

# 7SG11Argus

Overcurrent Protection Relays

## Document Release History

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

Pre release

2010/02	Document reformat due to rebrand
2005/06	Third issue: Editorial modifications, software revision histories updated
2004/07	Second issue. Power On alarm added
2002/12	First issue

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## Software Release History

The software listed below is used in one of more types Argus relay. The list of software revisions applying to Argus 6, up to and including this document issue is:

Mar 2005	2716H80005 R5	Mods to reclose blocked Mod to "Checking Settings" screen at switch on
Jul 2003	2716H80005 R3	Function added: Status input Inversion Minor change: Latched input 8/9 display corrected
Mar 2003	2716H80005 R2	Function added: Power On count alarm Minor change: IEC 870-5-103 Time Sync optimised Minor change: communications with ReyDisp Minor change: Trip & Reclose action when no CB - corrected
Feb 2002	2716H80005R1	Function added: trip count alarm display added Function added: setting added to hide/show linesman mode display Function added: close and reclaim command split in two – one for local (delayed) and one for remote (no delay) Minor change: fault display shows lockout due to hot line working Minor change: communications – general command blocking Minor change: trip count – non-fault trips and alarm action
Nov 2000	2716H80004 R1/2	Internal Evaluation code - version not released
Sep 1999	2716H80003 R2	Minor change: on-screen alarm display Minor change: frequent operation counter reset Minor change: trip circuit supervision alarm
Nov 1998	2716H80001 R3	First release

## Hardware Release History

The Argus hardware is used in many different relays. The list of hardware revisions applying to Argus 6, up to and including this document issue is:

Mar 2002	Appearance change:	modification to grey fascia design – logo, dark grey band, buttons and label.
Jan 2002	External change:	SMA fibre-optic connectors replaced by ST <sup>TM</sup> (BFOC/2.5) by default.
Jul 1999	Appearance change:	introduction of grey fascia design to replace existing black fascia.
Jul 1999	External change:	introduction of Epsilon case and terminal blocks
Nov 1998	First release	

## Contents

Software Release History .....	2
Hardware Release History .....	2
Contents .....	3
List of Figures .....	3
Section 1: Variants .....	4
Section 2: Settings .....	6
Section 3: IEC 60870-5-103 Definitions .....	14
Section 4: Application Diagrams .....	21

## List of Figures

Figure 2-1 Status Input and Output Relay Programming Matrix .....	13
Figure 4-1 Typical Connection for 3 Directional Phase-fault and Directional Earth-fault .....	21
Figure 4-2 Typical Connection for 3 Directional Phase-fault and Sensitive Earth-fault .....	22
Figure 4-3 Typical Connection for 3 Phase-fault and Directional Earth-fault Protection .....	22

## Section 1: Variants

This document applies to the Argus relays listed in the following table.

The MLFB Structure references the complete number for each relay:

- 7SG11nn-nxxnn-nxA0

where n is a digit and x is a letter.

The table uses two references for most relays, each of which is valid:

- an 'Order code' of the form *AGn-nnn*, and
- a 'Type' of the form *GAFnnnX*

where *n* is a digit and *X* is a letter.

Protection	Application Diagram	I/O	Order code / Type				
			30/48 aux.		110/220 aux.		
			30V status	48V status	48V status	110V status	220V status
3 directional phase-fault and directional earth-fault	Fig. 4-1	9 SI 7 OR	GAF911C	<b>AG6-401</b> GAF913C	<b>AG6-402</b> GAF914C		GAF915C
3 directional phase-fault and SEF/REF	Fig. 4-2	9 SI 7 OR	GAF921C	<b>AG6-403</b> GAF923C	<b>AG6-404</b> GAF924C		
3 phase-fault and directional. earth-fault	Fig. 4-3	9 SI 7 OR	GAF931C	<b>AG6-405</b> GAF933C	<b>AG6-406</b> GAF934C		

## Ordering Information – 7SG1164 Argus 6

Product description	Variants	Order No.
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### Directional O/C relay with auto-reclose

Bi-directional version of ARGUS 4.

Product description	Order No.
<b>Number of elements</b> Four pole relay	7 S G 1 1 6 <span style="border: 1px solid black; padding: 0 2px;"> </span> - <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;"> </span> - <span style="border: 1px solid black; padding: 0 2px;"> </span> <span style="border: 1px solid black; padding: 0 2px;"> </span> A 0
<b>Auxiliary supply /binary input voltage</b> 24/30/48 V DC auxiliary, 30 V binary input 110/220 V DC auxiliary, 30 V binary input 24/30/48 V DC auxiliary, 48 V binary input 110/220 V DC auxiliary, 48 V binary input <sup>1)</sup> 110/220 V DC auxiliary, 110 V low burden binary input 110/220 V DC auxiliary, 220 V low burden binary input	4  0 1 2 3 4 5
<b>Type of elements</b> 3 pole phase-fault directional and sensitive/restricted earth-fault (SEF/REF) 3 pole phase-fault directional and earth-fault directional or 3 pole phase-fault directional and earth-fault 3 pole phase-fault directional and earth-fault directional or 3 pole phase-fault directional and earth-fault 3 pole phase-fault and earth-fault directional 3 pole phase-fault and earth-fault directional	N P P Q Q
<b>Nominal current</b> 1/ 5 A	1 E 4 E 5 E 2 D 3 D
<b>I/O range</b> 9 Binary Inputs / 7 Binary Outputs (incl. 3 changeover)	A  2
<b>Communication interface</b> Fibre optic (ST-connector) / IEC 60870-5-103 or Modbus RTU RS485 interface / IEC 60870-5-103 or Modbus RTU	1 2
<b>Directional measurement characteristic angle (CA)</b> +30°, +45° for phase faults 0°, -15°, -45°, -65° for earth faults 0°, -15°, -45°, -90° for earth faults +30°, +45° for phase faults and 0°, -15°, -45°, -65° for earth faults +30°, +45° for phase faults and 0°, -15°, -45°, -90° for earth faults	1 2 3 4 5
<b>Housing size</b> Case size E6 (4U high) Case size E8 (4U high)	D E

## Section 2: Settings

Relay Type \_\_\_\_\_

Serial Number \_\_\_\_\_

Substation \_\_\_\_\_

Feeder Identity \_\_\_\_\_

### Notes on Tables

All settings found in the Argus 6 relay types are listed below. Within the list some settings (indicated with greyed cells) are not always visible, for the following reasons:

- Depending on the version of the relay, a particular function and hence its related settings may not be present, e.g. on a 2 phase-fault and SEF relay any settings related to earth-fault will not be present.
- Depending on the value of some settings, other settings will be hidden, e.g. if the main characteristic is set to DTL, rather than an IDMT characteristic, the time multiplier setting will be hidden and replaced by a time delay setting.

Some settings in the tables show text in square brackets, e.g. '[SEF/REF] Current Setting'. This indicates different text that may be displayed, depending on the value of other settings, i.e. 'SEF Current Setting' or 'REF Current Setting' dependent on the value of the 'Earth Fault Mode Select' setting.

The second column in the tables ('Ref') provides a reference to the section in the Technical Reference (publication P20007 issue 2002/12) that describes the setting.



The third column is left blank to allow users to complete the table with applied settings.




### System Config. Menu

Setting name	Ref	Applied value
Active Settings Group	2.2.1	
Settings Group Edit/View	2.2.1	
Cold Load Pickup Group	2.6	
Copy Group	2.2.1	
Power System Frequency	2.2.2	Hz
Set Pole B Type	2.2.3	
Earth Fault Mode Select	2.2.3	
P/F Rating (In)	2.2.3	A
E/F Rating (In)	2.2.3	A
SEF/REF Rating (In)	2.2.3	A
P/F CT Ratio	2.2.3	
E/F CT Ratio	2.2.3	
SEF/REF CT Ratio	2.2.3	
Current Display	2.2.3	
Set Identifier	2.2.4	
SET Alarm 1	2.2.5	
SET Alarm 2	2.2.5	

Setting name	Ref	Applied value
SET Alarm 3	2.2.5	
SET Alarm 4	2.2.5	
SET Alarm 5	2.2.5	
FWD Name Tag	2.2.6	
REV Name Tag	2.2.6	
Calendar – Set Date	2.2.7	
Clock - Set Time	2.2.7	
Clock Sync. From Status	2.2.7	
Default Screen Time	2.2.8	
Change Password	2.2.9	
Linesman Display	2.15	

### Protection Menu

For non-directional settings use the Gn[] settings, ignoring the forward () notation.

Setting name	Ref	Applied value
Gn P/F Charact. Dir Control	2.3.1	
Gn[  ] P/F Charact. Setting	2.3.1	xin
Gn[  ] P/F Charact.	2.3.1	
Gn[  ] P/F Charact. Time Mult	2.3.1	

Setting name	Ref	Applied value
Gn P/F Charact. Delay	2.3.1	sec
Gn P/F Charact. Setting	2.3.1	xIn
Gn P/F Charact.	2.3.1	
Gn P/F Charact. Time Mult	2.3.1	
Gn P/F Charact. Delay	2.3.1	sec
Gn P/F Lowset Dir Control	2.3.2	
Gn P/F Lowset Setting	2.3.2	xIn
Gn P/F Lowset Delay	2.3.2	sec
Gn P/F Lowset Setting	2.3.2	xIn
Gn P/F Lowset Delay	2.3.2	sec
Gn P/F Highset1 Dir Control	2.3.2	
Gn P/F Highset1 Setting	2.3.2	xIn
Gn P/F Highset1 Delay	2.3.2	sec
Gn P/F Highset1 Setting	2.3.2	xIn
Gn P/F Highset1 Delay	2.3.2	sec
Gn P/F Highset2 Dir Control	2.3.2	
Gn P/F Highset2 Setting	2.3.2	xIn
Gn P/F Highset2 Delay	2.3.2	sec
Gn P/F Highset2 Setting	2.3.2	xIn
Gn P/F Highset2 Delay	2.3.2	sec
Gn E/F Charact. Dir Control	2.3.1	
Gn E/F Charact. Setting	2.3.1	xIn
Gn E/F Charact.	2.3.1	
Gn E/F Charact. Time Mult	2.3.1	
Gn E/F Charact. Delay	2.3.1	sec
Gn E/F Charact. Setting	2.3.1	xIn
Gn E/F Charact.	2.3.1	
Gn E/F Charact. Time Mult	2.3.1	
Gn E/F Charact. Delay	2.3.1	sec
Gn E/F Lowset Dir Control	2.3.2	
Gn E/F Lowset Setting	2.3.2	xIn
Gn E/F Lowset Delay	2.3.2	sec

Setting name	Ref	Applied value
Gn E/F Lowset Setting	2.3.2	xIn
Gn E/F Lowset Delay	2.3.2	sec
Gn E/F Highset1 Dir Control	2.3.2	
Gn E/F Highset1 Setting	2.3.2	xIn
Gn E/F Highset1 Delay	2.3.2	sec
Gn E/F Highset1 Setting	2.3.2	xIn
Gn E/F Highset1 Delay	2.3.2	sec
Gn E/F Highset2 Dir Control	2.3.2	
Gn E/F Highset2 Setting	2.3.2	xIn
Gn E/F Highset2 Delay	2.3.2	sec
Gn E/F Highset2 Setting	2.3.2	xIn
Gn E/F Highset2 Delay	2.3.2	sec
Gn [SEF/REF] Current Setting	2.4	
Gn [SEF/REF] 1st Time Delay	2.4	sec
Gn [SEF/REF] 2nd Time Delay	2.4	sec
Gn [SEF/REF] Lowset Delay	2.4	sec
Gn CB Fail Time Delay1	2.5	sec
Gn CB Fail Time Delay2	2.5	sec
Gn Relay Reset Delay	2.3.3	sec
Gn Backup Alarm SA	2.9.1	sec
Gn Backup Trip SA	2.9.1	Sec

**Directional Menu**

Setting name	Ref	Applied value
Gn 2-Out-Of-3 Gate Logic	2.7	
Gn P/F Charact. Angle	2.7	
Gn E/F Charact. Angle	2.7	

**Auto-reclose Menu**

Setting name	Ref	Applied value
Gn Line Check Trip	2.9.1	
Gn Seq Edit/View	2.9	
GnP/F ARC	2.9.1	
GnP/F Line Check Trip	2.9.1	
GnP/F Protection Trip 1	2.9.1	

Setting name	Ref	Applied value
GnP/F Reclose DTL 1	2.9.1	sec
GnP/F Protection Trip 2	2.9.1	
GnP/F Reclose DTL 2	2.9.1	sec
GnP/F Protection Trip 3	2.9.1	
GnP/F Reclose DTL 3	2.9.1	sec
GnP/F Protection Trip 4	2.9.1	
GnP/F Reclose DTL 4	2.9.1	sec
GnP/F Shots To Lockout	2.9.1	
GnP/F HS1 Trips to Lockout	2.9.1	
GnP/F HS2 Trips to Lockout	2.9.1	
GnE/F ARC	2.9.1	
GnE/F Line Check Trip	2.9.1	
GnE/F Protection Trip 1	2.9.1	
GnE/F Reclose DTL 1	2.9.1	sec
GnE/F Protection Trip 2	2.9.1	
GnE/F Reclose DTL 2	2.9.1	sec
GnE/F Protection Trip 3	2.9.1	
GnE/F Reclose DTL 3	2.9.1	sec
GnE/F Protection Trip 4	2.9.1	
GnE/F Reclose DTL 4	2.9.1	sec
GnE/F Shots To Lockout	2.9.1	
GnE/F HS1 Trips to Lockout	2.9.1	
GnE/F HS2 Trips to Lockout	2.9.1	
Gn[SEF/REF] ARC	2.9.1	
Gn[SEF/REF] Line Check Trip	2.9.1	
Gn[SEF/REF] Protection Trip 1	2.9.1	
Gn[SEF/REF] Reclose DTL 1	2.9.1	sec
Gn[SEF/REF] Protection Trip 2	2.9.1	
Gn[SEF/REF] Reclose DTL 2	2.9.1	sec
Gn[SEF/REF] Protection Trip 3	2.9.1	
Gn[SEF/REF] Reclose DTL 3	2.9.1	sec
Gn[SEF/REF] Protection Trip 4	2.9.1	
Gn[SEF/REF] Reclose DTL 4	2.9.1	sec








Setting name	Ref	Applied value
Gn[SEF/REF] Shots To Lockout	2.9.1	
GnSA ARC	2.9.1	
GnSA Line Check Trip	2.9.1	
GnSA Reclose DTL 1	2.9.1	sec
GnSA Reclose DTL 2	2.9.1	sec
GnSA Reclose DTL 3	2.9.1	sec
GnSA Reclose DTL 4	2.9.1	sec
GnSA Shots To Lockout	2.9.1	
GnSA Trips To Block	2.9.1	
Gn Reclaim Time	2.9	sec
Gn Close Pulse	2.9	sec
Manual Close Delay	2.9.2	sec
Gn LO Recovery	2.9.1	sec
Cold Load Enable	2.6	sec
Cold Load Reset	2.6	sec

#### Output Relay Configuration Menu

See also Figure 2-1 on page 13 for the programming matrix. For non-directional settings use the Gn[F] settings, ignoring the forward (F) notation.

Setting name	Ref	Applied value
Gn Prot. Healthy	2.14.3	
Gn[F] P/F Starter	2.3.1	
Gn[R] P/F Starter	2.3.1	
Gn[F] P/F Charact.	2.3.1	
Gn[R] P/F Charact.	2.3.1	
Gn[F] P/F Lowset	2.3.2	
Gn[R] P/F Lowset	2.3.2	
Gn[F] P/F Highset1	2.3.2	
Gn[R] P/F Highset1	2.3.2	
Gn[F] P/F Highset2	2.3.2	
Gn[R] P/F Highset2	2.3.2	
Gn[F] E/F Starter	2.3.1	
Gn[R] E/F Starter	2.3.1	
Gn[F] E/F Charact.	2.3.1	



Setting name	Ref	Applied value
Gn  E/F Charact.	2.3.1	
Gn  E/F Lowset	2.3.2	
Gn  E/F Lowset	2.3.2	
Gn  E/F Highset1	2.3.2	
Gn  E/F Highset1	2.3.2	
Gn  E/F Highset2	2.3.2	
Gn  E/F Highset2	2.3.2	
Gn [SEF/REF] Starter	2.4	
Gn [SEF/REF] Delay1	2.4	
Gn [SEF/REF] Delay2	2.4	
Gn [SEF/REF] Lowset	2.4	
Gn P/F FWD Block	2.7	
Gn P/F REV Block	2.7	
Gn E/F FWD Block	2.7	
Gn E/F REV Block	2.7	
Gn Status 1	2.11	
Gn Status 2	2.11	
Gn Status 3	2.11	
Gn Status 4	2.11	
Gn Status 5	2.11	
Gn Status 6	2.11	
Gn Status 7	2.11	
Gn Status 8	2.11	
Gn Status 9	2.11	
Gn CB Fail 1	2.5	
Gn CB Fail 2	2.5	
Gn ΔTrip Alarm	2.14.1	
Gn Counter Alarm	2.14.1	
Gn FOC Alarm	2.14.1	
Gn ΣI <sup>2</sup> Alarm	2.14.1	
Gn Power On Count	2.14.3	
Gn Hand Reset	2.11	
Gn Pulsed Relays	2.11	

Setting name	Ref	Applied value
Gn Lockout Alarm	2.9.1	
Gn Close Pulse	2.9.1	
Gn AUX Close	2.9.1	
Gn ARC Active	2.9.1	
Gn Reclaimed	2.9.1	
Gn SA Blocked	2.9.1	
Gn SA Alarm	2.9.1	
Gn SA Trip	2.9.1	
Min O/P Energise Time	2.11	ms

### Status Configuration Menu

See also Figure 2-1 on page 13 for the programming matrix.

Setting name	Ref	Applied value
Settings Group Select	2.2.1	
Gn Inverted Inputs	2.11	
Gn Latched Inputs	2.11	
Gn P/F Charact. Inhib.	2.3.1	
Gn P/F Lowset Inhib.	2.3.2	
Gn P/F Highset 1 Inhib.	2.3.2	
Gn P/F Highset 2 Inhib.	2.3.2	
Gn E/F Charact. Inhib.	2.3.1	
Gn E/F Lowset Inhib.	2.3.2	
Gn E/F HighSet 1 Inhib.	2.3.2	
Gn E/F HighSet 2 Inhib.	2.3.2	
Gn [SEF/REF] Delay 1 Inhib.	2.4	
Gn [SEF/REF] Delay 2 Inhib.	2.4	
Gn [SEF/REF] Lowset Inhib.	2.4	
Gn Trip Circuit Fail	2.10	
Gn Waveform Trig	2.13.3	
Gn ΣI <sup>2</sup> Update	2.14.1	
Gn Reset Flag & Output	2.11	
Gn Clock Sync.	2.2.7	

Setting name	Ref	Applied value
Gn Status 1 P/U Delay	2.11	sec
Gn Status 1 D/O Delay	2.11	sec
Gn Status 2 P/U Delay	2.11	sec
Gn Status 2 D/O Delay	2.11	sec
Gn Status 3 P/U Delay	2.11	sec
Gn Status 3 D/O Delay	2.11	sec
Gn Status 4 P/U Delay	2.11	sec
Gn Status 4 D/O Delay	2.11	sec
Gn Status 5 P/U Delay	2.11	sec
Gn Status 5 D/O Delay	2.11	sec
Gn Status 6 P/U Delay	2.11	sec
Gn Status 6 D/O Delay	2.11	sec
Gn Status 7 P/U Delay	2.11	sec
Gn Status 7 D/O Delay	2.11	sec
Gn Status 8 P/U Delay	2.11	sec
Gn Status 8 D/O Delay	2.11	sec
Gn Status 9 P/U Delay	2.11	sec
Gn Status 9 D/O Delay	2.11	sec
Gn ARC Status A	2.9.1	
Gn ΔTrip Counter Reset	2.14.1	
Gn Counter Reset	2.14.1	
Gn FOC Reset	2.14.1	
Gn Trip & ARC	2.9.2	
Gn Close & Lockin	2.9.2	
Gn Trip & Lockout	2.9.2	
Gn Local Close & Reclaim	2.9.2	
Gn Remote Close Reclaim	2.9.2	
Gn CB Open	2.9.1	
Gn CB Closed	2.9.1	
Gn Reclose Block	2.8.1	
Gn P/F ARC Off	2.9.1	
Gn E/F ARC Off	2.9.1	
Gn [SEF/REF] ARC Off	2.9.1	

Setting name	Ref	Applied value
Gn Hot Line Working	2.9.4	
Gn Alarm 1 * see note below	2.2.5	
Gn Alarm 2 * see note below	2.2.5	
Gn Alarm 3 * see note below	2.2.5	
Gn Alarm 4 * see note below	2.2.5	
Gn Alarm 5 * see note below	2.2.5	

\* The text of these setting names reflects the value applied to the 'Set Alarm *n*' settings in the 'System Config.' menu.

#### Comms Interface Menu

Setting name	Ref	Applied value
Comms Baud Rate	4.3.1	baud
Comms Parity	4.3.2	
Relay Address	4.3.3	
Line Idle	4.3.4	
Data Echo	4.3.5	

#### Data Storage Menu

Setting name	Ref	Applied value
Gn Fault Trigger	2.13.2	
Gn Waveform Trig	2.13.3	
Gn Waveform Pre-Trigger	2.13.3	%
Clear All Waveforms	2.13.3	
Clear All Events	2.13.1	
Clear All Faults	2.13.2	

#### CB Maintenance Menu

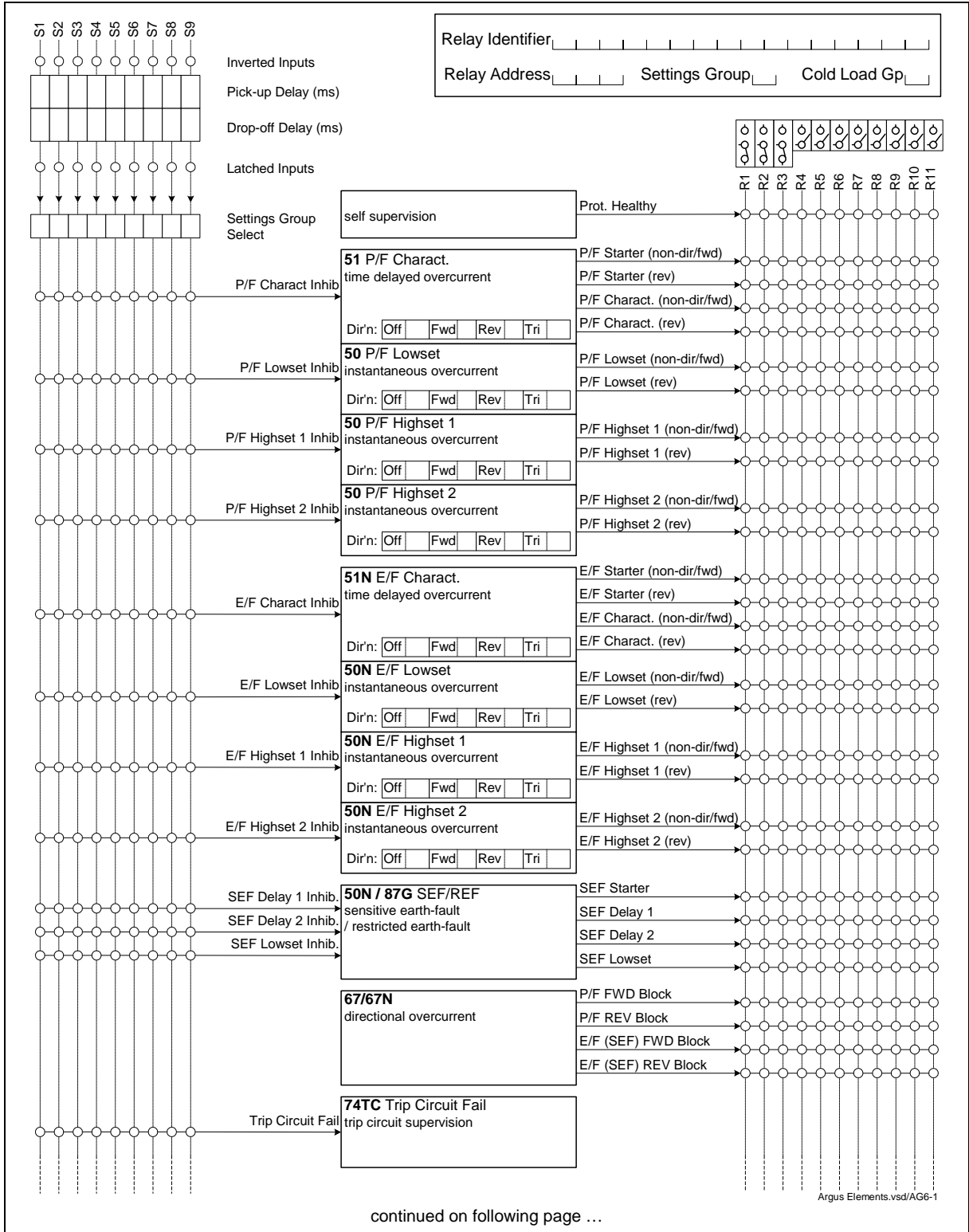
Setting name	Ref	Applied value
Δ Trip Counter Reset	2.14.1	
Δ Trip Counter Alarm	2.14.1	
Trip Counter Reset	2.14.1	
Trip Counter Alarm	2.14.1	
Freq Op Counter Reset.	2.14.1	
Freq Op Counter Alarm	2.14.1	
ΣI <sup>2</sup> Reset	2.14.1	
ΣI <sup>2</sup> Alarm	2.14.1	
Power On Count Reset	2.14.3	

Setting name	Ref	Applied value
Power On Count Alarm	2.14.3	
O/P Relay Test	2.14.2	

**Linesman Menu**

Setting name	Ref	Applied value
Scada Control	2.15	
Hot Line Working	2.15	
Trip & Lockout	2.15	

Setting name	Ref	Applied value
Trip & Reclose	2.15	
Close & Reclaim	2.15	
ARC	2.15	
Inst. Lowset	2.15	
Trip Counter Reset	2.15	
SEF	2.15	



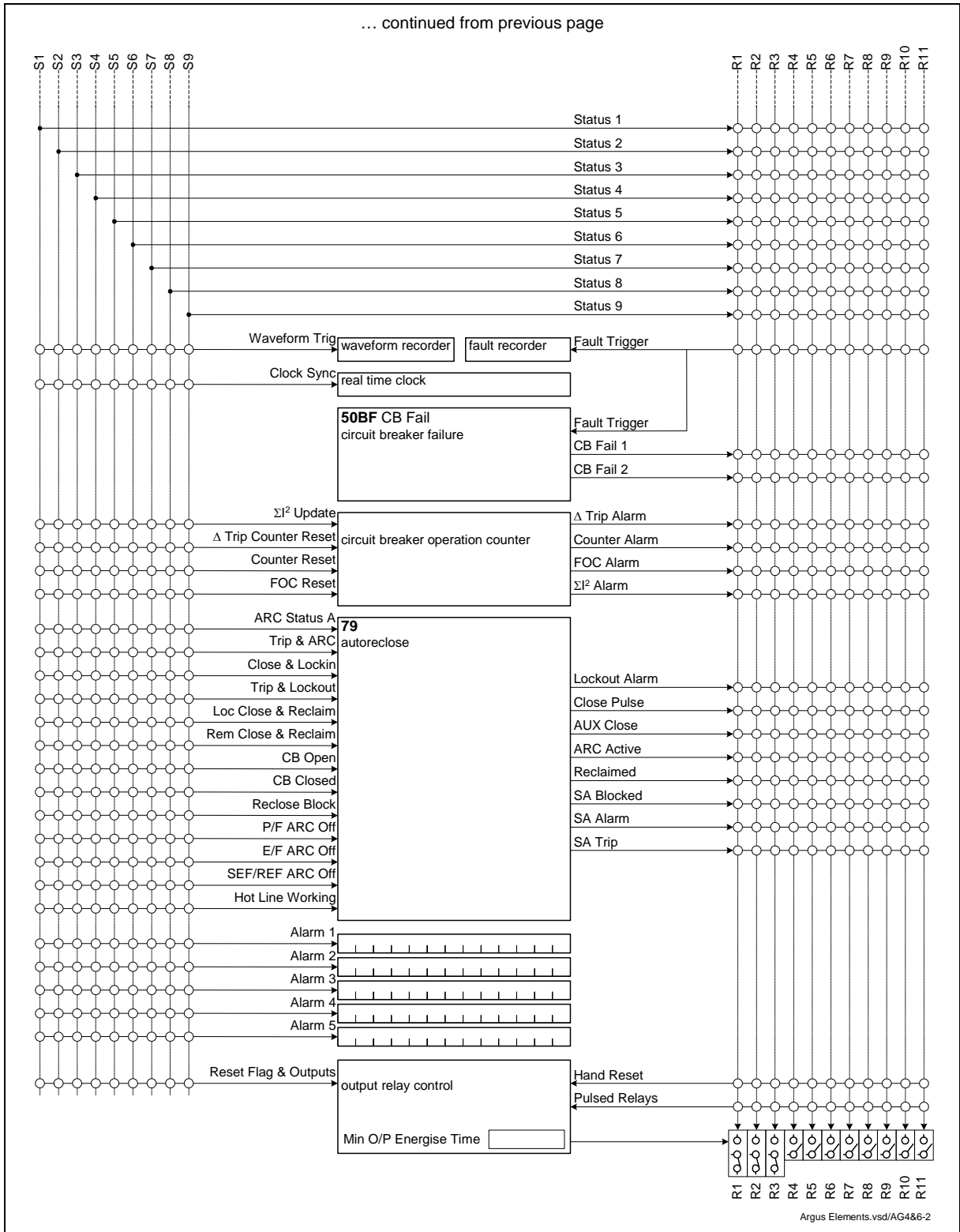


Figure 2-1 Status Input and Output Relay Programming Matrix

## Section 3: IEC 60870-5-103 Definitions

The following tables give information on the IEC 60870-5-103 protocol. A detailed description of all protocol information is available in report no 434/TM/5/13 which can be accessed on the [www.reyrolle-protection.com](http://www.reyrolle-protection.com) in publications section under technical reports, "communications interface manual".

**Table Showing Function Type Numbers Used**

Function Type	Description
160	IEC Overcurrent Protection
164	Reyrolle Overcurrent Protection
254	IEC Generic
255	IEC Global

### Cause of Transmission

The cause of transmission (COT) column of the 'Information Number and Function' table lists possible causes of transmission for these frames. The following abbreviations are used:

**Table Showing Permitted Cause of Transmission Numbers**

Cause of Transmission (COT)	Description
1	Spontaneous Events
2	Cyclic
3	Reset Frame Count Bit (FCB)
4	Reset Communication Unit (CU)
5	Start Restart
6	Power On
7	Test Mode
8	Time Synchronisation
9	General Interrogation
10	Termination of General Interrogation
11	Local Operation
12	Remote Operation
20	Positive Command Acknowledge
21	Negative Command Acknowledge
31	Transmission of Disturbance Data

### Information Number and Function

The following tables list information number and function definitions together with a description of the message and function type and cause of transmission that can result in that message. Not all definitions are available on all relay types – this is dependent on functionality

<b>KEY</b>	<b>FUN</b>	Function Type (defined in IEC60870-5-103 section 7.2.5.1)
	<b>INF</b>	Information Number (defined in IEC60870-5-103 section 7.2.5.2)
	<b>TYP</b>	ASDU Type (defined in IEC60870-5-103 sections 7.3.1 and 7.3.2)
	<b>GI</b>	Event supports General Interrogation x = supported (defined in IEC60870-5-103 section 7.2.5.2)
	<b>COM</b>	Type of command single (ON only) or double (ON/OFF) (defined in IEC60870-5-103 section 7.2.5.2)
	<b>COT</b>	Cause of Transmission (defined in IEC60870-5-103 section 7.2.3, table 5)
	<b>DIR</b>	Direction of event - Raised Only (RO), Raised/Cleared (RC) or Double Point Travelling, Cleared, Raised or Unknown (DBI)
	<b>x</b>	Supported, - Not supported.

Table Showing Command Information (INF) Numbers

FUN	INF	Description	GI	TYP	COT	DIR	Argus 6
160	2	Reset FCB	-	5	3	RO	x
160	3	Reset CU	-	5	4	RO	x
160	4	Start/Restart	-	5	5	RO	x
160	5	Power On	-	5	6	RO	x
160	16	ARC in progress	x	1	1, 9, 12, 20, 21	RC	x
160	19	LEDs reset	-	1	1, 7, 11, 12, 20, 21	RO	x
160	21	Trip Test	x	1	1, 9	RC	x
160	22	Settings changed	x	1	1, 9, 11, 12	RC	x
160	23	Setting G1 selected	x	1	1, 9, 11, 12, 20, 21	RC	x
160	24	Setting G2 selected	x	1	1, 9, 11, 12, 20, 21	RC	x
160	25	Setting G3 selected	x	1	1, 9, 11, 12, 20, 21	RC	x
160	26	Setting G4 selected	x	1	1, 9, 11, 12, 20, 21	RC	x
160	27	Input 1	x	1	1, 9	RC	x
160	28	Input 2	x	1	1, 9	RC	x
160	29	Input 3	x	1	1, 9	RC	x
160	30	Input 4	x	1	1, 9	RC	x
160	36	Trip circuit fail	x	1	1, 9	RC	x
160	46	Group Warning	x	1	1, 9	RC	x
160	47	Alarm	x	1	1, 9	RO	x
160	64	A-starter	x	2	1, 9	RC	x
160	65	B-starter	x	2	1, 9	RC	x
160	66	C-starter	x	2	1, 9	RC	x
160	67	E-starter	x	2	1, 9	RC	x
160	68	General trip	-	2	1	RO	x
160	69	A-general trip	-	2	1	RO	x
160	70	B-general trip	-	2	1	RO	x
160	71	C-general trip	-	2	1	RO	x
160	84	General starter	x	2	1, 9	RC	x
160	85	Circuit breaker fail 1	-	2	1	RO	x
160	91	P/F-general HS trip	-	2	1	RO	x
160	92	E/F-general trip	-	2	1	RO	x

FUN	INF	Description	GI	TYP	COT	DIR	Argus 6
160	93	E/F-general HS trip	-	2	1	RO	x
160	128	CB on by auto reclose	-	1	1	DP	x
160	130	Reclose blocked	x	1	1, 9	RC	x
160	144	Measurand $I_{L1}$ <sup>1</sup>	-	3.1	2,7	-	x
160	148	Measurand $I_{L1,2,3}$ , <sup>1</sup> $V_{L1,2,3}$ , P, Q	-	9	2,7	-	
164	0	Data lost	-	1	1	RO	x
164	1	A-lowset starter	-	2	1	RC	x
164	2	B-lowset starter	-	2	1	RC	x
164	3	C-lowset starter	-	2	1	RC	x
164	4	E-lowset starter	-	2	1	RC	x
164	5	A-lowset trip	-	2	1	RO	x
164	6	B-lowset trip	-	2	1	RO	x
164	7	C-lowset trip	-	2	1	RO	x
164	8	E-lowset trip	-	2	1	RO	x
164	9	A-delayed trip	-	2	1	RO	x
164	10	B-delayed trip	-	2	1	RO	x
164	11	C-delayed trip	-	2	1	RO	x
164	12	E-delayed trip	-	2	1	RO	x
164	13	A-HS1 trip	-	2	1	RO	x
164	14	B-HS1 trip	-	2	1	RO	x
164	15	C-HS1 trip	-	2	1	RO	x
164	16	E-HS1 trip	-	2	1	RO	x
164	17	A-HS2 trip	-	2	1	RO	x
164	18	B-HS2 trip	-	2	1	RO	x
164	19	C-HS2 trip	-	2	1	RO	x
164	20	E-HS2 trip	-	2	1	RO	x
164	21	SEF/REF starter	x	2	1, 9	RC	x
164	23	SEF/REF lowset trip	-	2	1	RC	x
164	24	SEF/REF stage 1 trip	-	2	1	RC	x
164	25	SEF/REF stage 2 trip	-	2	1	RC	x
164	26	A-HS1 starter	-	2	1	RC	x
164	27	B-HS1 starter	-	2	1	RC	x
164	28	C-HS1 starter	-	2	1	RC	x

<sup>1</sup> Current Measurand Scaling can be User set to either 1.2 x In or 2.4 x In



FUN	INF	Description	GI	TYP	COT	DIR	Argus 6
164	29	E-HS1 starter	-	2	1	RC	x
164	30	A-HS2 starter	-	2	1	RC	x
164	31	B-HS2 starter	-	2	1	RC	x
164	32	C-HS2 starter	-	2	1	RC	x
164	33	E-HS2 starter	-	2	1	RC	x
164	34	Circuit breaker open	x	1	1, 9	RO	x
164	35	Setting G5 selected	x	1	1, 9, 11, 12, 20, 21	RC	x
164	36	Setting G6 selected	x	1	1, 9, 11, 12, 20, 21	RC	x
164	37	Setting G7 selected	x	1	1, 9, 11, 12, 20, 21	RC	x
164	38	Setting G8 selected	x	1	1, 9, 11, 12, 20, 21	RC	x
164	39	Circuit breaker fail 2	-	2	1	RO	x
164	41	CB close fail	x	1	1, 9	RO	x
164	43	CB DBI state	x	1	1, 9	RO	x
164	44	External Trip	-	2	1	RO	x
164	45	Input 5	x	1	1, 9	RC	x
164	46	Input 6	x	1	1, 9	RC	x
164	47	Input 7	x	1	1, 9	RC	x
164	48	Input 8	x	1	1, 9	RC	x
164	49	Input 9	x	1	1, 9	RC	x
164	51	Output 1	x	1	1, 9, 12, 20, 21	RC	x
164	52	Output 2	x	1	1, 9, 12, 20, 21	RC	x
164	53	Output 3	x	1	1, 9, 12, 20, 21	RC	x
164	54	Output 4	x	1	1, 9, 12, 20, 21	RC	x
164	55	Output 5	x	1	1, 9, 12, 20, 21	RC	x
164	56	Output 6	x	1	1, 9, 12, 20, 21	RC	x
164	57	Output 7	x	1	1, 9, 12, 20, 21	RC	x
164	58	Output 8	x	1	1, 9, 12, 20, 21	RC	
164	59	Output 9	x	1	1, 9, 12, 20, 21	RC	
164	60	Output 10	x	1	1, 9, 12, 20, 21	RC	
164	61	Output 11	x	1	1, 9, 12, 20, 21	RC	
164	62	Forward A	x	2	1, 9	RC	x
164	63	Reverse A	x	2	1, 9	RC	x
164	64	Forward B	x	2	1, 9	RC	x
164	65	Reverse B	x	2	1, 9	RC	x
164	66	Forward C	x	2	1, 9	RC	x
164	67	Reverse C	x	2	1, 9	RC	x
164	68	Forward E	x	2	1, 9	RC	x
164	69	Reverse E	x	2	1, 9	RC	x

FUN	INF	Description	GI	TYP	COT	DIR	Argus 6
164	70	Trip count alarm	x	1	1, 9	RC	x
164	70	Trip count alarm	x	4	1, 9	RC	
164	71	CB maintenance alarm	x	1	1, 9	RC	x
164	71	CB maintenance alarm	x	4	1, 9	-	
164	72	Frequent operations exceeded	x	1	1, 9	RC	x
164	73	Delta Trip Counter Alarm	x	1	1, 9	RC	x
164	79	Voltage Block	x	1	1, 9	RC	
164	80	Waveform stored	-	1	1, 12, 20, 21	RO	x
164	81	Remote control interrupted	-	1	1	RO	x
164	82	Trip and Lockout	-	1	1, 12, 20, 21	RO	x
164	83	Close and Reclaim	-	1	1, 12, 20, 21	RO	x
164	84	Trip And Reclose	-	1	1, 12, 20, 21	RO	x
164	85	Circuit breaker closed	x	1	1, 9	RO	x
164	86	Close And Lockin	-	1	1, 12, 20, 21	RO	x
164	87	Reclose delay	x	1	1, 9	RC	x
164	88	Reclaim	x	1	1, 9	RC	x
164	89	Lockout	x	1	1, 9	RC	x
164	90	Forward SEF	x	2	1, 9	RC	x
164	91	Reverse SEF	x	2	1, 9	RC	x
164	92	Power On Counter Alarm	x	1	1, 9	RC	x
164	97	CT Failure	x	1	1, 9	RC	
164	100	Cold load pickup	x	1	1, 9, 12, 20, 21	RC	x
164	101	Cold load trip	-	2	1	RO	x
164	102	Line check trip	-	2	1	RO	x
164	103	ARC start A	x	1	1, 9	RC	x
164	104	A backup time	-	1	1	RC	x
164	105	A backup trip	-	1	1	RC	x
164	106	External trip block	x	1	1, 9	RC	x
164	110	SEF off	x	1	1, 9, 12, 20, 21	RC	x
164	111	All ARC off	x	1	1, 9	RC	x
164	112	P/F ARC off	x	1	1, 9, 12, 20, 21	RC	x
164	113	E/F ARC off	x	1	1, 9, 12, 20, 21	RC	x
164	114	SEF ARC off	x	1	1, 9, 12, 20, 21	RC	x
164	115	All inst off	x	1	1, 9, 12, 20, 21	RC	x
164	116	P/F inst off	x	1	1, 9, 12, 20, 21	RC	x
164	117	E/F inst off	x	1	1, 9, 12, 20, 21	RC	x

FUN	INF	Description	GI	TYP	COT	DIR	Argus 6
164	118	SEF inst off	x	1	1, 9, 12, 20, 21	RC	x
164	119	Hot line working	x	1	1, 9, 12, 20, 21	RC	x
164	120	Scada Control	x	1	1, 9	RC	x
164	121	General alarm 1	x	1	1, 9	RC	x
164	122	General alarm 2	x	1	1, 9	RC	x
164	123	General alarm 3	x	1	1, 9	RC	x
164	124	General alarm 4	x	1	1, 9	RC	x
164	125	General alarm 5	x	1	1, 9	RC	x
164	131	Va/Vab starter	x	2	1, 9	RC	
164	132	Vb/Vbc starter	x	2	1, 9	RC	
164	133	Vc/Vca starter	x	2	1, 9	RC	
164	170	V starter	x	2	1, 9	RC	
164	182	V trip	-	2	1	RO	
164	190	Voltage Memory A	x	1	1, 9	RC	
164	191	Voltage Memory B	x	1	1, 9	RC	
164	192	Voltage Memory C	x	1	1, 9	RC	
164	240	Ia Fault Current	x	4	1, 9	-	
164	241	Ib Fault Current	x	4	1, 9	-	
164	242	Ic Fault Current	x	4	1, 9	-	
164	243	Ie Fault Current	x	4	1, 9	-	
164	244	Isef Fault Current	x	4	1, 9	-	
164	245	Va Fault Voltage	x	4	1, 9	-	
164	246	Vb Fault Voltage	x	4	1, 9	-	
164	247	Vc Fault Voltage	x	4	1, 9	-	
164	248	Vn Fault Voltage	x	4	1, 9	-	
255	0	Time Synchronisation	-	6	8	-	x
255	0	End of General Interrogation	-	8	10	-	x

Table Showing Command Information (INF) Numbers

FUN	INF	Description	COM	TYP	COT	Argus 6
160	16	Auto-recloser ON/OFF	ON/OFF	20	20	x
160	19	Reset Flag & Outputs	ON	20	20	x

FUN	INF	Description	COM	TYP	COT		Argus 6
160	23	Settings Group 1 Select	ON	20	20		x
160	24	Settings Group 2 Select	ON	20	20		x
160	25	Settings Group 3 Select	ON	20	20		x
160	26	Settings Group 4 Select	ON	20	20		x
164	35	Settings Group 5 Select	ON	20	20		x
164	36	Settings Group 6 Select	ON	20	20		x
164	37	Settings Group 7 Select	ON	20	20		x
164	38	Settings Group 8 Select	ON	20	20		x
164	51	Energise Output 1	ON	20	20		x
164	52	Energise Output 2	ON	20	20		x
164	53	Energise Output 3	ON	20	20		x
164	54	Energise Output 4	ON	20	20		x
164	55	Energise Output 5	ON	20	20		x
164	56	Energise Output 6	ON	20	20		x
164	57	Energise Output 7	ON	20	20		x
164	58	Energise Output 8	ON	20	20		
164	59	Energise Output 9	ON	20	20		
164	60	Energise Output 10	ON	20	20		
164	61	Energise Output 11	ON	20	20		
164	80	Trigger Waveform Storage	ON	20	20		x
164	82	Trip and Lockout	ON	20	20		x
164	83	Close and Reclaim	ON	20	20		x
164	84	Trip And Reclose	ON	20	20		x
164	86	Close And Lockin	ON/OFF	20	20		x
164	100	Cold load pickup	ON/OFF	20	20		x
164	110	SEF	ON/OFF	20	20		x
164	112	P/F ARC Inhibit	ON/OFF	20	20		x
164	113	E/F ARC Inhibit	ON/OFF	20	20		x
164	114	SEF ARC Inhibit	ON/OFF	20	20		x
164	115	Instantaneous	ON/OFF	20	20		x
164	116	P/F Instantaneous	ON/OFF	20	20		x
164	117	E/F Instantaneous	ON/OFF	20	20		x
164	118	SEF Instantaneous	ON/OFF	20	20		x

FUN	INF	Description	COM	TYP	COT		Argus 6
164	119	Hot line working	ON/OFF	20	20		x
164	129	Reset Energy Meters	ON/OFF	20	20		
164	130	Reset Maximum Demand	ON/OFF	20	20		x
255	0	Initiate General Interrogation	-	7	9	-	x
255	0	Time Synchronisation	-	6	8		x

**Note:** Events listed as responding to a General Interrogation (**GI**) will be raised and cleared (**RC**); other events are raised only (**RO**) and do not respond to a **GI**.

## Section 4: Application Diagrams

The following pages contain example application diagrams for a variety of connections, showing various hardware options.

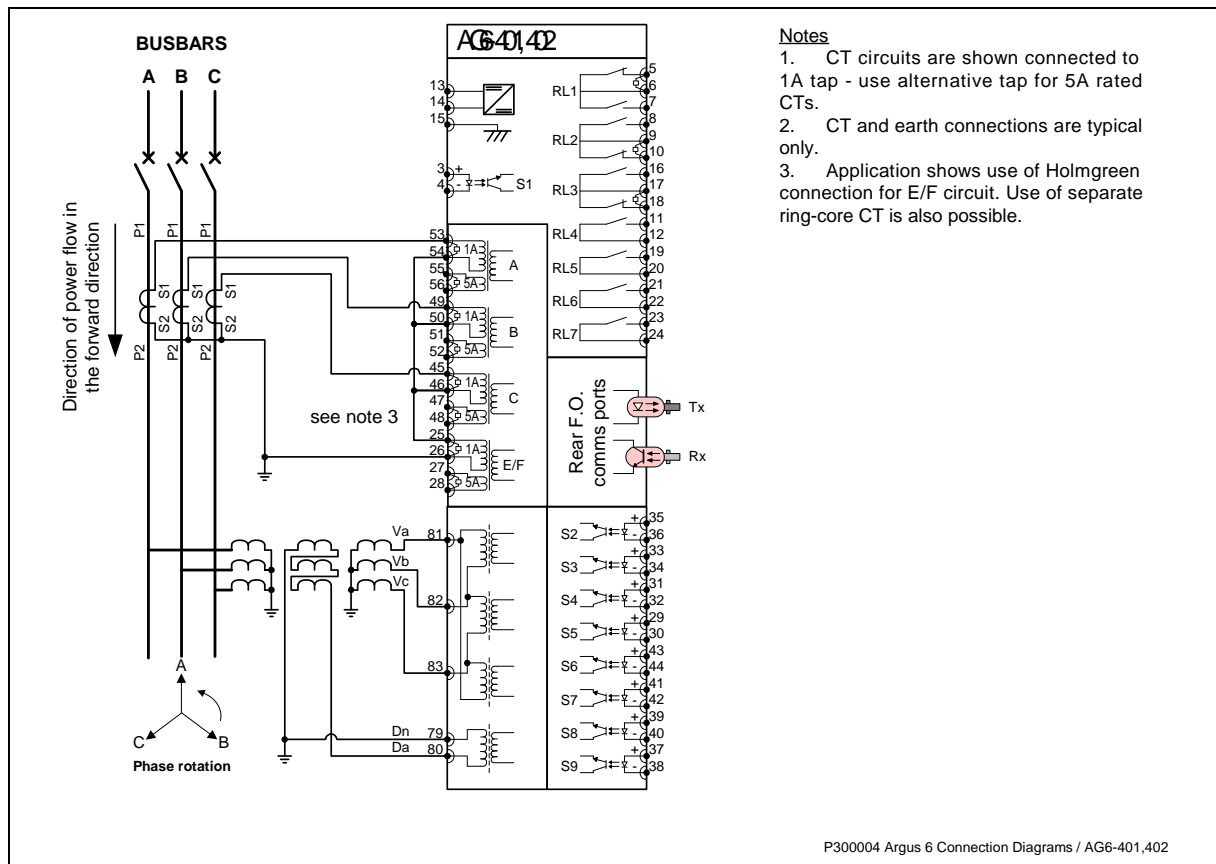


Figure 4-1 Typical Connection for 3 Directional Phase-fault and Directional Earth-fault

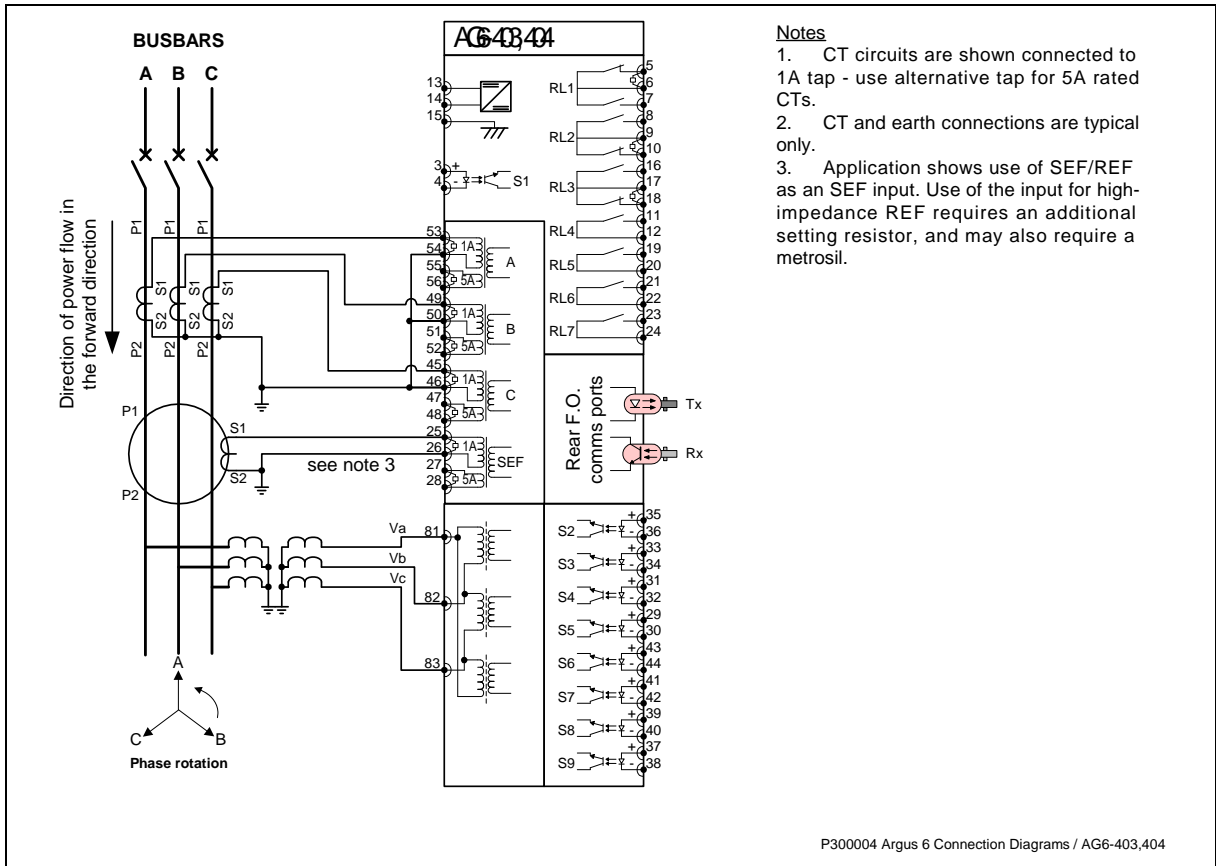


Figure 4-2 Typical Connection for 3 Directional Phase-fault and Sensitive Earth-fault

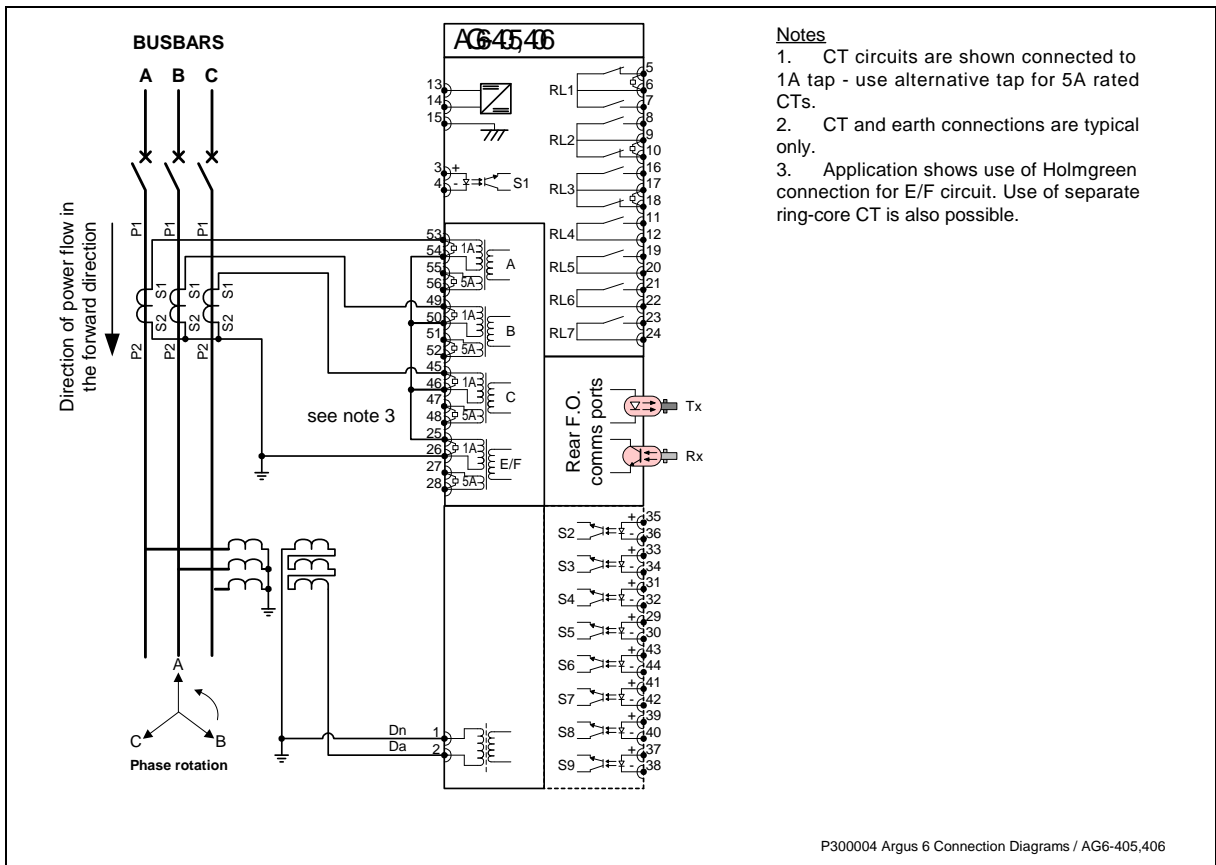


Figure 4-3 Typical Connection for 3 Phase-fault and Directional Earth-fault Protection

**Notes**

1. CT circuits are shown connected to 1A tap - use alternative tap for 5A rated CTs.
2. CT and earth connections are typical only.
3. Application shows use of SEF/REF as an SEF input. Use of the input for high-impedance REF requires an additional setting resistor, and may also require a metrosil.

**Notes**

1. CT circuits are shown connected to 1A tap - use alternative tap for 5A rated CTs.
2. CT and earth connections are typical only.
3. Application shows use of Holmgreen connection for E/F circuit. Use of separate ring-core CT is also possible.