1...29 ¹	16	
A/R Out of Service	NONE, 1...29 ¹	NONE	
A/R In Service	NONE, 1...29 ¹	NONE	
A/R In Progress	NONE, 1...29 ¹	18	
Live Line	NONE, 1...29 ¹	NONE	
Live Bus	NONE, 1...29 ¹	NONE	
In Sync	NONE, 1...29 ¹	NONE	
CB Open	NONE, 1...29 ¹	NONE	
CB Closed	NONE, 1...29 ¹	NONE	

Setting	Range	Default	Setting
CB Failed To Close	NONE, 1...29 ¹	NONE	
System Split	NONE, 1...29 ¹	NONE	
Successful Close	NONE, 1...29 ¹	NONE	
CB Failed to Open	NONE, 1...29 ¹	NONE	
Check Sync Start	NONE, 1...29 ¹	NONE	
Sync In Prog Flag	NONE, 1...29 ¹	NONE	
Close Onto Fault	NONE, 1...29 ¹	NONE	
Delta CB Count Alarm	NONE, 1...29 ¹	NONE	
Total CB Count Alarm	NONE, 1...29 ¹	NONE	
CB Not In Ser Alarm	NONE, 1...29 ¹	NONE	
CB Memory	NONE, 1...29 ¹	NONE	
A/R Not Allowed	NONE, 1...29 ¹	NONE	
Input 1 Operated	NONE, 1...29 ¹	NONE	
Input 1 Not Operated	NONE, 1...29 ¹	NONE	
Input 2 Operated	NONE, 1...29 ¹	NONE	
Input 2 Not Operated	NONE, 1...29 ¹	NONE	
Input 3 Operated	NONE, 1...29 ¹	NONE	
Input 4 Operated	NONE, 1...29 ¹	NONE	
Input 5 Operated	NONE, 1...29 ¹	NONE	
Input 6 Operated	NONE, 1...29 ¹	NONE	
Timer 1 Operated	NONE, 1...29 ¹	NONE	
Timer 2 Operated	NONE, 1...29 ¹	NONE	
Counter 1 Operated	NONE, 1...29 ¹	NONE	
Counter 2 Operated	NONE, 1...29 ¹	NONE	
Trip Circuit Fail	NONE, 1...29 ¹	NONE	
IRIG-B Synch'	NONE, 1...29 ¹	NONE	
Hand Reset Outputs	NONE, 1...29 ¹	NONE	

1) 29 output relays represents the maximum configuration.

OUTPUT OPERATE TIME MENU

Setting	Range	Default	Setting
R1 Min Operate Time	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	
R2 Min Operate Time	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	
R3 Min Operate Time	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	
R4 Min Operate Time	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	
R5 Min Operate Time	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	
R6 Min Operate Time ¹	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	
R7 Min Operate Time ¹	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	
R8 Min Operate Time ¹	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	
R9 Min Operate Time ¹	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	
R10 Min Operate Time ¹	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	
R11 Min Operate Time	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	
R12 Min Operate Time ¹	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	
R13 Min Operate Time ¹	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	
R14 Min Operate Time ¹	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	
R15 Min Operate Time ¹	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	
R16 Min Operate Time ¹	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	
R17 Min Operate Time ¹	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	
R18 Min Operate Time ¹	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	
R19 Min Operate Time	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	
R20 Min Operate Time	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	
R21 Min Operate Time ¹	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	
R22 Min Operate Time ¹	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	
R23 Min Operate Time ¹	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	
R24 Min Operate Time ¹	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	

Setting	Range	Default	Setting
R25 Min Operate Time ¹	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	
R26 Min Operate Time ¹	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	
R27 Min Operate Time ¹	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	
R28 Min Operate Time ¹	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	
R29 Min Operate Time ¹	0.1, 0.12, ..., 2, 2.1, ..., 20, 21, ..., 60s	0.10 s	

1) Only when fitted.

LED CONFIG MENU

Setting	Range	Default	Setting
Signal Send 1	NONE, 1...32	NONE	
POR Weak Infeed	NONE, 1...32	27	
DEF Aided Trip	NONE, 1...32	13	
Signal Send 2	NONE, 1...32	NONE	
DEF Protection <i>Directional Earth Fault element operated</i>	NONE, 1...32	11	
Sig Recvd 2 Flag	NONE, 1...32	12	
UV1 Alarm	NONE, 1...32	22	
UV2 Alarm	NONE, 1...32	22	
UV Trip	NONE, 1...32	23	
SOTF Operated	NONE, 1...32	17	
VTS Alarm	NONE, 1...32	18	
Trip Output <i>An element has operated. Useful when testing individual functions!</i>	NONE, 1...32	NONE	
Trip Reset	NONE, 1...32	NONE	
Phase A Fault <i>A phase A element operated</i>	NONE, 1...32	5	
Phase B Fault <i>A phase B element operated</i>	NONE, 1...32	6	
Phase C Fault <i>A phase C element operated</i>	NONE, 1...32	7	
Earth Fault <i>An Earth Fault element operated</i>	NONE, 1...32	8	
Zone 1 <i>A Zone 1 element operated</i>	NONE, 1...32	1	
Zone 2 <i>A Zone 2 element operated</i>	NONE, 1...32	2	
Zone 3 <i>A Zone 3 element operated</i>	NONE, 1...32	3	
Aided Trip	NONE, 1...32	10	
Sig Recvd 1 Flag	NONE, 1...32	9	
Carrier Guard	NONE, 1...32	NONE	
Power Swing Alarm	NONE, 1...32	26	
Delta Trip Cnt Alarm	NONE, 1...32	NONE	
Total Trip Cnt Alarm	NONE, 1...32	NONE	
High Set <i>A High Set overcurrent element operated</i>	NONE, 1...32	19	
Overvoltage Alarm	NONE, 1...32	20	
Overvoltage	NONE, 1...32	21	
SEF Alarm	NONE, 1...32	24	
SEF Protection	NONE, 1...32	25	
Close Pulse	NONE, 1...32	NONE	
Trip Relay Reset	NONE, 1...32	NONE	
Lockout	NONE, 1...32	15	
A/R Out of Service	NONE, 1...32	NONE	
A/R In Service	NONE, 1...32	NONE	

Setting	Range	Default	Setting
A/R In Progress	NONE, 1...32	14	
Live Line	NONE, 1...32	NONE	
Live Bus	NONE, 1...32	NONE	
In Sync	NONE, 1...32	NONE	
CB Open	NONE, 1...32	16	
CB Closed	NONE, 1...32	NONE	
CB Failed To Close	NONE, 1...32	30	
System Split	NONE, 1...32	32	
Successful Close	NONE, 1...32	NONE	
CB Failed to Open	NONE, 1...32	30	
Check Sync Start	NONE, 1...32	NONE	
Sync In Prog Flag	NONE, 1...32	31	
Close Onto Fault	NONE, 1...32	NONE	
Delta CB Count Alarm	NONE, 1...32	30	
Total CB Count Alarm	NONE, 1...32	30	
CB Not In Ser Alarm	NONE, 1...32	NONE	
CB Memory	NONE, 1...32	NONE	
A/R Not Allowed	NONE, 1...32	NONE	
Input 1 Operated	NONE, 1...32	NONE	
Input 1 Not Operated	NONE, 1...32	NONE	
Input 2 Operated	NONE, 1...32	NONE	
Input 2 Not Operated	NONE, 1...32	NONE	
Input 3 Operated	NONE, 1...32	NONE	
Input 4 Operated	NONE, 1...32	NONE	
Input 5 Operated	NONE, 1...32	NONE	
Input 6 Operated	NONE, 1...32	NONE	
Timer 1 Operated	NONE, 1...32	NONE	
Timer 2 Operated	NONE, 1...32	NONE	
Counter 1 Operated	NONE, 1...32	NONE	
Counter 2 Operated	NONE, 1...32	NONE	
Trip Circuit Fail <i>A trip circuit has failed, look at status inputs Leds to find out which one</i>	NONE, 1...32	NONE	
IRIG-B Synch'	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	9,12,14-16,18,20,22, 24, 26, 29, 31-32	

COMMUNICATIONS MENU

Setting	Range	Default	Setting
Station Address <i>IEC 60870-5-103 Station Address</i>	0, 1, ... 254	0	
IEC870 on port <i>Selects which port to use for IEC 60870-5-103 communications</i>	COM1, COM2	COM1	
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 On, Light Off	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	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 On, Light Off	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, Rear Port, Front Port	AUTO-DETECT	

CB MAINTENANCE MENU

Setting	Range	Default	Setting
Total CB Trip Count Alarm	OFF, 1, 2, ..., 9999	OFF	
Delta CB Trip Count Alarm	OFF, 1, 2, ..., 9999	OFF	
Total CB Close Count Alarm	1, 2, ... 999	100	
Delta CB Close Count Alarm	1, 2, ... 999	20	
Reset Total CB Trip Count	NO, YES	NO	
Reset Delta CB Trip Count	NO, YES	NO	
Reset Total CB Close Count	NO, YES	NO	
Reset Delta CB Close Count	NO, YES	NO	

DATA STORAGE MENU

Setting	Range	Default	Default
Pre-trigger Storage	10 ... 90%	20 %	
Record Duration	10x1, 5x2, 2x5, 1x10	5 Rec x 1 Sec	

FAULT LOCATOR MENU

Setting	Range	Default	Default
Pos Seq Line Impedance	Enabled, Disabled	10.00 Ohms	
Sec'y Z+ per unit distance	0.1, 0.11, ..., 10, 10.1, ..., 100, 101, ..., 250 Ω	0.500 Ohms	
Display distance as	0.001, 0.002, ..., 5 Ω	Percent	
Fault Locator	Percent, Kilometres, Miles	ENABLED	

3 INSTRUMENTS

INSTRUMENT	DESCRIPTION
Primary Voltages 0.0 0.0 0.0 kV	
Primary Currents 0.0 0.0 0.0 kA	
Secondary Voltages 0.0 0.0 0.0 V	
Secondary Currents 0.00 0.00 0.00 A	
Prim. Res. Current 0.00 kA	
Sec'y Res Current 0.00 A	
Sec'y NPS Current 0.00A @ 0°	
Sec'y ZPS Current 0.00A @ 0°	
Sec'y ZPS Voltage 0.00V @ 0°	
Total Power 0.0 MW	
Total Reactive Power 0.0 MVar	
Power Factor -----	
Power Flow Direction -----	
Check Sync Bus RMS 0.0 V	
Check Sync Line RMS 0.0 V	
Check Sync Volt Diff 0.0 V	
Check Sync Line/Bus Phase Diff 0.0°	
Check Sync Bus Freq 0.00 Hz	
Check Sync Line Freq 0.00 Hz	
Check Sync Slip Freq 0.00 Hz	
Autotreclose State AROutOfService	
Total Trip Count 0	
Delta Trip Count 0	
Total CB Close Count 0	
Delta CB Trip Count 0	
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
Num Waveform Records 0	
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

4 SETTINGS WALKTHROUGH

The relay displays are organised into three lists:-

- A list of settings
- A list of meters (instruments)
- A list of fault records

This walkthrough describes the settings and is intended to be read in front of a powered-up relay. The starting point is the relay identifier screen. This is the screen the relay displays when it is first powered-up and can be reached from any display by pressing **CANCEL** a few times.

From this position press the down arrow key once, the relay will display “**SETTINGS MODE**”. From this display the down arrow key can be pressed again to enter the setting list, or the right arrow key ⇒ can be pressed to choose a different list (“**INSTRUMENTS MODE**” or “**FAULT DATA MODE**”). Press the down arrow key ↓. The relay enters the settings list and displays “**SYSTEM CONFIG MENU**”.

SYSTEM CONFIG MENU

This menu contains general settings which allows the relay to be configured. Press ⇒ to open the menu and display the settings.

Active Group

There are 8 setting groups in the relay. Some settings can have different values in each group while others have the same value in all groups. This setting controls which group of values is applied to the relay. When it is changed all the settings which can have different values in each group are changed.

Alternate Setting Group

It is possible to cause the relay to switch from one setting group to another on application of a signal to a status input (Use Alt Setting Grp). When this status input is made high the relay will switch from whichever group is currently active to the alternate group defined in this setting. The relay will revert to the previous setting group when the status input is de-energised.

CT Ratio

The protection CT ratio can be set. This will allow the meter display to show the correct primary current. This setting does not affect any protection functions.

VT Ratio

The protection VT ratio can be set. This will allow the meter display to show the correct primary voltage. This setting does not affect any protection functions.

CVT in use

Specifies whether Capacitive Voltage Transformers are in use as oppose to traditional Electromagnetic VTs.

Clock Sync. From Status

The relay can synchronise its internal clock from pick-up of a status input. The relay can be set to synchronise the minutes or seconds.

View/Edit Group

Each setting group can be viewed and edited without making it active. Settings that can be different in each group indicate which group the displayed value belongs to with the letter “G” and the group number in front of the setting description. This setting controls which group is displayed.

IMPORTANT: whichever group of settings are visible may NOT be the settings the relay is using. The relay will only operate on the Active Group regardless of the displayed settings.

Defaults Screens Timer

Time delay after which display will return to the top of the menu.

Backlight Timer

If no keys are pressed for this time delay, the relay will turn off the backlight.

Date

The current date is set in this menu. The format is DD,MM,YYYY

Time

The current time is set. In this menu only minutes and hours are set. The format is HH,MM the 24 hour clock is used.

Change Password

The relay is provided with a password feature. If set it will prevent any un-authorized changes to any of the relay settings. The password is a four character word once set it can be disabled by entering the new password NONE. If the password has been lost then an authorised person must contact a Reyrolle Protection representative.

Relay Identifier

The relay is supplied with a default identifier usually the relay model. This can be changed to give any meaningful identification to the relay. eg feeder name or circuit number.

DISTANCE PROTECTION MENU

The settings for the impedance elements are located in this menu.

Active Scheme

There are a number of different protection schemes available in Ohmega depending upon the model. These can be chosen at this setting. Only one scheme can be active at a time. The schemes are described in section 3 of this manual.

Carrier Guard

Allows the carrier guard function of the active scheme to be disabled between settings groups.

CT Secondary

The relay can operate from 1, 2 or 5 Amp CT secondary circuits. The value MUST be programmed for the correct CT. This will affect the impedance measurements if not programmed correctly.

Line Angle

This is the positive sequence characteristic fault angle of the composite transmission line.

EF Comp Z0/Z1 ratio

The ratio of Z0/Z1 is used in an internal calculation for earth fault compensation. This is common for all zones.

EF Comp Z0 angle

This is the zero sequence characteristic fault angle for the earth fault component.

Reactive Drop Angle

This sets the angle for the reactive part of the quadrilateral characteristic. This line is parallel to the resistive axis.

Z1 Phase Fault

The zone 1 phase fault elements A-B, B-C, C-A, can be disabled from this setting. No other elements are affected.

Z1 PF Impedance

The zone 1 phase fault impedance values are applied using this setting. The values are in terms of secondary positive sequence impedance.

Z1 PF Time Delay

An independent time delay from 0 – 10s can be applied to the zone 1 phase fault protection elements.

Z1 Earth Fault

The zone 1 earth fault elements A-E, B-E, C-E, can be disabled from this setting. No other elements are affected.

Z1 EF Type

The type of zone 1 earth fault elements are selected from this setting, defining whether Mho or Quad Characteristics are used.

Z1 EF Impedance

The zone 1 earth fault impedance reach for the mho or quad characteristics is applied using this setting. The values are in terms of secondary positive sequence impedance. This allows a reach setting which is independent from the phase fault setting.

Z1 EF Resistance

The zone 1 earth fault resistive reach for the quad characteristic is applied using this setting. If mho characteristics are enabled, this setting is ignored. The values are in terms of secondary positive sequence resistance. This allows a reach setting which is independent from the phase fault setting.

Z1 EF Time Delay

An independent time delay from 0 – 10s can be applied to the zone 1 earth fault protection elements.

Z2 Phase Fault

The zone 2 phase fault elements A-B, B-C, C-A, can be disabled from this setting. No other elements are affected.

Z2 PF Impedance

The zone 2 phase fault impedance values are applied using this setting. The values are in terms of secondary positive sequence impedance.

Z2 PF Time Delay

An independent time delay from 0 – 10s can be applied to the zone 2 phase fault protection elements.

Z2 Earth Fault

The zone 2 earth fault elements A-E, B-E, C-E, can be disabled from this setting. No other elements are affected.

Z21 EF Type

The type of zone 2 earth fault elements are selected from this setting, defining whether Mho or Quad Characteristics are used.

Z2 EF Impedance

The zone 2 earth fault impedance reach for the mho or quad characteristics is applied using this setting. The values are in terms of secondary positive sequence impedance. This allows a reach setting which is independent from the phase fault setting.

Z2 EF Resistance

The zone 2 earth fault resistive reach for the quad characteristic is applied using this setting. If mho characteristics are enabled, this setting is ignored. The values are in terms of secondary positive sequence resistance. This allows a reach setting which is independent from the phase fault setting.

Z2 EF Time Delay

An independent time delay from 0 – 10s can be applied to the zone 1 earth fault protection elements.

Z3 Phase Fault

The zone 3 phase fault elements A-B, B-C, C-A, can be disabled from this setting. No other elements are affected.

Z3 PF Type

There are three types of zone 3 characteristic, Offset Mho, Forward (Fwd) Mho, Reverse (Rev) Mho. If either forward or reverse is selected then these elements become a standard directional element and require a polarising voltage. If an offset Mho characteristic is selected, then operation can occur without polarising voltage.

Z3 PF Impedance (Fwd)

The zone 3 phase fault forward reach impedance values are applied using this setting. The values are in terms of secondary positive sequence impedance. If the element is selected as a reverse element then this setting is ignored.

Z3 PF Impedance (Rev)

The zone 3 phase fault reverse reach impedance values are applied using this setting. The values are in terms of secondary positive sequence impedance. If the element is selected as a forward element then this setting is ignored.

Z3 PF Time Delay

An independent time delay from 0 – 10s can be applied to the zone 3 phase fault protection elements.

Z3 Earth Fault

The zone 3 earth fault elements A-E, B-E, C-E, can be disabled from this setting. No other elements are affected.

Z3 EF Type

There are six types of zone 3 characteristic, Offset Mho, Forward (Fwd) Mho, Reverse (Rev) Mho, Offset Quad, Forward (Fwd) Quad, Reverse (Rev) Quad. If either forward or reverse is selected then these elements become a standard directional element and require a polarising voltage. If an Offset Mho characteristic is selected, then operation can occur without polarising voltage.

Z3 EF Impedance (Fwd)

The zone 3 earth fault impedance reach for the mho or quad characteristics is applied using this setting. The values are in terms of secondary positive sequence impedance. This allows a reach setting which is independent from the phase fault setting. If the element is selected as a reverse element then this setting is used as the reverse setting.

Z3 EF Resistance (Fwd)

The zone 3 earth fault resistive reach for the quad characteristic is applied using this setting. If mho characteristics are enabled, this setting is ignored. The values are in terms of secondary positive sequence resistance. If the element is selected as a reverse element then this setting is used as the reverse resistance setting.

Z3 EF Impedance (Rev)

The zone 3 earth fault reverse reach impedance values are applied using this setting. The values are in terms of secondary positive sequence impedance. If the element is selected as a reverse element then this setting is ignored.

Z3 EF Resistance (Rev)

The zone 3 earth fault reverse resistive reach for the quad characteristic is applied using this setting. If mho characteristics are enabled, this setting is ignored. The values are in terms of secondary positive sequence resistance. If the element is selected as a reverse element then this setting is ignored.

Z3 EF Time Delay

An independent time delay from 0 – 10s can be applied to the zone 3 earth fault protection elements.

POR Weak Infeed Tripping

Allows the main trip contacts to operate for a weak infeed fault detection.

WI Voltage Level

Sets the phase-neutral voltage below which a weak Infeed condition can be assumed

POR Current Rev Reset

Sets the time for which tripping is disabled during a current reversal to allow the permissive signal receive to drop off.

POR CB Echo Pulse

Length of pulse returned to sending end if local CB is open in POR scheme.

LOL Level

Where the *Loss of Load* scheme is used, a LOL condition occurs if the current level in one or two phases drops below this level, and the current in the remaining phase(s) is above the level, and there is a residual voltage on the system. The relay will detect a loss of load condition (i.e the remote end breaker has opened) and allow instantaneous tripping of the zone 2 element, for a fixed time window.

LOL CB Op Delay

This delay allows for pole scatter between phases when the breaker opens.

LOL Time Limit

Maximum time after a loss of load condition is detected for which the Zone2 time delay will be removed.

Power Swing Detector

This setting allows the power swing detector to be enabled or disabled

PSD Zone Blocking

This defines which zones of protection tripping would be blocked for in the event of a power swing.

PSD Shape

Allows setting of the power swing zone characteristics as either rectangular or circular.

PSD Blinders

This allows blinders to be applied to the power swing zone to prevent load encroachment. These are applied parallel to the line angle when enabled.

PSD Inner Fwd Impedance

Sets the inner impedance reach in the forward direction (on the line angle) for the PSD characteristic. This must be set equal to or greater than the Zone three reach.

PSD Inner Rev Impedance

Sets the inner impedance reach in the reverse direction (on the line angle) for the PSD characteristic. This must be set equal to or greater than the Zone three reverse reach.

PSD Inner FWD Blinder

This is the impedance (perpendicular to the line angle) between the line impedance and the blinder applied to the PSD zone, to the right of the line characteristic.

PSD Inner REV Blinder

This is the impedance (perpendicular to the line angle) between the line impedance and the blinder applied to the PSD zone, to the left of the characteristic.

PSD Outer Multiplier

The outer reach of the Power swing detector is set as a multiple of the inner reach, normally 1.5 times the inner reach.

PSD Transit Time

This is the length of time for which the impedance characteristic must be between the inner and out zone of the Power Swing Detector for a Power Swing to be detected.

AUX PROTECTION MENU

Any additional protection elements are programmed in this section.

High Set

Overcurrent high set elements can be enabled or disabled using this setting.

HS Level

The overcurrent setting is applied here. It is set in multiples of I_n which is set in the DISTANCE PROTECTION MENU under the CT Secondary setting.

HS Time Delay

A time delay from 0 – 1s can be added to the instantaneous operating time of the high set elements.

SEF Protection.

This allows the feature to be enabled or disabled.

SEF Current Setting.

This defines the pick-up level of the SEF element. Settable from 0.2 – 0.95 x I_n in steps of 0.01A.

SEF Alarm Delay.

This is the time between the current detector going high and the alarm contact operating. Setting range from 0-60s.

SEF Trip Delay.

This is the time between the alarm timer going high and the tripcontact operating. Setting range from 0-60s.

Overvoltage Protection

Enables or disables the Overvoltage Protection.

OV Alarm Level

The level of Overvoltage at which the *OV Alarm* timer will start.

OV Alarm Time Delay

Time delay after which the *OV Alarm* output will operate, if the system voltage on any phase remains above the OV alarm level.

OV Trip Level

The level of Overvoltage at which the *OV Trip* timer will start.

OV Trip time Delay

Time delay after which the *OV Trip* output will operate, if the system voltage on any phase remains above the OV trip level.

Undervoltage Protection

Enables or disables the Undervoltage Protection

UV Block Level

When the voltage drops below the block level this will prevent operation of the undervoltage detectors. Prevents nuisance alarms when the line is dead.

UV1 Level

This sets the pick-up level of the first Undervoltage element. This may be used as either the alarm or the trip output.

UV1 Time Delay

Time delay after which the *UV1* output will operate, if the voltage remains below the UV1 trip level.

UV1 Hysteresis

Percentage difference between pick-up and drop off of the *UV1* element.

UV1 O/P Phases

Determines whether the UV1 element will operate for Undervoltage on all three phases or any one phase.

UV1 Tripping

Determines whether operation of the UV1 element will cause the relay's *Trip Output* to operate.

UV2 Level

This sets the pick-up level of the second Undervoltage element. This may be used as either the alarm or the trip output.

UV2 Time Delay

Time delay after which the *UV2* output will operate, if the voltage remains below the *UV2* trip level.

UV2 Hysteresis

Percentage difference between pick-up and drop off of the *UV2* element.

UV2 O/P Phases

Determines whether the UV2 element will operate for Undervoltage on all three phases or any one phase.

UV2 Tripping

Determines whether operation of the UV1 element will cause the relay's *Trip Output* to operate.

SOTF

This setting determines whether the DEF Protection is enabled or not.

SOTF Mode

The Switch On To Fault feature has two modes of operation. It can be energised from an AC function or a DC function. The DC SOTF function is energised by the operation of a status input from the CB manual close handle. The AC SOTF function can be used if the VT is on the bus bar side of the relay.

SOTF O/C Operate Level

The Switch On To Fault feature has two modes of operation.

AC SOTF Pickup Delay

The AC line check time delay which is used to reset the function has a nominal setting of 10s this can be adjusted from 0 – 60s.

Min AUX DC SOTF Dead Time

The minimum DC line check time delay for use with CB auxiliary contacts which is used to reset the function has a nominal setting of 10s this can be adjusted from 0 – 60s.

VT Supervision

This checks for the security of the VT circuit. It can be enabled or disabled.

VTS Latched Operation

Selects whether VTS is latched in after the *VTS Latch PU Delay* or allowed to reset at any time for any sequence current detection above setting.

VTS Mode

If the VTS operates it can be selected to give an alarm only or it can inhibit the operation of the impedance elements.

VTS Phase Fault Inhibit

During a fault condition the VTS is reset when the zero sequence current exceeds the setting. For a phase fault there is no zero sequence current therefore the relay may be inhibited during a phase fault. This setting allows VTS to be disabled for phase faults.

VTS Input Source

Selects the component used for VTS analysis as negative phase sequence or zero sequence current and voltage.

VTS Ires Level

During an earth fault condition the zero sequence current is used to reset the VTS element and allow tripping. The current setting is in terms of I_n .

VTS Vop Level

The VTS feature operated by measuring the summated voltages of the healthy system. If a fuse blows then the resultant voltage is used to operate the VTS function. A nominal 20 volts is used but this can be changed to make the function more or less sensitive.

VTS Alarm PU Delay

If the VTS operates a time delay for the alarm can be set to prevent unwanted alarm signals during temporary system voltage unbalances.

VTS Latch PU Delay

This setting will specify the time after a VTS detection at which point the VTS will latch and no longer be reset by sequence current above the setting.

DEF Protection

This setting determines whether the DEF Protection is enabled or not.

DEF Active Scheme.

There are two active schemes for the relay.

The first is DEF POR (permissive overreach). This is designed to be used in conjunction with a signalling channel. When the DEF element operates it sends a permissive signal to the remote end. In order to trip instantaneously on DEF the relay must detect a DEF and have received a signal from the remote end.

In the other mode, DEF Direct Trip, the relay will trip on detecting an earth fault in the set direction. This mode is intended for used mainly to simplify commissioning.

DEF Char Angle.

This represents the maximum torque angle of the directional relay. Operation will occur for angles in the range ± 85 of this setting. This should be set to the zero sequence impedance angle of the protected feeder.

DEF Direction.

The directionality of the relay can be set to either forward or reverse. With the relay set to forward operation will occur for fault current occurring within the forward operating zone. With the relay set to reverse operation will occur for fault current occurring within the reverse operating zone.

DEF IDMTL Setting.

This is the level of residual current at which the DEF element picks up.

DEF IDMTL Char

Allows selection of the DEF characteristic as various ANSI or IEC curves.

DEF IDMTL Time Mult (IEC/ANSI)

Setting for the IDMTL Time Multiplier.

DEF Time Delay (DTL)

This setting provides a time delay on pick-up which is applied to an Aided DEF trip (in DEF POR mode), or Direct DEF trip (in DEF direct mode).

DEF IDMTL Reset

This allows a ANSI reset characteristic to be selected to replace the default instantaneous setting.

DEF WI Res OV Level.

Specifies the residual voltage which must be present in the absence of a DEF fault detection to assume a Weak Infeed fault.

DEF Current Reversal Reset.

This determines the length of time after a current reversal for which the current reversal logic is active.

CB Echo Pulse Width.

This determine the length of signal which is echoed back to the send end when the remote end is open.

Trip Circuit Fail

Allows the Trip Circuit Supervision function to be disabled.

AUTO RECLOSE MENU**A/R In Service (In, Out)**

This setting allows the AR to be switched in and out of service directly. The autorecloser can also be switched in and out of service using a pair of Status Inputs (*AR In, AR Out*).

Dead Bar Charge (Enabled, Disabled)

Allows a close pulse to be issued to the breaker if the Busbar voltage is less than the Bus Dead voltage level and the Line voltage is greater than the Line Live voltage level during an Autoreclose sequence.

Dead Line Charge (Enabled, Disabled)

Allows a close pulse to be issued to the breaker if the Line voltage is less than the Line Dead voltage level and the Bus voltage is greater than the Bus Live voltage level during an Autoreclose sequence.

Dead Line & Dead Bar Close (Enabled, Disabled)

Allows a close pulse to be issued to the breaker if both the Line and Busbar voltages are less than the Dead voltage levels.

Check Sync Close (Enabled, Disabled)

Allows a close pulse to be issued to the breaker if both the Line and Busbar voltages are greater than the Live voltage levels during an Autoreclose sequence if synchronising conditions between the Line and Busbar voltages are also met.

Unconditional Close (Enabled, Disabled)

Allows closing of the breaker under any system conditions during an Autoreclose sequence.

Manual Close DBC (Enabled, **Disabled**)

Checks that the Busbar voltage is less than the Bus Dead voltage level before a close pulse is issued to the breaker following a Manual Close request.

Manual Close DLC (Enabled, **Disabled**)

Checks that the Line voltage is less than the Line Dead voltage level before a close pulse is issued to the breaker following a Manual Close request.

Manual Close DLDB (Enabled, **Disabled**)

Checks that both the Line and Busbar voltages are less than the Dead voltage levels before a close pulse is issued to the breaker following a Manual Close request.

Manual Close CS (Enabled, **Disabled**)

Checks synchronism between the Line and Busbar voltages, before a close pulse is issued to the breaker following a Manual Close request.

Deadtime (0 – 900s) **15s**

The Deadtime is started when the trip initiation drops off and the circuit breaker has opened. This delay allows the fault conditions on the system to decay before a close pulse is issued to the breaker.

Live Line Check (Enabled, **Disabled**)

If the Line voltage is “dead” for 2 seconds before the trip, a maintenance condition is assumed and no ARC is attempted. Where VTs are mounted on the busbar side of the circuit breaker this feature should be disabled.

This function also initiates an additional check that the line is dead before the Deadtime will start.

Check Sync During Deadtime (Enabled, **Disabled**)

With this setting disabled the relay will wait until the end of the deadtime before it checks the synchronism of the line and bus voltages. With it enabled, if the line and bus voltages come into synchronism during the deadtime a close pulse will be issued to the breaker.

VT Fail Lockout (Enabled, **Disabled**)

If the CB is closed and either Line or Bus is considered Live whilst the other is considered dead, this indicates that there is a VT Fail (blown fuse) on the “dead” side. This condition will drive the Autoreclose to Lockout if this setting is set to Enabled.

CB Close Pulse (0.2..20) **2s**

This is the length of the close pulse. If the circuit breaker has not closed within this time, the relay will operate the *CB fail to Close* output and the autorecloser will lockout.

Reclaim Time (OFF..600) **20s**

This is the time after the close pulse has been issued before the Autoreclose cycle resets itself. If a fault occurs during the reclaim time, the relay will lockout the autorecloser.

Dead Line Charge Delay (0 – 60) **0s****Dead Bar Charge Delay** (0 – 60) **0s**

These settings allow different Deadtimes to be used for DBC and DLC. These times are in addition to the standard Deadtime setting.

Reclose Blocked Delay

If the status input assigned to *Block Autoreclose* remains energised for longer than this time delay the relay will lockout the autorecloser.

Sync Close Delay (0 – 60) **1s**

This is the maximum length of time allowed between the end of the *Deadtime* and the line and bus voltages coming into synchronism. If synchronism is not achieved within this time, the relay will lockout.

Sequence Fail Timer (Off – 600)

This setting defines the maximum time that the relay will wait for the Trip conditions to be cleared – trip reset, breaker open and that the line is dead if Live Line Check is enabled – before it locks out the autorecloser.

CB Fail To Open Delay (50 – 2000) **200ms**

Once a trip signal has been issued, if the breaker fails to open before the Open Delay has elapsed the *CB Fail to Open* alarm will be given.

Reset LO By Timer (Enabled, **Disabled**)

Normally, the AR lockout will be reset automatically when the Breaker is successfully re-closed. Alternatively, it is possible to reset the Lockout after a time delay.

Minimum LO Timer (0 – 60) **2s**

If the *Reset LO by Timer* setting is enabled, the lockout will reset after this time delay.

Z2 AR Start (Enabled, **Disabled**)

Z3 AR Start (Enabled, **Disabled**)

DEF AR Start (Enabled, **Disabled**)

DEF AIDED AR Start (Enabled, **Disabled**)

These settings individually select which protection elements cause an autoreclose sequence to start or lockout.

Fault Type AR Start (**2P/1P**, All)

This selects which type of fault will start an autoreclose. If *2P/1P* is selected, a 3-Phase fault will cause the autorecloser to lockout.

SYNC MENU

Sync Connection (**Phase B-Earth** / Phase A-Phase B)

This defines the connection of the busbar VT used to provide the sync voltage.

Check Sync Vnom (**63.5v**, 110v)

This specifies the nominal voltage upon which the voltage percentage settings are based.. This should be set to 63.5v on Ohmegs relays.

Bus: Dead | Live (5:10..150:155) **20:90%**

These settings define the “live” and “dead” conditions of the Busbar voltage. Once the voltage goes below the “dead” level, the relay will treat the line as dead, until the voltage rises above the “live” level. Similarly when the voltage goes above the live level, the relay will treat the line as live until it goes below the “dead” level.

Line: Dead | Live (5:10..150:155) **20:90%**

These settings define the “live” and “dead” conditions of the Line voltage. Once the voltage goes below the “dead” level, the relay will treat the line as dead, until the voltage rises above the “live” level. Similarly when the voltage goes above the live level, the relay will treat the line as live until it goes below the “dead” level.

Bus Undervolts (OFF, 150) **90%**

This sets the maximum allowable undervoltage on the bus for a check sync close.

Line Undervolts (OFF, 150) **90%**

This sets the maximum allowable undervoltage on the line for a check sync close.

Voltage Differential (OFF, 100) **10%**

This is the maximum allowable difference in magnitude between the line voltage and the busbar voltage for a check sync close.

Split Angle (OFF, **175Deg**)

This is the angle at which the relay will switch from check sync mode to system sync mode.

MC Split Action (System Sync, Check Sync)

This is the action that will be carried out, if a manual close is attempted, when a system split condition is detected

ARC Split Action (System Sync, Lockout)

This defines the relay operation when the angle between line and bus voltage reaches the Split angle during an auto-reclose operation.

Check Sync Angle (5 – 90) **20 deg**

These are the conditions that must exist for the relay to indicate that the voltages are In Sync, during a **Check Sync** operation. These conditions must exist for longer than the Check Sync Timer setting.

Check Sync Slip (OFF..2000) **50 mHz**

This is the maximum frequency difference between the bus and line voltages.

Check Sync Timer (OFF – 100)

This is the minimum time that the bus and line voltage signals must remain in synchronism before a close pulse is issued. Older auto-reclose systems used this time to ensure that the slip frequency between voltages was below a chosen level. Normally it will be set to off, and the maximum slip frequency can be set as the check sync slip set. However, if the auto-reclose system is being used in conjunction with older recloser systems (i.e. the Reyrolle GAD), this setting is included to ensure that equivalent settings can be made on the relay.

System Sync Angle (5..90) **10 deg**

These are the conditions that must exist for the relay to indicate that the voltages are In Sync, during a System Sync operation. Also the angle between the two signals must be decreasing. The conditions are more onerous than for a check sync condition.

System Sync Slip (OFF..2000) **125mHz**

This defines the maximum slip frequency for a System Sync closure to occur.

System Sync Timer (OFF..100)

This is the minimum time that the bus and line voltage signals must remain in synchronism before a close pulse is issued.

REYLOGIC CONFIG MENU

Elements of functions that have had the logic configured in REYLOGIC are found in this menu.

SR Dropoff

The signal received can be extended using this timer to provide a variable pulse length.

SS Dropoff

The send signal can be delayed using this timer to provide a variable pulse length.

SR2 Dropoff

The signal received can be extended using this timer to provide a variable pulse length.

SS2 Dropoff

The send signal can be delayed using this timer to provide a variable pulse length.

Timer 1 Pickup Delay

Allows a delay to be applied to the Reylogic timer designated Timer 1.

Timer 1 Drop off Delay

Allows a delay on drop-off to be applied to the Reylogic timer designated Timer 1.

Timer 2 Pickup Delay

Allows a delay to be applied to the Reylogic timer designated Timer 2.

Timer 2 Drop off Delay

Allows a delay on drop-off to be applied to the Reylogic timer designated Timer 2.

Counter 1 Target

Specifies the number of input pulses that must be applied before an output is produced by the Reylogic Counter designated Counter 1.

Counter 2 Target

Specifies the number of input pulses that must be applied before an output is produced by the Reylogic Counter designated Counter 2.

STATUS CONFIG MENU

The number of status inputs can vary with the relay model type. Each of the status inputs can be mapped to any one or more of the relay functions. The following list shows the purpose of the function.

Signal Receive 1

This is the received signal from the remote end of a distance protection scheme.

Carrier Guard

This input is used to disable the effect of the Signal Receive input within a protection scheme if the signalling channel is detected as unreliable by the signalling equipment.

Signal Receive 2

This is the received signal from the remote end of a DEF protection scheme.

Block DEF

The block DEF input can be used to inhibit tripping of the DEF element.

DC SOTF Manual Close

This input is used in conjunction with the Switch On To Fault feature. It is the signal which is required for use with the DC scheme. A fleeting contact is required from the circuit breaker closing handle. This function can be mapped to any of the status inputs. This is disabled by default.

Start Aux DC SOTF

This input is used to allow DC Switch On To Fault to be driven from a circuit breaker auxiliary contact.

VT Circuit Isolated

This input is used to detect a three phase VT failure, and should be connected to an auxiliary contact from a three phase mcb.

Trigger Storage

An external device can be used to trigger the waveform storage through this input

Increment Trip Count

This input is used to register a CB trip with the CB trip counters within the relay.

Reset Total Trip Count

Used to reset the Total Trip Counter

Reset Delta Trip Count

Used to reset the Delta Trip Counter, typically used after CB maintenance.

Reset Total CB Close

Used to reset the Total Circuit Breaker Close Counter

Use Alternative Settings Group

This input when energised will cause the relay to switch to the alternative setting group defined in the system configuration menu. It will revert when this status input is de-energised.

Block Reclose

Energising this status input will cause a temporary auto-reclose inhibit. This will pause the autorecloser at whatever point it is at. All timers will stop until this Status Input is de-energised. If this status input is energised for longer than the *Reclose Blocked Delay*, the relay will lockout.

A/R Out

A/R In These switch the autorecloser In and Out. A pulse to the “AR in” status input will switch it into service, one to the “AR out” will switch it out of service. If both are high simultaneously, the autorecloser will be switched out of service.

Go Direct To Lockout

Energising this status input will cause the autorecloser to go immediately to lockout. While this input is kept high, the autorecloser will not leave lockout even if an attempt is made to reset it.

Trip And Reclose

Energising this status input will cause the relay to trip and initiate an autoreclose. All conditions for autoreclosing must still be met. This is designed as a test function.

External A/R Start

Energising this status input will cause the relay to start an autoreclose sequence. All conditions for autoreclosing must still be met. This is used where an external device has caused the trip but the Ohmega is required to control the autoreclose sequence.

Reset Lockout

Energising this status input will reset the relay from a lockout condition. This is not normally required because the lockout condition will be reset when the breaker is successfully reclosed.

Sync Override

When this status input is energised during an Autoreclose sequence, the synchroniser is overridden and a close pulse is issued to the breaker regardless of the synchronising conditions. All other Autoreclose conditions must still be met. This would be used where an external Synchronising device is in use.

Manual Sync Override

When this status input is energised during a Manual Close sequence, the synchroniser is overridden and a close pulse is issued to the breaker regardless of the synchronising conditions. All other manual close conditions must still be met. This would be used where a manual Synchronising override panel switch is applied for manual closing.

CB Phase A Closed

This status input should be energised to indicate that Phase A of the Circuit Breaker is closed.

CB Phase B Closed

This status input should be energised to indicate that Phase B of the Circuit Breaker is closed.

CB Phase C Closed

This status input should be energised to indicate that Phase C of the Circuit Breaker is closed.

CB Phase A Open

This status input should be energised to indicate that Phase A of the Circuit Breaker is open.

CB Phase B Open

This status input should be energised to indicate that Phase B of the Circuit Breaker is open.

CB Phase C Open

This status input should be energised to indicate that Phase C of the Circuit Breaker is open.

Manual Close

This input will cause a Manual Closing sequence to commence.

Input 1 .. 4

In order to utilise the status inputs and output relay matrix a number of connections have been created. These are named as Input 1..4 . Inputs 1 and 2 can be used as inverters (output contacts for input 1 (2) operated and input 1 (2) not operated are available)

Input 5 a,b,c,d.

These four inputs form the input to a four input AND gate, the output of which is taken from output 5 operated.

Input 6 a,b,c,d.

These four inputs form the input to a four input AND gate, the output of which is taken from output 6 operated.

Timer 1 (or 2)

This input will cause the output Timer 1(2) Operated to raise if the input is energised for the Timer 1(2) setting.

Counter 1 Count

When this input picks up, Counter 1 is incremented.

Counter 1 Reset

When this input picks up, Counter 1 is reset.

Counter 2 Count

When this input picks up, Counter 2 is incremented.

Counter 2 Reset

When this input picks up, Counter 1 is reset.

Trip Circuit Fail

Input for Trip Circuit Supervision function

Clock Sync

Provides the input for the Synchronise Internal Clock from Status Input function.

OUTPUT CONFIG MENU

Depending upon the configuration of the relay there are a large number of signals which can be mapped to output contacts.

Protection Healthy

This output monitors the condition of the relay and dc power to the relay. This must be mapped to one of the outputs which have a normally closed contact (by default relay 1). When this function is selected it will permanently operate the selected relay. By using a normally closed contact if there is any failure then this contact will close giving a fail safe alarm condition.

Signal Send 1

End to end scheme signal initiated indication of distance aided trip.

POR Weak Infeed

This indicated that a Weak infeed trip has occurred in a POR scheme.

DEF Aided Trip

This indicates that an aided DEF trip has occurred. Both the local and remote ends have detected a DEF condition.

Signal Send 2

End to end scheme signal initiated indication of DEF aided trip.

DEF Protection

This indicates that either an aided DEF trip or a DEF backup trip has occurred.

Signal Received 2 Flag

In an end to end signalling scheme (DEF) this signal can be used to indicate the signal has been received.

UV1 Alarm

This indicated that the Undervoltage element UV1 has operated.

UV2 Alarm

This indicated that the Undervoltage element UV1 has operated.

UV Trip

This indicated that Undervoltage element which is set as a tripping function has operated and caused a trip.

SOTF Operated

This can be used to give an alarm signal when the relay has generated a trip command from the Switch On To Fault logic.

VTS Alarm

This can be used to give an alarm signal when the relay has detected a VT fuse failure.

Trip Output

This signal is the main trip output and can be directed to any one or more of the contacts.

Trip Reset

This is the output produced to provide a trip relay resetting signal for electrically reset trip relays.

***Phase A Fault**

This signal indicates any operation of a phase A impedance protection element.

***Phase B Fault**

This signal indicates any operation of a phase B impedance protection element.

***Phase C Fault**

This signal indicates any operation of a phase C impedance protection element.

***Earth Fault**

This signal indicates any operation of an earth impedance protection element.

***Zone 1**

This signal indicates any operation of a zone 1 impedance protection element.

***Zone 2**

This signal indicates any operation of a zone 2 impedance protection element.

***Zone 3**

This signal indicates any operation of a zone 3 impedance protection element.

Aided Trip

This signal indicates that a trip has occurred as a result of an external signal received which may have been gated with an internal function.

Signal Received 1 Flag

In an end to end signalling scheme (distance) this signal can be used to indicate the signal has been received.

Carrier Guard

This signal is used in conjunction with end to end signaling equipment where a guard signal is available. If the communicating link fails this can be used to generate an output from this signal.

Power Swing Alarm.

Indicates that the impedance characteristic has entered the PSD zone of protection and remained there for longer than the set PSD Transit time. Thus, a power swing in progress.

Delta Trip Cnt Alarm

This output operates when the Delta Trip Counter has reached its set target number.

Total Trip Cnt Alarm

This output operates when the Total Trip Counter has reached its set target number.

High Set

This signal indicates a trip caused by operation of a high set element.

Overvoltage

Indicates that the overvoltage trip level has been exceeded for longer than the overvoltage trip delay.

Overvoltage alarm

Indicates that the overvoltage alarm level has been exceeded for longer than the overvoltage alarm delay.

SEF Protection

Indicates that the SEF Protection has been operated, i.e. the SEF condition has been present for the sum of the SEF alarm and SEF trip times.

SEF Alarm

Indicates that the SEF Alarm has been operated, i.e. the SEF condition has been present for the SEF alarm time.

Close Pulse

The output operated when a Close Pulse is issued to the breaker. This contact is wired to the CB close coil.

Trip Relay Reset

This output will give a pulse when the deadtime starts - i.e. once the breaker has opened and the trip initiation has disappeared. This is wired to the reset coils of the electrically reset trip relays.

Lockout

Operates when the autorecloser has locked out

A/R Out of Service

Operates whenever the autorecloser is "Out of service".

A/R In Service

Operates whenever the autorecloser is "in service".

A/R In Progress

This remains operated from the time the relay issues a trip until the end of the reclaim time. If the autorecloser locks out, this output will remain operated until the lockout condition is reset.

Live Line

Operates when the Line is considered to be Live, determined by the Line Live/Dead setting. See section 12 for application of these settings.

Live Bus

Operates when the Busbar is considered to be Live, determined by the Bus Live/Dead setting. See section 12 for application of these settings.

In Sync

Operates whenever the Busbar and Line voltages are in synchronism. Note that this output will be energised whenever the voltages are in synchronism, not just during a check sync operation.

CB Open

Operates when all 3 breaker Open status inputs (phases A, B and C) are high.

CB Closed

Operates when all 3 breaker Closed status inputs (phases A, B and C) are high.

CB Failed To Close

Operates if the breaker has not closed by the end of the Close Pulse.

System Split

Operates when a System Split occurs, i.e. when the phase angle difference between the Busbar and Line voltages becomes greater than the Split Angle setting.

Successful Close

This is a fleeting contact which operates at the end of the reclaim time.

CB Failed to Open

Operates if the breaker has not opened by the end of the *CB Failed to Open Delay* setting. The status (open or closed) of the breaker is determined from the breaker auxiliary contacts.

Check Sync Start

Operates at the start of the dead time and drops off at the end of the close pulse.

Sync In Prog Flag

Operates when the Busbar and Line voltages are live and the relay is checking the synchronising conditions. This drops off when the breaker closes.

Close Onto Fault

Operates if the relay re-trips during the close pulse.

Delta CB Count Alarm

The Delta CB Close counter is incremented every time the relay carries out a close operation. This output will operate when the Delta close counter reaches the target set in the CB maintenance Menu.

Total CB Count Alarm

The Total CB Close counter is incremented every time the relay carries out a close operation. This output operates when the Total CB Close counter reaches the target set in the CB maintenance Menu.

CB Not In Ser Alarm

The CB is Not In service if it is closed and the line is dead.

This Alarm operates if the breaker is undergoing maintenance work, as determined by the Live Line Check feature. While the breaker is Not In Service the relay will not initiate an autoreclose sequence.

CB Memory

This output is active if the CB is closed and the line is live. This output has a 2 second drop off delay and will still be active for 2 seconds after the opening of an 'In Service' CB. This output must be active for an Autoreclose sequence to start.

If the Line voltage was dead for 2 seconds (the CB memory time) prior to the breaker opening, the breaker is determined as being Not In Service. This output indicates that the condition of the Line

voltage is being checked. It will drop off after a trip signal is sent to the breaker and the CB memory time has elapsed.

A/R Not Allowed

Operates if the breaker is tripped while it is Not In Service

Input 1 Operated

Operates when the Status Input assigned to *Input 1* is energised.

Input 1 Not Operated

Operates when the Status Input assigned to *Input 1* is de-energised. This can be used as an inverter.

Input 2 Operated

Operates when the Status Input assigned to *Input 2* is energised.

Input 2 Not Operated

Operates when the Status Input assigned to *Input 2* is de-energised. This can be used as an inverter.

Input 3 Operated

Operates when the Status Input assigned to *Input 3* is energised.

Input 4 Operated

Operates when the Status Input assigned to *Input 4* is energised.

Input 5 Operated

Operates when the inputs assigned to *Input 5a*, *Input 5b*, *Input 5c* and *Input 5d* are all energised

Input 6 Operated

Operates when the inputs assigned to *Input 6a*, *Input 6b*, *Input 6c* and *Input 6d* are all energised

Timer 1 Operated

This indicates operation of Timer 1.

Timer 2 Operated

This indicates operation of Timer 1.

Counter 1 Operated

This indicates operation of Counter 1.

Counter 2 Operated

This indicates operation of Counter 1.

Trip Circuit Fail

Output for trip Circuit Supervision function.

Hand Reset Outputs

Output contacts listed here will latch once operated by any mapped function and must be reset by hand.

OUTPUT DO CONFIG MENU

This menu allows delays on drop off to be applied to any of the output relays included in the relay.

LED CONFIGURATION MENU

With the exception of the "Protection Healthy" item, this menu has the same relay outputs as the output Configuration menu and these can be used to energise any of the LED flags.

Self Reset LEDs

LEDs selected here will latch on such that they will remain illuminated after the operating signal has reset. These will be extinguished when the Test/Reset button is pressed.

COMMUNICATIONS MENU**Station Address**

IEC 60870-5-103 Station Address. Each relay connected on a communications circuit must have a unique address, a number from 1-255, for identification.

IEC870 on port

Selects which port to use for IEC 60870-5-103 communications

COM1 Baud Rate

Sets the communications baud rate for com port 1 (Rear upper Fibre optic port)

COM1 Parity

Selects whether parity information is used

COM1 Line Idle

Selects the communications line idle sense

COM1 Data Echo

Enables echoing of data from RX port to TX port when operating relays in a Fibre Optic ring configuration

COM2 Baud Rate

Sets the communications baud rate for com port 2 (Rear lower Fibre optic port AND Front Fascia RS232 port)

COM2 Parity

Selects whether parity information is used

COM2 Line Idle

Selects the communications line idle sense

COM2 Data Echo

Enables echoing of data from RX port to TX port when operating relays in a Fibre Optic ring configuration

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

CB MAINTENANCE**Total CB Trip Count Alarm**

Number of CB trips before the Total CB Trip Count Alarm is raised.

Delta CB Trip Count Alarm

Number of CB trips before the Delta CB Trip Count Alarm is raised.

Total CB Close Count Alarm

Number of CB closes trips before the Total CB Close Count Alarm is raised.

Delta CB Close Count Alarm

Number of CB closes trips before the Delta CB Close Count Alarm is raised.

Reset Total CB Trip Count

The Total CB Trip Count can be manually reset by changing this setting.

Reset Delta CB Trip Count

The Delta CB Trip Count can be manually reset by changing this setting.

Reset Total CB Close Count

The Total CB Close Count can be manually reset by changing this setting.

Reset Delta CB Close Count

The Delta CB Close Count can be manually reset by changing this setting.

DATA STORAGE MENU**Pre-trigger Storage**

Sets the percentage of the waveform record that is stored before the trigger point.

Record Duration

Selects the total number and duration of waveform records stored by the relay

FAULT LOCATOR MENU**Pos Seq Line Impedance**

Specifies the positive sequence line impedance equating to 100% of the line.

Sec'y Z₊ per unit distance

Specifies the positive sequence line impedance per unit mile or kilometre of the line.

Display distance as

Specifies how the distance to fault shall be displayed, percentage of line length, miles or kilometres.

Fault Locator

Fault Locator can be enabled or disabled here.

5 LABEL INSERTS

	OHMEGA 308-50/60 R5	OHMEGA 308-50/60 R5	
	**	**	
	Left	Right	
	28/05/2008 10:43:00	28/05/2008 10:43:00	
1	ZONE 1	SOTF	17
2	ZONE 2	VTS	18
3	ZONE 3	HIGH SET	19
4		OVERVOLTAGE ALARM	20
5	PHASE A	OVERVOLTAGE TRIP	21
6	PHASE B	UNDERVOLTAGE ALARM	22
7	PHASE C	UNDERVOLTAGE TRIP	23
8	EARTH	SEF ALARM	24
9	SIGNAL RECEIVE 1	SEF TRIP	25
10	AIDED TRIP	POWER SWING ALARM	26
11	DEF	WEAK INFEEED	27
12	SIGNAL RECEIVE 2		28
13	DEF AIDED TRIP		29
14	ARC IN PROGRESS	CB ALARM	30
15	ARC LOCKOUT	SYNC IN PROGRESS	31
16	CB OPEN	SYSTEM SPLIT	32