SELECTION GUIDE
Emax 2 embedded automatic throwover Creating the main-tie-main automatic transfer scheme


# Quickly and easily create a 

 main-tie-main closed transition automatic throwover (ATO) scheme using ABB's Emax 2 all-in-one embedded solution.
## Table of contents

1. Introduction 04
2. Emax 2 air circuit breaker ordering code construction 06
3. Accessories 11

## Introduction

# This guide will assist you in selecting the three (3) circuit breakers required to automatically switch from the main utility power line to secondary utility power using ABB's Emax 2 all-in-one embedded ATO solution. 

A system able to switch the electrical power supply from the main line to an emergency line minimizes problems caused by faulty conditions in the public power network. These operations, commonly known as "automatic switching," comprise sequences that automatically control the installation components (circuit breakers play a fundamental role) without intervention from a human operator.

To help guarantee that power is supplied to the load, redundancy in supply sources type $N+1$, usually consisting of a transformer and emergency generator (or, as an alternative, a second transformer), is a fundamental requirement.

Use this document in conjunction with the ABB Emax 2 configurator, the embedded white paper 1SDC007115G0202 and the Emax 2 circuit breaker technical catalog
1SXU200040C0201 to create a main-tie-main ATO solution.

Emax 2 circuit breakers are configured by the user specifically for their intended application. A complete Emax 2 circuit breaker catalog number consists of 20 characters. For your main-tie-main ATO to operate properly, characters shown without gray boxes in this guide are mandatory, while characters shown in gray boxes are for options and may be filled with a zero (0) or X if not utilized. Three separate breakers are required for the main-tie-main ATO.

A simple selection list for the Emax 2 would be as follows:

- Ekip Touch (or higher) trip unit
- Ekip Measuring (or higher) package
- Ekip supply
- Ekip link
- Ekip synchrocheck
- Ekip signaling 4k
- Ekip Com actuator
- Spring-charging motor
- YO opening coil
- YC closing coil
- ATO license

Additional accessories such as pilot devices, mechanical interlocks and mechanically interlocked contactors are included in this selector.

Application-specific wiring diagrams can be found in document 1SDM000010A1001.


Legend
R, S T, N: 3 phases

+ neutral
MEAS: Ekip measuring
pro/internal voltage plug
SYNCH: Ekip
Synchrocheck
Feeder A/B: Power
sources (transformer
or generator) or bus tie cubicle.



## Instructions for ordering

## Main-tie-main ATO

## Emax 2 circuit breaker order code explanation for embedded main-tie-main closed ATO

Three separate breakers are required for the main-tie-main ATO.
Order an embedded main-tie-main closed ATO all in one catalog number.
All 20 characters are required. The characters shown without gray boxes must be selected from the choices listed in these pages for proper configuration. Characters shown in gray boxes are for options and may be filled with a zero ( 0 ) or X if not utilized.


02 - Frame


04 - Frame rating (amps)


07 - Fixed/drawout and terminal connections

08-Ekip trip unit

E


09 - Auxiliary power supply (Ekip supply) and measuring

01 - Emax 2 prefix

|  | Code |
| :--- | ---: |
| Standard AC version | 2 |
| Triple certification (UL/IEC/CCC) | L) |
| ML Naval version (IEC) | $M$ |
| $800-900$ V AC version (IEC) | 9 |

02 - Frame

|  |  |  |  |  |
| :--- | ---: | ---: | ---: | ---: |
|  | E2.2 | E4.2 | E6.2 | E6.2/f |
| $3 p$ | 2 | 4 | 6 | - |
| $4 p-N$ left | B | C | D | E |
| $4 p-N$ right | C | H | (3) | K |

03 - Short circuit rating/version

|  | B | C | (N) | (s) | (H) | v | Code |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  | ( | $\times$ |
| UL kA at 508 V AC | 42 | - | 50 | 65 | 85 | 100 | - | - |
| UL kA at 635 V AC | 42 | - | 50 | 65 | 85 | $85 / 100$ <br> (2) | - | - |
| IECkA at 440 V AC | 42 | 50 | 66 | 85 | 100 | 150 | - | 150 |
| IECkA at 690 V AC | 42 | 42 | 66 |  | $00^{(1)}$ | 100 | - | 100 |

1) E 2.2 H and $\mathrm{E} 4.2 \mathrm{H}=85 \mathrm{kA} / \mathrm{E} 6.2 \mathrm{H}=100 \mathrm{kA}$
2) $\mathrm{E} 2 . \mathrm{V}$ and $\mathrm{E} 4.2 \mathrm{~V}=85 \mathrm{kA} / \mathrm{E} 6.2 \mathrm{~V}=100 \mathrm{kA}$

NOTE: E1.2 cannot be used in the M-T-M ATS
-
05-06 - Rating plug (amps)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Code |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Switch | (0) 0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| UL | (U) A | (1) ${ }^{\text {B }}$ | (1) ${ }^{\text {c }}$ | (1) ${ }^{\text {d }}$ | (1) ${ }^{\text {c }}$ | (U) ${ }^{\text {c }}$ | (1) ${ }^{\text {c }}$ | (1) (H) | (U) 3 | (U) 1 | (1) ${ }^{\text {( }}$ | (1) (N) | (1) ${ }^{\text {a }}$ | (U) B | (U) 5 | (1) ${ }^{\text {a }}$ |
|  | 100 | 200 | 250 | 400 | 600 | 800 | 1000 | 1200 | 1600 | 2000 | 2500 | 3200 | 3600 | 4000 | 5000 | 6000 |
| IEC | (E) A | (E) ${ }^{\text {B }}$ | (E) | (E) ${ }^{\text {d }}$ | (E) E | (E) ${ }^{\text {c }}$ | ( ${ }^{\text {c }}$ | (E) H | (E) ${ }^{3}$ | E ${ }^{1}$ | (E) | (E) ${ }^{\text {N }}$ | (E) ${ }^{\text {R }}$ | E ${ }^{\text {S }}$ | E ${ }^{\text {T }}$ | - |
|  | 100 | 200 | 250 | 400 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3200 | 4000 | 5000 | 6300 | - |
| IECL-OFF | (L) A | (1) B | ( ${ }^{\text {c }}$ | ( ${ }^{\text {( }}$ | ( E $^{\text {c }}$ | (L) ${ }^{\text {P }}$ | ( ${ }^{\text {c }}$ | (L) H | ( 1 ) | (L) ${ }^{1}$ | (L) ${ }^{\text {L }}$ | (L) (1) | (L) B | (L) 5 | ( ${ }^{\text {T }}$ | - |
|  | 100 | 200 | 250 | 400 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3200 | 4000 | 5000 | 6300 | - |
| IEC RC | R A | (B) ${ }^{\text {B }}$ | ( ${ }^{\text {c }}$ | B D | R E | (R) ${ }^{\text {c }}$ | B ${ }^{\text {H }}$ | B ${ }^{1}$ | ( ${ }^{\text {N }}$ | B B | - | - | - | - | - | - |
|  | 100 | 200 | 250 | 400 | 630 | 800 | 1250 | 2000 | 3200 | 4000 |  |  |  |  |  | - |



|  |  |  |  |  |  |  |  |  |  |  |  | Code |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | A | B | C | D | E | F | C | (H) | 2 | ( | , | ( |
| UL | 250 | 400 | 800 | 1200 | 1600 | 2000 | 2500 | 3200 | 3600 | 4000 | 5000 | 6000 |
|  | M | N | P | Q | R | S | T | ( | v | W | $\times$ | Y |
| IEC | 250 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | 2500 | 3200 | 4000 | 5000 | 6300 |

- 

07 - Fixed/drawout and terminal connections


1) Standard terminals: E1=F / E2.2-E6.2 = HR with exception of E4.2 3200 A and 3600 A, and E6.2 6000 A,
which are VR
2) Not available for E4.2 3200 A, 3600 A and E6.2 6000 A
3) Available for E1.2 only (IEC version)
4) Not available for E4.2 3200 A, 3600 A and E6.2 6000 A
5) Available for E2.2-E6.2 (IEC versions)
6) Available for E2.2 and E4.2 (IEC version)
7) Not UL listed

## Instructions for ordering

## Main-tie-main ATO

## 08 - Ekip trip unit

| Code |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  | Protection functions | LI | LSI | LSIG |
| Ekip trip unit + standard 250 V bell alarm | Touch | ( | ( ${ }^{\text {c }}$ | F |
|  | Touch + Power Controller ${ }^{(1)}$ | (c) | ( | (1) |
|  | Hi-Touch | - | (3) | * |
|  | Hi-Touch + Power Controller ${ }^{(1)}$ | - | (L) | (1) |
|  | G Touch | - | - | (1) |
|  | G Touch + Power Controller ${ }^{(1)}$ | - | - | P |
|  | G Hi-Touch | - | - | © |
|  | G Hi-Touch + Power Contoller ${ }^{(1)}$ | - | - | B |
|  | Touch | v | (1) | ( |
|  | Touch + Power Controller ${ }^{(1)}$ | * | 2 | (1) |
|  | Hi-Touch | - | (2) | 3 |
| Ekip trip unit + optional 24 V DC bell alarm | Hi -Touch + Power Controller ${ }^{(1)}$ | - | 4 | 5 |
|  | G Touch | - | - | 6 |
|  | G Touch + Power Controller ${ }^{(1)}$ | - | - | 1 |
|  | G Hi-Touch | - | - | 8 |
|  | G Hi-Touch + Power Contoller ${ }^{(1)}$ | - | - | © |

1) Ekip Power Controller requires the use of Ekip

$$
\overline{0}
$$

$\overline{09}$ - Auxiliary power supply (Ekip supply)
and measuring

|  | Code |  |
| :---: | :---: | :---: |
|  | Measuring package | 1\% Accuracy measuring ${ }^{(1)}$ |
| 24-48 V DC supply | 4 | 5 |
| 110-240 V AC/DC supply | 3 | 8 |
| Measuring - Top supply | A | B |
| Measuring-External mounting cables | C | D |
| Measuring - Top supply +24 V DC supply | ( | F |
| Measuring - Top +110-240 V AC/DC supply | (c) | (1) |
| Measuring-External mounting +24 V DC supply | 3 | * |
| Measuring-External <br> mounting +110-240 VAC/DC <br> supply | (L) | (1) |

$\overline{10}$-Communication modules ${ }^{(1)}$ (optional)

| Code |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| None | 0 | - | - | - | - | - | - |
| Single | 2 | 3 | 4 | 5 | 6 | 3 | 8 |
|  | Modbus RS-485 | Modbus TCP/IP | Profibus | Profinet | DeviceNet ${ }^{\text {TM }}$ | EtherNet/IPTM | IEC 61850 |

1) Maximum of 3 modules for E2.2, E4.2, E6.2

- 

11 - Redundant communications and additional Ekip modules

|  | Code |
| :--- | ---: |
| Combos Ekip Link + Synchrocheck | © |

- 

12 - Auxilary contacts (AUX) and additional signaling (4k)

|  | Code |  |
| :---: | :---: | :---: |
|  | B | T |
| 4 k signaling ${ }^{(1)(2)}$ | 4 AUX (4Q) $400 \mathrm{~V}^{(3)}$ | 4 AUX (2Q+2Q) 24 and 400 V |

(1) Not compatible with E1.2
(2) Not compatible with Ekip Dip or switch disconnectors
-
13 - Remote reset (YR), second bell alarm (S51/2) and ready-to-close contacts (RTC) (optional)

| Code |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| None | 0 |  |  |  |  |  |
|  | - | YR 24 | YR 110 | YR 220 | S51/2 | S51/2 |
|  |  | VAC/DC | VAC/DC | VAC/DC | 24 V DC | $250 \mathrm{~V} \mathrm{C}^{(1)}$ |
|  | - | A | B | C | P | Q |
| RTC 24 V DC | D | E | F | © | B | S |
| RTC 250 <br> VAC/DC | ( | 3 | * | (L) | ( | 0 |

(1) Not compatible with E1.2
-
14-Closing coil (YC) and redundant closing coil (YC2)

| Code |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 24 | 30 | 48 | 60 | 110-120 | 120-127 | 220-240 | 240-250 | 380-400 | 415-440 | 480-500 |
|  | VAC/DC | VAC/DC | VAC/DC | VAC/DC | VAC/DC | VAC/DC | VAC/DC | VAC/DC | VAC | VAC | VAC |
| YC | (1) | B | $\bigcirc$ | - | © | © | $\bigcirc$ | $\stackrel{+}{+}$ | ${ }^{*}$ | ( | © |
| YC + YCz | © | - | - | ® | © | (1) | ( | * | ${ }^{*}$ | © | 2 |

Note: YC2 will have the same control voltage as YC1
-
15-Opening coil (YO)

|  |  |  |  |  |  |  |  |  |
| ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |

- 

16-Undervoltage release (UVR) or redundant opening coil (YOZ) (optional)

-
17 - Spring-charging motor (M) and Ekip Com actuator


Note: Standard aux $=$ E1.2 $=250 \mathrm{~V} / \mathrm{E} 2.2-E 6.2=400 \mathrm{~V}$
(1) Not compatible with E1.2

## 18-Pushbutton locking options (optional)

| Code |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| None | 0 |  |  |  |  |  |  |  |
|  |  | Pushbutton covers (PBC) |  |  |  | Padlock in open position (PLC) |  |  |
|  |  | PBC special key | PBC padlock ( 4 mm ) | PBC padlock ( 7 mm ) | PBC padlock ( 8 mm ) | PLC ( 4 mm ) | PLC ( 7 mm ) | PLC ( 8 mm ) |
|  |  | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Key lock in open position different keys (KLC-D) | A | D | E | F | © | ( | (3) | ( |
| Key lock in open position same keys (KLC-S) ${ }^{(1)}$ | B | ( | (1) | (1) | P | © | B | S |
| Key lock in open position Kirk key provisions (KLA) | C | ( | (1) | v | (1) | * | © | 2 |

[^0] available for order as separate accessories.

## Instructions for ordering

## Main-tie-main ATO

- 

19 - Racking lock options (first lock) and factory test report (optional)

|  |  |  |  |  | Code |
| :---: | :---: | :---: | :---: | :---: | :---: |
| None | * | Keylock in racked in/out-Same keys (KLP-S) ${ }^{(1)}$ | Keylock in racked in/out-Different keys (KLP-D) ${ }^{(1)}$ | Keylock in racked in/out-Kirk/Ronis/ Profulaux provisions $(K L P-A)^{(1)}$ | Keylock in racked in/out - Castell provisions (KLP-A) ${ }^{(2)}$ |
|  | - | A | B | C | ( |
| Padlock in racked in/out position (PLP) | ( ${ }^{\text {c }}$ | ( | ( | ( | 3 |
| Factory test report | (1) | (1) | (1) | P | © |
| PLP + factory test report | ( | ( | (1) | (1) | v |

(1) Standard key for same key option is \#20005. Locks for \#20006-20009 are available for order as separate accessories.
(2) Two Castell adapters cannot be used at once, but can used in either position with another style of lock.

20 - Second racking lock options, mechanical operations counter (MOC) and extended warranty (optional)

|  |  |  |  |  | Code |
| :---: | :---: | :---: | :---: | :---: | :---: |
| None | * | Keylock in racked in/out Same keys (KLP_S) ${ }^{(1)}$ | Keylock in racked in/out Different keys (KLP-D) ${ }^{(1)}$ | Keylock in racked in/out Kirk/Ronis/ Profulaux provisions (KLP-A) ${ }^{(1)}$ | Keylock in racked out Castell provisions (KLP-A) ${ }^{(2)}$ |
|  |  | B | C | ( | ( ${ }^{\text {c }}$ |
| Mechanical operations counter (MOC) | A | ( | ( | (H) | (3) |
| 2-Year extended warranty | (2) | (1) | B | (1) | ( |
| 4-Year extended warranty | 4 | P | (s) | v | 2 |
| 5-Year extended warranty | (5) | © | ( | (1) | 6 |
| Additional combinations |  |  |  |  |  |
| MOC + 2-year extended warranty | (k) | 7 | - | - | - |
| MOC + 4-year extended warranty | (1) | 8 | - | - | - |
| MOC + 5-year extended warranty | (1) | (9) | - | - | - |

Note: For additional combinations, please contact your local ABB sales person
(1) Standard key for same key option is \#20005. Locks for \#20006-20009 are available for order as separate accessories.
(2) Two Castell adapters cannot be used at once, but can used in either position with another style of lock.

## Accessories

Order separately
-
Accessories

| Type | U.S. code |
| :---: | :---: |
| Ekip programming T\&P cable | ZEAKPPGM |
| Ekip programming software | Download |
| Main-tie-main ATO license ${ }^{(1)}$ | ZEAMTMC |

1) One ATO license per 3 breakers required

Pilot devices ${ }^{(1)(2)}$

| Type |  |  |
| :--- | :--- | ---: | :--- |
| 2-Position; black bezel |  |  |
|  |  |  |
|  |  |  |

1) Choose according to selector switches needed as per circuit diagrams 1SDM000010A1001
2) $A B B$ pilot device catalog $\mathbf{1 S F C 1 5 1 0 0 7 C 0 2 0 1}$

ABB Inc.
Electrification Business 860 Ridge Lake Blvd.
Memphis, TN 38120
abb.com/lowvoltage


[^0]:    (1) Standard key for same key option is \#20005. Locks for \#20006-20009 are available for order as separate accessories. Note: Key lock options for Castell and Ronis/Profalux are

