

7SG14 Duobias-M

Transformer Protection

Document Release History

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

Revision	Date	Description
	2010/02	Document reformat due to rebrand
R6	07/07/2004	Added additional information describing Trip Cct Pickup Delay, will be renamed to be Trip Cct Fail Pickup Delay at next software release.
R5	07/05/2004	Correct Inrush Setting text, Bias Differential text
R4	26/01/2004	Corrected Settings Group command numbering
R3	09/12/2003	Added new inrush bias settings
R2	08/12/2003	Yd4 corrected to be Yy4
R1	29/09/2003	Document revision history added

Software Revision History

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1 Introduction

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

Model No	Cat No	Configuration No
Duobias-M-200-2W-E8-50Hz	DU3-201-*A-50	2661H80014R12
Duobias-M-200-2W-E8-60Hz	DU3-201-*A-60	2661H80038R12
Duobias-M-200-2W-50Hz	DU3-201-**-50	2661H80024R12
Duobias-M-200-2W-60Hz	DU3-201-**-60	2661H80039R12
Duobias-M-200-3W-50Hz	DU3-301-**-50	2661H80015R12
Duobias-M-200-3W-60Hz	DU3-301-**-60	2661H80054R12
Duobias-M-200-4W-50Hz	DU3-401-**-50	2661H80035R12
Duobias-M-200-5W-50Hz	DU3-501-**-50	2661H80017R12
Duobias-M-200-5W-60Hz	DU3-501-**-60	2661H80058R12

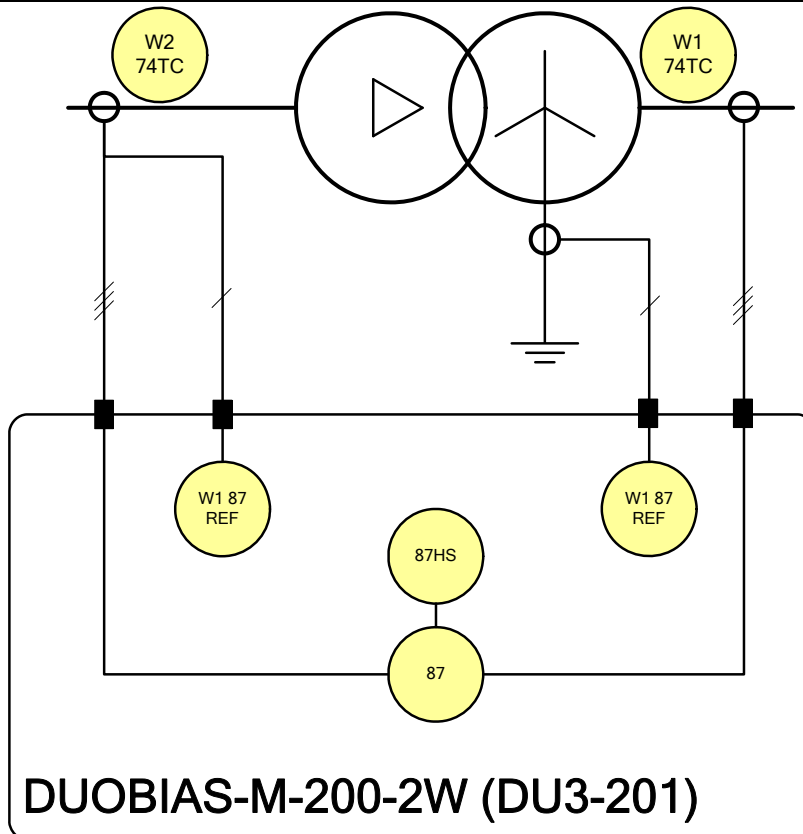


Figure 1 - Duobias-M-200-2W [DU3-201]

2 DUOBIAS-M-200-2/3/4/5W-R15 Relay Setting List

2.1 System Config Menu

Description	Range	Default	Setting
System Frequency <i>Selects the system frequency.</i> <i>!! Please note that the relay may have to restart for this setting to take affect. If so the relay will automatically restart after 5 seconds !!</i>	50,60 Hz	50 Hz	
Active Group <i>Selects which settings group is currently activated</i>	1,2...4	1	
View/Edit Group <i>Selects which settings group is currently being displayed</i>	1,2...4	1	
Default Screens Timer <i>Selects the time delay after which, if no key presses have been detected, the relay will begin to poll through any screens which have been selected as default instruments screens</i>	OFF, 1,2,5,10,15,30,60 min	60 min	
Backlight timer <i>Controls when the LCD backlight turns off</i>	OFF, 1,2,5,10,15,30,60 min	5 Min	
Date	Date	1/1/1980	
Time	Time	00:00:00	
Clock Sync. From Status <i>Real time clock may be synchronised using a status input (See Clock Sync. in Status Input Menu)</i>	Disabled, Seconds,Minutes	Minutes	
Operating Mode <i>To allow access to change configuration files using Reylogic Toolbox the relay must be placed Out Of Service.</i>	Local, Remote, Local Or Remote, Out Of Service	Local Or Remote	
Change Password <i>Allows a 4 character alphanumeric code to be entered as the password. Note that the display shows a password dependant encrypted code on the second line of the display</i>	AAAA...ZZZZ	"NONE" displayed as "NOT ACTIVE"	
Relay Identifier <i>An alphanumeric string shown on the LCD normally used to identifier the circuit the relay is attached to or the relays purpose</i>	Up to 16 characters	DUOBIAS-M-200-2W/3W/4W/5W	

2.2 CT/VT Config Menu

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

Description	Range	Default	Setting
<i>Winding 1 CT ratio to scale primary current instruments</i>			
W2 REF Input <i>Selects whether 1 or 5 Amp terminals are being used for winding 2 REF</i>	1,5 A	1 A	
W3 Input1 <i>Selects whether 1 or 5 Amp terminals are being used for winding 3</i>	1,5 A	1 A	
W3 CT Ratio1 <i>Winding 3 CT ratio to scale primary current instruments</i>	5:0.2...5000:7	2000:1	
W3 REF Input1 <i>Selects whether 1 or 5 Amp terminals are being used for winding 3 REF</i>	1,5 A	1 A	
W4 Input2 <i>Selects whether 1 or 5 Amp terminals are being used for winding 4</i>	1,5 A	1 A	
W4 CT Ratio2 <i>Winding 4 CT ratio to scale primary current instruments</i>	5:0.2...5000:7	2000:1	
W5 Input3 <i>Selects whether 1 or 5 Amp terminals are being used for winding 5</i>	1,5 A	1 A	
W5 CT Ratio3 <i>Winding 5 CT ratio to scale primary current instruments</i>	5:0.2...5000:7	2000:1	

- 1) >2W Only
2) >3W Only.
3) >4W Only.

2.3 Biased Differential Menu

Description	Range	Default	Setting
W1 Interposing CT Multiplier <i>Winding 1 scaling factor</i>	0.25,0.26...3.00 x	1.00 x	
W1 Interposing CT Connection <i>Winding 1 transformer vector group compensation and/or zero sequence filtering</i>	Yy0, Yd1, Yy2, Yd3, Yy4, Yd5, Yy6, Yd7, Yy8, Yd9, Yy10, Yd11, Ydy0	Yy0, 0°	
W2 Interposing CT Multiplier <i>Winding 2 scaling factor</i>	0.25,0.26...3.00 x	1.00 x	
W2 Interposing CT Connection <i>Winding 2 transformer vector group compensation and/or zero sequence filtering</i>	Yy0, Yd1, Yy2, Yd3, Yy4, Yd5, Yy6, Yd7, Yy8, Yd9, Yy10, Yd11, Ydy0	Yy0, 0°	
W3 Interposing CT Multiplier1 <i>Winding 3 scaling factor</i>	0.25,0.26...3.00 x	1.00 x	
W3 Interposing CT Connection1 <i>Winding 3 transformer vector group compensation and/or zero sequence filtering</i>	Yy0, Yd1, Yy2, Yd3, Yy4, Yd5, Yy6, Yd7, Yy8, Yd9, Yy10, Yd11, Ydy0	Yy0, 0°	
W4 Interposing CT Multiplier2 <i>Winding 4 scaling factor</i>	0.25,0.26...3.00 x	1.00 x	
W4 Interposing CT Connection2 <i>Winding 4 transformer vector group compensation and/or zero sequence filtering</i>	Yy0, Yd1, Yy2, Yd3, Yy4, Yd5, Yy6, Yd7, Yy8, Yd9, Yy10, Yd11, Ydy0	Yy0, 0°	
W5 Interposing CT Multiplier3 <i>Winding 5 scaling factor</i>	0.25,0.26...3.00 x	1.00 x	
W5 Interposing CT Connection3 <i>Winding 5 transformer vector group compensation and/or zero sequence filtering</i>	Yy0, Yd1, Yy2, Yd3, Yy4, Yd5, Yy6, Yd7, Yy8, Yd9, Yy10, Yd11, Ydy0	Yy0, 0°	
87 Inrush Inhibit	Disabled, Enabled	Enabled	

Description	Range	Default	Setting
Selects whether the biased differential characteristic is inhibited from operating when magnetising inrush is detected			
87 Inrush Bias Selects the bias method used for magnetising inrush Phase – Segregated, each phase blocks itself. Cross – Blocked, each phase can block the operation of other phases (Modular 1 method). Sum - Of Squares, each phase blocks itself using the square root of the sum of squares of the even harmonics. (Improves Switch On To Fault performance when REF not applied).	Phase, Cross, Sum	Cross	
87 Inrush Setting The magnetising inrush detector operates when the even harmonics in the differential operate current exceed a set percentage of the differential operate current	0.1,0.11...0.50 xld	0.20 xld	
87 Bias Differential Selects whether the transformer differential protection element is enabled	Disabled, Enabled	Enabled	
87 Initial Setting The initial unbiased pickup level	0.1,0.15...2.00 xln	0.2 xln	
87 Bias Slope The bias slope varies the pickup level to compensates for CT measuring errors and tap changer not mid tap errors as the through current (bias) increases	0,0.05...0.7 x	0.2 x	
87 Bias Slope Limit At this point in the characteristics the bias slope increases tot provide increased security when additional measuring errors are introduced due to CT saturation effects.	1,2...20 xln	4 xln	
87 Delay The operation of the differential may be delayed to cater for special system conditions e.g. for use on cable circuits a delay of 5ms is recommended	0,0.005...1 s	0.005 s	
87HS Differential Highset Selects whether the differential Highset element is enabled. Note this element is never blocked by magnetising inrush	Disabled, Enabled	Disabled	
87HS Setting The differential setting pickup setting	1,2...30 xln	4 xln	
87HS Delay The operation of the differential may be delayed to cater for special system conditions e.g. for use on cable circuits a delay of 5ms is recommended	0,0.005...1 s	0.005 s	

1) >2W Only

2) >3W Only.

3) >4W Only.

2.4 Restricted E/F Menu

Description	Range	Default	Setting
Gn W1 87REF High impedance restricted earth fault current element	Disabled, Enabled	Disabled	
Gn W1 87REF Setting2 Pickup level	0.020,0.025...0.960 xln	0.200 xln	

Description	Range	Default	Setting
Gn W1 87REF Delay <i>Pickup delay</i>	0,0.0025...864000 s	0.0000	
Gn W2 87REF <i>High impedance restricted earth fault current element</i>	Disabled, Enabled	Disabled	
Gn W2 87REF Setting2 <i>Pickup level</i>	0.020,0.025...0.960 xIn	0.200 xIn	
Gn W2 87REF Delay <i>Pickup delay</i>	0,0.0025...864000 s	0.0000	
Gn W3 87REF1 <i>High impedance restricted earth fault current element</i>	Disabled, Enabled	Disabled	
Gn W3 87REF Setting1 2 <i>Pickup level</i>	0.020,0.025...0.960 xIn	0.200 xIn	
Gn W3 87REF Delay1 <i>Pickup delay</i>	0,0.0025...864000 s	0.0000	

1) >2W Only

2) REF versions have minimum setting of 0.020, SREF versions have minimum setting of 0.005xIn.

2.5 Status Input Menu

Description	Range	Default	Setting
Aux I/P 1 Pickup Delay <i>Delay on pickup of DC Status input 1</i>	0.000,0.005...864000 s	0 s	
Aux I/P 2 Pickup Delay	0.000,0.005...864000 s	0 s	
Aux I/P 3 Pickup Delay	0.000,0.005...864000 s	0 s	
Aux I/P 4 Pickup Delay1	0.000,0.005...864000 s	0 s	
Aux I/P 5 Pickup Delay1	0.000,0.005...864000 s	0 s	
Aux I/P 6 Pickup Delay1	0.000,0.005...864000 s	0 s	
Aux I/P 7 Pickup Delay1	0.000,0.005...864000 s	0 s	
Aux I/P 8 Pickup Delay1	0.000,0.005...864000 s	0 s	
Aux I/P 9 Pickup Delay1	0.000,0.005...864000 s	0 s	
Aux I/P 10 Pickup Delay1	0.000,0.005...864000 s	0 s	
Aux I/P 11 Pickup Delay1	0.000,0.005...864000 s	0 s	
Aux I/P 12 Pickup Delay1	0.000,0.005...864000 s	0 s	
Aux I/P 13 Pickup Delay1	0.000,0.005...864000 s	0 s	
Aux I/P 14 Pickup Delay1	0.000,0.005...864000 s	0 s	
Aux I/P 15 Pickup Delay1	0.000,0.005...864000 s	0 s	
Aux I/P 16 Pickup Delay1	0.000,0.005...864000 s	0 s	
Aux I/P 17 Pickup Delay1	0.000,0.005...864000 s	0 s	
Aux I/P 18 Pickup Delay1	0.000,0.005...864000 s	0 s	
Aux I/P 19 Pickup Delay1	0.000,0.005...864000 s	0 s	
Aux I/P 20 Pickup Delay1	0.000,0.005...864000 s	0 s	
Aux I/P 21 Pickup Delay1	0.000,0.005...864000 s	0 s	
Aux I/P 22 Pickup Delay1	0.000,0.005...864000 s	0 s	
Aux I/P 23 Pickup Delay1	0.000,0.005...864000 s	0 s	
Aux I/P 24 Pickup Delay1	0.000,0.005...864000 s	0 s	
Aux I/P 25 Pickup Delay1	0.000,0.005...864000 s	0 s	
Aux I/P 26 Pickup Delay1	0.000,0.005...864000 s	0 s	
Aux I/P 27 Pickup Delay1	0.000,0.005...864000 s	0 s	
Inhibit W1 87REF3 <i>Selects which inputs inhibit the 87REF element</i>	NONE, 1...272	NONE	
Inhibit W2 87REF3 <i>Selects which inputs inhibit the 87REF element2</i>	NONE, 1...272	NONE	
Trip Circuit Fail <i>Selects which inputs are monitoring trip circuits, inputs should normally also be selected as Inverted Inputs (see below)</i>	NONE, 1...272	NONE	
Trigger Storage <i>Selects which inputs can trigger a waveform record</i>	NONE, 1...272	NONE	

Description	Range	Default	Setting
Clock Sync. <i>Selects which input is used to synchronise the real time clock</i>	NONE, 1...272	NONE	
Inverted Inputs <i>Selects which inputs pickup when voltage is removed, often used when monitoring trip circuits.</i>	NONE, 1...272	NONE	

1) Only when fitted.

2) 27 status inputs represents maximum configuration.

2.6 Reylogic Control Menu

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

2.7 Reylogic Element Menu

Description	Range	Default	Setting
Trip Cct Fail Pickup Delay <i>Delay before trip circuit failure picks up. Used in conjunction with STATUS INPUT MENU/Trip Circuit Fail setting to configure how many trip circuits are being monitored.</i>	0,1...60000 ms	400 ms	

2.8 Output Relay Menu

Description	Range	Default	Setting
87 <i>Biased Differential operated</i>	NONE, 1...291	4,5	
87 HS <i>Differential Highset operated</i>	NONE, 1...291	4,5	
W1 87REF <i>Winging 1 High Impedance Restricted Earth Fault operated</i>	NONE, 1...291	4,5	
W2 87REF <i>Winging 2 High Impedance Restricted Earth Fault operated</i>	NONE, 1...291	4,5	
Phase A <i>A phase A element operated</i>	NONE, 1...291	NONE	
Phase B <i>A phase B element operated</i>	NONE, 1...291	NONE	
Phase C <i>A phase C element operated</i>	NONE, 1...291	NONE	
General Starter <i>A starter element is picked up</i>	NONE, 1...291	NONE	
General Trip <i>An element has operated. Useful when testing individual functions!</i>	NONE, 1...291	NONE	
Trip Circuit Fail <i>A trip circuit has failed, look at status input Leds to find out which one</i>	NONE, 1...291	NONE	
New Data Stored <i>The waveform recorder has stored new information Note: this is a pulsed output</i>	NONE, 1...291	NONE	
Aux I/P 1 Operated <i>DC Status 1 has operated</i>	NONE, 1...291	NONE	
Aux I/P 2 Operated	NONE, 1...291	NONE	
Aux I/P 3 Operated	NONE, 1...291	NONE	
Aux I/P 4 Operated2	NONE, 1...291	NONE	
Aux I/P 5 Operated2	NONE, 1...291	NONE	
Aux I/P 6 Operated2	NONE, 1...291	NONE	

Description	Range	Default	Setting
Aux I/P 7 Operated2	NONE, 1...291	NONE	
Aux I/P 8 Operated2	NONE, 1...291	NONE	
Aux I/P 9 Operated2	NONE, 1...291	NONE	
Aux I/P 10 Operated2	NONE, 1...291	NONE	
Aux I/P 11 Operated2	NONE, 1...291	NONE	
Aux I/P 12 Operated2	NONE, 1...291	NONE	
Aux I/P 13 Operated2	NONE, 1...291	NONE	
Aux I/P 14 Operated2	NONE, 1...291	NONE	
Aux I/P 15 Operated2	NONE, 1...291	NONE	
Aux I/P 16 Operated2	NONE, 1...291	NONE	
Aux I/P 17 Operated2	NONE, 1...291	NONE	
Aux I/P 18 Operated2	NONE, 1...291	NONE	
Aux I/P 19 Operated2	NONE, 1...291	NONE	
Aux I/P 20 Operated2	NONE, 1...291	NONE	
Aux I/P 21 Operated2	NONE, 1...291	NONE	
Aux I/P 22 Operated2	NONE, 1...291	NONE	
Aux I/P 23 Operated2	NONE, 1...291	NONE	
Aux I/P 24 Operated2	NONE, 1...291	NONE	
Aux I/P 25 Operated2	NONE, 1...291	NONE	
Aux I/P 26 Operated2	NONE, 1...291	NONE	
Aux I/P 27 Operated2	NONE, 1...291	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...291	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...291	1	

1) 29 output relays represents maximum configuration.

2) Only when fitted.

3) 3W Only

4) 2W Only.

2.9 LED Menu

Description	Range	Default	Setting
87 <i>Biased Differential operated</i>	NONE, 1...32	18	
87 HS <i>Differential Highset operated</i>	NONE, 1...32	19	
W1 87REF <i>Winging 1 High Impedance Restricted Earth Fault operated</i>	NONE, 1...32	4	
W2 87REF <i>Winging 2 High Impedance Restricted Earth Fault operated</i>	NONE, 1...32	5	
Phase A <i>A phase A element operated</i>	NONE, 1...32	1	
Phase B <i>A phase B element operated</i>	NONE, 1...32	2	
Phase C <i>A phase C element operated</i>	NONE, 1...32	3	
General Starter <i>A starter element is picked up. Useful when testing individual functions!</i>	NONE, 1...32	NONE	
General Trip	NONE, 1...32	NONE	

Description	Range	Default	Setting
<i>An element has operated. Useful when testing individual functions!</i>			
Trip Circuit Fail <i>A trip circuit has failed, look at status inputs Leds to find out which one</i>	NONE, 1...32	20	
New Data Stored <i>The waveform recorder has stored new information</i>	NONE, 1...32	17	
Aux I/P 1 Operated <i>DC Status 1 has operated</i>	NONE, 1...32	9	
Aux I/P 2 Operated	NONE, 1...32	10	
Aux I/P 3 Operated	NONE, 1...32	11	
Aux I/P 4 Operated ¹	NONE, 1...32	12	
Aux I/P 5 Operated ¹	NONE, 1...32	13	
Aux I/P 6 Operated ¹	NONE, 1...32	14	
Aux I/P 7 Operated ¹	NONE, 1...32	15	
Aux I/P 8 Operated ¹	NONE, 1...32	16	
Aux I/P 9 Operated ¹	NONE, 1...32	25	
Aux I/P 10 Operated ¹	NONE, 1...32	26	
Aux I/P 11 Operated ¹	NONE, 1...32	27	
Aux I/P 12 Operated ¹	NONE, 1...32	NONE	
Aux I/P 13 Operated ¹	NONE, 1...32	NONE	
Aux I/P 14 Operated ¹	NONE, 1...32	NONE	
Aux I/P 15 Operated ¹	NONE, 1...32	NONE	
Aux I/P 16 Operated ¹	NONE, 1...32	NONE	
Aux I/P 17 Operated ¹	NONE, 1...32	NONE	
Aux I/P 18 Operated ¹	NONE, 1...32	NONE	
Aux I/P 19 Operated ¹	NONE, 1...32	NONE	
Aux I/P 20 Operated ¹	NONE, 1...32	NONE	
Aux I/P 21 Operated ¹	NONE, 1...32	NONE	
Aux I/P 22 Operated ¹	NONE, 1...32	NONE	
Aux I/P 23 Operated ¹	NONE, 1...32	NONE	
Aux I/P 24 Operated ¹	NONE, 1...32	NONE	
Aux I/P 25 Operated ¹	NONE, 1...32	NONE	
Aux I/P 26 Operated ¹	NONE, 1...32	NONE	
Aux I/P 27 Operated ¹	NONE, 1...32	NONE	
Self Reset LEDs <i>Leds selected, as Self Reset will automatically reset when the driving signal is removed. By default all Leds are Hand Reset and must be manually reset either locally via the front fascia or remotely via communications.</i>	NONE, 1...32	NONE	

1) Only when fitted.

2.10 Data Storage Menu

Description	Range	Default	Setting
Clear Faults <i>Clears the Fault Records, useful after routine testing.</i>	NO, YES	NO	
Clear Events <i>Clears the Event Records, useful after routine testing.</i>	NO, YES	NO	
Pre-Trigger Storage <i>Specifies the amount of pre fault data for the waveform records.</i>	10...90 %	20 %	
Data Record Duration ¹ <i>Specifies the duration of the waveform records and the number of records available.</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 a waveform record.</i>	NO, YES	NO	
Clear Waveforms	NO, YES	NO	

Description	Range	Default	Setting
<i>Clears the Waveform Records, useful after routine testing.</i>			

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

2.11 Communications Menu

Description	Range	Default	Setting
Station Address <i>IEC 60870-5-103 Station Address</i>	0...254	0	
IEC870 On Port <i>Selects which port to use for IEC 60870-5-103 communications.</i>	None, Com1, Com2, Auto	Com1	
Line Switch Time <i>When IEC870 On Port is selected to Auto the communications ports are scanned for valid IEC 60870-5-103 communications frames. Once valid frames are detected the com port will remain selected. Subsequently if there are no valid frames received for the Line Switch Time period then the driver will assume the communications circuit has failed and will resume scanning the com ports.</i> <i>Only visible when set to Auto.</i>	1,2...60 s	30 s	
Com1 Baud Rate <i>Sets the communications baud rate for com port 1 (Rear upper Fibre optic port)</i>	75, 110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200	19200	
Com1 Parity <i>Selects whether parity information is used</i>	Even, Odd, None	Even	
Com1 Line Idle <i>Selects the communications line idle sense</i>	Light Off, Light On	Light Off	
Com1 Data Echo <i>Enables echoing of data from RX port to TX port when operating relays in a Fibre Optic ring configuration</i>	Off, On	Off	
Com2 Baud Rate <i>Sets the communications baud rate for com port 2 (Rear lower Fibre optic port AND Front Fascia RS232 port)</i>	75, 110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200	19200	
Com2 Parity <i>Selects whether parity information is used</i>	Even, Odd, None	None	
Com2 Line Idle <i>Selects the communications line idle sense</i>	Light Off, Light On	Light Off	
Com2 Data Echo <i>Enables echoing of data from RX port to TX port when operating relays in a Fibre Optic ring configuration</i>	Off, On	Off	
Com2 Direction <i>Selects how Com2 is shared between the front fascia port and the rear fibre optic port. This allows interlocking to prevent remote access whilst an engineer is attached locally on site if IEC870 is on Com2 and Auto-detect is enabled</i>	AUTO-DETECT, FRONT PORT, REAR PORT	AUTO-DETECT	

3 Instruments

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

INSTRUMENT	DESCRIPTION
W3 Relay Currents 0.00 0.00 0.00 xIn	Winding 3 currents after Interposing CT correction factors applied
W4 Relay Currents 0.00 0.00 0.00 xIn	Winding 3 currents after Interposing CT correction factors applied
W5 Relay Currents 0.00 0.00 0.00 xIn	Winding 3 currents after Interposing CT correction factors applied
Operate Currents 0.00 0.00 0.00 xIn	Differential operate currents
Restrain Currents 0.00 0.00 0.00 xIn	Differential restrain currents
Mag Inrush Currents 0.00 0.00 0.00 xIn	Differential magnetising inrush currents (even harmonic content of operate currents but mainly 2nd harmonic content)
[MISC METERS] --> press down <--	Start of miscellaneous meters
Status Inputs 1-16 -----	Displays the state of DC status inputs 1 to 16
Status Inputs 17-27 -----	Displays the state of DC status inputs 17 to 27
Output Relays 1-16 -----	Displays the state of output relays 1 to 16
Output Relays 17-29 -----	Displays the state of output relays 17 to 29
Time & Date 13/08/2002 10:16:11	Time and Date

4 IEC 60870-5-103 Communications Information

4.1 IEC 60870-5-103 Semantics in monitor direction

FUN	INF	Description	GI	TYP	COT
60	1	IEC870 Active Com1	x	1	1,9
60	2	IEC870 Active Com2	x	1	1,9
60	3	Front Port OverRide	x	1	1,9

FUN	INF	Description	GI	TYP	COT
176	0	GI End	-	8	10
176	0	Time Synchronisation	-	6	8
176	2	Reset FCB	-	2	3
176	3	Reset CU	-	2	4
176	4	Start/Restart	-	2	5
176	22	Settings changed	-	1	1
176	23	Setting G1 selected	x	1	1,9
176	24	Setting G2 selected	x	1	1,9
176	25	Setting G3 selected	x	1	1,9
176	26	Setting G4 selected	x	1	1,9
176	27	Status Input 1	x	1	1,9
176	28	Status Input 2	x	1	1,9
176	29	Status Input 3	x	1	1,9
176	30	Status Input 4	x	1	1,9
176	36	Trip Circuit Fail	x	1	1,9
176	64	Start/Pick-up L1	x	2	1,9
176	65	Start/Pick-up L2	x	2	1,9
176	66	Start/Pick-up L3	x	2	1,9
176	67	Start/Pick-up N	x	2	1,9
176	68	General Trip	-	2	1
176	69	Trip L1	-	2	1
176	70	Trip L2	-	2	1
176	71	Trip L3	-	2	1
176	84	General Start/Pick-up	x	2	1,9
178	7	Biased Differential	-	2	1
178	8	Differential Highset	-	2	1
178	9	W1 Restricted Earth Fault	-	2	1
178	10	W2 Restricted Earth Fault	-	2	1
178	12	W3 Restricted Earth Fault	-	2	1
178	128	Cold Start	-	1	1
178	129	Warm Start	-	1	1
178	130	Re-Start	-	1	1
178	135	Trigger Storage	-	1	1
178	145	Status Input 5	x	1	1,9
178	146	Status Input 6	x	1	1,9
178	147	Status Input 7	x	1	1,9
178	148	Status Input 8	x	1	1,9
178	149	Status Input 9	x	1	1,9
178	150	Status Input 10	x	1	1,9

FUN	INF	Description	GI	TYP	COT
178	151	Status Input 11	x	1	1,9
178	152	Status Input 12	x	1	1,9
178	153	Status Input 13	x	1	1,9
178	154	Status Input 14	x	1	1,9
178	155	Status Input 15	x	1	1,9
178	156	Status Input 16	x	1	1,9
178	157	Status Input 17	x	1	1,9
178	158	Status Input 18	x	1	1,9
178	159	Status Input 19	x	1	1,9
178	160	Status Input 20	x	1	1,9
178	161	Status Input 21	x	1	1,9
178	162	Status Input 22	x	1	1,9
178	163	Status Input 23	x	1	1,9
178	164	Status Input 24	x	1	1,9
178	165	Status Input 25	x	1	1,9
178	166	Status Input 26	x	1	1,9
178	167	Status Input 27	x	1	1,9
178	181	Plant Control Relay 1	x	1	1,9
178	182	Plant Control Relay 2	x	1	1,9
178	183	Plant Control Relay 3	x	1	1,9
178	184	Plant Control Relay 4	x	1	1,9
178	185	Plant Control Relay 5	x	1	1,9
178	186	Plant Control Relay 6	x	1	1,9
178	187	Plant Control Relay 7	x	1	1,9
178	188	Plant Control Relay 8	x	1	1,9
178	189	Plant Control Relay 9	x	1	1,9
178	190	Plant Control Relay 10	x	1	1,9
178	191	Plant Control Relay 11	x	1	1,9
178	192	Plant Control Relay 12	x	1	1,9
178	193	Plant Control Relay 13	x	1	1,9
178	194	Plant Control Relay 14	x	1	1,9
178	195	Plant Control Relay 15	x	1	1,9
178	196	Plant Control Relay 16	x	1	1,9
178	197	Plant Control Relay 17	x	1	1,9
178	198	Plant Control Relay 18	x	1	1,9
178	199	Plant Control Relay 19	x	1	1,9
178	200	Plant Control Relay 20	x	1	1,9
178	201	Plant Control Relay 21	x	1	1,9
178	202	Plant Control Relay 22	x	1	1,9
178	203	Plant Control Relay 23	x	1	1,9
178	204	Plant Control Relay 24	x	1	1,9
178	205	Plant Control Relay 25	x	1	1,9
178	206	Plant Control Relay 26	x	1	1,9
178	207	Plant Control Relay 27	x	1	1,9
178	208	Plant Control Relay 29	x	1	1,9
178	209	Plant Control Relay 29	x	1	1,9

4.2 IEC 60870-5-103 Semantics in control direction

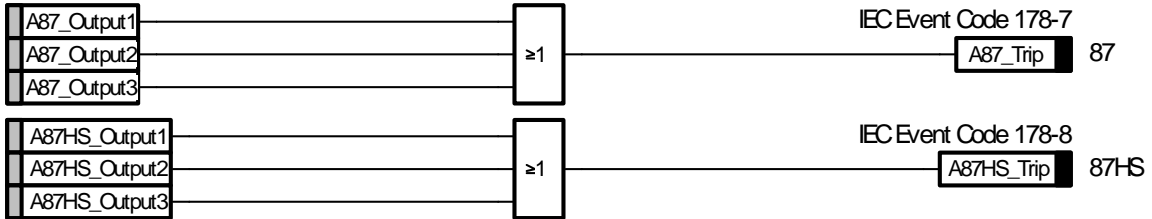
FUN	INF	Description	COM	TYP	COT
176	0	GI Initiation		7	9
176	0	Time Synchronisation		6	8
176	19	LED reset	ON	20	20
176	23	Settings Group 1 Select	ON	20	20
176	24	Settings Group 2 Select	ON	20	20
176	25	Settings Group 3 Select	ON	20	20
176	26	Settings Group 4 Select	ON	20	20
178	110	Settings Group 5 Select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

5 Reylogic Diagrams

Filename: 87.RLD
 Art.No.: 2661S81460
 Description: 87 n WindingLogic
 Author: Paul Mudditt
 Revision History

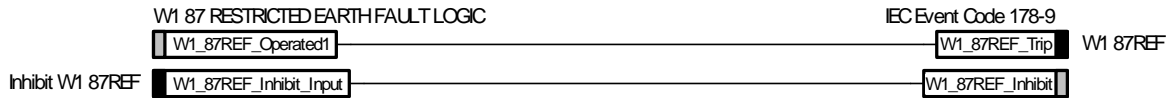
Release	Initials	Date	Comment
1	FM	14-03-2003	First version
2	FM	24-03-2003	Art No Added
3	FM	14-05-2003	Renamed, standard logic for all Duobias-M winding versions

87/87HS BIASED DIFFERENTIAL LOGIC



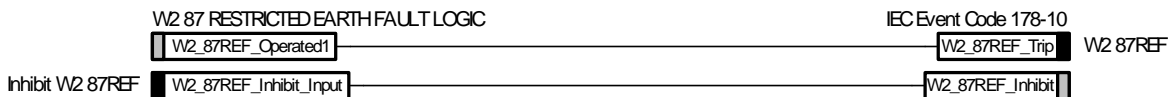
Filename: W1-87REF.RLD
 Art.No.: 2661S81462
 Description: W1-87REF Logic
 Author: Paul Mudditt
 Revision History

Release	Initials	Date	Comment
1	FM	14-03-2003	First version
2	FM	24-03-2003	Art No Added
3	FM	06-05-2003	Inhibit added



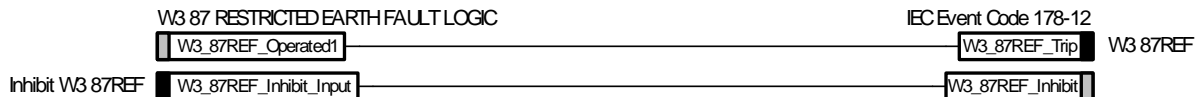
Filename: W2-87REF.RLD
 Art.No.: 2661S81465
 Description: W2-87REF Logic
 Author: Paul Mudditt
 Revision History

Release	Initials	Date	Comment
1	FM	14-03-2003	First version
2	FM	24-03-2003	Art No Added
3	FM	06-05-2003	Inhibit added



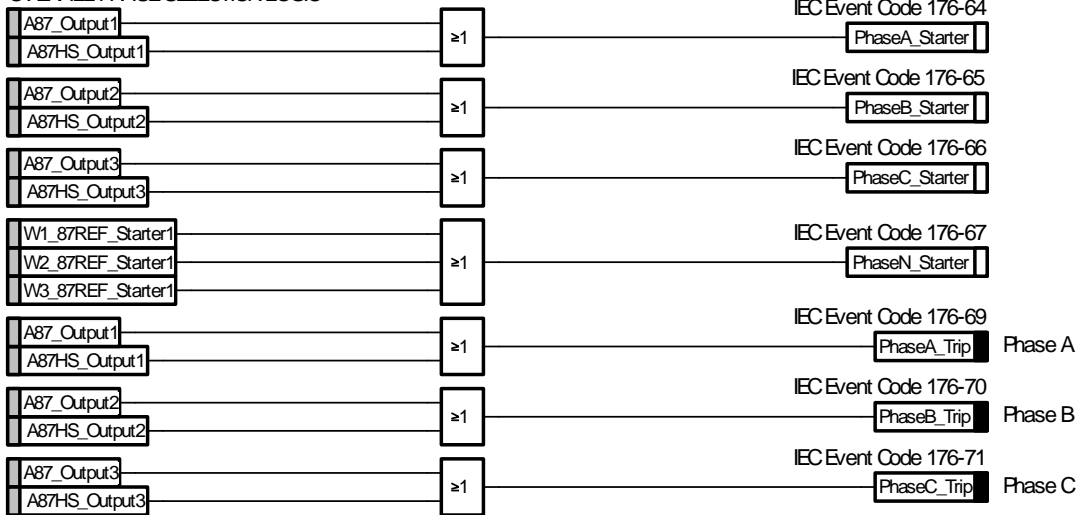
Filename: W3-87REF.RLD
 Art.No.: 2661S81479
 Description: W1-87REF Logic
 Author: Paul Mudditt
 Revision History

Release	Initials	Date	Comment
1	FM	14-05-2003	First version based upon W1-87REF.RLD

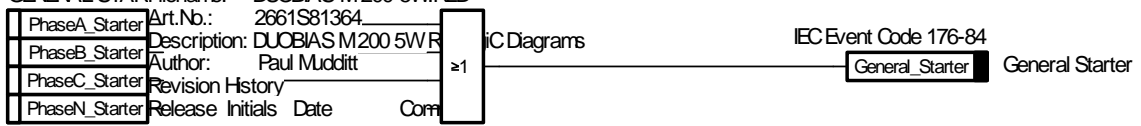


Filename: DUOBIAS-M-200-5W-LOGIC.RLD
 Art.No.: 2661S81510
 Description: DUOBIAS M200 5W General Logic Diagram
 Author: Paul Mudditt
 Revision History
 Release Initials Date Comment
 1 PM 15-06-2003 First version
 2 PM 19-06-2003 Art No's added

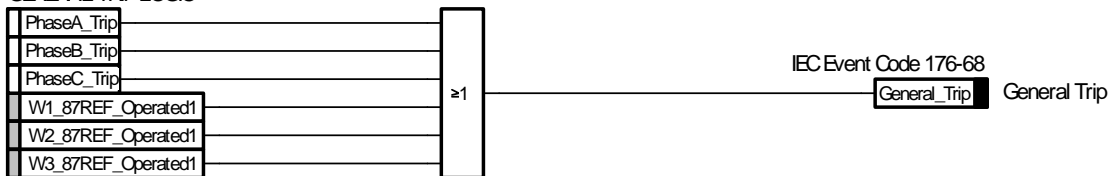
OVERALL PHASE SELECTION LOGIC



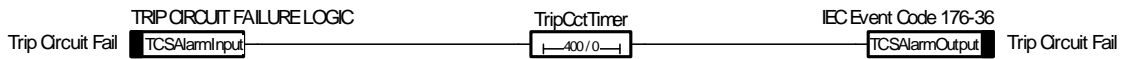
GENERAL STARTER LOGIC



GENERAL TRIP LOGIC

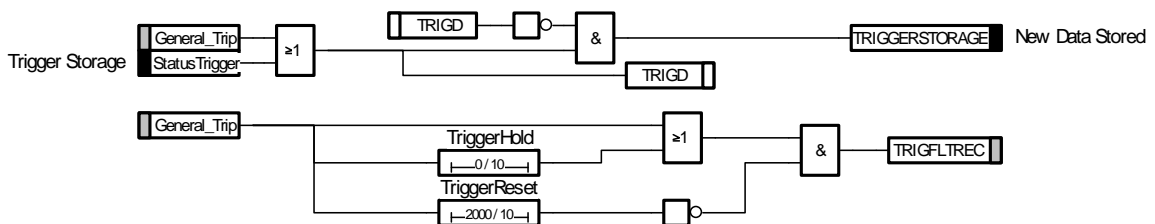


Filename: COMMON.RLD
 Art.No.: 2661S81468
 Description: Common Functions Logic Diagram
 Author: Paul Mudditt
 Revision History
 Release Initials Date Comment
 1 PM 20-03-2003 First RDL version
 2 PM 24-03-2003 Art No Added



Don't forget to program Trip OCT inputs as inverted
 Individual Trip OCT Fail LED or CONTACTS can be achieved by programming/labelling because of the I/O marshalling logic

FAULT AND WAVEFORM RECORDER LOGIC



6 Label Inserts

6.1 2W E8 CASE

	Duobias-M-200-2W
	R12
	E8
	23.02.10
1	NEW DATA STORED
2	PHASE A
3	PHASE B
4	PHASE C
5	(87) BIAS. DIFFERENTIAL
6	(87HS) DIFF. HIGHSET
7	(W1 87REF) RES. E/F
8	(W2 87REF) RES. E/F
9	(74TC) TRIP CIRCUIT FAIL
10	
11	
12	
13	
14	<i>AUX 1 I/P OPERATED</i>
15	<i>AUX 2 I/P OPERATED</i>
16	<i>AUX 3 I/P OPERATED</i>

6.2 2W E12, E16 CASE

	Duobias-M-200-2W	Duobias-M-200-2W	
	R12	R12	
	Left	Right	
	23.02.10	23.02.10	
1	PHASE A	NEW DATA STORED	17
2	PHASE B	(87) BIAS. DIFFERENTIAL	18
3	PHASE C	(87HS) DIFF. HIGHSET	19
4	(W1 87REF) RES. E/F	(74TC) TRIP CIRCUIT FAIL	20
5	(W2 87REF) RES. E/F		21
6			22
7			23
8			24
9	<i>AUX 1 I/P OPERATED</i>	<i>AUX 9 I/P OPERATED</i>	25
10	<i>AUX 2 I/P OPERATED</i>	<i>AUX 10 I/P OPERATED</i>	26
11	<i>AUX 3 I/P OPERATED</i>	<i>AUX 11 I/P OPERATED</i>	27
12	<i>AUX 4 I/P OPERATED</i>		28
13	<i>AUX 5 I/P OPERATED</i>		29
14	<i>AUX 6 I/P OPERATED</i>		30
15	<i>AUX 7 I/P OPERATED</i>		31
16	<i>AUX 8 I/P OPERATED</i>		32

6.3 3/4/5W E12, E16 CASE

	Duobias-M-200-nW	Duobias-M-200-nW	
	R12	R12	
	Left	Right	
	23.02.10	23.02.10	
1	PHASE A	NEW DATA STORED	17
2	PHASE B	(87) BIAS. DIFFERENTIAL	18
3	PHASE C	(87HS) DIFF. HIGHSET	19
4	(W1 87REF) RES. E/F	(74TC) TRIP CIRCUIT FAIL	20
5	(W2 87REF) RES. E/F		21
6	(W3 87REF) RES. E/F		22
7			23
8			24
9	<i>AUX 1 I/P OPERATED</i>	<i>AUX 9 I/P OPERATED</i>	25
10	<i>AUX 2 I/P OPERATED</i>	<i>AUX 10 I/P OPERATED</i>	26
11	<i>AUX 3 I/P OPERATED</i>	<i>AUX 11 I/P OPERATED</i>	27
12	<i>AUX 4 I/P OPERATED</i>		28
13	<i>AUX 5 I/P OPERATED</i>		29
14	<i>AUX 6 I/P OPERATED</i>		30
15	<i>AUX 7 I/P OPERATED</i>		31
16	<i>AUX 8 I/P OPERATED</i>		32