Preventative Maintenance for PowerPacT H-, J-, and L-Frame Circuit Breakers with MicroLogic 5 or 6 Trip Units

Instruction Bulletin

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Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

⚠CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result in** minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved. Electrical equipment should be transported, stored, installed, and operated only in the environment for which it is designed.

Section 1– Introduction

Maintenance Using Trip Units

MicroLogic™ 5 and 6 electronic trip units offers monitoring of alarms, quality indicators and maintenance indicators. This makes it possible to:

- Identify overloaded equipment
- Perform predictive maintenance
  - Time-stamped historical logs allow analysis of system operation
  - Pre-alarms allow early detection of potential events
  - Local or remote alarm of events allow quick analysis and action
- Preventative maintenance
  - Log of maintenance operations, including contact wear, operating hours, and load profiles

Maintenance Indicators

MicroLogic A and E trip units have indicators for, among others, the number of operating cycles, contact wear and operating times (operating hours counter) of the PowerPacT™ H-, J-, and L-frame circuit breakers.

It is possible to assign an alarm to the operating cycle counter to plan maintenance. The various indicators can be used together with the trip histories to analyze the level of stresses the device has been subjected to. The information provided by the indicators cannot be displayed on the MicroLogic trip unit LCD. It is displayed on the PC through the communication network.

When the MicroLogic trip unit, with or without a front display module, is connected to a communication network, all information can be accessed using a PC with the appropriate software installed.

Two types of time-stamped event tables

- Protection settings
- Minimums / maximums

Display of alarms and tables

The time-stamped history and event tables may be displayed on a PC through the communication network.

Embedded memory

MicroLogic A and E trip units have a non-volatile memory that saves all data on alarms, histories, event tables, counters and maintenance indicators even if power is lost.

Management of Installed Devices

Each circuit breaker equipped with a MicroLogic 5 or 6 trip unit can be identified using the communication network:

- serial number
- firmware version
- hardware version
- device name assigned by the user.

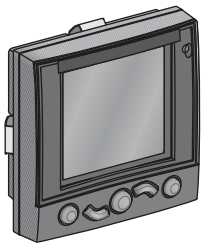
This information together with that previously described provides a clear view of the state of the installed devices.

- Contact wear
  Each time PowerPacT H-, J-, and L-frame circuit breakers open, the MicroLogic 5 / 6 trip unit measures the interrupted current and increments the contact-wear indicator as a function of the interrupted current, according to test results stored in memory. Breaking under normal load conditions results in a very slight increment. The indicator value may be read on the front display module. It provides an estimation of contact wear calculated on the basis of the cumulative forces affecting the circuit breaker. When the indicator reaches 80%, it is advised to replace the circuit breaker to ensure the availability of the protected equipment.
- Circuit breaker load profile
  MicroLogic 5 / 6 trip units calculate the load profile of the circuit breaker protecting a load circuit. The profile indicates the percentage of the total operating time at four current levels (% of In):
  - 0 to 49% In
  - 50 to 79% In
  - 80 to 89% In
  - ≥ 90% In
  - This information can be used to optimize use of the protected devices or to plan ahead for expansion.

Section 2– Display Options

Front Display Module Functions (FDM121)

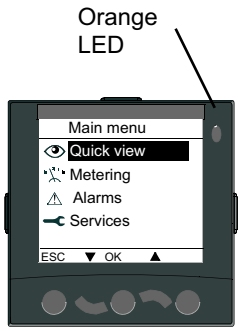
Front Display Module Functions (FDM121)



The front display module (FDM121) can be integrated in the PowerPacT H-, J-, and L-frame circuit breaker system. It uses the sensors and processing capacity of the MicroLogic trip unit to display measurements, demand, power quality and maximum/minimum values along with alarms, histories, and maintenance indicators.

Display of MicroLogic Trip Unit Measurements and Alarms

Display of MicroLogic Trip Unit Measurements and Alarms



The FDM121 is intended to display MicroLogic 5 / 6 trip unit measurements, alarms and operating information. It cannot be used to modify the protection settings. Measurements may be easily accessed through a menu.

All user-defined alarms are automatically displayed. The display mode depends on the priority level selected during alarm set-up:

- high priority: a pop-up window displays the time-stamped description of the alarm and the orange LED flashes
- medium priority: the orange Alarm LED goes steady on I
- low priority: no display on the screen.

All faults resulting in a trip automatically produce a high-priority alarm, without any special settings required. In all cases, the alarm history is updated.

If power to the FDM121 fails, all information is stored in the MicroLogic trip unit non-volatile memory. The data can be consulted using the communication network when power is restored.

Status Indications and Remote Control

When the circuit breaker is equipped with the BSCM module, the FDM121 display can also be used to view circuit breaker status conditions:

- Auxiliary switch (OF): ON/OFF
- Alarm switch (SD): trip indication
- Overcurrent trip switch (SDE): fault-trip indication (overload, short- circuit, ground fault)

Screens

Main menu

When powered up, the FDM121 screen automatically displays the ON/OFF status of the device.

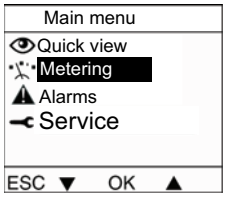
When not in use, the screen is not backlit. Backlighting can be activated by pressing one of the buttons. It goes off after 3 minutes.

Quick view	Provides access to five screens that display a summary of essential operating information (I, U, f, P, E, THD, circuit breaker On / Off).
Metering	Used to display the measurement data (I, U-V, f, P, Q, S, E, THD, PF) with the corresponding min/max values.
Alarms	Displays active alarms and the alarm history
Services	Provides access to the operation counters, energy and maximum reset function, maintenance indicators, identification of modules connected to the internal bus and FDM121 internal settings (language, contrast, etc.)

Fast Access to Essential Information

Quick viewprovides access to five screens that display a summary of essential operating information (I, V, f, P, E, THD, circuit breaker On / Off).

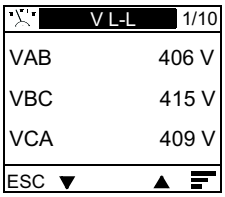
Quick view



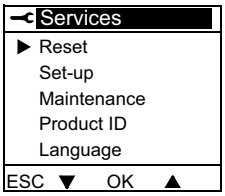
Access to Detailed Information

- **Metering** can be used to display the measurement data (I, U-V, f, P, Q, S, E, THD, PF) with the corresponding min/max values.
- **Alarms** displays active alarms and the alarm history
- **Services** provides access to the operation counters, energy and maximum reset function, maintenance indicators, identification of modules connected to the internal bus and FDM121 internal settings (language, contrast, etc.)

Metering Sub-Menu



Services



Alarm Indication

Alarms display on the FDM121 according to their order of occurrence. The last active alarm to occur replaces the previous alarm, even if it is still active or has not been acknowledged.

Alarms are recorded in the alarm history.

Alarm indication on the display depends on their priority level.

Table 1 - Alarm Indication Priority Level

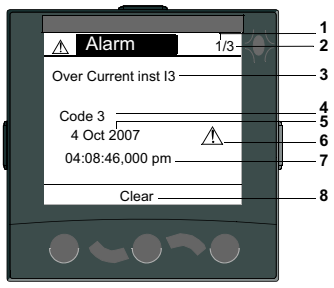
Priority	Real-Time Indication	History	Alarm Clearance from the Display
High	• LED blinking • Pop-up screen	Yes	Press the Clear key to stop the LED blinking and clear the pop-up screen.
Medium	LED steady ON	Yes	View the alarm history to turn the LED off.
Low	—	Yes	—
None	—	No	—

NOTE: Clear the indication of successive high-priority alarms by pressing the Clear key a number of times in succession (the number of times corresponds to the number of active alarms) in reverse chronological order of their occurrence. View the alarm history to clear the indication of all medium-priority alarms.

Alarm Pop-up Screen

An **Alarm** pop-up screen appears when a high-priority alarm occurs

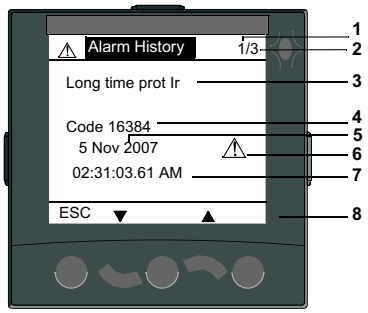
Alarm Pop-Up Screen Example



1. Alarm number in order of occurence
2. Number of alarms recorded in the FDM121
3. Alarm name
4. Alarm code
5. Date of occurence of the alarm
6. Symbol for occurence of the alarm
7. Alarm occurence time, in hours, minutes, seconds, and milliseconds
8. Clear key for clearning the alarm pop-up screen displayed

Alarm History Screen

Alarm History Screen Example



1. Screen number
2. Total number of screens in the alarm history
3. Alarm name
4. Alarm code
5. Event date
6. Event type

⚠ Completion of the alarm

⚠ Completion of the alarm

7. Event time, in hours, minutes, seconds, and milliseconds
8. Navigation keys

Services Menu

The Services menu provides access to the:

- Reset energy meters and measurement minimum and maximum values mode
- FDM121 contrast and brightness setting
- Maintenance indicators (operation counters, load profile, and so on.)
- Intelligent functional unit product identification information
- Language selection for the FDM121 screens

Maintenance Sub-menu Screens

Table 2 - Maintenance Screens Available

Display	Description
Contact wear 1/3 Rate 9% ESC ▼ ▲	Screen 1 **Contact wear** displays the amount of wear on the circuit breaker contacts. Pressing the ▼ key switches to screen 2. Pressing the ESC key returns to the **Maintenance Info.** sub-menu.
Load Profile 2/3 0..49% 610 H 50..79% 15 H 80..89% 360 H 90..100% 3 H ESC ▼ ▲	Screen 2 **Load Profile** displays four circuit breaker operating hours counters for four loading sections. Pressing the ▼ key switches to screen 3. Pressing the ESC key returns to the **Maintenance Info.** sub-menu.
Counters 3/3 Operations 17 Trip SDE 0 Close command 5 ESC ▼ ▲	Screen 3 **Counters** display the values for the: • OF operations counter • SDE fault counter • Close command counter (communicating motor mechanism) Pressing the ESC key returns to the **Maintenance Info.** sub-menu.

Section 3— Circuit Breaker Communication Network Options

Circuit Breaker Communication

PowerPacT™ H-, J, and L-frame circuit breakers with MicroLogic™ trip units can be integrated into a communication network created using Modbus™ protocol. Use data transmitted by the communication network to provide supervision and monitoring for an installation.

This communication network offers the options of:

- Reading remotely:
  - The circuit breaker status
  - Measurements
  - Operating assistance information
- Controlling the circuit breaker remotely

For more information about the Modbus communication network, refer to the specific circuit breaker user manual.

For more information about the communication network, refer to the *MasterPacT and PowerPacT UL/ANSI ULP System — Installation and User Guide*.

Remote readout of the circuit breaker status is accessible by all circuit breakers equipped with a BSCM. The following data is available using the communication network:

- Open/closed position (OF)
- Trip indicator (SD)
- Electrical fault indicator (SDE)

For more information, refer to the bulletin shipped with the circuit breaker.

Access the measurement readout with MicroLogic 5 and 6 trip units. For more information about measurements, refer to the EPC Online Help.

Access the operating assistance readout with MicroLogic 5 and 6 trip units. The following operating assistance information is available:

- Protection and alarm settings (see)
- History and tables of time-stamped events (more information is available in the help menu within EPC).
- Maintenance indicators (see Maintenance Indicators, page 6)

The circuit breaker remote control is accessible by any circuit breaker with a MicroLogic trip unit, a BSCM, and a communicating motor mechanism. The following commands are available using the communication network:

- Circuit breaker opening
- Circuit breaker closing
- Circuit breaker reset

For more information, refer to the bulletin shipped with the circuit breaker.

Maintenance Indicators

BSCM Counters

The counters embedded in the BSCM generate information relating to the number of volt-free contact operations. These volt-free contacts qualify:

- The number of open/close operations (OF contact) and open on fault operations (SD and SDE contacts) on the PowerPacT H-, J-, or L-frame circuit breaker
- The number of close, open, and reset operations on the motor mechanism

Access the maintenance counters embedded in the MicroLogic trip unit with the communication option.

- Counters are assigned to each type of protection:
  - Long time protection
  - Short-time protection
  - Ground-fault protection
  - Jam motor protection
  - Phase unbalance protection
  - Long start motor protection
  - Underload motor protection
- Ten counters are assigned to the alarms associated with measurements. These counters reset if the alarm is reconfigured.
- One counter indicates the number of operating hours. This counter is updated every 24 hours.
- Four counters are assigned to the load profile: Each counts the number of operating hours per loading section (for example, one counter indicates the number of operating hours for the loading section 50–79% of In. Six counters are assigned to the temperature section (for example, one counter indicates the number of operating hours for the temperature section 140–165°F (60–74°C).
- Use maintenance counters to enter quantitative information about operations performed on the MicroLogic trip unit (such as the number of push to trip tests) or the status of the MicroLogic trip units (such as the number of Err screens or protection setting lock/unlock operations).
- One counter indicates the amount of wear on the circuit breaker contacts as a percentage. When this figure reaches 100%, the contacts must be changed.

History and Time-Stamped Information

History

MicroLogic trip units generate three types of history:

- History of alarms associated with measurements (the last ten alarms are recorded)
- History of trips (the last 18 trips are recorded)
- History of maintenance operations (the last ten operations are recorded)

Time-Stamped Information

Time-stamped information displays dates for important information such as previous protection settings and minimum/maximum current, voltage, and network frequency values.

The table of time-stamped information describes:

- The previous protection configurations and corresponding dates

- The minimum and maximum voltage measurement values and corresponding dates
- The maximum current measurement values and corresponding dates
- The minimum and maximum network frequencies and corresponding dates

The time when the minimum and maximum values were reset is also available.

Section 4 — Alarms

Alarms Associated with Measurements

Alarms Associated with Measurements

MicroLogic 5 and 6 trip units monitor measurements using:

- One or two pre-alarms (depending on the type of trip unit) assigned to:
  - Long-time protection (PAL Ir) for the MicroLogic 5 trip unit
  - Long-time protection (PAL Ir) and ground-fault protection (PAL Ig) for the MicroLogic 6 trip unit

By default, these alarms are active.

- Ten alarms defined by the user as required. The user assigns each of these alarms to a measurement.

By default, these alarms are not active.

All the alarms associated with measurements are accessible:

- Using the communication network
- On the Front Display Module (FDM121)

The alarms associated with measurements can be assigned to an SDx Module output.

Alarm Setup

Select user-defined alarms and set their functions using the EPC software under the Alarms tab.

Alarm setup consists of:

- Selecting the alarm priority level
- Setting the alarm activation thresholds and time delays

The alarm description tables indicate for each of the alarms:

- The setting range (thresholds and time delays)
- The default setting values.

Alarm Priority Level

Each alarm is assigned a priority level:

- High priority
- Medium priority
- Low priority
- No priority

Alarm indication on the Front Display Module (FDM121) depends on the alarm priority level.

The user sets the priority level of each alarm, according to the urgency of the action required.

By default, alarms are medium priority, except for alarms associated with operating indicators which are low priority.

Alarm Activation Conditions

An alarm associated with a measurement is activated when:

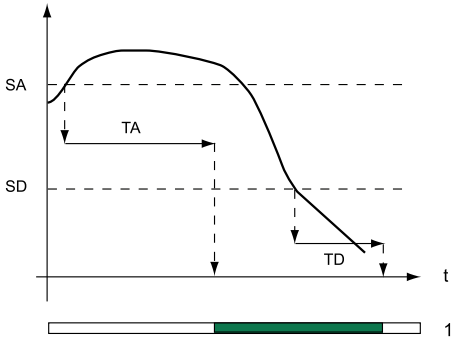
- Values rise above the measurement pickup threshold for overvalue conditions
- Values drop below the measurement pickup threshold for undervalue conditions
- Values equal to the measurement pickup threshold for equality conditions

The EPC software predetermines the type of monitoring.

Overvalue Condition

Activation of the alarm on an overvalue condition is determined using two thresholds and two time delays.

Figure 1 - Figure 2: Activation of an Alarm on an Undervalue Condition



SA Pickup threshold

TA Pickup time delay

SD Dropout threshold

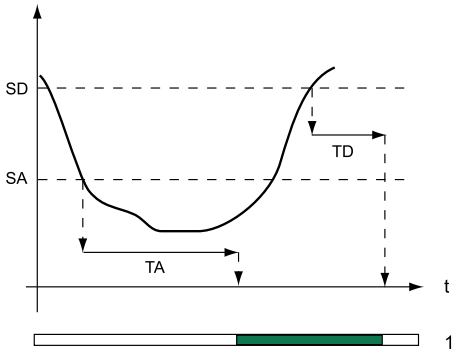
TD Dropout time delay

1 Alarm pickup zone (shaded)

Undervalue Condition

Activation of the alarm on an undervalue condition is determined using two thresholds and two time delays.

Figure 2 - Activation of an Alarm on an Undervalue Condition



SA Pickup threshold

TA Pickup time delay

SD Dropout threshold

TD Dropout time delay

1 Alarm pickup zone (shaded)

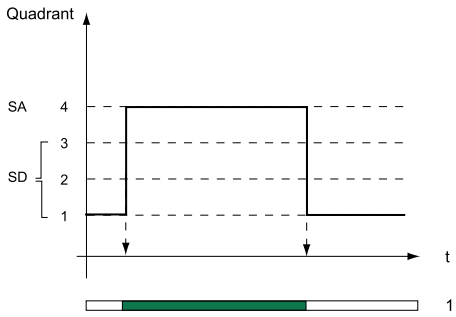
Equality Condition

The alarm is activated when the associated monitored quantity equals the pickup threshold.

The alarm is deactivated when the associated monitored quantity is different from the pickup threshold.

Alarm activation is determined using the pickup/drop-out thresholds.

Figure 3 - Figure 3: Activation of an Alarm on an Equality Condition (Monitoring of Quadrant 4)



SA Pickup threshold

SD Dropout thresholds

1 Quadrant 4 alarm pickup zone (shaded)

Management of Time Delays (Overvalue or Undervalue Conditions)

The alarm time delays are managed by two counters that are normally at 0.

For the pickup threshold, the time delay counter is:

- Incremented when the activation condition is fulfilled.
- Decremented if the activation condition is no longer fulfilled (before the end of the pickup time delay). If the deactivation condition is reached, the pickup time delay counter is reset and the dropout time delay counter is incremented.

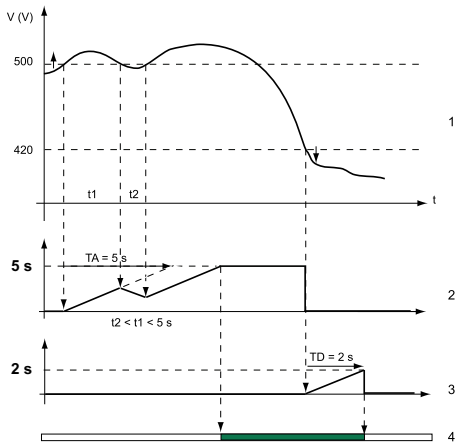
For the dropout threshold, the same principle is used.

The example curve shows management of the time delay on an overvoltage alarm (code 79, see Tables of Alarms, page 19)

The alarm pickup time delay counter trips when the voltage crosses the 500 V threshold. It is incremented or decremented according to the value of the voltage in relation to the threshold.

The alarm dropout time delay counter trips when the voltage drops back below the 420 V threshold.

Figure 4 - Time Delay on an Overvoltage Alarm



1 Evolution of the voltage

2 Pickup time delay counter at 5 s

3 Dropout time delay counter at 2 s

4 Overvoltage alarm: pickup zone (shaded)

Alarms on a Trip, Failure, and Maintenance Event

Alarms on a trip, failure, and maintenance event are always active. They can be accessed:

- Using the communication network
- On the Front Display Module (FDM121) (see Front Display Module Functions (FDM121), page 8)

Certain alarms can be assigned to an SDx Module output using the system software.

Alarm Setup

The functions of alarms on a trip and failure event are fixed and cannot be modified.

Modify the functions of the two maintenance alarms (OF operation overrun counter threshold and Close command overrun threshold) using the EPC software under the Breaker I/O tab.

Alarm Priority Level

Assign each alarm a priority level:

- High priority
- Medium priority

For more details on the use of priority levels, see Display of MicroLogic Trip Unit Measurements and Alarms, page 8

Tables of Alarms

Table 3 - Pre-Alarms

Label	Code	Default Setting	Default Priority	Setting Range		Default Setting			
				Thresholds (Pickup or Drop-Out	Time Delay	Thresholds		Time Delay	
						Pickup	Drop-Out	Pickup	Drop-Out
Pre Alarm I_r (PAL I_r)	1013	Active	Medium	40–100% Ir	1 s	90% Ir	85% Ir	1 s	1 s
Pre Alarm I_g (PAL I_g) (MicroLogic 6 trip unit)	1014	Active	Medium	40–100% Ig	1 s	90% Ig	85% Ig	1 s	1 s

Table 4 - MicroLogic A User-Defined Alarms

Label	Code	Default Setting	Default Priority	Setting Range		Default Setting		
				Thresholds (Pickup or Drop-Out)	Time Delay	Thresholds	Time Delay	
							Pickup	Drop-Out
Over Current Inst I_A	1	Not Active	Medium	0.2–10 I_n	1–3000 s	In	40 s	10 s
Over Current Inst I_B	2	Not Active	Medium	0.2–10 I_n	1–3000 s	In	40 s	10 s
Over Current Inst I_C	3	Not Active	Medium	0.2–10 I_n	1–3000 s	In	40 s	10 s
Over Current Inst I_N	4	Not Active	Medium	0.2–10 I_n	1–3000 s	In	40 s	10 s
Ground-Fault Alarm (MicroLogic 6 Trip Unit)	5	Not Active	Medium	10–100% I_g	1–3000 s	40% Ig	40 s	10 s
Under Current Inst I_A	6	Not Active	Medium	0.2–10 I_n	1–3000 s	0.2 In	40 s	10 s
Under Current Inst I_B	7	Not Active	Medium	0.2–10 I_n	1–3000 s	0.2 In	40 s	10 s
Under Current Inst I_C	8	Not Active	Medium	0.2–10 I_n	1–3000 s	0.2 In	40 s	10 s
Over Current I_{avg}	55	Not Active	Medium	0.2–10 I_n	1–3000 s	In	60 s	15 s
Over I max (A, B,C)	56	Not Active	Medium	0.2–10 In	1–3000 s	In	60 s	15 s
Under Current I_N	57	Not Active	Medium	0.2–10 I_n	1–3000 s	0.2 In	40 s	10 s
Under Current I_{avg}	60	Not Active	Medium	0.2–10 I_n	1–3000 s	0.2 In	60 s	15 s
Under I min (A, B, C)	65	Not Active	Medium	0.2–10 I_n	1–3000 s	0.2 In	60 s	15 s

Table 5 - MicroLogic E User-Defined Alarms

Label	Code	Default Setting	Default Priority	Setting Range		Default Setting		
				Thresholds (Pickup or Drop-Out)	Time Delay	Thresh-olds	Time Delay	
							Pick-up	Drop-Out
Over Current Inst I_A	1	Not Active	Medium	0.2–10 I_n	1–3000 s	I_n	40 s	10 s
Over Current Inst I_B	2	Not Active	Medium	0.2–10 I_n	1–3000 s	I_n	40 s	10 s
Over Current Inst I_C	3	Not Active	Medium	0.2–10 I_n	1–3000 s	I_n	40 s	10 s
Over Current Inst I_N	4	Not Active	Medium	0.2–10 I_n	1–3000 s	I_n	40 s	10 s
Ground-Fault Alarm (MicroLogic 6 Trip Unit)	5	Not Active	Medium	10–100% I_g	1–3000 s	40% I_g	40 s	10 s
Under Current Inst I_A	6	Not Active	Medium	0.2–10 I_n	1–3000 s	0.2 I_n	40 s	10 s
Under Current Inst I_B	7	Not Active	Medium	0.2–10 I_n	1–3000 s	0.2 I_n	40 s	10 s
Under Current inst I_C	8	Not Active	Medium	0.2–10 I_n	1–3000 s	0.2 I_n	40 s	10 s
Over Iunbal phase A	9	Not Active	Medium	5–60% I_{avg}	1–3000 s	25%	40 s	10 s
Over Iunbal phase B	10	Not Active	Medium	5–60% I_{avg}	1–3000 s	25%	40 s	10 s
Over Iunbal phase C	11	Not Active	Medium	5–60% I_{avg}	1–3000 s	25%	40 s	10 s

Table 5 - MicroLogic E User-Defined Alarms (Continued)

Over Voltage V_{AN}	12	Not Active	Medium	100–1100 V	1–3000 s	300 V	40 s	10 s
Over Voltage V_{BN}	13	Not Active	Medium	100–1100 V	1–3000 s	300 V	40 s	10 s
Over Voltage V_{CN}	14	Not Active	Medium	100–1100 V	1–3000 s	300 V	40 s	10 s
Under Voltage V_{AN}	15	Not Active	Medium	100–1100 V	1–3000 s	180 V	40 s	10 s
Under Voltage V_{BN}	16	Not Active	Medium	100–1100 V	1–3000 s	180 V	40 s	10 s
Under Voltage V_{CN}	17	Not Active	Medium	100–1100 V	1–3000 s	180 V	40 s	10 s
Over Vunbal V_{AN}	18	Not Active	Medium	2%–30% V_{avg}	1–3000 s	10%	40 s	10 s
Over Vunbal V_{BN}	19	Not Active	Medium	2%–30% V_{avg}	1–3000 s	10%	40 s	10 s
Over Vunbal V_{CN}	20	Not Active	Medium	2%–30% V	1–3000 s	10%	40 s	10 s
Over total KVA	21	Not Active	Medium	1–1000 kVA	1–3000 s	100 kVA	40 s	10 s
Over direct KW	22	Not Active	Medium	1–1000 kVA	1–3000 s	100 kW	40 s	10 s
Reverse power KW	23	Not Active	Medium	1–1000 kVA	1–3000 s	100 kW	40 s	10 s
Over direct KVAr	24	Not Active	Medium	1–1000 kva	1–3000 s	100 kvar	40 s	10 s
Reverse power KVAr	25	Not Active	Medium	1–1000 kvar	1–3000 s	100 kvar	40 s	10 s
Under total KVA	26	Not Active	Medium	1–1000 kVA	1–3000 s	100 kVA	40 s	10 s
Under direct KW	27	Not Active	Medium	1–1000 kW	1–3000 s	100 kW	40 s	10 s
Under direct KVAr	29	Not Active	Medium	1–1000 kva	1–3000 s	100 kvar	40 s	10 s
Leading PF (IEEE)[1]	31	Not Active	Medium	0–0.99	1–3000 s	0.80	40 s	10 s
Lead or Lag PF(IEC)[1]	33	Not Active	Medium	0–0.99	1–3000 s	0.80	40 s	10 s
Lagging PF (IEEE)[1]	34	Not Active	Medium	-0.99–0	1–3000 s	-0.80	40 s	10 s
Over THD Current I_A	35	Not Active	Medium	0–500%	1–3000 s	15%	40 s	10 s
Over THD Current I_B	36	Not Active	Medium	0–500%	1–3000 s	15%	40 s	10 s
Over THD Current I_C	37	Not Active	Medium	0–500%	1–3000 s	15%	40 s	10 s
Over THD V_{AN}	38	Not Active	Medium	0–500%	1–3000 s	5%	40 s	10 s
Over THD V_{BN}	39	Not Active	Medium	0–500%	1–3000 s	5%	40 s	10 s
Over THD V_{CN}	40	Not Active	Medium	0–500%	1–3000 s	5%	40 s	10 s
Over THD V_{AB}	41	Not Active	Medium	0–500%	1–3000 s	5%	40 s	10 s
Over THD V_{BC}	42	Not Active	Medium	0–500%	1–3000 s	5%	40 s	10 s
Over THD V_{CA}	43	Not Active	Medium	0–500%	1–3000 s	5%	40 s	10 s
Over Current I_{avg}	55	Not Active	Medium	0.2–10 I_n	1–3000 s	I_n	60 s	15 s
Over I max (A, B, C)	56	Not Active	Medium	0.2–10 I_n	1–3000 s	I_n	60 s	15 s
Under Current I_N	57	Not Active	Medium	0.2–10 I_n	1–3000 s	0.2 I_n	40 s	10 s
Under Current I_{avg}	60	Not Active	Medium	0.2–10 I_n	1–3000 s	0.2 I_n	60 s	15 s
Over I_A Demand	61	Not Active	Medium	0.2–10.5 I_n	1–3000 s	0.2 I_n	60 s	15 s
Over I_B Demand	62	Not Active	Medium	0.2–10.5 I_n	1–3000 s	0.2 I_n	60 s	15 s
Over I_C Demand	63	Not Active	Medium	0.2–10.5 I_n	1–3000 s	0.2 In	60 s	15 s
Over I_N Demand	64	Not Active	Medium	0.2–10.5 I_n	1–3000 s	0.2 I_n	60 s	15 s
Under I min (A, B, C)	65	Not Active	Medium	0.2–10 I_n	1–3000 s	0.2 I_n	60 s	5 s
Under I_A Demand	66	Not Active	Medium	0.2–10.5 I_n	1–3000 s	0.2 I_n	60 s	15 s
Under I_B Demand	67	Not Active	Medium	0.2–10.5 I_n	1–3000 s	0.2 I_n	60 s	15 s
Under I_C Demand	68	Not Active	Medium	0.2–10.5 I_n	1–3000 s	0.2 I_n	60 s	15 s
Under I_N Demand	69	Not Active	Medium	0.2–10.5 I_n	1–3000 s	0.2 I_n	60 s	15 s

1. The type of alarms associated with monitoring the cos ϕ and PF indicators must always be consistent with the sign convention (IEEE or IEC) for the PF indicator.

Table 5 - MicroLogic E User-Defined Alarms (Continued)

Over I_{unbal} max	70	Not Active	Medium	5–60% I_{avg}	1–3000 s	25%	40 s	10 s
Over Voltage V_{AB}	71	Not Active	Medium	100–1100 V	1–3000 s	500 V	40 s	10 s
Over Voltage V_{BC}	72	Not Active	Medium	100–1100 V	1–3000 s	500 V	40 s	10 s
Over Voltage V_{CA}	73	Not Active	Medium	100–1100 V	1–3000 s	500 V	40 s	10 s
Over Volt V_{avg} L-N	75	Not Active	Medium	100–1100 V	1–3000 s	300 V	5 s	2 s
Under Voltage V_{AB}	76	Not Active	Medium	100–1100 V	1–3000 s	320 V	40 s	10 s
Under Voltage V_{BC}	77	Not Active	Medium	100–1100 V	1–3000 s	320 V	40 s	10 s
Under Voltage V_{CA}	78	Not Active	Medium	100–1100 V	1–3000 s	320 V	40 s	10 s
Over V max L-L	79	Not Active	Medium	100–1100 V	1–3000 s	300 V	5 s	2 s
Under Volt V_{avg} L-N	80	Not Active	Medium	100–1100 V	1–3000 s	180 V	5 s	2 s
Under V min L-L	81	Not Active	Medium	100–1100 V	1–3000 s	180 V	5 s	2 s
Over Vunb max L-N	82	Not Active	Medium	2%–30% V_{avg}	1–3000 s	10%	40 s	10 s
Over Vunbal V_{AB}	86	Not Active	Medium	2%–30% V_{avg}	1–3000 s	10%	40 s	10 s
Over Vunbal V_{2B}	87	Not Active	Medium	2%–30% V_{avg}	1–3000 s	10%	40 s	10 s
Over Vunbal V_{CA}	88	Not Active	Medium	2%–30% V_{avg}	1–3000 s	10%	40 s	10 s
Over Vunb max L-L	89	Not Active	Medium	2%–30% V_{avg}	1–3000 s	10%	40 s	10 s
Phase sequence	90	Not Active	Medium	0.1	N/A	0	N/A	N/A
Under Frequency	92	Not Active	Medium	45–65 Hz	1–3000 s	45 Hz	5 s	2 s
Over Frequency	93	Not Active	Medium	45–65 Hz	1–3000 s	65 Hz	5 s	2 s
Over KW Power dmd	99	Not Active	Medium	1–.1000 kW	1–3000 s	100 kW	40 s	10 s
Leading cos ϕ (IEEE) [2]	121	Not Active	Medium	0–0.99	1–3000 s	0.80	40 s	10 s
Lead, Lag cos ϕ (IEC)[1]	123	Not Active	Medium	0–0.99	1–3000 s	0.80	40 s	10 s
Lagging cos ϕ (IEEE) [1]	124	Not Active	Medium	-0.99–0	1–3000 s	–0.80	40 s	10 s
Over T° image motor (MicroLogic 6 E-M trip unit)	125	Not Active	Medium	0.2–10.5 I_n	1–3000 s	I_n	60 s	15 s
Under T° image motor (MicroLogic 6 E-M trip unit)	126	Not Active	Medium	0.2–10.5 I_n	1–3000 s	I_n	60 s	15 s
Over IA Peak Demand	141	Not Active	Medium	0.2–10.5 I_n	1–3000 s	I_n	60 s	15 s
Over IB Peak Demand	142	Not Active	Medium	0.2–10.5 I_n	1–3000 s	I_n	60 s	15 s
Over IC Peak Demand	143	Not Active	Medium	0.2–10.5 I_n	1–3000 s	I_n	60 s	15 s
Over IN Peak Demand	144	Not Active	Low	0.2–10.5 I_n	1–3000 s	I_n	60 s	15 s
Lead	145	Not Active	Low	0.0	1–3000 s	0	40 s	10 s
Lag	146	Not Active	Low	1.1	1–3000 s	1	40 s	10 s
Quadrant 1	147	Not Active	Low	1.1	1–3000 s	1	40 s	10 s
Quadrant 2	148	Not Active	Low	2.2	1–3000 s	2	40 s	10 s
Quadrant 3	149	Not Active	Low	3.3	1–3000 s	3	40 s	10 s
Quadrant 4	150	Not Active	Low	4.4	1–3000 s	4	40 s	10 s

Table 6 - Event Alarms

Alarm Type	Label	Code	SDx Output	Priority
Alarms on a Trip Event	Long-time prot I_r	16384	Yes	High
	Short-time prot I_{sd}	16385	Yes	High

2. The type of alarms associated with monitoring the cos ϕ and PF indicators must always be consistent with the sign convention (IEEE or IEC) for the PF indicator.

Table 6 - Event Alarms (Continued)

	Instant prot I_i	16386	Yes	High
	Ground fault I_g	16387	Yes	High
	Integ instant prot	16390	No	High
	Trip unit fail (Stop)	16391	Yes	High
	Instant vigi prot	16392	No	High
	Reflex tripping	16393	No	High
	Phase unbalance	16640	Yes	High
	Jam motor prot	16641	Yes	High
	Under load mtr prot	16642	Yes	High
	Under load mtr prot	16642	Yes	High
	Long start mtr prot	16643	Yes	High
	Trip indicator SD	1905	Yes	Medium
Alarms on a Failure Event	BSCM failure (Stop)	1912	Yes	High
	BSCM failure (Err)	1914	Yes	Medium
Alarms on a Maintenance Event	OF operation overrun	1916	Yes	Medium
	Close command overrun	1919	Yes	Medium

Operation of SDx and SDTAM Module Outputs Assigned to Alarms

Two alarms can be assigned to the two SDx Module outputs.

Set up the two outputs using the EPC software (Outputs tab). They are activated (or deactivated) by the occurrence (or completion) of:

- An alarm associated with a measurement (See Alarms Associated with Measurements, page 15)
- An alarm on a trip, failure, and maintenance event (see Alarms on a Trip, Failure, and Maintenance Event, page 18)

The two outputs on the SDTAM Module (MicroLogic M) cannot be configured:

- Output 1 is assigned to motor thermal fault indication
- Output 2 is used to open the contactor

For more details on the SDx and SDTAM Modules, see the *PowerPacT™ H-, J-, and L-Frame Circuit Breaker—User Guide*.

SDx Module Output Operating Modes

Set the operating mode for the SDx Module outputs as:

- Non-latching mode
  The output (S) position follows the associated alarm (A) transitions.
- Latching mode
  The position of the output (S) follows the active transition of the associated alarm (A) and remains latched irrespective of the alarm state.
- Time-delayed non-latching mode
  The output (S) follows the activation transition for the associated alarm (A). The output returns to the deactivated position after a time delay irrespective of the alarm state.
  The setting range for the time delay (using the EPC software) is 1–360 s. The default time delay setting is 5 seconds.

- Open or closed forced mode
  - In open forced mode, the output remains in the deactivated position irrespective of the alarm state.
  - In closed forced mode, the output remains in the activated position irrespective of the alarm state.

  NOTE: Both these modes can be used for debugging or checking an electrical installation.

Figure 5 - Operation in Non-Latching Mode

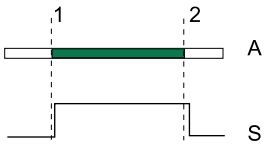


Figure 6 - Operation in Latching Mode

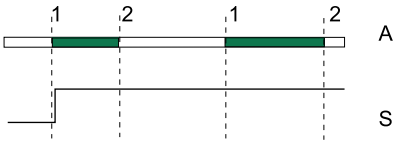
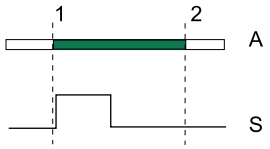


Figure 7 - Operation in Time-Delayed Non-Latching Mode



A Alarm:	Shaded when activated White when deactivated
S Output:	High position = activated Low position = deactivated
1 Alarm activation transition	
2 Alarm deactivation transition	

Acknowledgement of Latching Mode

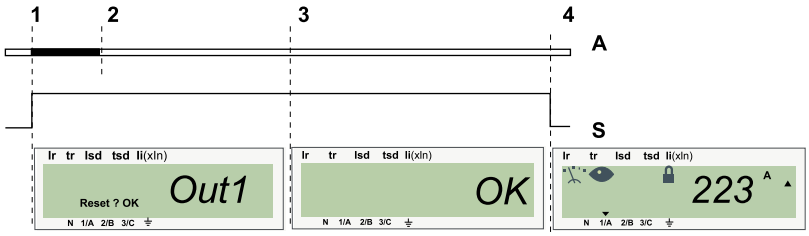
Acknowledge the Latching Mode using the MicroLogic trip unit keypad by pressing the Special Features of Latching Mode

If the acknowledge request is made when the alarm is still active:

- Acknowledgment of the output active position has no effect.
- Keypad navigation is possible.
- The screensaver returns to the Out1 message.

If two alarms associated with two outputs in latching mode are active:

- The first alarm message Out1 (or Out2) is displayed on the screen until the alarm is acknowledged (the output's active position is acknowledged after the alarm is deactivated).
- After acknowledgment of the first alarm, the screen displays the second alarm message Out2 (or Out1) until the second alarm is acknowledged.
- After both acknowledgments, the display returns to the screensaver.



A Alarm:
Green when activated
White when deactivated

S Output:
High position = activated
Low position = deactivated

Step	Event/Action	Display Information
1	Alarm activation	“Out1” is displayed.
2	Alarm deactivation	“Out1” is still displayed.
3	Confirm active position of the output (press the key twice to confirm)	“OK” is displayed.
4	–	The screensaver is displayed.

Section 5 — EcoStruxure Power Commission (EPC) Software

Function Setting

EcoStruxure Power Commission (EPC) Software works with MicroLogic trip units to:

- Check and configure
  - Metering functions
  - Alarms
  - Assignment of the SDx Module outputs
  - BSCM functions
  - Modbus™Interface Module
- Modify passwords
- Save configurations
- Edit configurations
- Download the firmware

Some functionality may require the inclusion of a test kit(s) found in Section 7 of The Digest (Reference 0100CT1901).

Using the EPC Software

⚠WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

Change default passwords at first use to help prevent unauthorized access to device settings, controls and information.

Disable unused ports/services and default accounts to help minimize pathways for malicious attackers.

Place networked devices behind multiple layers of cyber defenses (such as firewalls, network segmentation, and network intrusion detection and protection.

Use cybersecurity best practices (for example, least privilege, separation of duties) to help prevent unauthorized exposure, loss, modification of data and logs, or interruption of services.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The EPC software can be used:

- In standalone mode, directly on the MicroLogic trip unit and SI kit connected to the test port and to a PC over USB.
- Using the communication network

For more details, see the *EPC Software Online Help* under the Help menu in EPC.

Use offline mode to configure the protection, metering, and alarm functions of the MicroLogic trip unit in the EPC software.

For more details on offline mode, see the *EPC Software Online Help.*

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As standards, specifications, and design change from time to time, please ask for confirmation of the information given in this publication.

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