Eaton Arc Flash Relay

MN026009EN

Standard Arc Configurations User Manual for Eaton Arc Flash Relays

EATON
Powering Business Worldwide
DISCLAIMER OF WARRANTIES AND LIMITATION OF LIABILITY

The information, recommendations, descriptions, and safety notations in this document are based on Eaton Corporation’s (“Eaton”) experience and judgment and may not cover all contingencies. If further information is required, an Eaton sales office should be consulted. Sale of the product shown in this literature is subject to the terms and conditions outlined in appropriate Eaton selling policies or other contractual agreement between Eaton and the purchaser.

THERE ARE NO UNDERSTANDINGS, AGREEMENTS, WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY, OTHER THAN THOSE SPECIFICALLY SET OUT IN ANY EXISTING CONTRACT BETWEEN THE PARTIES. ANY SUCH CONTRACT STATES THE ENTIRE OBLIGATION OF EATON. THE CONTENTS OF THIS DOCUMENT SHALL NOT BECOME PART OF OR MODIFY ANY CONTRACT BETWEEN THE PARTIES.

In no event will Eaton be responsible to the purchaser or user in contract, in tort (including negligence), strict liability or otherwise for any special, indirect, incidental or consequential damage or loss whatsoever, including but not limited to damage or loss of use of equipment, plant or power system, cost of capital, loss of power, additional expenses in the use of existing power facilities, or claims against the purchaser or user by its customers resulting from the use of the information, recommendations and descriptions contained herein. The information contained in this manual is subject to change without notice.
Contents

1. INTRODUCTION .................................................. 1
   1.1 Abbreviations ............................................. 1

2. ONE MAIN WITHOUT TIE BREAKER .......................... 2
   2.1 One Main with EAFR to One Feeder Breakers (EAFR-101 CS:1) ........ 2
   2.2 One Main with EAFR to Two Feeder Breakers (EAFR-101 CS:4) ........ 7
   2.3 One Main with EAFR to Four Feeder Breakers (EAFR-101 CS:6) ....... 12

3. TWO MAINS WITHOUT TIE BREAKER ......................... 16
   3.1 Two Mains with EAFR to One Feeder Breakers (EAFR-110P CS:4,A) ...... 16

4. TWO MAINS WITH TIE BREAKER ............................... 23
   4.1 Two Mains with Tie Breaker with EAFR to One Feeder Breakers
       (EAFR-101 CS:1) ......................................... 23
   4.2 Two Mains with Tie Breaker with EAFR to Two Feeder Breakers
       (EAFR-101 CS:4) ......................................... 28
   4.3 Two Mains with Tie Breaker with EAFR to Four Feeder Breakers
       (EAFR-101 CS:6) ......................................... 33

5. STANDALONE ..................................................... 38
   5.1 One Main Four Zone (Standalone Configuration 6,A) ...................... 38

6. MULTI-MAINS WITHOUT BREAKER ............................. 41
   6.1 Multi-mains without Tie Breaker (EAFR-110P CS:4,A) ................... 41

7. MULTI-MAINS WITH TIE BREAKER ............................. 47
   7.1 Multi-mains with Tie Breaker .................................. 47

8. MULTI-SECTIONS CONFIGURATIONS ........................... 57
   8.1 Multi-sections Configurations - Single Main Per Section ............. 57
1. Introduction

Standard Arc Configurations (SACs) are fully tested and documented preconfigured arc protection solutions. The SACs approach save engineering time even in the most complex applications and secure effective commissioning of the EAFR-100 arc protection system.

To apply the SACs, the wiring and dipswitch settings of the applied configuration shall be implemented as described in the following sections. The amount of outgoing feeders does not impact the settings, but only the quantity of the units applied. The amount of arc sensors per zone may vary and does not impact the settings. Therefore, the configurations may be extended or reduced by adding or removing units with identical settings and wiring. A different amount or type of arc sensors per zone may be utilized as well. Also, the protected zones may be reduced by simply not connecting the sensors and/or trip signals of the respective protected zone(s). In all configurations, there are a set of user-selectable parameters such as current measurement nominal values, enable/disable the CBFP function, and choose the trip criteria (i.e.: trip on arc light only or simultaneous arc light and over-current condition).

The EAFR-110 series is applicable for other types of configurations as well. If your particular application is not included in SACs library, consult your nearest Eaton representative for a solution.

1.1 Abbreviations

BB – Busbar
BC – Bus Coupler
BS – Bus Section
CB – Circuit breaker
CC – Cable compartment
CS – Configuration Select
MT – Master Trip
n – number
VT – Voltage Transformer
2. One Main without Tie Breaker

2.1 One Main with One for One Feeder Breakers (EAFR-101 CS:1)

2.1.1 Configuration Characteristics

Figure 1. One Main with One for One Feeder Breakers (EAFR-101 CS:1).
Table 1. Configuration Table for Figure 1

| Configuration Selection Number | EAFR-110P CS:1,A
| Number of Incoming Mains | 1 x Incoming Main
| Number of Outgoing Feeders | n x Outgoing Feeders
| Number of the Circuit Breakers | 1 x Main CBs
| Selective Trip for Incoming Main CBs | Yes
| Selective Trip for Outgoing Feeder CBs | Yes
| Master Trip Function (MT) | Yes
| Units Applied | 1 x EAFR-110P
| Note: n = 1 to 20.

2.1.2 Trip and I/O Description

*EAFR-110P CS:1,A*

Table 2. Trip and I/O Description - EAFR-110P CS:1,A.

<table>
<thead>
<tr>
<th>Light</th>
<th>Current (Internal)</th>
<th>I/O Description</th>
<th>Trip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IL, Ig</td>
<td>Current inputs phase IL1, IL2, IL3, and E/F Ig. Measuring current for main(s).</td>
<td>Signal outputs: HSO1 (current) to outgoing units EAFR-101 CS:1 input BI1.</td>
<td></td>
</tr>
<tr>
<td>S1</td>
<td>Sensor channel 1. Monitoring incoming cable compartment.</td>
<td>Trip criteria: Light only. Trip outputs: T1 (main CB), T2 (upstream CB (HV side)), T4 (trip alarm).</td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Trip and I/O Logic - EAFR-110P CS:1,A.

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>Current (Internal)</td>
</tr>
<tr>
<td>-------</td>
<td>-------------------</td>
</tr>
<tr>
<td>IL, Ig</td>
<td>x</td>
</tr>
<tr>
<td>S1</td>
<td></td>
</tr>
<tr>
<td>S2</td>
<td>IL, Ig</td>
</tr>
<tr>
<td>S3</td>
<td>IL, Ig</td>
</tr>
<tr>
<td>S4</td>
<td>IL, Ig</td>
</tr>
<tr>
<td>B12</td>
<td>IL, Ig</td>
</tr>
</tbody>
</table>
Table 4. Trip and I/O Description - EAFR-101 CS:1.

<table>
<thead>
<tr>
<th>Light</th>
<th>Current (External)</th>
<th>I/O Description</th>
<th>Trip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BI1</td>
<td></td>
<td>Binary input 1.</td>
<td>Signal inputs: BI1 (Current) from main unit EAFR-110P CS:1,A output HSO1.</td>
</tr>
</tbody>
</table>

Table 5. Trip and I/O Logic - EAFR-101 CS:1.

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>T1 T2 T3 T4 B01</td>
</tr>
<tr>
<td>BI1</td>
<td>x(xCBFP) x x x(xCBFP)</td>
</tr>
<tr>
<td>S1</td>
<td>BI1 x(xCBFP) x(xCBFP) x</td>
</tr>
<tr>
<td>S2</td>
<td>BI1 x(xCBFP) x(xCBFP) x</td>
</tr>
<tr>
<td>S3</td>
<td>BI1 x(xCBFP) x(xCBFP) x</td>
</tr>
<tr>
<td>S4</td>
<td>BI1 x(xCBFP) x(xCBFP) x</td>
</tr>
<tr>
<td>BI2</td>
<td>x(MT) x(MT) x(MT) x(MT)</td>
</tr>
</tbody>
</table>
2. One Main without Tie Breaker

2.1.3 Connections

Figure 2. EAFR-110P CS:1.A.
2. One Main without Tie Breaker

Figure 3. EAFR-101 CS:1.
2. One Main without Tie Breaker

2.2 One Main with EAFR to Two Feeder Breakers (EAFR-101 CS:4)

2.2.1 Configuration Characteristics

Table 6. Configuration Table for Figure 4

| Configuration Selection Number | EAFR-110P CS:1,A  
|---------------------------|---------------------|
| Number of Incoming Main     | 1 x Incoming Main   
| Number of Outgoing Feeders  | n x Outgoing Feeders|
| Number of the Circuit Breakers | 1 x Main CBs  
|                            | n x Outgoing CBs    |
| Selective Trip for Incoming Main CBs | Yes  
| Selective Trip for Outgoing Feeder CBs | Yes  
| Master Trip Function (MT) | Yes  
| Units Applied               | 1 x EAFR-110P  
|                            | n x EAFR-101       |

Note: n = 1 to 20.

Figure 4. One Main without Tie Breaker (EAFR-101 CS:4).
2. One Main without Tie Breaker

2.2.2 Trip and I/O Description

EAFR-110P CS:1,A

Table 7. Trip and I/O Description - EAFR-110P CS:1,A.

<table>
<thead>
<tr>
<th>Light</th>
<th>Current (Internal)</th>
<th>I/O Description</th>
<th>Trip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IL, Ig</td>
<td>Current inputs Phase IL1, IL2, IL3 and E/F Ig. Measuring current for main(s).</td>
<td></td>
<td>Signal outputs: HSO1 (Current) to outgoing units EAFR-101 CS:1 input BI1.</td>
</tr>
<tr>
<td>S1</td>
<td>Sensor channel 1. Monitoring incoming cable compartment.</td>
<td>Trip criteria: Light only.</td>
<td>Trip outputs: T1 (main CB), T2 (upstream CB [HV side]), T4 (trip alarm).</td>
</tr>
</tbody>
</table>

Table 8. Trip and I/O Logic - EAFR-110P CS:1,A.

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>Current (Internal) T1 T2 T3 T4 HSO1 (Current) HSO2 (MT) BO1</td>
</tr>
<tr>
<td>IL, Ig</td>
<td>x x x x x x x</td>
</tr>
<tr>
<td>S1</td>
<td>x x x x x</td>
</tr>
<tr>
<td>S2</td>
<td>IL, Ig x x x x x x</td>
</tr>
<tr>
<td>S3</td>
<td>IL, Ig x x x x x x</td>
</tr>
<tr>
<td>S4</td>
<td>IL, Ig x x x x x x</td>
</tr>
<tr>
<td>BI2</td>
<td>IL, Ig x x x x x x</td>
</tr>
</tbody>
</table>
### Table 9. Trip and I/O Description - EAFR-101 CS:4.

<table>
<thead>
<tr>
<th>Light</th>
<th>Current (External)</th>
<th>I/O Description</th>
<th>Trip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BI1</td>
<td>Binary input 1.</td>
<td></td>
<td>Signal inputs: BI1 (Current) from main feeder EAFR-110P CS:1,A output HSO1.</td>
</tr>
<tr>
<td>S1</td>
<td>BI1</td>
<td>Sensor channel 1. Monitoring outgoing cable compartment.</td>
<td>Trip criteria: Current + Light. Trip outputs: T1 (outgoing CB), T3 (not in use), T4 (Trip alarm). Signal outputs: BO1 (Light) to main unit EAFR-110P CS:1,A after CBFP setting time.</td>
</tr>
</tbody>
</table>

### Table 10. Trip and I/O Logic - EAFR-101 CS:4.

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>Current (External)</td>
</tr>
<tr>
<td>BI1</td>
<td></td>
</tr>
<tr>
<td>S1</td>
<td>BI1</td>
</tr>
<tr>
<td>S2</td>
<td>BI1</td>
</tr>
<tr>
<td>S3</td>
<td>BI1</td>
</tr>
<tr>
<td>S4</td>
<td>BI1</td>
</tr>
<tr>
<td>BI2</td>
<td>x(MT)</td>
</tr>
</tbody>
</table>
2. One Main without Tie Breaker

2.2.3 Connections

Figure 5. EAFR-110P CS:1,A.
Figure 6. EAFR-101 CS:4.
2. One Main without Tie Breaker

2.3 One Main with EAFR to Four Feeder Breakers (EAFR-101 CS:6)

2.3.1 Configuration Characteristics

Figure 7. One Main without Tie Breaker (EAFR-101 CS:6).
Table 11. Configuration Table for Figure 7

<table>
<thead>
<tr>
<th>Configuration Selection Number</th>
<th>EAFR-110P CS:0,A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Incoming Mains</td>
<td>1 x Incoming Mains</td>
</tr>
<tr>
<td>Number of Outgoing Feeders</td>
<td>n x Outgoing Feeders</td>
</tr>
<tr>
<td>Number of the Circuit Breakers</td>
<td>1 x Main CBs; n x Outgoing CBs</td>
</tr>
<tr>
<td>Selective Trip for Incoming Main CBs</td>
<td>No</td>
</tr>
<tr>
<td>Selective Trip for Outgoing Feeder CBs</td>
<td>No</td>
</tr>
<tr>
<td>Master Trip Function (MT)</td>
<td>Yes</td>
</tr>
<tr>
<td>Units Applied</td>
<td>1 x EAFR-110P n x EAFR-101</td>
</tr>
</tbody>
</table>

Note: n = 1 to 20.

2.3.2 Trip and I/O Description

EAFR-110P CS:0,A

Table 12. Trip and I/O Description - EAFR-110P CS:0,A.

<table>
<thead>
<tr>
<th>Light</th>
<th>Current (Internal)</th>
<th>I/O Description</th>
<th>Trip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IL, Ig</td>
<td></td>
<td>Current inputs Phase IL1, IL2, IL3, and E/F Ig. Measuring current for main(s).</td>
<td>Signal outputs (not in use): HSO1 (Current) and BO1 (Current) are activated.</td>
</tr>
<tr>
<td>S1/S2 IL, Ig</td>
<td>Sensor channel 1.</td>
<td>Monitoring incoming cable compartment.</td>
<td>Trip criteria: Light +Current.</td>
</tr>
<tr>
<td>/ S3/S4</td>
<td></td>
<td></td>
<td>Trip outputs: T1 (main CB), T2 (not in use), T3 (not in use), T4 (trip alarm).</td>
</tr>
<tr>
<td>BI2   IL, Ig</td>
<td>Binary input 2.</td>
<td></td>
<td>Signal outputs: HSO2 (MT) to outgoing units EAFR-101 CS:6 input BI2.</td>
</tr>
</tbody>
</table>

Table 13. Trip and I/O Logic - EAFR-110P CS:0,A.

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>T1</td>
</tr>
<tr>
<td></td>
<td>IL, Ig</td>
</tr>
<tr>
<td>IL, Ig</td>
<td>S1/S2/S3/S4</td>
</tr>
<tr>
<td>IL, Ig</td>
<td>BI2</td>
</tr>
</tbody>
</table>
2. One Main without Tie Breaker

**Table 14. Trip and I/O Description - EAFR-101 CS:6**

<table>
<thead>
<tr>
<th>Light</th>
<th>Current (External)</th>
<th>I/O Description</th>
<th>Trip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BI1</td>
<td></td>
<td>Binary input 1.</td>
<td>Signal inputs: BI1 (Current) from main unit EAFR-110P CS:0,A output HSO1.</td>
</tr>
<tr>
<td>S1</td>
<td>BI1</td>
<td>Sensor channel 1. Monitoring outgoing cable compartment.</td>
<td>Trip criteria: Current + Light.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Trip outputs: T1 (outgoing CB).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Signal outputs: BO1 (Light) to main unit EAFR-110P CS:0,A BI2 after CBFP setting time.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Trip outputs: T2 (outgoing CB).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Signal outputs: BO1 (Light) to main unit EAFR-110P CS:0,A BI2 after CBFP setting time.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Trip outputs: T3 (outgoing CB).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Signal outputs: BO1 (Light) to main unit EAFR-110P CS:0,A BI2 after CBFP setting time.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Trip outputs: T4 (outgoing CB).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Signal outputs: BO1 (Light) to main unit EAFR-110P CS:0,A BI2 after CBFP setting time.</td>
</tr>
<tr>
<td>BI2</td>
<td></td>
<td>Binary input 2.</td>
<td>Trip criteria: Current + Light.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Trip outputs: T1 (outgoing CB), T2 (outgoing CB), T3 (outgoing CB), T4 (outgoing CB).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Signal inputs: BI2 (MT) from main unit EAFR-110P CS:1,A output HSO2.</td>
</tr>
</tbody>
</table>

**Table 15. Trip and I/O Logic - EAFR-101 CS:6.**

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>Current (External)</td>
</tr>
<tr>
<td>BI1</td>
<td></td>
</tr>
<tr>
<td>S1</td>
<td>BI1</td>
</tr>
<tr>
<td>S2</td>
<td>BI1</td>
</tr>
<tr>
<td>S3</td>
<td>BI1</td>
</tr>
<tr>
<td>S4</td>
<td>BI1</td>
</tr>
<tr>
<td>BI2</td>
<td>x(MT)</td>
</tr>
</tbody>
</table>
2.3.3. Connections

Figure 8. EAFR-110P CS:0.A.

Figure 9. EAFR-101 CS:6.
3. Two Mains without Tie Breaker

3.1 Two Mains with EAFR to One Feeder Breakers (EAFR-110P CS:4,A)

3.1.1 Configuration Characteristics

Table 16. Configuration Table for Figure 10.

<table>
<thead>
<tr>
<th>Configuration Selection Number</th>
<th>EAFR-110P CS:2,A</th>
<th>EAFR-110P CS:4,A</th>
<th>EAFR-101 CS:1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Incoming Mains</td>
<td>2 x Incoming Mains</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Outgoing Feeders</td>
<td>n x Outgoing Feeders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of the Circuit Breakers</td>
<td>2 x Main CBs</td>
<td>n x Outgoing CBs</td>
<td></td>
</tr>
<tr>
<td>Selective Trip forIncoming Main CBs</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selective Trip for Outgoing Feeder CBs</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Master Trip Function (MT)</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units Applied</td>
<td>2 x EAFR-110P</td>
<td>n x EAFR-101</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** n = 1 to 20.

Figure 10. Two Mains with EAFR to One Feed Breakers.
3.1.2 Trip and I/O Description

**EAFR-110P CS:2,A**

### Table 17. Trip and I/O Description - EAFR-110P CS:2,A.

<table>
<thead>
<tr>
<th>Light</th>
<th>Current (External)</th>
<th>Current (Internal)</th>
<th>I/O Description</th>
<th>Trip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bi1</td>
<td>IL, Ig</td>
<td></td>
<td>Current inputs phase IL1, IL2, IL3, and E/F Ig. Measuring current for main(s).</td>
<td>Signal outputs: HSO1 (Current) to outgoing units EAFR-101 CS:1 input Bi1.</td>
</tr>
<tr>
<td>S1</td>
<td></td>
<td></td>
<td>Sensor channel 1. Monitoring incoming cable compartment.</td>
<td>Trip criteria: Light only.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bi1</td>
<td>Trip outputs: Trip outputs: T1 (main CB), T2 (upstream CB [HV side]), T4 (trip alarm).</td>
<td></td>
</tr>
<tr>
<td>S2</td>
<td>IL, Ig</td>
<td>Bi1</td>
<td>Sensor channel 2. Monitoring incoming circuit breaker compartment.</td>
<td>Trip criteria: Current + Light.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Trip outputs: T1 (main CB), T2 (upstream CB [HV side]), T3 (not in use), T4 (trip alarm).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Signal outputs: HSO2 (MT) to main unit EAFR-110P CS:4,A input Bi1 and outgoing units EAFR-101 CS:1 input Bi2.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Trip outputs: T1 (main CB), T3 (not in use), T4 (trip alarm).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Signal outputs: HSO2 (MT) to main unit EAFR-110P CS:4,A input Bi1 and outgoing units EAFR-101 CS:1 input Bi2.</td>
<td></td>
</tr>
<tr>
<td>Bi2</td>
<td>IL, Ig</td>
<td>Bi1</td>
<td>Binary input 2.</td>
<td>Trip criteria: Current + Light.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Trip outputs: T1 (main CB), T3 (not in use), T4 (trip alarm).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Signal outputs: HSO2 (MT) to main unit EAFR-110P CS:4,A input Bi1 and outgoing unit EAFR-101 CS:1 input Bi2.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Signal outputs: Light from outgoing units EAFR-101 CS:1 output B01 and main unit EAFR-110P CS:4,A output B01.</td>
<td></td>
</tr>
</tbody>
</table>

### Table 18. Trip and I/O Logic - EAFR-110P CS:2,A.

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
<th>Light</th>
<th>Current (External)</th>
<th>Current (Internal)</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>HSO1 (Current)</th>
<th>HSO2 (MT)</th>
<th>B01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bi1</td>
<td></td>
<td>IL, Ig</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>S2</td>
<td></td>
<td>IL, Ig</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>S3</td>
<td></td>
<td>IL, Ig</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>S4</td>
<td></td>
<td>IL, Ig</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Bi2</td>
<td></td>
<td>IL, Ig</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>
### 3. Two Mains without Tie Breaker

#### EAFR-110P CS:4,A

**Table 19. Trip and I/O Description - EAFR-110P CS:2,A.**

<table>
<thead>
<tr>
<th>Light</th>
<th>Current (Internal)</th>
<th>I/O Description</th>
<th>Trip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IL, Ig</td>
<td>Current inputs phase IL1, IL2, IL3, and E/F Ig.</td>
<td>Measuring current for main(s).</td>
<td>Signal outputs: HSO1 (Current) to outgoing units EAFR-101 CS:2,A input BI1.</td>
</tr>
<tr>
<td>S1</td>
<td>Sensor channel 1.</td>
<td>Monitoring incoming cable compartment.</td>
<td>Trip criteria: Light only. Trip outputs: T1 (main CB), T2 (upstream CB [HV side]), T4 (trip alarm).</td>
</tr>
</tbody>
</table>

**Table 20. Trip and I/O Logic - EAFR-110P CS:4,A.**

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>Current (Internal)</td>
</tr>
<tr>
<td>S1</td>
<td>x</td>
</tr>
<tr>
<td>S2</td>
<td>IL, Ig</td>
</tr>
<tr>
<td>S3</td>
<td>IL, Ig</td>
</tr>
<tr>
<td>S4</td>
<td>IL, Ig</td>
</tr>
<tr>
<td>BI1</td>
<td>x(MT)</td>
</tr>
</tbody>
</table>
### Table 21. Trip and I/O Description - EAFR-101 CS:1.

<table>
<thead>
<tr>
<th>Light</th>
<th>Current (External)</th>
<th>I/O Description</th>
<th>Trip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BI1</td>
<td>Binary input 1.</td>
<td>Signal inputs: BI1 (Current) from main unit EAFR-110P CS:2,A output HS01.</td>
<td></td>
</tr>
<tr>
<td>S1</td>
<td>BI1</td>
<td>Trip criteria: Light only.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Monitoring outgoing cable compartment.</td>
<td>Trip outputs: T1 (outgoing CB), T3 (not in use), T4 (trip alarm). Signal outputs: B01 (Light) to main unit EAFR-110P CS:2,A after CBFP setting time.</td>
<td></td>
</tr>
<tr>
<td>S2</td>
<td>BI1</td>
<td>Trip criteria: Current + Light.</td>
<td></td>
</tr>
<tr>
<td>S3/S4</td>
<td>BI1</td>
<td>Trip criteria: Current + Light.</td>
<td></td>
</tr>
<tr>
<td>BI2</td>
<td>Binary input 2.</td>
<td>Trip criteria: Current + Light.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trip outputs: T1 (outgoing CB), T2 (not in use), T3 (not in use), T4 (trip alarm). Signal inputs: BI2 (MT) from main unit EAFR-110P CS:2,A output HS02.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 22. Trip and I/O Logic - EAFR-101 CS:1.

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td></td>
</tr>
<tr>
<td>BI1</td>
<td>BI1</td>
</tr>
<tr>
<td>S1</td>
<td>BI1</td>
</tr>
<tr>
<td>S2</td>
<td>BI1</td>
</tr>
<tr>
<td>S3</td>
<td>BI1</td>
</tr>
<tr>
<td>S4</td>
<td>BI1</td>
</tr>
<tr>
<td>BI2</td>
<td>x(MT)</td>
</tr>
</tbody>
</table>
3. Two Mains without Tie Breaker

3.1.3 Connections

Figure 11. EAFR-110P CS.2,A.
Figure 12. EAFR-110P CS:4,A.
3. Two Mains without Tie Breaker

Figure 13. EAFR-101 CS:1.
4. Two Mains with Tie Breaker

4.1 Two Mains with Tie Breaker with EAFR to One Feeder Breakers (EAFR-101 CS:1)

4.1.1 Configuration Characteristics

Table 23. Configuration Table for Figure 14

| Configuration Selection Number | EAFR-110P CS:2,A  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Incoming Mains</td>
<td>2 x Incoming Mains</td>
</tr>
<tr>
<td>Number of Outgoing Feeders</td>
<td>n x Outgoing Feeders</td>
</tr>
</tbody>
</table>
| Number of the Circuit Breakers| 2 x Main CBs  
|                               | n x Outgoing CBs|
| Selective Trip for Incoming Main CBs | Yes  
| Selective Trip for Outgoing Feeder CBs | Yes  
| Master Trip Function (MT)    | Yes  
| Units Applied                 | 2 x EAFR-110P  
|                               | n x EAFR-101|

Note: n = 1 to 20.
4. Two Mains with Tie Breaker

4.1.2 Trip and I/O Description

**EAFR-110P CS:2,A**

**Table 24. Trip and I/O Description - EAFR-110P CS:2,A.**

<table>
<thead>
<tr>
<th>Light</th>
<th>Current (External)</th>
<th>Current (Internal)</th>
<th>I/O Description</th>
<th>Trip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IL, Ig</td>
<td>IL, Ig</td>
<td></td>
<td>Current inputs phase IL1, IL2, IL3, and E/F Ig. Measuring current for main(s).</td>
<td>Signal outputs: HSO1 (Current) to outgoing units EAFR-101 CS:1 input BI1. Signal outputs: BO1 (Current) to outgoing units EAFR-110P CS:2,A input BI1.</td>
</tr>
<tr>
<td>BI1</td>
<td></td>
<td></td>
<td></td>
<td>Signal inputs: Current from main unit EAFR-110P CS:2,A output BO1.</td>
</tr>
<tr>
<td>S1</td>
<td></td>
<td></td>
<td>Sensor channel 1. Monitoring incoming cable compartment.</td>
<td>Trip criteria: Light only. Trip outputs: T1 (main CB), T2 (upstream CB [HV side]), T4 (trip alarm).</td>
</tr>
<tr>
<td>BI1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BI1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 25. Trip and I/O Logic - EAFR-110P CS:2,A.**

<table>
<thead>
<tr>
<th>Light</th>
<th>Current (External)</th>
<th>Current (Internal)</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>HSO1 (Current)</th>
<th>HSO2 (MT)</th>
<th>BO1</th>
</tr>
</thead>
<tbody>
<tr>
<td>BI1</td>
<td></td>
<td>IL, Ig</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S1</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S2</td>
<td>IL, Ig</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S3</td>
<td>IL, Ig</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S4</td>
<td>IL, Ig</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BI2</td>
<td>IL, Ig</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Table 26. Trip and I/O Description - EAFR-101 CS:1.

<table>
<thead>
<tr>
<th>Light (External)</th>
<th>I/O Description</th>
<th>Trip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BI1</td>
<td>Binary input 1.</td>
<td>Signal inputs: BI1 (Current) from main unit EAFR-110P CS:2,A output HSO1.</td>
</tr>
</tbody>
</table>

## Table 27. Trip and I/O Logic - EAFR-101 CS:1

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light (External)</td>
<td>T1</td>
</tr>
<tr>
<td>BI1</td>
<td>x</td>
</tr>
<tr>
<td>S1</td>
<td>BI1</td>
</tr>
<tr>
<td>S2</td>
<td>BI1</td>
</tr>
<tr>
<td>S3</td>
<td>BI1</td>
</tr>
<tr>
<td>S4</td>
<td>BI1</td>
</tr>
<tr>
<td>BI2</td>
<td>x(MT)</td>
</tr>
</tbody>
</table>
4. Two Mains with Tie Breaker

4.1.3 Connections

Figure 15. EAFR-110P CS.2.A.
Figure 16. EAFR-101 CS:1.
4. Two Mains with Tie Breaker

4.2 Two Mains with Tie Breaker with EAFR to Two Feeder Breakers (EAFR-101 CS:4)

4.2.1 Configuration Characteristics

Table 28. Configuration Table for Figure 17.

<table>
<thead>
<tr>
<th>Configuration Selection Number</th>
<th>EAFR-110P CS:2,A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Incoming Mains</td>
<td>2 x Incoming Mains</td>
</tr>
<tr>
<td>Number of Outgoing Feeders</td>
<td>n x Outgoing Feeders</td>
</tr>
<tr>
<td>Number of the Circuit Breakers</td>
<td>2 x Main CBs</td>
</tr>
<tr>
<td></td>
<td>n x Outgoing CBs</td>
</tr>
<tr>
<td>Selective Trip for Incoming Main CBs</td>
<td>Yes</td>
</tr>
<tr>
<td>Selective Trip for Outgoing Feeder CBs</td>
<td>Yes</td>
</tr>
<tr>
<td>Master Trip Function (MT)</td>
<td>Yes</td>
</tr>
<tr>
<td>Units Applied</td>
<td>2 x EAFR-110P</td>
</tr>
<tr>
<td></td>
<td>n x EAFR-101</td>
</tr>
</tbody>
</table>

Note: n = 1 to 20.
4. Two Mains with Tie Breaker

### 4.2.2 Trip and I/O Description

**EAFR-110P CS:2,A**

**Table 29. Trip and I/O Description - EAFR-110P CS:2.A.**

<table>
<thead>
<tr>
<th>Light</th>
<th>Current (External)</th>
<th>Current (Internal)</th>
<th>I/O Description</th>
<th>Trip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IL, Ig</td>
<td></td>
<td>Current inputs phase IL1, IL2, IL3, and E/F Ig.</td>
<td>Signal outputs: HSO1 (Current) to outgoing units EAFR-101 CS:1 input BI1.</td>
</tr>
<tr>
<td>S1</td>
<td>Sensor channel 1.</td>
<td>IL, Ig</td>
<td>Monitoring incoming cable compartment.</td>
<td>Trip criteria: Light only.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Trip outputs: T1 (main CB), T2 (upstream CB [HV side]), T4 (trip alarm).</td>
</tr>
<tr>
<td>S2</td>
<td>Sensor channel 2.</td>
<td>IL, Ig</td>
<td>Monitoring incoming circuit breaker compart-ment.</td>
<td>Trip criteria: Current + Light.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Trip outputs: T1 (main CB), T2 (upstream CB [HV side]), T3 (tie breaker), T4 (trip alarm).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BI1</td>
<td></td>
<td>Signal outputs: HSO2 (MT) to outgoing units EAFR-101 CS:4 input BI2.</td>
</tr>
<tr>
<td>S3</td>
<td>Sensor channel 3.</td>
<td>IL, Ig</td>
<td>Monitoring busbar compartment.</td>
<td>Trip criteria: Current + Light.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Trip outputs: T1 (main CB), T3 (tie breaker), T4 (trip alarm).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BI1</td>
<td></td>
<td>Signal outputs: HSO2 (MT) to outgoing units EAFR-101 CS:4 input BI2.</td>
</tr>
<tr>
<td>S4</td>
<td>Sensor channel 4.</td>
<td>IL, Ig</td>
<td>Monitoring tie breaker compartment.</td>
<td>Trip criteria: Current + Light.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Trip outputs: T1 (main CB), T3 (tie breaker), T4 (trip alarm).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BI1</td>
<td></td>
<td>Signal outputs: HSO2 (MT) to outgoing units EAFR-101 CS:4 input BI2.</td>
</tr>
<tr>
<td>BI2</td>
<td>IL, Ig</td>
<td></td>
<td>Binary input 2.</td>
<td>Trip criteria: Current + Light.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Trip outputs: T1 (main CB), T3 (tie breaker), T4 (trip alarm).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BI1</td>
<td></td>
<td>Signal outputs: HSO2 (MT) to outgoing units EAFR-101 CS:4 input BI2.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Signal outputs: BI2 (&gt; from outgoing units EAFR-101 CS:4 output BO1.</td>
</tr>
</tbody>
</table>

**Table 30. Trip and I/O Logic - EAFR-110P CS:2,A.**

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>T1</td>
</tr>
<tr>
<td>IL, Ig</td>
<td></td>
</tr>
<tr>
<td>BI1</td>
<td>x</td>
</tr>
<tr>
<td>S1</td>
<td>x</td>
</tr>
<tr>
<td>S2</td>
<td>IL, Ig</td>
</tr>
<tr>
<td>BI1</td>
<td></td>
</tr>
<tr>
<td>S3</td>
<td>IL, Ig</td>
</tr>
<tr>
<td>BI1</td>
<td></td>
</tr>
<tr>
<td>S4</td>
<td>IL, Ig</td>
</tr>
<tr>
<td>BI1</td>
<td></td>
</tr>
<tr>
<td>BI2</td>
<td>IL, Ig</td>
</tr>
<tr>
<td>BI1</td>
<td></td>
</tr>
</tbody>
</table>
4. Two Mains with Tie Breaker

_EAFR-101 CS:4_

**Table 31. Trip and I/O Description - EAFR-101 CS:4.**

<table>
<thead>
<tr>
<th>Light</th>
<th>Current (External)</th>
<th>I/O Description</th>
<th>Trip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BI1</td>
<td>Binary input 1.</td>
<td></td>
<td>Signal inputs: BI1 (Current) from main unit EAFR-110P CS:2,A output HS01.</td>
</tr>
</tbody>
</table>

**Table 32. Trip and I/O logic - EAFR-101 CS:4.**

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>Current (External)</td>
</tr>
<tr>
<td></td>
<td>BI1</td>
</tr>
<tr>
<td>S1</td>
<td>BI1</td>
</tr>
<tr>
<td>S2</td>
<td>BI1</td>
</tr>
<tr>
<td>S3</td>
<td>BI1</td>
</tr>
<tr>
<td>S4</td>
<td>BI1</td>
</tr>
<tr>
<td>BI2</td>
<td>BI1</td>
</tr>
</tbody>
</table>
### 4. Two Mains with Tie Breaker

#### 4.2.3 Connections

Figure 18. EAFR-110P CS:2,A.
4. Two Mains with Tie Breaker

Figure 19. EAFR-101 CS:4.
4.3 Two Mains with Tie Breaker with EAFR to Four Feeder Breakers (EAFR-101 CS:0)

4.3.1 Configuration Characteristics

Table 33. Configuration Table for Figure 20.

<table>
<thead>
<tr>
<th>Configuration Selection Number</th>
<th>EAFR-110P CS:2,A</th>
<th>EAFR-101 CS:0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Incoming Mains</td>
<td>2 x Incoming Mains</td>
<td></td>
</tr>
<tr>
<td>Number of Outgoing Feeders</td>
<td>n x Outgoing Feeders</td>
<td></td>
</tr>
<tr>
<td>Number of the Circuit Breakers</td>
<td>2 x Main CBs</td>
<td>n x Outgoing CBs</td>
</tr>
<tr>
<td>Selective Trip for Incoming Main CBs</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Selective Trip for Outgoing Feeder CBs</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Master Trip Function (MT)</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Units Applied</td>
<td>2 x EAFR-110P</td>
<td>n x EAFR-101</td>
</tr>
</tbody>
</table>

Note: n = 1 to 20.
4. Two Mains with Tie Breaker

4.2.2 Trip And I/O Description

**EAFR-110P CS:2,A**

Table 34. Trip and I/O Description - EAFR-110P CS:2,A.

<table>
<thead>
<tr>
<th>Light</th>
<th>Current (External)</th>
<th>Current (Internal)</th>
<th>I/O Description</th>
<th>Trip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IL, Ig</td>
<td></td>
<td></td>
<td>Current inputs phase IL1, IL2, IL3, and E/F Ig.</td>
<td>Signal outputs: BO1 (Current) to outgoing units EAFR-110P CS:2,A input BI1.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Measuring current for main(s).</td>
<td></td>
</tr>
<tr>
<td>BI1</td>
<td></td>
<td></td>
<td>Binary input 1.</td>
<td>Signal inputs: Current from main unit EAFR-110P CS:2,A output BO1.</td>
</tr>
<tr>
<td>S1</td>
<td>Sensor channel 1.</td>
<td></td>
<td>Monitoring incoming cable compartment.</td>
<td>Trip criteria: Light only.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Trip outputs: T1 (main CB), T2 (upstream CB [HV side]), T4 (trip alarm).</td>
</tr>
<tr>
<td>S2</td>
<td>IL, Ig</td>
<td></td>
<td>Sensor channel 2.</td>
<td>Trip criteria: Current + Light.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Monitoring incoming circuit breaker compartment.</td>
<td>Trip outputs: T1 (main CB), T2 (upstream CB [HV side]), T3 (tie breaker), T4 (trip alarm).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Signal outputs: HSO2 (MT) to outgoing units EAFR-101 CS:0 input BI2.</td>
</tr>
<tr>
<td>BI1</td>
<td></td>
<td></td>
<td>Binary input 2.</td>
<td></td>
</tr>
<tr>
<td>S3</td>
<td>IL, Ig</td>
<td></td>
<td>Sensor channel 3.</td>
<td>Trip criteria: Current + Light.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Monitoring busbar compartment.</td>
<td>Trip outputs: T1 (main CB), T3 (tie breaker), T4 (trip alarm).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Signal outputs: HSO2 (MT) to outgoing units EAFR-101 CS:4 input BI2.</td>
</tr>
<tr>
<td>BI1</td>
<td></td>
<td></td>
<td>Binary input 2.</td>
<td></td>
</tr>
<tr>
<td>S4</td>
<td>IL, Ig</td>
<td></td>
<td>Sensor channel 4.</td>
<td>Trip criteria: Current + Light.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Monitoring tie breaker compartment.</td>
<td>Trip outputs: T1 (main CB), T3 (tie breaker), T4 (trip alarm).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Signal outputs: HSO2 (MT) to outgoing units EAFR-101 CS:0 input BI2.</td>
</tr>
<tr>
<td>BI2</td>
<td>IL, Ig</td>
<td></td>
<td>Binary input 2.</td>
<td>Trip criteria: Current + Light.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Trip outputs: T1 (main CB), T3 (tie breaker), T4 (trip alarm).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Signal outputs: HSO2 (MT) to outgoing unit EAFR-101 CS:4 input BI2.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Signal outputs: BI2 -&gt; from outgoing units EAFR-101 CS:0 output BO1.</td>
</tr>
<tr>
<td>BI1</td>
<td></td>
<td></td>
<td>Binary input 2.</td>
<td></td>
</tr>
</tbody>
</table>

Table 35. Trip and I/O Logic - EAFR-110P CS:2,A.

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>Current (External)</td>
</tr>
<tr>
<td>B11</td>
<td>IL, Ig</td>
</tr>
<tr>
<td>S1</td>
<td></td>
</tr>
<tr>
<td>S2</td>
<td>IL, Ig</td>
</tr>
<tr>
<td>S3</td>
<td>IL, Ig</td>
</tr>
<tr>
<td>S4</td>
<td>IL, Ig</td>
</tr>
<tr>
<td>B11</td>
<td>IL, Ig</td>
</tr>
</tbody>
</table>

**Note:** *: HSO1 (Current) is not in use.
EAFR-101 CS:0

Table 36. Trip and I/O Description - EAFR-101 CS:0.

<table>
<thead>
<tr>
<th>Light</th>
<th>Current (External)</th>
<th>I/O Description</th>
<th>Trip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BI1</td>
<td></td>
<td>Binary input 1.</td>
<td></td>
</tr>
<tr>
<td>S1</td>
<td>BI1</td>
<td>Sensor channel 1. Monitoring cable, breaker and busbar compartment.</td>
<td>Trip criteria: Light. Trip outputs: T1, T2, T3 and T4 (outgoing CB). Signal outputs: B01 (Light) to main unit EAFR-110P CS:2,A input BI2.</td>
</tr>
<tr>
<td>BI2</td>
<td></td>
<td>Binary input 2.</td>
<td></td>
</tr>
</tbody>
</table>

Table 37. Trip and I/O Logic - EAFR-101 CS:0.

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>T1</td>
</tr>
<tr>
<td>S1</td>
<td></td>
</tr>
<tr>
<td>S2</td>
<td></td>
</tr>
<tr>
<td>S3</td>
<td></td>
</tr>
<tr>
<td>S4</td>
<td>x(MT)</td>
</tr>
<tr>
<td>BI2</td>
<td>x(MT)</td>
</tr>
</tbody>
</table>
4. Two Mains with Tie Breaker

4.3.3 Connections

Figure 21. EAFR-110P CS:2,A.
Figure 22. EAFR-101 CS:0.
5. Standalone

5.1 One Main Four Zone (Standalone Configuration 6,A)

5.1.1 Configuration Characteristics

Table 38. Configuration Table for Figure 23.

<table>
<thead>
<tr>
<th>Configuration Selection Number</th>
<th>EAFR-110P CS:6,A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Incoming Mains</td>
<td>1 x Incoming Mains</td>
</tr>
<tr>
<td>Number of Outgoing Feeders</td>
<td>2 x Outgoing Feeders</td>
</tr>
<tr>
<td>Number of the Circuit Breakers</td>
<td>1 x Main CBs</td>
</tr>
<tr>
<td></td>
<td>2 x Outgoing CBs</td>
</tr>
<tr>
<td>Selective Trip for Incoming Main CBs</td>
<td>Yes</td>
</tr>
<tr>
<td>Selective Trip for Outgoing Feeder CBs</td>
<td>No</td>
</tr>
<tr>
<td>Master Trip Function (MT)</td>
<td>No</td>
</tr>
<tr>
<td>Units Applied</td>
<td>1 x EAFR-110P</td>
</tr>
</tbody>
</table>

Figure 23. One Main (Standalone Configuration 6,A).
### 5.1.2 I/O Description

#### EAFR-110P CS:6,A

**Table 39. Trip and I/O Description - EAFR-110P CS:2,A.**

<table>
<thead>
<tr>
<th>Light</th>
<th>Pressure</th>
<th>Current (Internal)</th>
<th>I/O Description</th>
<th>Trip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>IL, Ig</td>
<td></td>
<td>IL, Ig</td>
<td>Current inputs phase IL1, IL2, IL3, and E/F Ig. Measuring current for main(s).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S1</td>
<td>Sensor channel 1. Zone 1 breaker compartment. Trip criteria: Light only.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S1 Trip outputs: T1 (Zone 1 breaker), T2 (Zone 2 breaker), T3 (Zone 3 breaker). Signal outputs: HS01 (Alarm) and BO1 (Light).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S1, IL, Ig</td>
<td>Trip criteria: Light + Pressure.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S1 Trip outputs: T1 (Zone 1 breaker), T2 (Zone 2 breaker), T3 (Zone 3). Signal outputs: HS01 (Alarm) and BO1 (Light + Pressure).</td>
<td></td>
</tr>
<tr>
<td>S2</td>
<td>IL, Ig</td>
<td></td>
<td>S2</td>
<td>Sensor channel 2. Zone 2 breaker compartment. Trip criteria: Light only.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S2 Trip outputs: T1 (Zone 1 breaker), T2 (Zone 2 breaker), T3 (Zone 3). Signal outputs: HS02 (Alarm) and BO1 (Light + Pressure).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S2</td>
<td>Trip criteria: Light + Current.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S2 Trip outputs: T1 (Zone 1 breaker), T2 (Zone 2 breaker), T3 (Zone 3). Signal outputs: HS02 (Alarm) and BO1 (Light + Pressure).</td>
<td></td>
</tr>
<tr>
<td>S3</td>
<td>IL, Ig</td>
<td></td>
<td>S3</td>
<td>Sensor channel 3. Zone 3 breaker compartment and cable compartment. Trip criteria: Light only.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S3 Trip outputs: T1 (Zone 1 breaker), T2 (Zone 2 breaker), T3 (Zone 3 breaker), T4 (Zone 4 breaker). Signal outputs: BO1 (Light).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S3, IL, Ig</td>
<td>Trip criteria: Light + Current.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S3 Trip outputs: T1 (Zone 1 breaker), T2 (Zone 2 breaker), T3 (Zone 3 breaker), T4 (Zone 4 breaker). Signal outputs: BO1 (Light + Current).</td>
<td></td>
</tr>
<tr>
<td>S4</td>
<td>IL, Ig</td>
<td></td>
<td>S4</td>
<td>Sensor channel 4. Zone 4 breaker compartment and outgoing feeder breaker compartment. Trip criteria: Light only.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S4 Trip outputs: T1 (Zone 1 breaker), T2 (Zone 2 breaker), T3 (Zone 3 breaker), T4 (Zone 4 breaker). Signal outputs: BO1 (Light + Pressure).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S4</td>
<td>Trip criteria: Light + Current.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S4 Trip outputs: T1 (Zone 1 breaker), T2 (Zone 2 breaker), T3 (Zone 3 breaker), T4 (Zone 4 breaker). Signal outputs: BO1 (Light + Current).</td>
<td></td>
</tr>
</tbody>
</table>
5. Standalone

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>Pressure</td>
</tr>
<tr>
<td>S1</td>
<td>x ( †CBFP)</td>
</tr>
<tr>
<td>S1</td>
<td>x ( †FAST)</td>
</tr>
<tr>
<td>S1</td>
<td>IL, Ig</td>
</tr>
<tr>
<td>S2</td>
<td>x ( †CBFP)</td>
</tr>
<tr>
<td>S2</td>
<td>IL, Ig</td>
</tr>
<tr>
<td>S3</td>
<td>x ( †CBFP)</td>
</tr>
<tr>
<td>S3</td>
<td>IL, Ig</td>
</tr>
<tr>
<td>S4</td>
<td>x ( †CBFP)</td>
</tr>
<tr>
<td>S4</td>
<td>IL, Ig</td>
</tr>
</tbody>
</table>

Note: * – Trip time is less than 7 ms.
† – One CBFP setting time of dipswitch DIPSW2/3.
‡ – Two CBFP setting time of dipswitch DIPSW2/3.

5.1.3 Connections

Figure 24. EAFR-110P CS:6,A.
6. Multi-mains without Breaker

6.1 Multi-mains without Tie Breaker (EAFR-110P CS:4,A)

6.1.1 Configuration Characteristics

Table 41. Configuration Table for Figure 27.

<table>
<thead>
<tr>
<th>Configuration Selection Number</th>
<th>EAFR-110P CS:2,A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EAFR-110P CS:4,A</td>
</tr>
<tr>
<td></td>
<td>EAFR-101 CS:1</td>
</tr>
<tr>
<td>Number of Incoming Mains</td>
<td>m x Incoming Mains</td>
</tr>
<tr>
<td>Number of Outgoing Feeders</td>
<td>n x Outgoing Feeders</td>
</tr>
<tr>
<td>Number of the Circuit Breakers</td>
<td>m x Main CBs</td>
</tr>
<tr>
<td></td>
<td>n x Outgoing CBs</td>
</tr>
<tr>
<td>Selective Trip for Incoming Main CBs</td>
<td>Yes</td>
</tr>
<tr>
<td>Selective Trip for Outgoing Feeder CBs</td>
<td>Yes</td>
</tr>
<tr>
<td>Master Trip Function (MT)</td>
<td>Yes</td>
</tr>
<tr>
<td>Units Applied</td>
<td>m x EAFR-110P</td>
</tr>
<tr>
<td></td>
<td>n x EAFR-101</td>
</tr>
</tbody>
</table>

Note: n = 1 to 20.  
   m = 1 to 6.

Figure 25. Multi-mains without Tie Breaker.
6. Multi-mains without Breaker

6.1.2 I/O Description

**EAFR-110P CS:2,A**

Table 42. Trip and I/O Description - EAFR-110P CS:2,A.

<table>
<thead>
<tr>
<th>Light</th>
<th>Current (External)</th>
<th>Current (Internal)</th>
<th>I/O Description</th>
<th>Trip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IL, Ig</td>
<td></td>
<td>Current inputs phase IL1, IL2, IL3, and E/F Ig. Measuring current for main(s).</td>
<td>Signal outputs: HSO1 (Current) to outgoing units EAFR-101 CS:1 input BI1.</td>
</tr>
<tr>
<td>BI1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S1</td>
<td></td>
<td></td>
<td>Sensor channel 1. Monitoring incoming cable compartment.</td>
<td>Trip criteria: Light only. Trip outputs: T1 (main CB), T2 (upstream CB [HV side]), T4 (trip alarm).</td>
</tr>
<tr>
<td></td>
<td>IL, Ig</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BI1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BI1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 43. Trip and I/O Logic - EAFR-110P CS:2,A.

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>T1</td>
</tr>
<tr>
<td>BI1</td>
<td>IL, Ig</td>
</tr>
<tr>
<td>S1</td>
<td></td>
</tr>
<tr>
<td>S2</td>
<td>IL, Ig</td>
</tr>
<tr>
<td>BI1</td>
<td></td>
</tr>
<tr>
<td>S3</td>
<td>IL, Ig</td>
</tr>
<tr>
<td>BI1</td>
<td></td>
</tr>
<tr>
<td>S4</td>
<td>IL, Ig</td>
</tr>
<tr>
<td>BI1</td>
<td></td>
</tr>
<tr>
<td>BI2</td>
<td>IL, Ig</td>
</tr>
<tr>
<td>BI1</td>
<td></td>
</tr>
</tbody>
</table>
### EAFR-110P CS:4A

**Table 44. Trip and I/O Description - EAFR-110P CS:4,A.**

<table>
<thead>
<tr>
<th>Light</th>
<th>Current (External)</th>
<th>Current (Internal)</th>
<th>I/O Description</th>
<th>Trip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IL, Ig</td>
<td>Current inputs phase IL1, IL2, IL3, and E/F Ig.</td>
<td>Measuring current for main(s).</td>
<td></td>
<td>Signal outputs: HSO1 (Current) to main unit EAFR-110P CS:2,A input BI1.</td>
</tr>
<tr>
<td>BI2</td>
<td>Binary input 2.</td>
<td></td>
<td></td>
<td>Signal outputs: HSO1 (Current) to main unit EAFR-110P CS:2,A input BI1 and main unit EAFR-110P CS:4,A.</td>
</tr>
<tr>
<td>S1</td>
<td></td>
<td>Sensor channel 1.</td>
<td></td>
<td>Signal inputs: Current from main unit EAFR-110P CS:4,A output HSO1.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Monitoring incoming cable compartment.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S2</td>
<td>IL, Ig</td>
<td>Sensor channel 2.</td>
<td></td>
<td>Trip criteria: Current + Light.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Monitoring incoming circuit breaker compartment.</td>
<td></td>
<td>Trip outputs: T1 (main CB), T2 (upstream CB [HV side]), T3 (not in use), T4 (trip alarm).</td>
</tr>
<tr>
<td>BI2</td>
<td></td>
<td></td>
<td></td>
<td>Signal outputs: BO1 (Light) to main unit EAFR-110P CS:2,A input BI2.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Monitoring busbar compartment.</td>
<td></td>
<td>Trip outputs: T1 (main CB), T3 (not in use), T4 (trip alarm).</td>
</tr>
<tr>
<td>BI2</td>
<td></td>
<td></td>
<td></td>
<td>Signal outputs: BO1 (Light) to main unit EAFR-110P CS:2,A input BI2.</td>
</tr>
<tr>
<td>BI1</td>
<td>Binary input 1.</td>
<td></td>
<td></td>
<td>Trip criteria: Current + Light.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Trip outputs: T1 (main CB), T3 (not in use), T4 (trip alarm).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Signal inputs: MT from main unit EAFR-110P CS:2,A output HSO2.</td>
</tr>
</tbody>
</table>

**Table 45. Trip and I/O Logic - EAFR-110P CS:4,A.**

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
<th>Light</th>
<th>Current (External)</th>
<th>Current (Internal)</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>HSO1 (Current)</th>
<th>HSO2 (MT)</th>
<th>B01 (Light)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S2</td>
<td></td>
<td>IL, Ig</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S3</td>
<td></td>
<td>IL, Ig</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S4</td>
<td></td>
<td>IL, Ig</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BI1</td>
<td></td>
<td>IL, Ig</td>
<td>x(MT)</td>
<td></td>
<td>x(MT)</td>
<td>x(MT)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BI2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 6. Multi-mains without Breaker

**EAFR-101 CS:1**

#### Table 46. Trip and I/O Description - EAFR-101 CS:1.

<table>
<thead>
<tr>
<th>Light</th>
<th>Current (External)</th>
<th>I/O Description</th>
<th>Trip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BI1</td>
<td></td>
<td>Binary input 1.</td>
<td>Signal inputs: BI1 (Current) from main unit EAFR-110P CS:2,A output HSO1.</td>
</tr>
</tbody>
</table>

#### Table 47. Trip and I/O Logic - EAFR-101 CS:1.

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>Current (External)</td>
</tr>
<tr>
<td>BI1</td>
<td>x</td>
</tr>
<tr>
<td>S1</td>
<td>BI1</td>
</tr>
<tr>
<td>S2</td>
<td>BI1</td>
</tr>
<tr>
<td>S3</td>
<td>BI1</td>
</tr>
<tr>
<td>S4</td>
<td>BI1</td>
</tr>
<tr>
<td>BI2</td>
<td>x(MT)</td>
</tr>
</tbody>
</table>
6. Multi-mains without Breaker

6.1.3 Connections

Figure 26. EAFR CS:2,A.

Figure 27. EAFR-110P CS:4,A.
6. Multi-mains without Breaker

Figure 28. EAFR-101 CS:1.
7. Multi-mains with Tie Breaker

7.1 Multi-mains with Tie Breaker

7.1.1 Configuration Characteristics

Table 48. Configuration Table for Figure 31.

<table>
<thead>
<tr>
<th>Configuration Selection Number</th>
<th>EAFR-110P CS:2,A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EAFR-110P CS:7,A</td>
</tr>
<tr>
<td></td>
<td>EAFR-101 CS:1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of Incoming Mains</th>
<th>m x Incoming Mains</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Outgoing Feeders</td>
<td>n x Outgoing Feeders</td>
</tr>
<tr>
<td>Number of the Circuit Breakers</td>
<td>m x Main CBs</td>
</tr>
<tr>
<td></td>
<td>n x Outgoing CBs</td>
</tr>
<tr>
<td>Selective Trip for Incoming Main CBs</td>
<td>Yes</td>
</tr>
<tr>
<td>Selective Trip for Outgoing Feeder CBs</td>
<td>Yes</td>
</tr>
<tr>
<td>Master Trip Function (MT)</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Units Applied

<table>
<thead>
<tr>
<th>m x EAFR-110P</th>
</tr>
</thead>
<tbody>
<tr>
<td>n x EAFR-101</td>
</tr>
</tbody>
</table>

Note: n = 1 to 20.  
m = 1 to 6.
### 7. Multi-mains with Tie Breaker

#### 7.1.2 I/O Description

**EAFR-110P CS:2,A (LS):**

<table>
<thead>
<tr>
<th>Light</th>
<th>Current (External)</th>
<th>Current (Internal)</th>
<th>I/O Description</th>
<th>Trip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IL, Ig</td>
<td></td>
<td></td>
<td>Trip and I/O Description - EAFR-110P CS:2,A (LS).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Current inputs phase IL1, IL2, IL3, and E/F Ig.</td>
<td>Measuring current for main(s).</td>
<td>Signal outputs: HSO1 (Current) to outgoing units EAFR-101 CS:1 input BI1. B01 (Current) to main units EAFR-110P CS:7,A (LS) input BI1.</td>
<td></td>
</tr>
<tr>
<td>S1</td>
<td>Sensor channel 1.</td>
<td>Monitoring incoming cable compartment.</td>
<td>Trip criteria: Light only.</td>
<td></td>
</tr>
<tr>
<td>BI1</td>
<td>IL, Ig</td>
<td></td>
<td>Trip outputs: T1 (main CB), T2 (upstream CB [HV side]), T3 (tie breaker), T4 (trip alarm). Signal outputs: HSO2 (MT) to main unit EAFR-110P CS:7,A (LS) input BI2 and outgoing units EAFR-101 CS:1 (LS) input BI2.</td>
<td></td>
</tr>
<tr>
<td>BI1</td>
<td>IL, Ig</td>
<td></td>
<td>Trip outputs: T1 (main CB), T3 (tie breaker), T4 (trip alarm). Signal outputs: HSO2 (MT) to main unit EAFR-110P CS:7,A (LS) input BI2 and outgoing units EAFR-101 CS:1 (LS) input BI2.</td>
<td></td>
</tr>
<tr>
<td>BI2</td>
<td>IL, Ig</td>
<td>Binary input 2.</td>
<td>Trip criteria: Current + Light.</td>
<td></td>
</tr>
</tbody>
</table>
Table 50. Trip and I/O Logic - EAFR-110P CS:2,A (LS).

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>Current (External)</td>
</tr>
<tr>
<td></td>
<td>IL, Ig</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bi1</td>
</tr>
<tr>
<td>S1</td>
<td></td>
</tr>
<tr>
<td>S2</td>
<td>IL, Ig</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>S3</td>
<td>IL, Ig</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>S4</td>
<td>IL, Ig</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>B12</td>
<td>IL, Ig</td>
</tr>
</tbody>
</table>

**EAFR-110P CS:7,A (LS):**

Table 51. Trip and I/O Description - EAFR-110P CS:7,A (LS).

<table>
<thead>
<tr>
<th>Inputs</th>
<th>I/O Description</th>
<th>Trip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>Current (External)</td>
<td>Current (Internal)</td>
</tr>
<tr>
<td></td>
<td>IL, Ig</td>
<td>Current inputs phase IL1, IL2, IL3, and E/F Ig.</td>
</tr>
<tr>
<td></td>
<td>Bi1</td>
<td>Binary input 1.</td>
</tr>
<tr>
<td>S1</td>
<td>Sensor channel 1.</td>
<td>Monitoring incoming cable compartment.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B12</td>
<td>Binary input 2.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
7. Multi-mains with Tie Breaker

Table 52. Trip and I/O Logic - EAFR-110P CS:7, A (LS).

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>Current (External)</td>
</tr>
<tr>
<td></td>
<td>IL, Ig</td>
</tr>
<tr>
<td>S1</td>
<td>x</td>
</tr>
<tr>
<td>S2</td>
<td>IL, Ig</td>
</tr>
<tr>
<td></td>
<td>x</td>
</tr>
<tr>
<td>S3</td>
<td>IL, Ig</td>
</tr>
<tr>
<td></td>
<td>x</td>
</tr>
<tr>
<td>S4</td>
<td>IL, Ig</td>
</tr>
<tr>
<td></td>
<td>x</td>
</tr>
<tr>
<td>BI2</td>
<td>IL, Ig</td>
</tr>
<tr>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>

**EAFR-101 CS:1 (LS):**

Table 53. Trip and I/O Description - EAFR-101 CS:1 (LS).

<table>
<thead>
<tr>
<th>Light</th>
<th>Current (External)</th>
<th>I/O Description</th>
<th>Trip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BI1</td>
<td>Binary input 1.</td>
<td></td>
<td>Signal inputs: BI1 (Current) from main unit EAFR-110P CS:2,A (LS) output HS01.</td>
</tr>
<tr>
<td>S1</td>
<td>BI1</td>
<td>Sensor channel 1.</td>
<td>Trip criteria: Current + Light.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Monitoring outgoing cable compartment.</td>
<td>Trip outputs: T1 (outgoing CB), T3 (not in use), T4 (trip alarm).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Signal outputs: BO1 (Light) to main unit EAFR-110P CS:2,A (LS) after CBFP setting time.</td>
</tr>
<tr>
<td>S2</td>
<td>BI1</td>
<td>Sensor channel 2.</td>
<td>Trip criteria: Current + Light.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Monitoring outgoing circuit breaker compartment.</td>
<td>Trip outputs: T2 (CBFP), T4 (CBFP).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Signal outputs: BO1 (Light) to main unit EAFR-110P CS:2,A (LS) input BI2.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Signal inputs: BI2 (MT) from main unit EAFR-110P CS:2,A (LS) output HS02.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Monitoring busbar compartment.</td>
<td>Trip outputs: T2 (CBFP), T4 (CBFP).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Signal outputs: BO1 (Light) to main unit EAFR-110P CS:2,A (LS) input BI2.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Signal inputs: BI2 (MT) from main unit EAFR-110P CS:2,A (LS) output HS02.</td>
</tr>
<tr>
<td>BI2</td>
<td>Binary input 2.</td>
<td></td>
<td>Trip criteria: Current + Light.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Trip outputs: T1 (outgoing CB), T2 (CBFP), T3 (not in use), T4 (trip alarm).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Signal inputs: BI2 (MT) from main unit EAFR-110P CS:2,A (LS) output HS02.</td>
</tr>
</tbody>
</table>

Table 54. Trip and I/O Logic - EAFR-101 CS:1 (LS).

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>Current (External)</td>
</tr>
<tr>
<td>BI1</td>
<td></td>
</tr>
<tr>
<td>S1</td>
<td>BI1</td>
</tr>
<tr>
<td>S2</td>
<td>BI1</td>
</tr>
<tr>
<td>S3</td>
<td>BI1</td>
</tr>
<tr>
<td>S4</td>
<td>BI1</td>
</tr>
<tr>
<td>BI2</td>
<td>x(MT)</td>
</tr>
</tbody>
</table>
### Table 55. Trip and I/O Description - EAFR-110P CS:2,A (LS).

<table>
<thead>
<tr>
<th>Light</th>
<th>Current (External)</th>
<th>Current (Internal)</th>
<th>I/O Description</th>
<th>Trip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BI1</td>
<td>IL, Ig</td>
<td></td>
<td>Current inputs phase IL1, IL2, IL3, and E/F Ig. Measuring current for main(s).</td>
<td>Signal outputs: HSO1 (Current) to outgoing units EAFR-101 CS:1 (RS) input BI1. B01 (Current) to main units EAFR-110P CS:7,A (RS) input BI1.</td>
</tr>
<tr>
<td>S2</td>
<td>IL, Ig</td>
<td></td>
<td>Sensor channel 1. Monitoring incoming cable compartment.</td>
<td>Trip criteria: Light only. Trip outputs: T1 (main CB), T2 (upstream CB [HV side]), T4 (trip alarm).</td>
</tr>
</tbody>
</table>

### Table 56. Trip and I/O Logic - EAFR-110P CS:2,A (RS).

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>Current (External)</td>
</tr>
<tr>
<td></td>
<td>IL, Ig</td>
</tr>
<tr>
<td>BI1</td>
<td></td>
</tr>
<tr>
<td>S1</td>
<td></td>
</tr>
<tr>
<td>S2</td>
<td>IL, Ig</td>
</tr>
<tr>
<td>BI1</td>
<td></td>
</tr>
<tr>
<td>S3</td>
<td>IL, Ig</td>
</tr>
<tr>
<td>BI1</td>
<td></td>
</tr>
<tr>
<td>S4</td>
<td>IL, Ig</td>
</tr>
<tr>
<td>BI1</td>
<td></td>
</tr>
<tr>
<td>B12</td>
<td>IL, Ig</td>
</tr>
<tr>
<td>BI1</td>
<td></td>
</tr>
<tr>
<td>BI2</td>
<td>IL, Ig</td>
</tr>
<tr>
<td>BI1</td>
<td></td>
</tr>
</tbody>
</table>
## 7. Multi-mains with Tie Breaker

### Table 57. Trip and I/O Description - EAFR-110P CS:7,A (RS).

<table>
<thead>
<tr>
<th>Light</th>
<th>Current (External)</th>
<th>Current (Internal)</th>
<th>I/O Description</th>
<th>Trip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IL, Ig</td>
<td></td>
<td>Current inputs phase IL1, IL2, IL3, and E/F Ig. Measuring current for main(s).</td>
<td>Signal outputs: HSO2 (Current) to main units EAFR-110P CS:2,A (LS &amp; RS) input BI1.</td>
</tr>
<tr>
<td>S1</td>
<td>IL, Ig</td>
<td></td>
<td>Sensor channel 1. Monitoring incoming cable compartment.</td>
<td>Trip criteria: Light only. Trip outputs: T1 (main CB), T2 (upstream CB [HV side]), T4 (trip alarm).</td>
</tr>
<tr>
<td>BI2</td>
<td>Binary input 2.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 58. Trip and I/O Logic - EAFR-110P CS:7,A (RS).

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
<th>Light</th>
<th>Current (External)</th>
<th>Current (Internal)</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>HSO1 (Current)</th>
<th>HSO2 (MT)</th>
<th>BO1 (Light)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>IL, Ig</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BI1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S1</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S2</td>
<td></td>
<td>IL, Ig</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BI1</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S3</td>
<td></td>
<td>IL, Ig</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BI1</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S4</td>
<td></td>
<td>IL, Ig</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BI1</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BI2</td>
<td></td>
<td>IL, Ig</td>
<td></td>
<td></td>
<td>x(MT)</td>
<td>x(MT)</td>
<td>x(MT)</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BI1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 59. Trip and I/O Description - EAFR-101 CS:1 (RS).

<table>
<thead>
<tr>
<th>Light</th>
<th>Current (External)</th>
<th>I/O Description</th>
<th>Trip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BI1</td>
<td></td>
<td>Binary input 1.</td>
<td>Signal inputs: BI1 (Current) from main unit EAFR-110P CS:2,A (LS) output HSO1.</td>
</tr>
<tr>
<td>S1</td>
<td>BI1</td>
<td>Sensor channel 1.</td>
<td>Trip criteria: Current + Light.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Monitoring outgoing cable compartment.</td>
<td>Trip outputs: T1 (outgoing CB), T3 (not in use), T4 (trip alarm). Signal outputs: BO1 (Light) to main unit EAFR-110P CS:2,A (RS) after CBFP setting time.</td>
</tr>
<tr>
<td>S2</td>
<td>BI1</td>
<td>Sensor channel 2.</td>
<td>Trip criteria: Current + Light.</td>
</tr>
<tr>
<td>BI2</td>
<td></td>
<td>Binary input 2.</td>
<td>Trip criteria: Current + Light.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Trip outputs: T1 (outgoing CB), T2 (CBFP), T3 (not in use), T4 (trip alarm). Signal inputs: BI2 (MT) from main unit EAFR-110P CS:2,A (RS) output HSO2.</td>
</tr>
</tbody>
</table>

### Table 60. Trip and I/O Logic - EAFR-101 CS:1 (RS).

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>Current (External)</td>
</tr>
<tr>
<td>BI1</td>
<td>x</td>
</tr>
<tr>
<td>S1</td>
<td>BI1</td>
</tr>
<tr>
<td>S2</td>
<td>BI1</td>
</tr>
<tr>
<td>S3</td>
<td>BI1</td>
</tr>
<tr>
<td>S4</td>
<td>BI1</td>
</tr>
<tr>
<td>BI2</td>
<td>x(MT)</td>
</tr>
</tbody>
</table>
7. Multi-mains with Tie Breaker

7.1.3 Connections

Figure 30. EAFR-110P CS:2,A (LS and RS).
7. Multi-mains with Tie Breaker

Figure 31. EAFR-110P CS:7A (LS and RS).
7. Multi-mains with Tie Breaker

Figure 32. EAFR-101 CS:1 (LS and RS).
8. Multi-sections Configurations

8.1 Multi-sections Configurations - Single Main Per Section

8.1.1 Configuration Characteristics

Table 61. Configuration Table for Figure 35.

<table>
<thead>
<tr>
<th>Configuration Selection Number</th>
<th>EAFR-110P CS:2,A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Incoming Mains</td>
<td>m x Incoming Mains</td>
</tr>
<tr>
<td>Number of Outgoing Feeders</td>
<td>n x Outgoing Feeders</td>
</tr>
<tr>
<td>Number of the Circuit Breakers</td>
<td>m x Main CBs;</td>
</tr>
<tr>
<td></td>
<td>n x Outgoing CBs</td>
</tr>
<tr>
<td>Selective Trip for Incoming Main CBs</td>
<td>Yes</td>
</tr>
<tr>
<td>Selective Trip for Outgoing Feeder CBs</td>
<td>Yes</td>
</tr>
<tr>
<td>Master Trip Function (MT)</td>
<td>Yes</td>
</tr>
<tr>
<td>Units Applied</td>
<td>m x EAFR-110P</td>
</tr>
<tr>
<td></td>
<td>n x EAFR-101</td>
</tr>
</tbody>
</table>

**Note:**
- n = 1 to 20.
- m = 1 to 6.
8. Multi-sections Configurations

8.1.2 Trip and I/O Description

**EAFR-110P CS:2,A (Main)**

**Table 62. Trip and I/O Description - EAFR-110P CS:2,A.**

<table>
<thead>
<tr>
<th>Light</th>
<th>Current (External)</th>
<th>Current (Internal)</th>
<th>I/O Description</th>
<th>Trip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IL, Ig</td>
<td></td>
<td>Current inputs phase IL1, IL2, IL3, and E/F Ig. Measuring current for main(s).</td>
<td>Signal outputs: HSO1 (Current) to outgoing units EAFR-101 CS:1 input B11. B01 (Current) to main units EAFR-110P CS:2,A input B1.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>IL, Ig</th>
<th></th>
<th>Sensor channel 1. Monitoring incoming cable compartment.</th>
<th>Trip criteria: Light only. Trip outputs: T1 (main CB), T2 (upstream CB [HV side]), T4 (trip alarm).</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td></td>
<td></td>
<td>Binary input 1.</td>
<td>Signal outputs: HSO1 (Current) to outgoing units EAFR-101 CS:1 input B11.</td>
</tr>
</tbody>
</table>

|-------|--------------------|--------------------|----------------------------------------------------------|----------------------------------------------------------------------------------|

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>S3</td>
<td></td>
<td></td>
<td>Binary input 1.</td>
<td>Signal outputs: HSO1 (Current) to outgoing units EAFR-101 CS:1 input B11.</td>
</tr>
</tbody>
</table>

|-------|--------------------|--------------------|----------------------------------------------------------|----------------------------------------------------------------------------------|

|-------|--------------------|--------------------|----------------------------------------------------------|----------------------------------------------------------------------------------|

**Table 63. Trip and I/O Logic - EAFR-110P CS:2,A.**

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
<th>Light</th>
<th>Current (External)</th>
<th>Current (Internal)</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>HSO1 (Current)</th>
<th>HSO2 (MT)</th>
<th>B01</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>S1</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>S2</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>S3</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>S4</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>B12</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### EAFR-110P CS:2,A (Outgoing)

#### Table 64. Trip and I/O Description - EAFR-110P CS:2,A.

<table>
<thead>
<tr>
<th>Light</th>
<th>Current (External)</th>
<th>I/O Description</th>
<th>Trip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BI1</td>
<td>Bin 1</td>
<td>Binary input 1.</td>
<td>Signal outputs: HSO1 (Current) to outgoing units EAFR-101 CS:1 input BI1. B01 (Current) to main units EAFR-110P CS:2,A input BI1.</td>
</tr>
<tr>
<td>S1</td>
<td></td>
<td>Sensor channel 1.</td>
<td>Trip criteria: Current + Light.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Monitoring incoming cable compartment.</td>
<td>Trip outputs: T1 (main CB), T2 (upstream CB [HV side]), T4 (trip alarm).</td>
</tr>
<tr>
<td>S2</td>
<td>BI1</td>
<td>Sensor channel 2.</td>
<td>Trip criteria: Current + Light.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Monitoring incoming circuit breaker compartment.</td>
<td>Trip outputs: T1 (main CB), T2 (upstream CB [HV side]), T3 (tie breaker), T4 (trip alarm). Signal outputs: HSO2 (MT) to outgoing units EAFR-101 CS:1 input B12.</td>
</tr>
<tr>
<td>S3</td>
<td>BI1</td>
<td>Sensor channel 3.</td>
<td>Trip criteria: Current + Light.</td>
</tr>
<tr>
<td>S4</td>
<td>BI1</td>
<td>Sensor channel 4.</td>
<td>Trip criteria: Current + Light.</td>
</tr>
<tr>
<td>BI2</td>
<td>BI1</td>
<td>Binary input 2.</td>
<td>Trip criteria: Current + Light.</td>
</tr>
</tbody>
</table>

#### Table 65. Trip and I/O Logic - EAFR-110P CS:2,A.

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>T1</td>
</tr>
<tr>
<td>BI1</td>
<td>x</td>
</tr>
<tr>
<td>S1</td>
<td>x</td>
</tr>
<tr>
<td>S2</td>
<td>x</td>
</tr>
<tr>
<td>S3</td>
<td>x</td>
</tr>
<tr>
<td>S4</td>
<td>x</td>
</tr>
<tr>
<td>BI2</td>
<td>x</td>
</tr>
</tbody>
</table>
8. Multi-sections Configurations

**EAFR-101 CS:1**

Table 66. Trip and I/O Description - EAFR-101 CS:1.

<table>
<thead>
<tr>
<th>Light</th>
<th>Current (External)</th>
<th>I/O Description</th>
<th>Trip Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BI1</td>
<td>BI1</td>
<td>Binary input 1.</td>
<td>Signal inputs: BI1 (Current) from main unit EAFR-110P CS:2,A output HSO1.</td>
</tr>
<tr>
<td>S1</td>
<td>BI1</td>
<td>Sensor channel 1. Monitoring outgoing cable compartment.</td>
<td>Trip criteria: Current + Light. Trip outputs: T1 (outgoing CB), T3 (not in use), T4 (trip alarm). Signal outputs: B01 (Light) to main unit EAFR-110P CS:2,A after CBFP setting time.</td>
</tr>
</tbody>
</table>

Table 67. Trip and I/O Logic - EAFR-101 CS:1.

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>Current (External)</td>
</tr>
<tr>
<td>BI1</td>
<td>x</td>
</tr>
<tr>
<td>S1</td>
<td>BI1</td>
</tr>
<tr>
<td>S2</td>
<td>BI1</td>
</tr>
<tr>
<td>S3</td>
<td>BI1</td>
</tr>
<tr>
<td>S4</td>
<td>BI1</td>
</tr>
<tr>
<td>BI2</td>
<td>x(MT)</td>
</tr>
</tbody>
</table>
8.1.3 Connections

Figure 34. EAFR-110P CS:2,A (Main).

Figure 35. EAFR-110P CS:2,A (Outgoing).
8. Multi-sections Configurations

Figure 36. EAFR-101 CS:1.

Diagram showing connections and configurations for EAFR-101 and EAFR-110P relays.
8. Multi-sections Configurations

Notes: