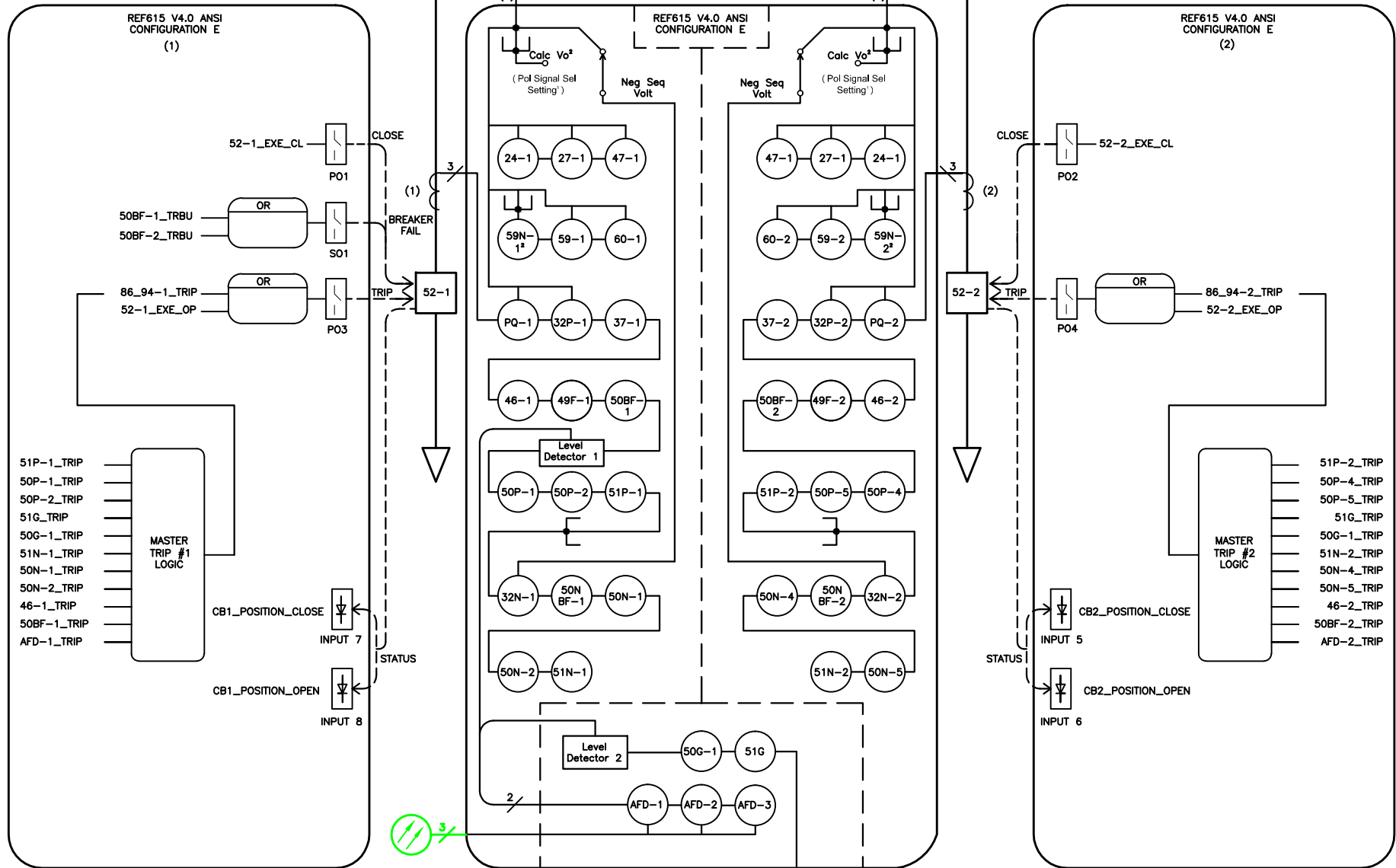


REF615\_HAFEEAEAFFE1BBN1XE (FEEDER APPLICATION)

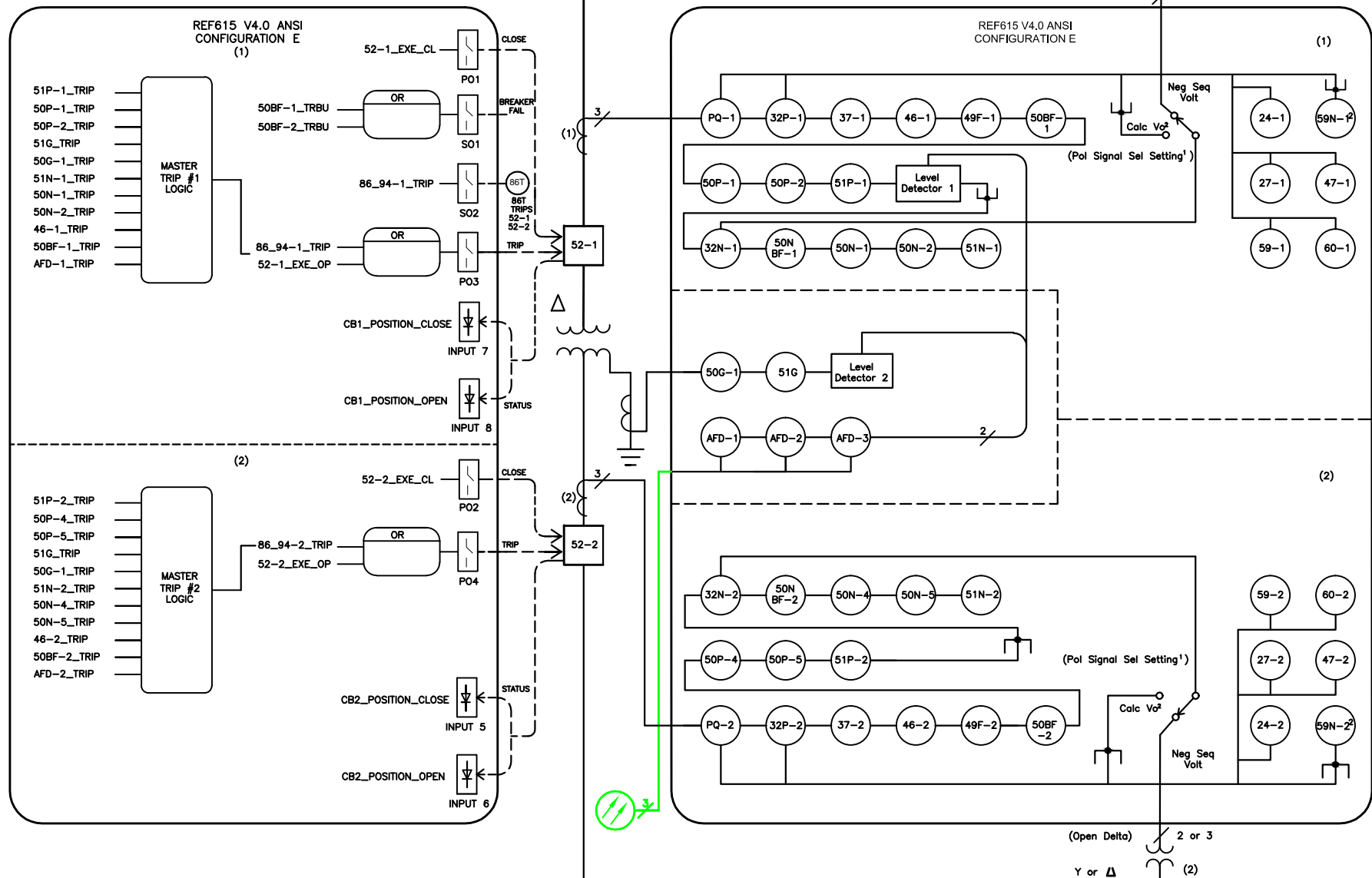


GENERAL NOTE:  
PCM600 ACT (Application Configuration Tool) logic is shown in default state.

NOTE:  
1. Rotary switch emulates drop down menu for "Pol Signal Sel" parameter setting in PCM600.  
Switch position shown for default setting (Neg Seq Volt). Switch is typical for all connected functions.  
2. "Pol Signal Sel" parameter setting "Calc Vo", and 59N-1 functions not applicable for open delta connected VTs.



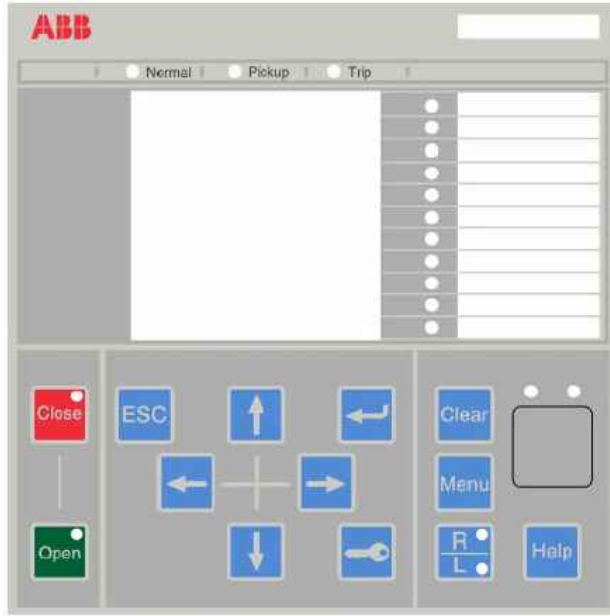
REF615\_HAFEEAEAFFE1BBN1XE (TRANSFORMER APPLICATION)



General Note:  
 PCM600 ACT (Application Configuration Tool) logic is shown in default state with exception of 86T lockout relay trip ( contact SO2).

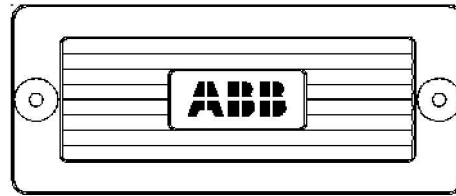
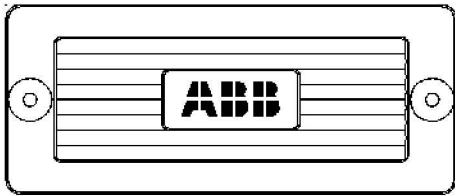
NOTE:  
 1. Rotary switch emulates drop down menu for "Pol Signal Sel" parameter setting in PCM600. Switch position shown for default setting (Neg Seq Volt). Switch is typical for all connected functions. Position can be set individually for each function.  
 2. "Pol Signal Se" parameter setting "Calc Vo", and 59N-1 functions not applicable for open delta connected VTs.

REF615\_HAFEEAEAFFE1BBN1XE (FEEDER APPLICATION)



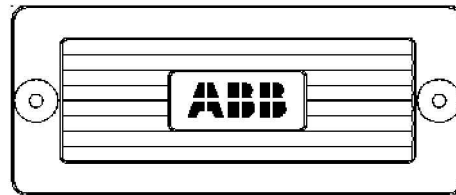
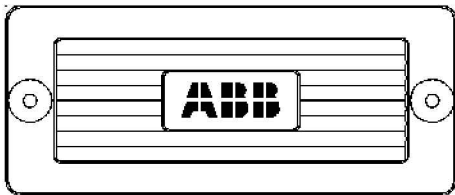
FT-1/TS1  
Style No: 774B430G20  
Code No: 171

FT-1/TS2  
Style No: 129A501G01  
Code No: 001



FT-1/TS3  
Style No: 774B430G20  
Code No: 171

FT-1/TS4  
Style No: 129A501G01  
Code No: 001



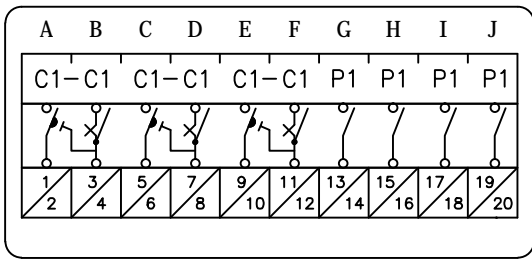
**General Notes:**

1. Style and code numbers for FT-1 switches provide black covers and handles, screw terminals and standard depth. Poles selection follows arrangement shown in this drawing set. For custom designs, different selection options can be made by using FT-1 configurator at [ft1switch.com](http://ft1switch.com).
2. Refer to 615 series ANSI Installation Manual for relay and cutout dimensions ( Document ID: MACCO51065-MB, Revision: D, Product version 4.0)



REF615\_HAFEEAEAFFE1BNN1XE (FEEDER APPLICATION)

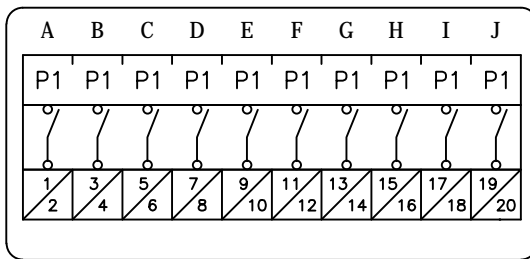
PHASE CURRENT  
 ■ IA (1)  
 PHASE CURRENT  
 ■ IB (1)  
 PHASE CURRENT  
 ■ IC (1)  
 PHASE VOLTAGE ■ VA (1)  
 PHASE VOLTAGE ■ VB (1)  
 PHASE VOLTAGE ■ VC (1)



FT-1/TS1

( RELAY 1 CURRENTS AND POTENTIALS)

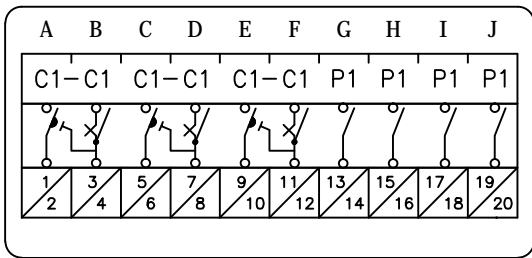
RELAY POS.VDC  
 RELAY NEG. VDC  
 52\_1\_EXE\_CL ( PO1)  
 86\_94+1\_TRIP/52-1\_EXE\_OP ( PO3)  
 50BF-1\_TRBU/50BF-2\_TRBU ( SO1)  
 CB1\_POSITION\_CLOSE ( IN7)  
 CB1\_POSITION\_OPEN ( IN8)



FT-1/TS2

( POWER SUPPLY AND RELAY 1 BINARY I/O)

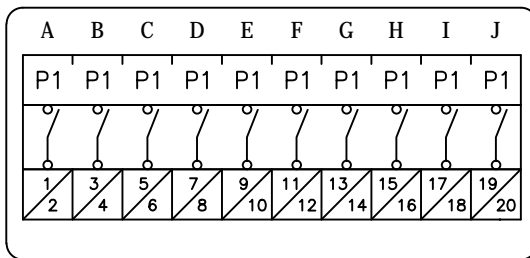
PHASE CURRENT  
 ■ IA (2)  
 PHASE CURRENT  
 ■ IB (2)  
 PHASE CURRENT  
 ■ IC (2)  
 PHASE VOLTAGE ■ VA (2)  
 PHASE VOLTAGE ■ VB (2)  
 PHASE VOLTAGE ■ VC (2)



FT-1/TS3

( RELAY 2 CURRENTS AND POTENTIALS)

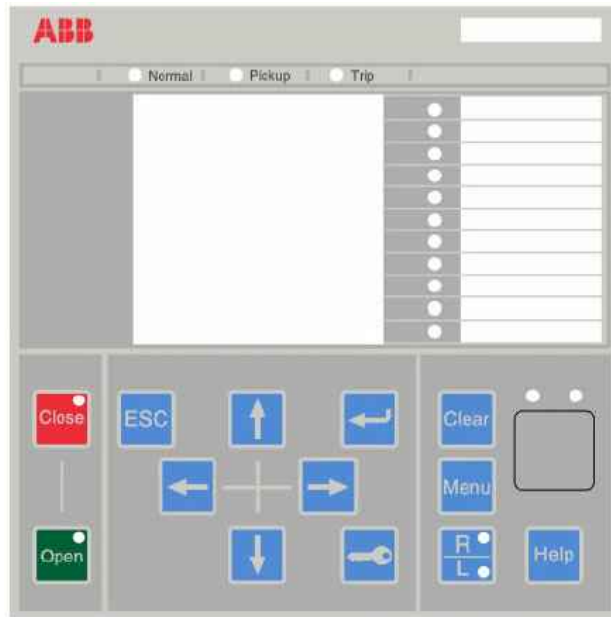
52-2\_EXE\_CL ( PO2)  
 86\_94+1\_TRIP/52-2\_EXE\_OP ( PO4)  
 CB2\_POSITION\_CLOSE ( IN5)  
 CB2\_POSITION\_OPEN ( IN6)



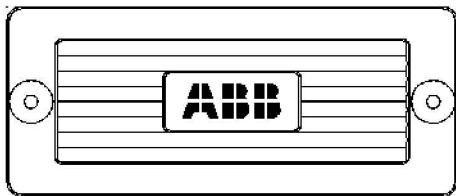
FT-1/TS4

( RELAY 2 BINARY I/O)

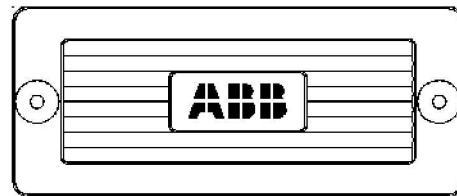
REF615\_HAFEEAEAFFE1BBN1XE (TRANSFORMER APPLICATION)



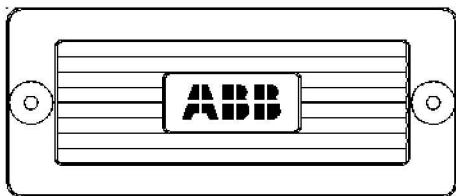
FT-1/TS1  
Style No: 837A407G01  
Code No: 083



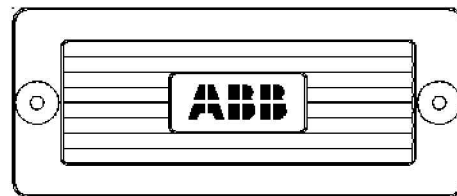
FT-1/TS2  
Style No: 129A501G01  
Code No: 001



FT-1/TS3  
Style No: 774B430G20  
Code No: 171



FT-1/TS4  
Style No: 129A501G01  
Code No: 001

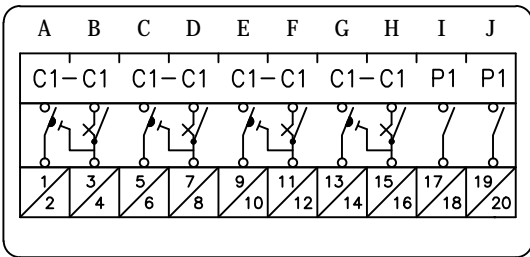


**General Notes:**

1. Style and code numbers for FT-1 switches provide black covers and handles, screw terminals and standard depth. Poles selection follows arrangement shown in this drawing set. For custom designs, different selection options can be made by using FT-1 configurator at [ft1switch.com](http://ft1switch.com).
2. Refer to 615 series ANSI Installation Manual for relay and cutout dimensions ( Document ID: MACCO51065-MB, Revision: D, Product version 4.0)

REF615\_HAFEEAEAFFE1BNN1XE (TRANSFORMER APPLICATION)

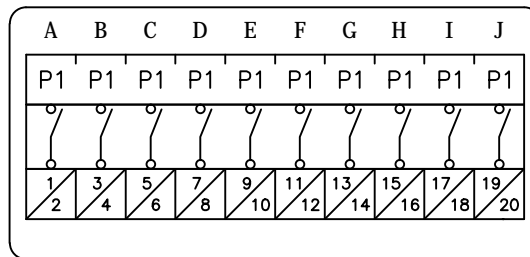
PHASE CURRENT  
 ■ IA (1)  
 PHASE CURRENT  
 ■ IB (1)  
 PHASE CURRENT  
 ■ IC (1)  
 GROUND CURRENT  
 ■ IG  
 RELAY POS. VDC  
 RELAY NEG. VDC



FT-1/TS1

(RELAY 1 CURRENTS, TRANSFORMER NEUTRAL CURRENT AND POWER SUPPLY)

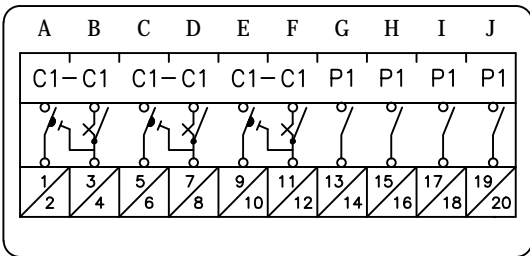
PHASE VOLTAGE VA (1)  
 PHASE VOLTAGE VB (1)  
 PHASE VOLTAGE VC (1)  
 52-1\_EXE\_CL (PO1)  
 86\_94-1\_TRIP/52-1\_EXE\_OP (PO3)  
 50BF-1/2\_TRBU (SO1)  
 86\_94-1\_TRIP/86T (SO2)  
 CB1\_POSITION\_CLOSE (IN7)  
 CB1\_POSITION\_OPEN (IN8)



FT-1/TS2

(RELAY 1 POTENTIALS AND BINARY I/O)

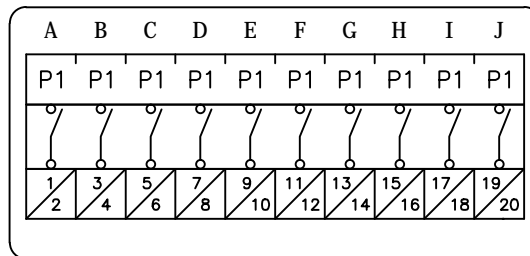
PHASE CURRENT  
 ■ IA (2)  
 PHASE CURRENT  
 ■ IB (2)  
 PHASE CURRENT  
 ■ IC (2)



FT-1/TS3

(RELAY 2 CURRENTS)

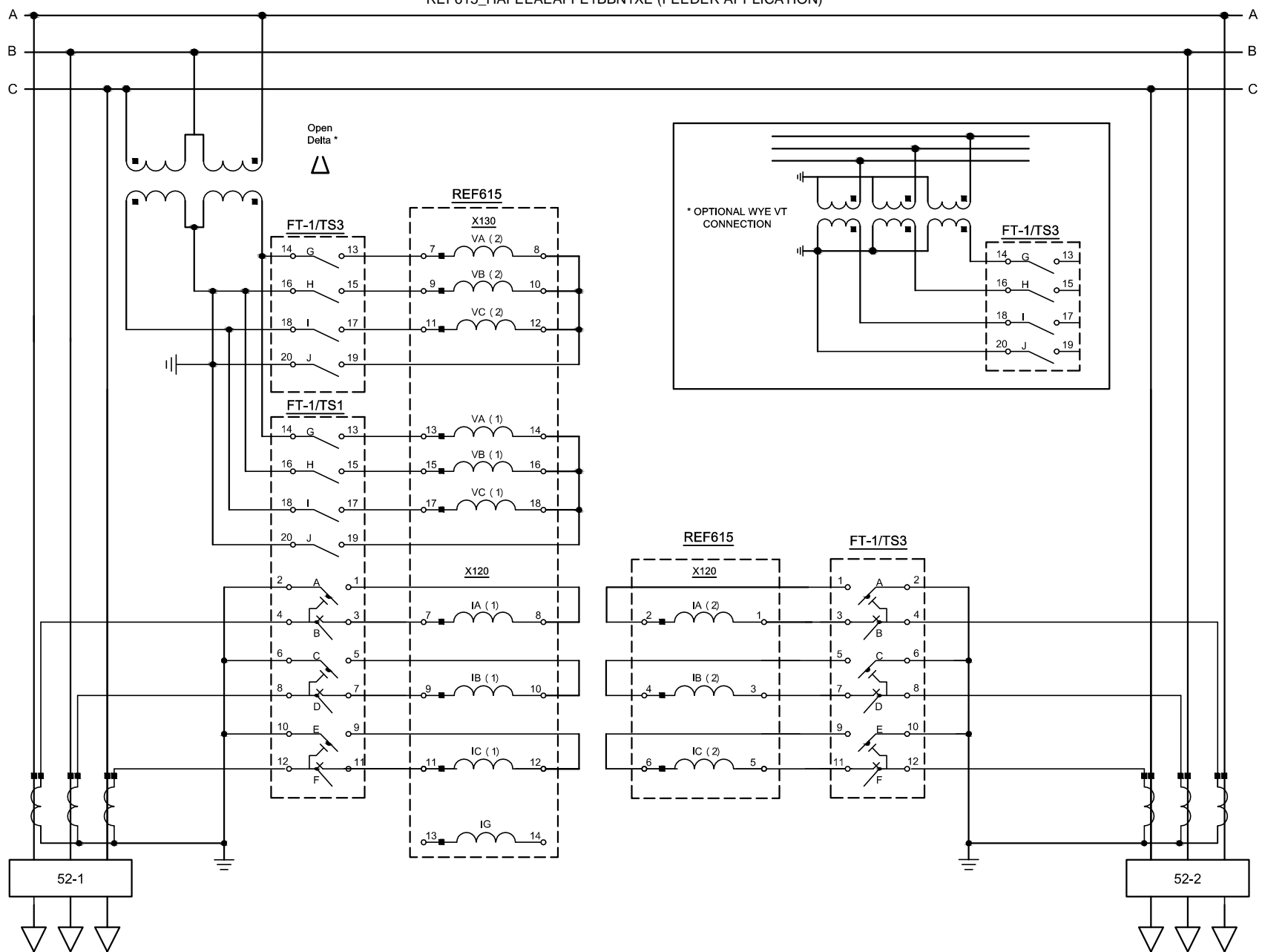
PHASE VOLTAGE VA (2)  
 PHASE VOLTAGE VB (2)  
 PHASE VOLTAGE VC (2)  
 52-2\_EXE\_CL (PO2)  
 86\_94-2\_TRIP/52-2\_EXE\_OP (PO4)  
 CB2\_POSITION\_CLOSE (IN5)  
 CB2\_POSITION\_OPEN (IN6)



FT-1/TS4

(RELAY 2 POTENTIALS AND BINARY I/O)

REF615\_HAFEEAEAFFE1BBN1XE (FEEDER APPLICATION)



TITLE: **AC SCHEMATIC (TYPICAL)**  
 RELAY ORDER CODE: **HAFEEAEAFFE1BBN1XE**

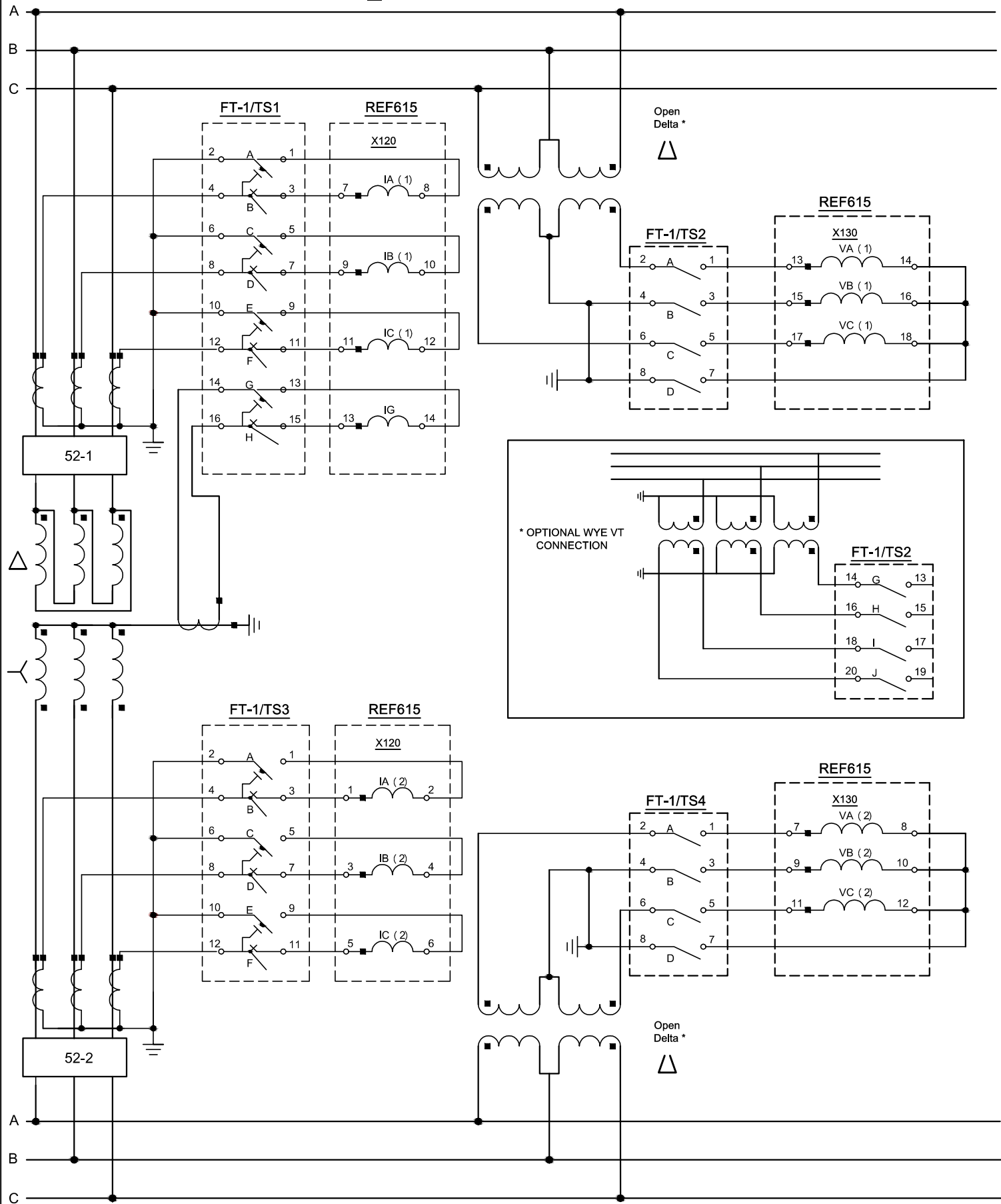
SOFTWARE TYPE:  
 AUTOCAD 2011  
 © Copyright 2014 ABB  
 All rights reserved  
 ABB Protective Relays and Switches, Coral Springs FL, U.S.A.

SIZE DWG. NO.  
**A** **1MAC101982-DR**

REV.  
**B**  
 SHEET 7 OF 14

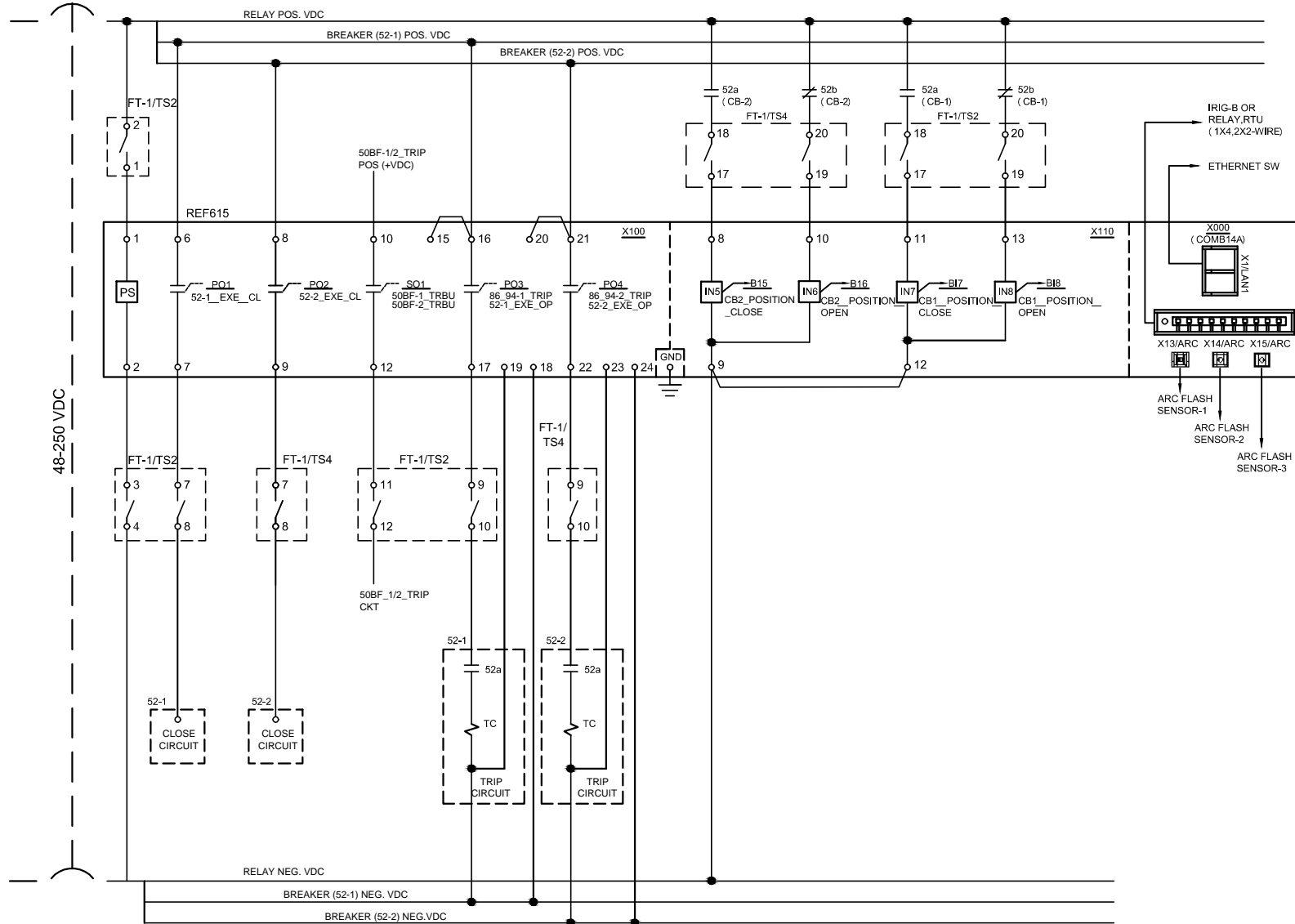


REF615\_HAFEEAEAFFE1BBN1XE ( TRANSFORMER APPLICATION)





REF615\_HAFEEAEAFFE1BBN1XE (FEEDER APPLICATION)



48-250 VDC

General Notes:

1. Binary I/O shown is from default PCM600 Application Configuration Tool (ACT) .
2. Connections shown are typical though more connections may be needed for specific application.

TITLE: DC SCHEMATIC (TYPICAL)

RELAY ORDER CODE: HAFEEAEAFFE1BBN1XE

SOFTWARE TYPE:

AUTOCAD 2011

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ABB Protective Relays and Switches, Coral Springs FL, U.S.A.

SIZE DWG. NO.

A

1MAC101982-DR

REV.

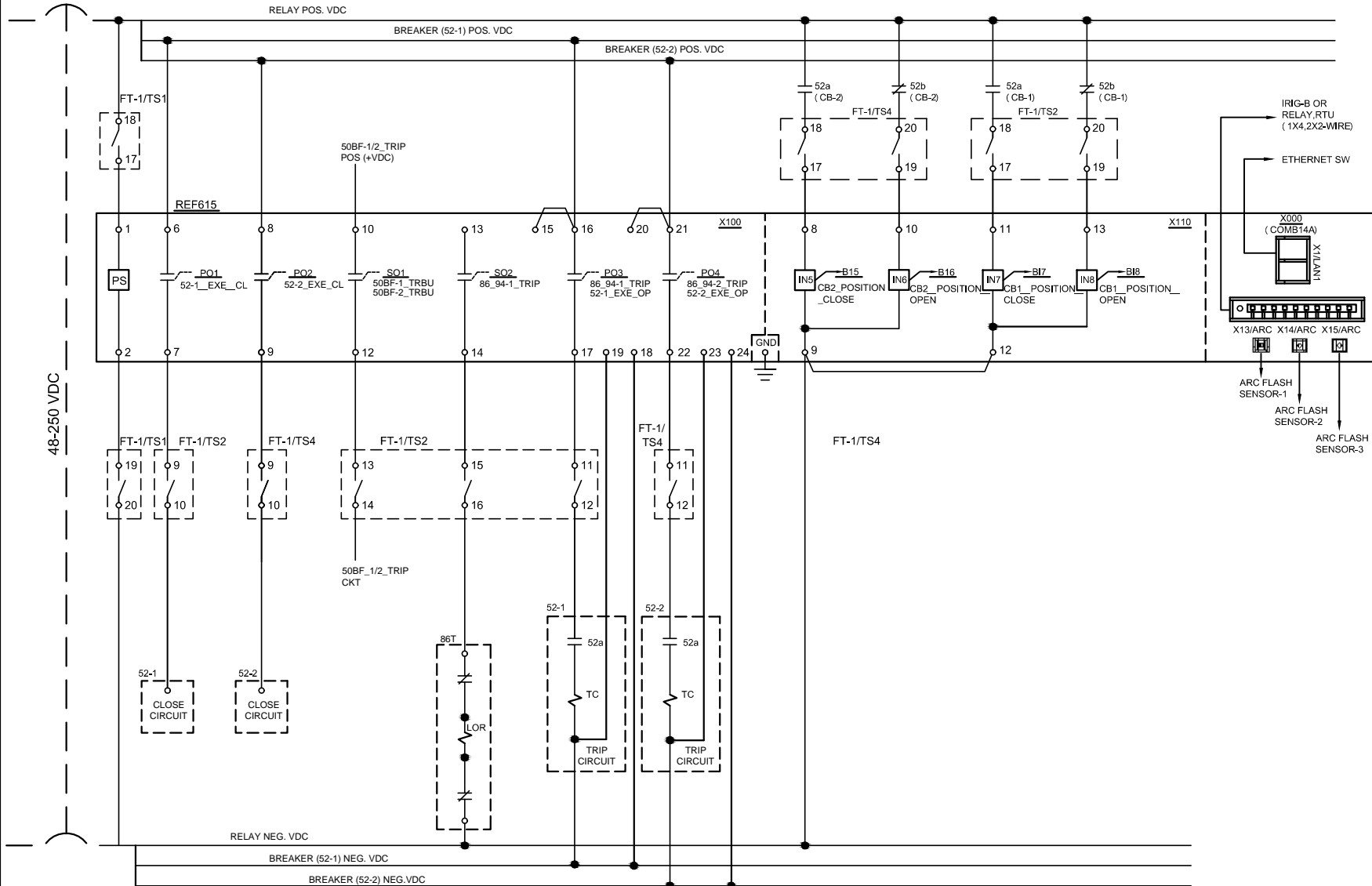
B

ABB

SCALE:

SHEET 9 OF 14

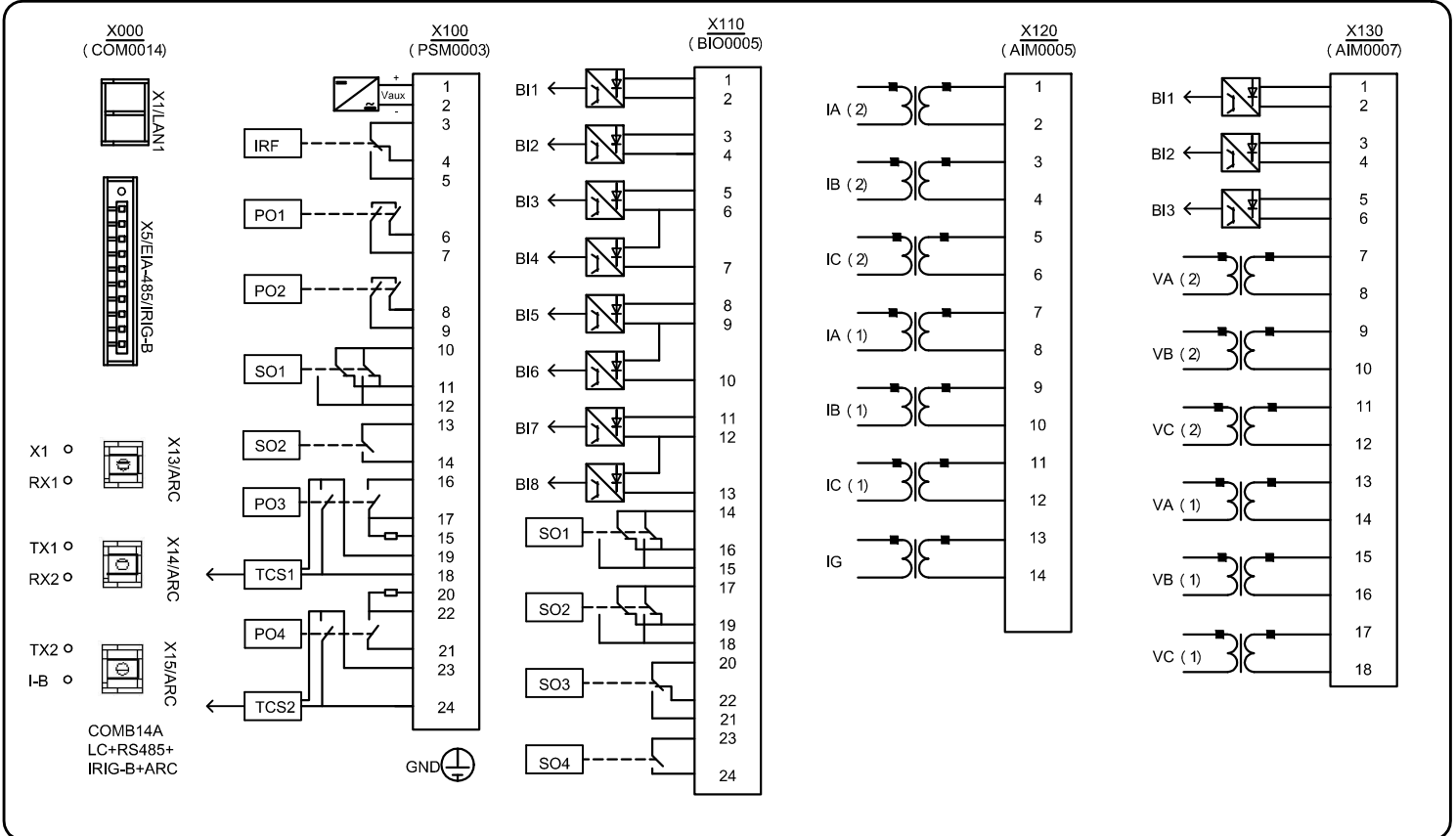
REF615\_HAFEEAEAFFE1BBN1XE ( TRANSFORMER APPLICATION)



**General Notes:**

Binary I/O shown is from default PCM600 Application Configuration Tool (ACT) .  
Connections shown are typical though more connections may be needed for specific application.

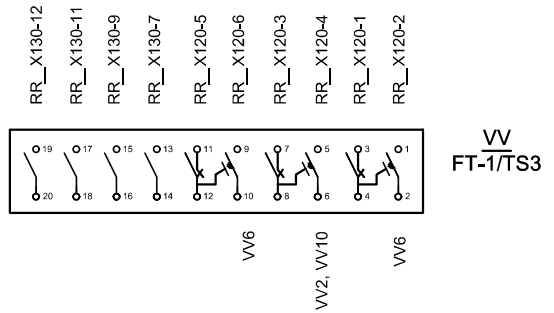
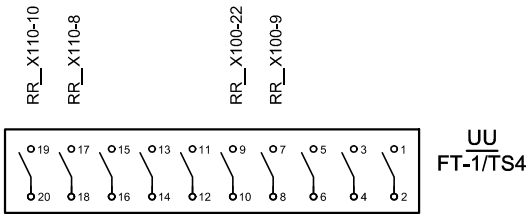
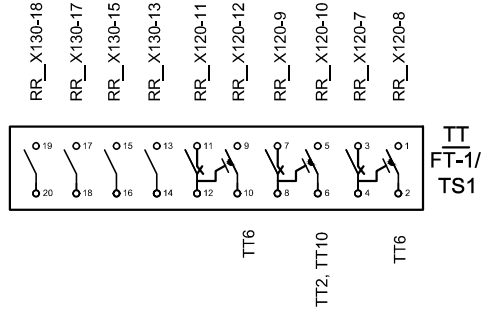
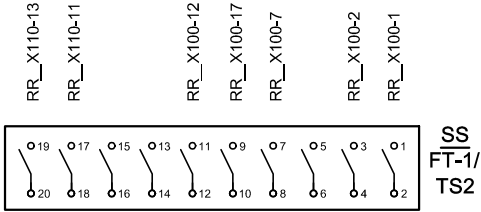
REF615\_HAFEEAEAFFE1BBN1XE (FEEDER APPLICATION)



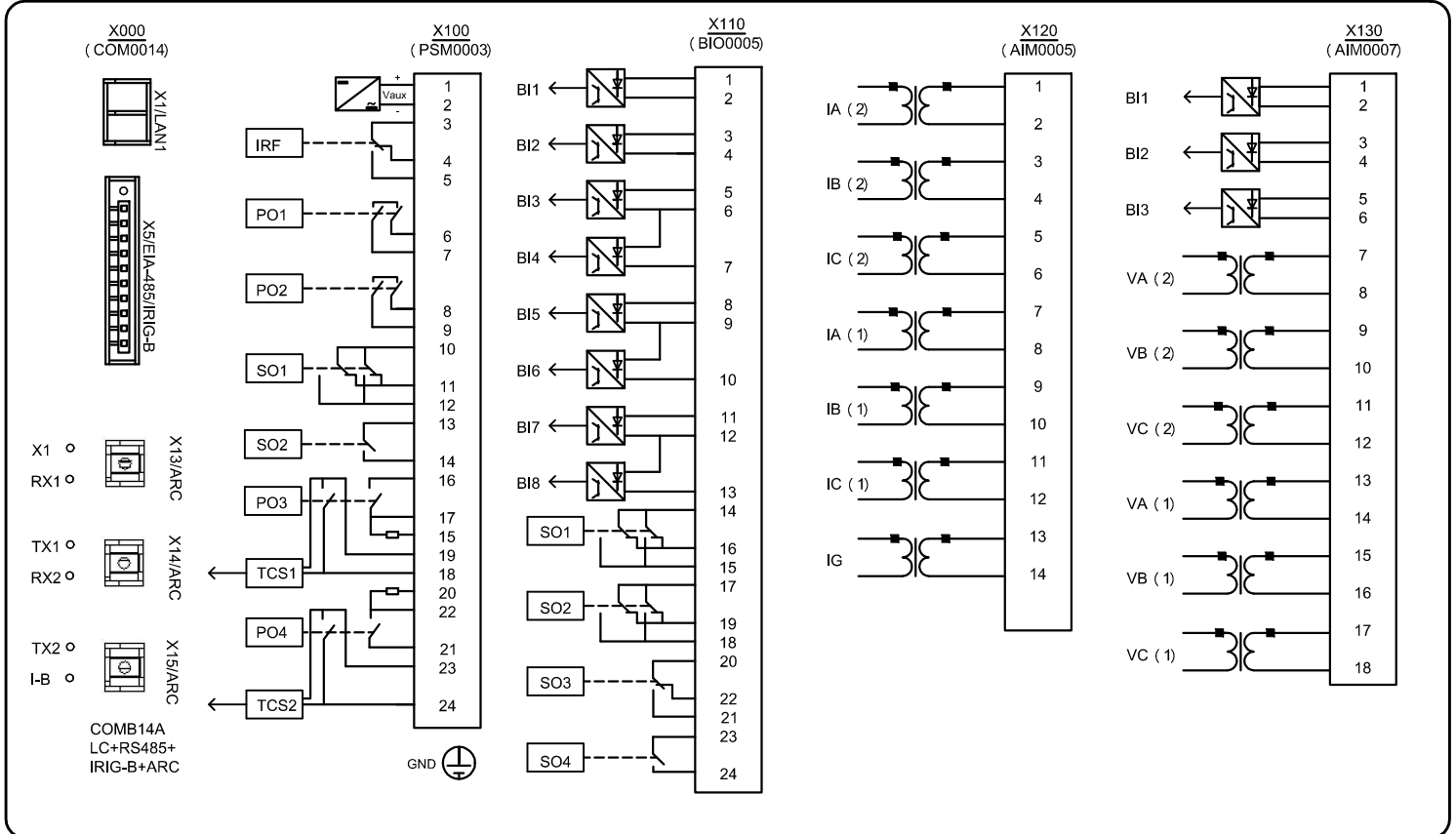
RR  
REF615

X000-X1:	X100-1: SS1	X110-1:	X120-1: VV3	X130-1:
X000-X5:	X100-2: SS3	X110-2:	X120-2: VV1	X130-2:
X000-X13:	X100-3:	X110-3:	X120-3: VV7	X130-3:
X000-X14:	X100-4:	X110-4:	X120-4: VV5	X130-4:
X000-X15:	X100-5:	X110-5:	X120-5: VV11	X130-5:
	X100-6:	X110-6:	X120-6: VV9	X130-6:
	X100-7: SS7	X110-7:	X120-7: TT3	X130-7: VV13
	X100-8:	X110-8: UU17	X120-8: TT1	X130-8: X130-10
	X100-9: UU7	X110-9: X110-12	X120-9: TT7	X130-9: VV15
	X100-10:	X110-10: UU19	X120-10: TT5	X130-10: X130-8, X130-12
	X100-11:	X110-11: SS17	X120-11: TT11	X130-11: VV17
	X100-12: SS11	X110-12: X110-9	X120-12: TT9	X130-12: X130-10, VV19
	X100-13:	X110-13: SS19	X120-13:	X130-13: TT13
	X100-14:	X110-14:	X120-14:	X130-14: X130-16
	X100-15: X100-16	X110-15:		X130-15: TT15
	X100-16: X100-15	X110-16:		X130-16: X130-14, X130-18
	X100-17: SS9	X110-17:		X130-17: TT17
	X100-18:	X110-18:		X130-18: X130-16, TT19
	X100-19:	X110-19:		
	X100-20: X100-21	X110-20:		GND:
	X100-21: X100-20	X110-21:		
	X100-22: UU9	X110-22:		
	X100-23:	X110-23:		
	X100-24:	X110-24:		

REF615\_HAFEEAEAFFE1BNN1XE (FEEDER APPLICATION)



REF615\_HAFEEAEAFFE1BBN1XE ( TRANSFORMER APPLICATION)



RR  
REF615

X000-X1:	X100-1: TT17	X110-1:	X120-1: VV3	X130-1:
X000-X5:	X100-2: TT19	X110-2:	X120-2: VV1	X130-2:
X000-X13:	X100-3:	X110-3:	X120-3: VV7	X130-3:
X000-X14:	X100-4:	X110-4:	X120-4: VV5	X130-4:
X000-X15:	X100-5:	X110-5:	X120-5: VV11	X130-5:
	X100-6:	X110-6:	X120-6: VV9	X130-6:
	X100-7: SS9	X110-7:	X120-7: TT3	X130-7: UU1
	X100-8:	X110-8: UU17	X120-8: TT1	X130-8: X130-10
	X100-9: UU9	X110-9: X110-12	X120-9: TT7	X130-9: UU3
	X100-10:	X110-10: UU19	X120-10: TT5	X130-10: X130-8, X130-12
	X100-11:	X110-11: SS17	X120-11: TT11	X130-11: UU5
	X100-12: SS13	X110-12: X110-9	X120-12: TT9	X130-12: X130-10, UU7
	X100-13:	X110-13: SS19	X120-13: TT15	X130-13: SS1
	X100-14: SS15	X110-14:	X120-14: TT13	X130-14: X130-16
	X100-15: X100-16	X110-15:		X130-15: SS3
	X100-16: X100-15	X110-16:		X130-16: X130-14, X130-18
	X100-17: SS11	X110-17:		X130-17: SS5
	X100-18:	X110-18:		X130-18: X130-16, SS7
	X100-19:	X110-19:		
	X100-20: X100-21	X110-20:		GND:
	X100-21: X100-20	X110-21:		
	X100-22: UU11	X110-22:		
	X100-23:	X110-23:		
	X100-24:	X110-24:		

REF615\_HAFEEAEAFFE1BNN1XE ( TRANSFORMER APPLICATION)

