MiCOM P123R

Overcurrent Relays

P123R/EN AD/A11

Upgrade Documentation

Schneider Electric

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MiCOM P123R ADDENDUM: MiCOM P12x UPDATE DOCUMENTATION

MiCOM P123R overcurrent protection is a new product of the MiCOM P12x range. This product has been designed to offer a cost-effective solution to the retrofit of KCGG122 and KCGG142 relays.

MiCOM P123R has the same firmware as a standard MiCOM P123. As a consequence, software features of MiCOM P123R are identical to MiCOM P123 ones.

The differentiation between P123R and a P123 is only mechanical: The existing MiCOM P123 relay has been adapted by re-assigning the internal digital input / output terminals in the internal side of the terminal blocks so that the inconvenience of the retrofit is reduced as much as possible. However, special care shall be undertaken before initiating the retrofit process, considering that the new MICOM P123R relay offers only 5 logic inputs, instead of 8 for KCGG142 01 relays, and only one watchdog contact (NC) instead of 2 for KCGG122 & 142 relays (NC and NO contacts)

The protective functions offered by the KCGG122 & 142 relays are fully supported by the MiCOM P123R relay and the replacement has no impact on the measuring circuits and tripping circuits. Nevertheless, MiCOM P123 relay offers more functionalities.

The purpose of this document is to give specific information on MiCOM P123R in addition to the MiCOM P123 Technical Manual which is part of the P12x Technical Manual.

The table hereafter summarizes the relation between this addendum and the P12x Technical Manual chapter:

Release	Version	Documentation
May 2012	P12x/EN T/Eb6	Technical Manual

Document Ref.	Section	Description
P12x/EN IT/Eb6	6	New section: Addition of section “evolution from KCGG122 & 142 to MiCOM P123R” (retrofit).
P12x/EN TD/Eb6	--	Information required with order (CORTEC) for MiCOM P123R
P12x/EN IN/Eb6	8	New section: Instruction to install a MiCOM P123R (replacement of a KCGG 122 & 142)
P12x/EN FT/Eb6	1.4	Warning message: specific instructions for MiCOM P123R (watchdog & terminals number)
	3	Wiring explanation: Block terminals numbering
	3.1	Auxiliary supply and terminal numbers adaptation and / or modification
	3.5	Additional wiring for RS485 rear communication port
P12x/EN GS/Eb6	1.2	Terminal numbers modification
	3.2	Terminal numbers modification
	3.3	Terminal numbers modification
P12x/EN CM/Eb6	3.7	Terminal numbers modification
	3.8	Terminal numbers modification
	3.9	Terminal numbers modification
	4.3	Terminal numbers modification
	5.2	Terminal numbers modification
	5.3	Terminal numbers modification
P12x/EN CO/Eb6	--	Connection diagram for MiCOM P123R

P12x/EN IT/Eb6 : Introduction

6 Evolutions from KCGG122 & 142 to MiCOM P123R

KCGG122 & 142 protective functions are fully supported by MiCOM P123R relay. The next sections summarize the main differences between the two products.

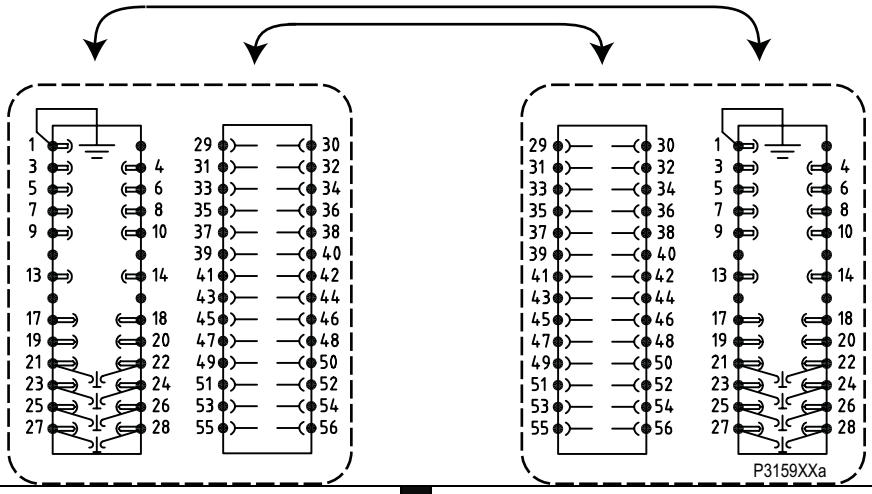
6.1 Main characteristics

KCGG122 & 142	MiCOM P123R
Power supply	
24–125 Vdc, 48–250 Vdc	Universal 24–250 Vdc / 48–240 Vac
Output contacts	
8 output contacts	8 output contacts
2 watchdog contact (1NO + 1 NC)	1 watchdog contact (1 NC)
Opto-isolated logic inputs	
Powered by the 48 Vdc field voltage: Nominal value = 48 Vdc	Powered by the same relay power supply value: default nominal value is 24 – 250 Vdc
8 opto-isolated logic inputs available	5 opto-isolated logic inputs available
Communication protocols	
KBus courier protocol	Modbus / KBus – Courier / IEC 60870-5-103 / DNP3
Protective functions	
	37 – 3-phase undercurrent
	46 – Negative phase sequence overcurrent
46BC – Broken conductor protection	46BC – Broken conductor protection
49 – thermal protection	49 – thermal protection
50/51(N) – Phase and earth overcurrent	50/51(N) – Phase and earth overcurrent
50BF – Breaker failure detection	50BF – Breaker failure detection
	64N – Restricted earth fault
	79 – Autoreclose
81U – Under frequency	
	86 – Output relay latching
CB maintenance	CB maintenance & trip circuit supervision
Cold Load Pick-up	Cold Load Pick-up
	Selective relay scheme logic
	Inrush blocking
Remote CB control	Remote CB control
	Blocking logic
	Switch on to fault (SOTF)
	Test of output relays
	Logic equations
	Clockwise and anti-clockwise phase rotation
Disturbance recorder	Disturbance recorder: up to 5
Event recorder: last 50	Event recorder: up to 250
Fault recorder: last 5	Fault recorder: up to 25
	Front port communication

6.2 Mechanical characteristics

KCGG122 & 142	MiCOM P123R
Watchdog	
Normally Closed contact (relay fail)	Normally Closed contact (relay fail)
Normally Open contact (relay healthy)	Not used
Output relays (new settings)	
RL0	RL4
RL1	RL2
RL2	RL3
RL3 (trip command)	RL1 (trip command)
RL4	RL5
RL5	RL6
RL6	RL7
RL7	RL8
Digital inputs (new settings)	
8 opto-isolated logic inputs:	5 opto-isolated logic inputs:
L0	L1
L1	L2
L2	Not used
L3	L3
L4	L4
L5	L5
L6 & L7	Not used
Rear connection: terminal blocks are inverted	

6.3 Rear connections



KCGG142

Earth	1	2		RL4	29	30	RL0	RL5	29	30	RL4
WD relay failed	3	4	WD relay healthy		31	32			31	32	
	5	6		RL5	33	34	RL1	RL6	33	34	RL2
Vaux+	7	8	Vaux–		35	36			35	36	
	9	10		RL6	37	38	RL2	RL7	37	38	RL3
	11	12			39	40			39	40	
PS	13	14	PS	RL7	41	42	RL3	RL8	41	42	RL1
	15	16			43	44			43	44	
	17	18		L3+	45	46	L0	L3+	45	46	L1+
	19	20		L4+	47	48	L1+	L4+	47	48	L2+
I A	21	22	I A	L5+	49	50	L2+	L5+	49	50	
I B	23	24	I B	L6+	51	52	L1 L2 –		51	52	L1 L2 –
I C	25	26	I C	L7+	53	54	Com+		53	54	
I N	27	28	I N	L3 to L7 –	55	56	Com-	L3 L4 L5 –	55	56	

MiCOM P123R

Earth	1	2	
WD	3	4	
	5	6	
Vaux+	7	8	Vaux–
Com+	9	10	Com–
	11	12	
Vaux+	13	14	Vaux–
	15	16	
	17	18	
	19	20	
I A	21	22	I A
I B	23	24	I B
I C	25	26	I C
I N	27	28	I N

PS = Power supply

P12x/EN TD/Eb6 : Technical Data

Information required with order (MiCOM P123R)

Information required with order														
Versions	**Order - No.**	1–3	4-5	6	7	8	9	10	11	12	13	14	15
MiCOM P123R – Overcurrent protection		**P123**	**R**	*	**0**	*	*	*	*	*	*	*	*
Variant													
Retrofit variant, replacement of KCCG 122 & 142			3 R										
Earth current input													
0.01 to 8 Ion				B									
0.002 to 1 Ion				C									
Current rating													
1 A						1							
5 A						5							
Auxiliary voltage	**Digital input voltage**												
24 - 250 Vdc / 48 - 240 Vac	24-250Vdc / 24-240Vac						Z						
Communication interface													
Modbus								1					
KBus / Courier								2					
IEC 60870-5-103								3					
DNP3								4					
Language													
French									0				
English / American									1				
Spanish									2				
German									3				
Italian									4				
Russian									5				
Polish									6				
Portuguese									7				
Dutch									8				
Czech									A				
Hungarian									B				
Greek									C				
Chinese (only available in phase II hardware with larger LCD display)									D				
Turkish									E				
Platform													
SE look&feel Phase 2										2			
SE look&feel Phase 2 with larger LCD										3			
Latest Major Software release													
V XX.X [(1)]											?		
Latest Minor Software release													
V XX.X [(1)]												?	
Mounting option													
None (default)													0
Pre-fixed HMI (no withdrawability)													1
Sealed cover													2
Pre-fixed with sealed cover													3

(1) Unless specified, the latest version will be delivered

P12x/EN IN/Eb6 : Installation

BEFORE CARRYING OUT ANY WORK ON THE EQUIPMENT, THE USER SHOULD BE FAMILIAR WITH THE CONTENTS OF THE SAFETY GUIDE SFTY/4LM/E11 OR LATER ISSUE, OR THE SAFETY AND TECHNICAL DATA SECTIONS OF THE TECHNICAL MANUAL AND ALSO THE RATINGS ON THE EQUIPMENT RATING LABEL.

8 Retrofit of KCGG122 or 142 relays

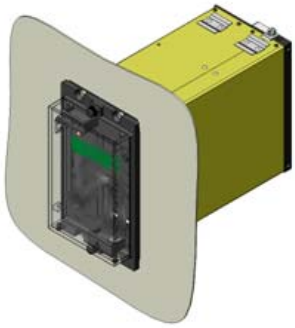
IDENTIFY IF THE CURRENT CIRCUIT CT RATIO IS 1 A OR 5 A. SELECT THE MiCOM P123R RELAY IN ACCORDANCE

8.1 Deposit of KCGG122 or 142 relays

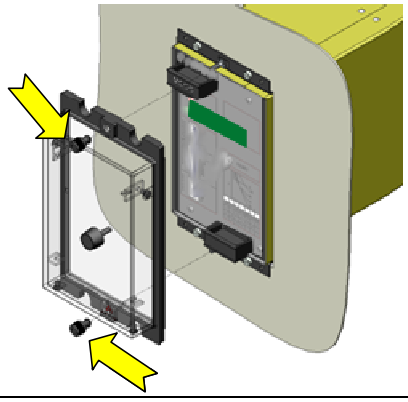
The steps to replace a KCGG122 or 142 by a MiCOM P123R are described hereafter.

Extract all the settings from the KCGG relay before switching off, and insure they are reported in the MiCOM P123R, or updated, if necessary.

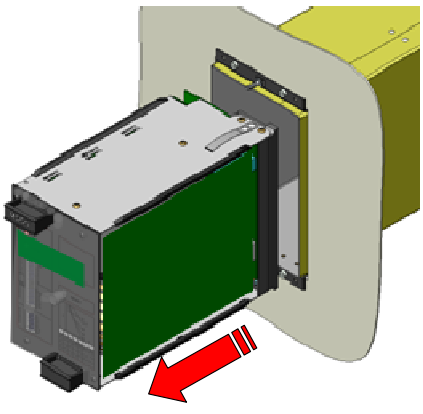
1 Switch off the existing KCGG122 or 142 relay, and isolate the current, power supply and tripping circuits, including CBF initiations and intertrip signals, if any.



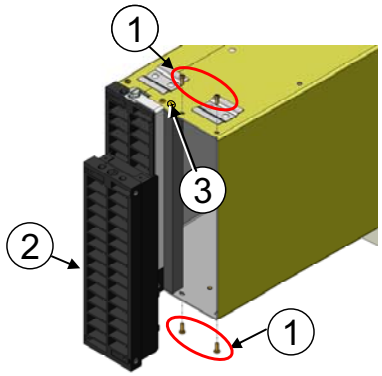
2 If necessary, remove the cover. Unscrew the upper and lower screw



3 Withdraw the KCGG122 or 142 active part by pulling the lower and upper handles

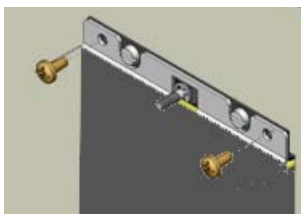


4 Disconnect the two rear side terminal blocks (2). Unscrew and remove the 4 retaining screws (1) (4 S/TAP screws Nr 2 × ¼ per block - Pozidrive screwdriver Nr 0)



NOTE: If necessary, unscrew the two screws (3) retaining the middle plate to facilitate the removal of the terminal block (S/TAP screws Nr 4 × 1/4)

5 Unscrew the case retaining screws, pull the case and remove it.

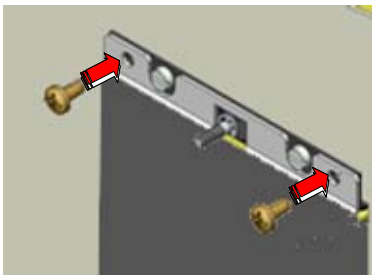


8.2 MiCOM P123R assembly

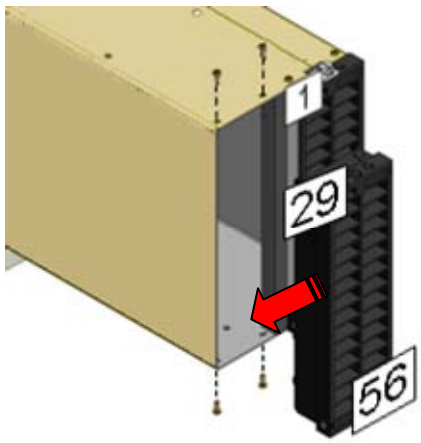
NOTE: P123R is provided with the same terminal block arrangement than the KCGG relay. It is therefore recommended to energize this relay, set accordingly and test "on the table

Withdraw the active module part of the MiCOM P123R relay (see section P12x/EN GS) from its case, and remove the two terminal blocks as explained in the previous lines

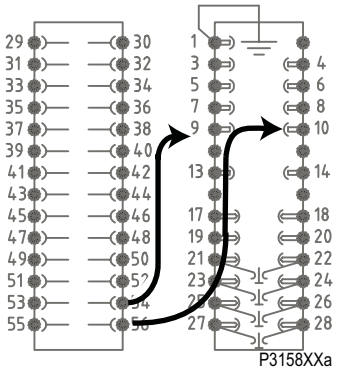
1 Place the MiCOM P123R case and screw the retaining screws



2 Fix the terminal blocks in the MiCOM P123R case after inverting their position from left to right. Screw the same retaining screws and fix the earth connecting plate.



3 Move the K-Bus communication terminals as follows:
– Terminal 54 to pin 9,
– terminal 56 to pins 10 and 1 (earth).



4 Fit the active part of the MiCOM P123R and screw the four retaining screws to the case. Close the top and lower hinged covers.

P12x/EN FT/Eb6 : User Guide

1.4 Displays of Alarm & Warning Messages

1.4.2 Relay Hardware or Software Warning Messages

The watchdog of the **MiCOM P123R** is a normally closed contacts relay (terminals 3-5), instead of a change-over contacts relay. If an internal hardware or software failure occurs, the **MiCOM P123R** closes its watchdog contact.

Alarm and Warning messages operation is identical to the other MiCOM P12x devices: Only normally open contacts are not used.

3 Wiring

MiCOM P123R relay has the same terminal layout for common elements. Only terminals numbers are inverted, that is to say terminals 1 to 28 are in the right side of the relay (view from the rear) and terminals 29 to 56 are in the left side. The wiring diagram is provided in this addendum.

3.1 Auxiliary supply

The auxiliary power supply for the **MiCOM P123R** relays can be either direct current with a voltage range of 24-250 Vdc, or alternative current with a voltage range of 48-240 Vac / 50-60 Hz.

The auxiliary power supply must be connected only to terminals 13 (+) and 14 (–).

3.5 Communication

3.5.1 RS485 rear communication port

The **MiCOM P123R** terminals 9 and 10 are dedicated to the RS485 communication port.

Retrofit of KCGG122 & 142 relays: If RS485 rear communication port is used, connect wire from terminal 54 to pin 9 and wire from terminal 56 to pin 10.

P12x/EN GS/Eb6 : Getting Started

1.2. Auxiliary Power Supply Connections

Connect a DC or AC (according to nominal supply rating Ua) voltage power supply.

POSITIVE Vaux to TERMINAL 13
NEGATIVE Vaux to TERMINAL 14

3 LOCAL CONNECTION TO A PC

3.2 Products plugged in the same panel

The principle of connection to plug a MiCOM P123R to another product in the same panel is identical to other MiCOM P12x relays. The MiCOM P123R earth terminal pin number is 1:

– A cable (green / yellow wire) must be screwed to the earth connection of each product,

– The communication cable shield must be connected to the pin number 1 of each product,

– The pin number 1 of each terminal block must be connected and screwed to the case earth connection of each product.

3.3 Communication between distant products

The principle of connection to plug a MiCOM P123R to distant products is identical to other MiCOM P12x relays. The MiCOM P123R earth terminal pin number is 1:

– A cable (green / yellow wire) must be screwed to the earth connection of each product,

– The communication cable shield must be connected to the pin number 1 of each product,

– The pin number 1 of each terminal block must be connected and screwed to the case earth connection of each product.

P12x/EN CM/Eb6: Commissioning and Maintenance

3 Product verification tests

3.7 Auxiliary supply

Check the value of the auxiliary supply voltage (terminals 13 and 14). The value measured shall be between 0.8 and 1.2 time the dc nominal auxiliary supply voltage, or 0.8 and 1.1 time the ac nominal auxiliary supply voltage.

Uaux range (Volts)	Uaux nominal zone (Volts)	Maximum peak value (Volts)
24–250 Vdc/48–240 Vac	19.2–300 Vdc/38.4–264 Vac	336

3.8 Logic inputs

The MiCOM P123R relays have 5 opto-isolated inputs.

Terminal 52 is the common (–) pin for opto-isolated inputs L1 and L2 respectively connected to pin 46 and 48 (+).

Terminal 55 is the common (–) pin for opto-isolated inputs L3 to L5 respectively connected to pins 45, 47 and 49 (+).

Input	Terminals		OP. PARAMETERS/Inputs Status cell value
	Pin +	Pin – (common)	
Opto input 1	46	52	00001
Opto input 2	48		00010
Opto input 3	45	55	00100
Opto input 4	47		01000
Opto input 5	49		10000

3.9 Logic outputs

The MiCOM P123R relays have 9 outputs.

The watchdog output is a normally close relay and is designed as WD (3-5).

The RL1 to RL8 logic output relays are normally open (NO) relays:

Output	Terminals	OP. PARAMETERS/Inputs Status cell value
RL 1	42 – 44	00000001
RL 2	34 – 36	00000010
RL 3	38 – 40	00000100
RL 4	30 – 32	00001000
RL 5	29 – 31	00010000
RL 6	33 – 35	00100000
RL 7	37 – 39	01000000
RL 8	41 – 43	10000000

4 Setting checks

MiCOM P123R RELAYS HAVE 1 OR 5 AMP CURRENT INPUTS (depending on the model: refer to the label under the upper flap).
CHECK THAT THE INJECTED CURRENT IS COMPATIBLE WITH THE SELECTED RANGE.

4.3 Phase overcurrent (I> and I>>)

This test wiring diagram makes it possible to conduct tests relating to the I> and I>> thresholds.

The diagram describes current injection onto the 1 or 5 Amp phase current inputs (terminals 21-22, 23-24, 25-26).

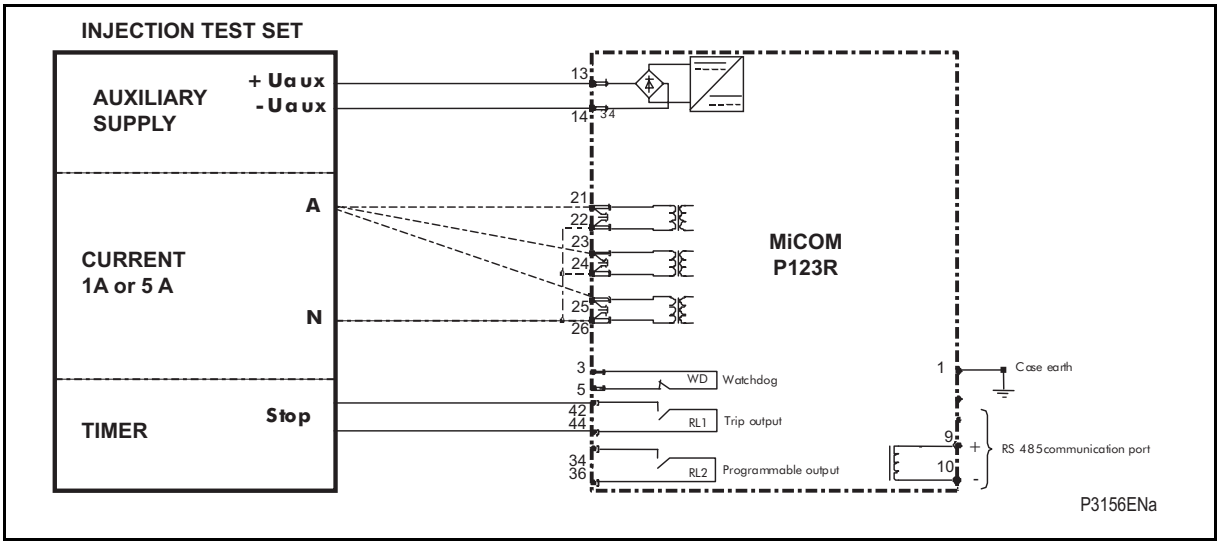


FIGURE 4: I> AND I>> TESTS WIRING

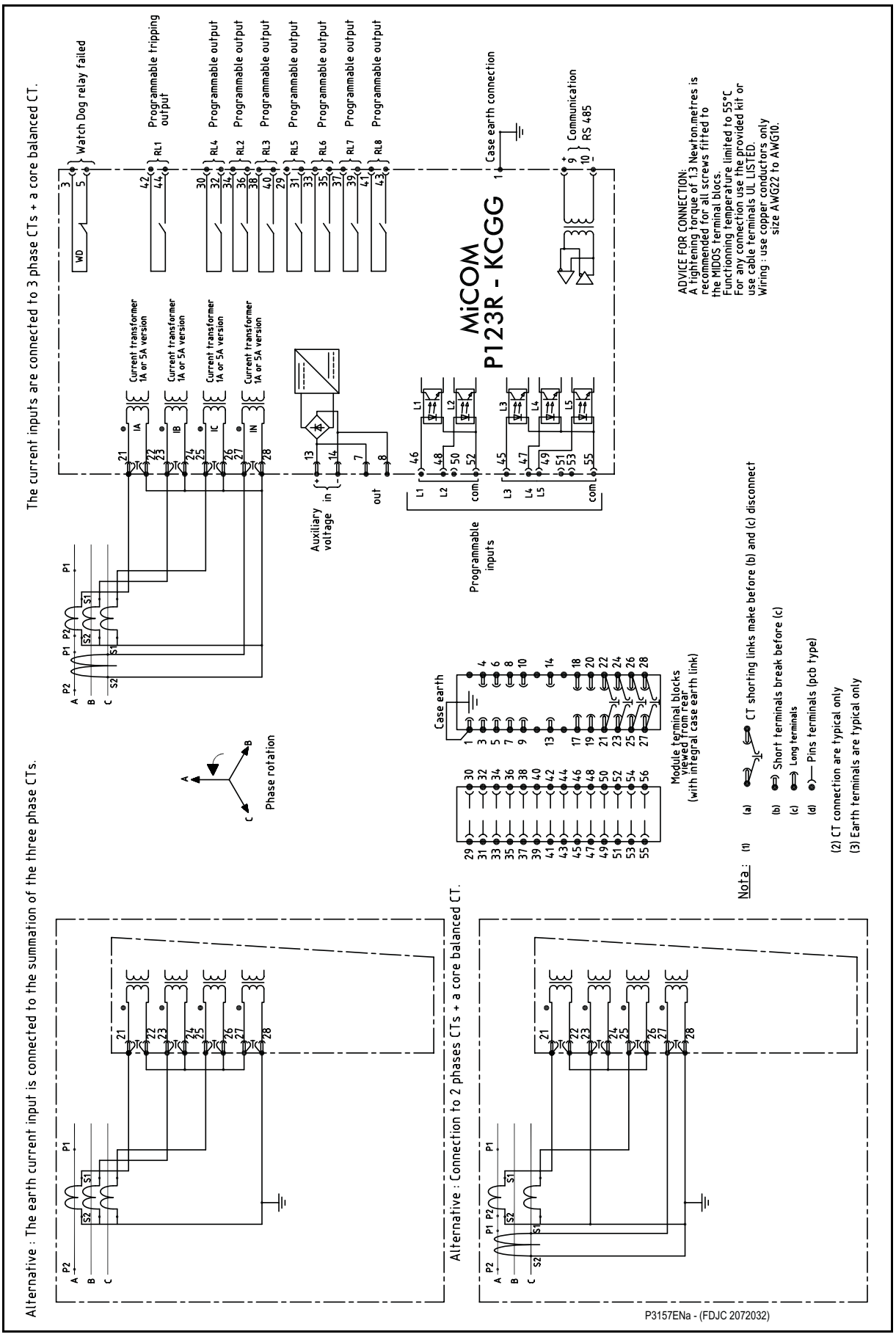
5 Maintenance

5.2 & 5.3 Minor or major fault

Regarded by the **MiCOM P123R** relays as a minor fault is a communication failure. If the communication is in fault, **MiCOM P123R** protection and automation modules are not affected. The MiCOM relay is fully operational. The watchdog relay is energised (3-5 contact open)

Major fault for **MiCOM P123R** relays are all software and hardware failures except the communication faults. As soon as this type of failure is detected, the watchdog (WD) is de-energised (3-5 contact closed) and all operations are stopped (protection, automation, communication).

P12x/EN CO/Eb6: Connection Diagram



SCHEME REPRESENTING MiCOM RELAY OFF

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