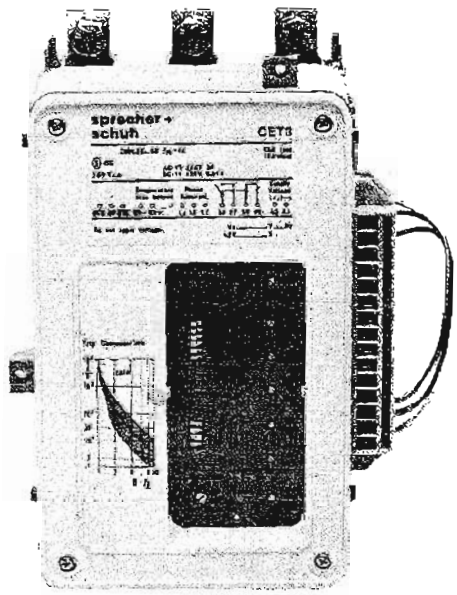
CET3 Electronic Motor Protection

The ultimate in motor protection is Sprecher + Schuh's CET3 Electronic Motor Protector. The CET3 Electronic Motor Protector uses an equivalent thermal circuit that produces an exact simulation of the copper and iron losses in the motor. This technology permits motors to run at their full capacity, while at the same time providing maximum overload protection. The equivalent thermal circuit also provides an external temperature rise output signal. The voltage appearing at the output terminals is proportional to the motor temperature simulated by the CET3. In addition, the CET3 provides an adjustable time delay for starting high-inertia loads, yet will trip immediately on an overload.



Temperature Rise Output
This output supplies a voltage which is proportional to the motor temperature simulated by the CET3. This analog signal provides status of the motor's thermal condition for use in pre-warning, event monitoring, load control and restart control.

- **Load Control** - The loading on the installation can be continually matched to the maximum permitted motor temperature. The result is optimum utilization of the motor with full thermal overload protection.
- **Restart Control** - The cooling of the motor is also accurately simulated in the CET3. When used with a threshold value detector for example, a motor start can be blocked until the motor has sufficiently cooled.

Adjustable Degree Of Inertia
The tripping time is digitally adjustable from 2 to 30 seconds. The CET3 is particularly adaptable to protecting special motors under maximum loading conditions including:

- **Low inertia applications** - Submersible pumps, hermetically sealed refrigeration compressors, etc.
- **High Inertia applications** - Rock crushing, centrifugal drives, flywheels, etc.

Additional Protection
The three available CET3 versions also contain the following protection functions:

CET3-01
- Single-phase protection

CET3-02
- Single-phase protection
- Ground fault protection
- Stall protection
- Phase reversal protection
- Underload protection

CET3-03
- Single-phase protection
- Ground fault protection
- Stall protection
- Underload protection (optional)
- Short circuit protection

All protection functions provide high speed disconnection of the load, and utilize individual LED's to swiftly detect the source of the problem. These additional protection functions are explained below.

Single-Phase Protection - With the loss of a phase, the CET3 will trip within 2 to 4 seconds irrespective of the load, thus preventing operation of the motor on only 2 phases.

Ground Fault Protection - The majority of winding faults are caused by faults in grounding. With a ground fault, the CET3 immediately isolates the motor and thus keeps damage to a minimum. Nuisance tripping due to transient current transformer saturation is minimized through the use of a high speed, non-instantaneous trip (i.e. cut-out after a short delay). For high sensitivity requirements, an additional core balance current transformer is used.

Stall Protection - When motor driven machinery becomes blocked or jammed, the CET3 cuts out immediately, preventing unnecessary motor temperature rise, and protects the entire installation from further damage. Since the motor has not experienced a significant temperature rise, it can be re-started immediately after the blockage has been removed without any further motor cooling time. This protection function will trip when the current has reached the preset response level of 2.5 x FLA (after motor start).

Type CET3

Phase Reversal Protection - Where an installation has been connected in an incorrect phase sequence (mobile installations, repairs and maintenance to the supply network, etc.), the CET3 prevents the motor from starting until the situation has been rectified.

Underload Protection - Motors which are cooled by the process gas or fluid can be overheated in spite of underloading. Very often, these motors are only accessible with difficulty, so any damage would cause long and costly repairs. The CET3 detects this underload condition and disconnects the motor. Additionally, mechanical damage, such as broken shafts, belts or defective couplings, can be detected in the same manner and disconnected. The required response level is adjustable from 0% to 100% of FLA. The CET3 will trip within 10 to 15 seconds after the motor current has fallen below the set response level.

Short Circuit Protection - This function provides rapid disconnection of the motor, independent of the standard overload protection function, if the current exceeds a preset threshold value (adjustable from 4 to 12 times FLA). The standard response time is 50ms. The response threshold and the response delay time are set to avoid undesired response when switching or starting the motor. Tripping is independent of the nature of the short circuit (2 pole, 3 pole or to earth).

Application Comments:

Behavior with loss of supply voltage - Motor cooling continues to be correctly simulated even with a loss of supply voltage. All fault protection functions possess a memory which, for a certain period of time after a supply voltage loss, will retain the fact of a particular trip occurrence. With return of the supply voltage, the appropriate LED glows again and the trip will need to be re-set in the normal manner.

Output relay circuitry - In the standard arrangement, the output relay is energized during normal operation, and de-energized with the occurrence of a fault (closed circuit). Therefore it is not possible for an unprotected motor to continue operating with a loss of the supply voltage to the CET3. If, for example, it is essential that a high-voltage motor continues to operate with the loss of the supply voltage to the CET3, the output relay can be connected in an open circuit arrangement.

Interference immunity - The CET3 is equipped with interference suppression elements which fulfill the latest relevant IEC and national standards, thus ensuring interference-free operation.

Protection of multi-speed motors - Together with the adaptor CEU3, the CET3 can also be used for the protection of multi-speed motors.

B

CET3 Operation

Current Setting
The current setting is digitally set by means of six slide switches. To determine the correct setting, first compute the percentage of the full load motor current to the primary rated current of the CWE converter module. The slide switches are then moved to the right according to their values. Note that the basic value of 50% is built in, so the switch values are added to this until the correct percentage is reached.
Example:
Motor full load amperes = 140 FLA
Converter module: CWE3-160A
Primary rated current = 160 Ampere
Setting:
140A/160A = 0.87 (87%)
87% = 50% (Given) + 32% + 4% + 1%
Slide +32, +4 and +1 switches to the right

Degree Of Inertia Setting
(Tripping time at 6 x FLA)
Trip time is set digitally, in seconds, with four slide switches. Tripping time is determined in accordance with the admissible locked rotor time of the motor and the time/current characteristic curve (page B7).
Example: To set time at 24 seconds, slide switches +8 and +16 to the right (8 + 16 = 24 seconds).

Reset After Trip
All protection functions can be reset manually by depressing the reset button. Surface mounted models can be reset manually from a button on the front panel, or remotely, by means of a reset magnet. Automatic reset is only available for thermal overload. After a trip from any of the other protection functions, reset must always take place manually as it is essential that the cause of fault is first removed.

Test Button For Thermal Overload Function
For functional check without any other aids.

Adjustment - Underload Protection

Adjustment - Short Circuit Protection

Operation Readiness Indicator
The green LED indicates that the supply is available and that the unit is ready for operation.

Fault Indicator
All protection functions utilize individual red LED's to swiftly detect the source of the problem.
- Thermal Overload Protection
- Single Phase Protection
- Ground Fault Protection
- Stall Protection
- Phase Reversal Protection
- Underload Protection
- Short Circuit Protection

Pricing (CET3 Electronic Protection Unit, Options & Accessories)

Description	Catalog Number (or "-Suffix")	Price (or Adder)
Electronic Protection Unit For connection to converter modules CWE3 and CWE1 ①		
With Protection Functions: •Thermal Overload Protection •Single Phase Protection		
For mounting onto converter module CWE	**CET3-01-A-∗V50/60** ②	**1080**
For flush mounting in panel (Includes frame) ③	**CET3-01-E-∗V50/60** ②	**1120**
With Protection Functions: •Thermal Overload Protection •Stall Protection •Single Phase Protection •Phase Reversal Protection •Ground Fault Protection •Underload Protection		
For mounting onto converter module CWE	**CET3-02-A-∗V50/60** ②	**1600**
For flush mounting in panel (Includes frame) ③	**CET3-02-E-∗V50/60** ②	**1640**
With Protection Functions: •Thermal Overload Protection •Stall Protection •Single Phase Protection •Short Circuit Protection •Ground Fault Protection •Underload Protection (optional)		
For mounting onto converter module CWE	**CET3-03-A-∗V50/60** ②	**1780**
For flush mounting in panel (Includes frame) ③	**CET3-03-E-∗V50/60** ②	**1820**
Options		
Open circuit arrangement of output relay	**-K**	**126**
Automatic reset of thermal overload protection	**-R**	**252**
Response current of ground fault detector For CET3-02 with converter module CWE3-1A-S or CWE3-5A-S Use with core balance current transformer. Response current: **Select: 5mA, 10mA, 25mA, 50mA, 100mA or 250mA**	**-5mA, -10mA, -25mA, -50mA, -100mA or -250mA**	**95**
For 36-48 VDC supply voltage	**Change "-∗V50/60" to "-36VDC"** ④	**175**
For special supply voltage	**Contact factory**	~
Blocking individual protection functions	**Contact factory**	~
Smooth Starting		
50 Hz	**-50SS**	**Contact Factory**
60 Hz	**-60SS**	
Warm Starting	**-WS**	
Underload Protection feature for CET3-03	**Contact factory**	~
Accessories		
Cover for front plate Transparent, sealable and equipped with:		
Test Button - Reset Button - Reset 300mm - Reset 500mm - Reset Magnet -	**CET3-P-01**	**68**
Reset Button ●	**CET3-P-02**	**82**
Test Button ● Reset Button ●	**CET3-P-03**	**98**
Test Button ● Reset 300mm ●	**CET3-P-04**	**118**
Test Button ● Reset 500mm ●	**CET3-P-05**	**121**
Test Button ● Reset Magnet ●	**CET3-P-06-∗V50/60** ②	**252**
Cover for front plate. Transparent, sealable with watertight seal (for flush mounting CET3 only)	**CET3-P-07**	**87**
Adaptor CEU3 for multi-speed motors		
AC	**CEU3-∗V50/60** ②	**430**
DC	**CEU3-∗VDC** ⑤	**430**
Indication instrument for motor temperature rise	**25.600.171-01**	**308**
DC supply for 48-240VDC	**CED3**	**265**
Reset magnet	**Contact factory**	~
Test unit for CET3	**Contact factory**	~

① Output relay connected in closed circuit arrangement. Manual reset.
② Replace ∗ in catalog number with AC supply voltage code: **110, 220, 240, 380, 415** or **440.**
③ For use with all CWE3-1A(-S) and CWE3-5A(-S) converter modules. All other converter modules must be surface mount type.
④ Order CED3 DC supply module for 48-240VDC applications.
⑤ Replace ∗ in catalog number with DC supply voltage code: **24, 36, 48, 60, 110** or **125.**

Pricing (CWE Converter Modules ① & Options)

Primary Current Range	Primary Rated Current	Primary Connections	Catalog Number (or "-Suffix")	Price (or Adder)
Flush Mounting Or Surface Mounting For flush mounting behind panel on CET3-...-E-... or surface mounting as base to CET3-...-A-...				
0.5 - 1.13 Amps	**1 Amp**	Saddle clamp 14 AWG (4mm²)	**CWE3-1A**	**405**
2.5 - 5.65 Amps	**5 Amp**	Saddle clamp 14 AWG (4mm²)	**CWE3-5A**	
Surface Mounting For surface mounting as base to CET3-...-A-...				
5 - 11.3 Amps	**10 Amp**	Saddle clamp 14 AWG (4mm²)	**CWE3-10A**	
10 - 22.6 Amps	**20 Amp** ②	Feed through window opening	**CWE3-40A**	
20 - 45.2 Amps	**40 Amp** ②			**405**
40 - 90.4 Amps	**80 Amp**	Rails with M6 connection terminals	**CWE3-80A**	
80 - 180.8 Amps	**160 Amp**	Rails with M8 connection terminals	**CWE3-160A**	
180 - 407 Amps	**360 Amp**	Rails with M10 connection terminals	**CWE1-360A**	**465**
		For attaching to CA1-480	**CWE1-360A/1-480**	
300 - 678 Amps	**600 Amp**	Rails with M12 connection terminals	**CWE1-600A**	**588**
		For attaching to CA5-550 thru 1200	**Contact factory**	~
Options				
Secondary Terminal Saddle clamp 14 AWG (4mm²) for separate mounting of converter module.			**-T**	**23**

Ordering Example

Specification:
- Electronic motor protection unit
- With all (6) protection functions (CET3-02)
- For flush mounting in panel
- With sealable cover for front plate
- Supply voltage 240VAC/60Hz
- With converter module for separate surface mounting
- For 100 H.P. motor 460VAC/60 Hz (120 FLA)

Ordering Specification:
- 1 Electronic Protection Unit
  CET3-02-E-240V50/60Hz
- 1 Cover
  CET3-P-01
- 1 Converter Module
  CWE3-160A-T

① CWE Converter Module comes complete with input current transformer and current/voltage converter.

② Primary current selected through appropriate installation of primary lines (connection between contactor and motor).

Primary Current Range	Primary Rated Current	Line Installation
10 - 22.6A	20 Amp	4 x looped
20 - 45.2A	40 Amp	2 x looped

Technical Information

General Data

Rated Voltage
- Motor circuit (to UL & CSA) 600V
- Control circuit
  - Maximum 440V
  - To UL & CSA 240V

Supply Voltage
- Alternating Current (AC) 50/60Hz ..... 110V, 220V, 240V, 380V, 415V or 440V
- Direct Current (DC) ..... 36V to 48V (48V to 240V with CED3 DC supply)
- Permissible fluctuation
  - AC ..... 0.80 to 1.10 of rated supply voltage
  - DC ..... 0.80 to 1.20 of rated supply voltage

Power Consumption
- CET3 ..... AC: 4 VA (3 Watt) DC: 3 Watt
- Reset magnet ..... AC: 85 VA (60 Watt) DC: 35 Watt
- CED3 DC supply ..... DC: 12 Watt

Output Relay
- Contact arrangement ..... 1 N.O. & 1 N.C.
- Continuous thermal current ..... 4 Amps
- Rated operating current (AC) 24-110V/4A, 220-240V/3A, 380-415V/2A, 440V/1.5A
- Rated operating current (DC) 24V/0.6A, 48V/0.3A, 60V/0.25A, 110V/0.15A, 220-240V/0.07A

Ambient Temperature
- Normal operation ..... -5°C to +60°C
- Short time operation ..... -20°C to +70°C
- For transport ..... -50°C to +85°C
- For storage ..... -50°C to +60°C

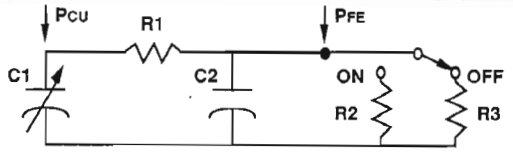
Climatic Resistance
- Humid heat ..... 40°C @ 95% relative humidity (56 days)
- Alternating climate (20 cycles) ..... 23°C @ 80% relative humidity/40°C @ 92% relative humidity

Thermal Overload Protection

Two Component Thermal Simulation

The CET3 exactly simulates the motor temperature with a two-component thermal equivalent circuit, and trips when the ultimate value is exceeded.

- Analyzes the copper and iron losses.
- Two separate memories monitor the copper and iron masses of the motor. Therefore, accurate thermal compensation is made for the superimposed copper and iron temperatures, as well as the widely differing thermal time constants of the copper and iron masses.
- Compensates for the varying cooling behaviors of self-ventilated motors at run or standstill. When a motor stops, longer time constants in the CET3 take the changed cooling behavior of the motor into account (correct function is also ensured without supply voltage).



C1 Capacitor representing the thermal capacity of the windings (adjustable).
C2 Capacitor representing the thermal capacity of the iron and remaining masses of the motor.
R1 Resistor represents the thermal resistance between the windings and iron.
R2 Resistor represents the resistance to thermal conduction (cooling) with motor running.
R3 Resistor represents the resistance to thermal conduction (cooling) with motor at standstill.
PCu Input current proportional to copper losses.
PFe Input current proportional to iron losses.

Tripping Data

Ultimate Tripping Current
- Setting range ..... 50% to 113% of CWE primary current (adjustable in steps of 1%)
- Accuracy ..... ± 2%
- Ultimate tripping current with symmetrical loading
  - Ambient -5°C to +60°C ..... 1.05 to 1.15 FLA
  - Ambient -20°C to -5°C ..... 1.05 to 1.20 FLA
  - Ambient +60°C to +70°C ..... 1.00 to 1.15 FLA

Tripping @ 6 x FLA
- Setting range ..... 2 to 30 seconds (adjustable in 2 second stages)
- Accuracy ..... ±10% or ±0.5 seconds
- Tripping time with symmetrical loading @ 6 x FLA (from cold state)
  - Ambient -5°C to +60°C ..... ±20%
  - Ambient -20°C to -5°C ..... -20%, +30%
  - Ambient +60°C to +70°C ..... -30%, +20%

Trip Indication ..... Red LED

Trip Memory w/ Loss of Supply Voltage ..... Yes (30 min @ 25°C; 5 min @ 60°C; 1 min @ 70°C)

Available Reset ..... Manual or automatic (after cooling to 60% of the tripping temperature)

Technical Information

Underload Protection

Provides delayed trip when the motor current falls below a set response level.

Setting Range	0 to 100% FLA with trimmer on front panel
Accuracy	±10%
Temperature Dependence (-20°C to +70°C)	±10% of set value
Tripping Time	10 to 15 seconds
Trip Indication	Red LED
Trip Memory w/ Loss of Supply Voltage	Yes (30 min @ 25°C; 5 min @ 60°C; 1 min @ 70°C)
Available Reset	Manual

Short Circuit Protection

Rapid tripping when the selected response threshold is exceeded. Independent of normal overload protection.

Response Threshold	
Setting range	4 to 12 x FLA with trimmer on front panel
Standard factory setting	10 x FLA
Setting accuracy	+10%
Temperature dependence (-20°C to +70°C)	±10% of set value
Tripping Time	
Standard version (-20°C to +70°C)	50ms (±20%)
On request-factory adjusted (-20°C to +70°C)	20 to 100ms (±20%)
Output Relay	
Contact arrangement	1 N.O. & 1 N.C.
Contact data	Same as for main output relay
Trip Indication	Red LED
Trip Memory w/ Loss of Supply Voltage	
Output relay	Yes (Unlimited until reset)
LED	Yes (30 min @ 25°C; 5 min @ 60°C; 1 min @ 70°C)
(The short circuit protection relay remains in the trip position even if the supply voltage is restored after the memory time of the LED has elapsed. LED does not light up.)	
Available Reset	Manual

Temperature Rise Output

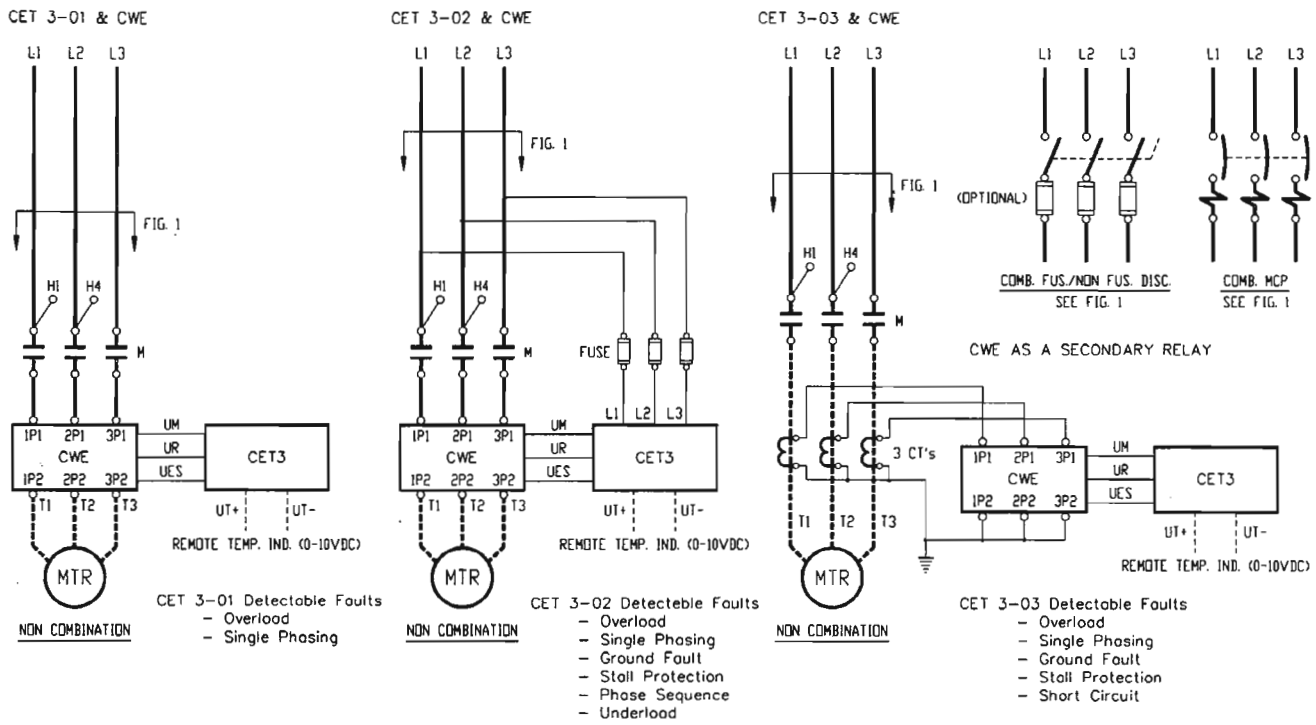
The voltage appearing at the output terminals is proportional to the motor temperature simulated by the CET3.

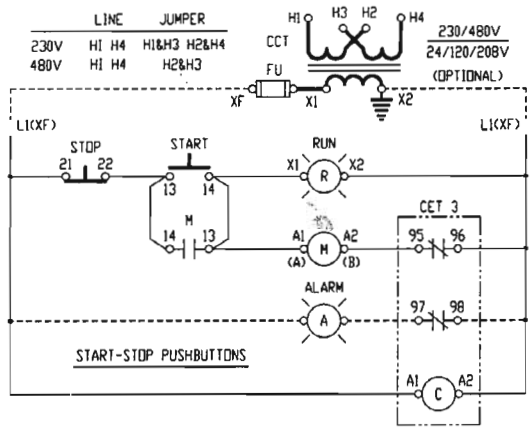
Voltage Level	
At thermal trip	10V (±0.2V)
At continuous operation - FLA	
Ambient -5°C to +60°C	8.5 volt (±0.6V)
Ambient -20°C to -5°C	8.5 volt (-1.1V, +0.6V)
Ambient +60°C to +70°C	8.5 volt (-0.6V, +1.5V)
Internal Resistance of the Voltage Source	500 ohm
External Load (recommended)	≥ 25K ohm, voltage free
Short Circuit Protection	Output is short circuit proof

Please Note:

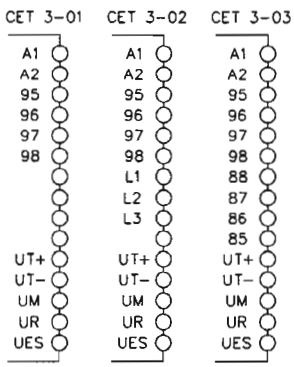
No external voltage may be applied. An integral protection circuit protects against accidental testing with normal insulation testing devices. Install cable away from sources of interference and power lines.

Wiring Diagrams





Terminal Arrangement



- A1, A2 — Control Power Supply
- 95, 96 — NO Contact With Power Applied To CET 3
- 97, 98 — NC Trip Contact With Power Applied To CET 3
- L1, L2, L3 — Three Phase Line Voltage Connection For Phase Sequence
- UT+, UT- — Output For Analog Output Meter
- UM, UR, UES — Converter Signal Wires Connected To CWE
- 85, 86 — NC Contact CET 3-03 Only
- 87, 88 — NO Contact CET 3-03 Only

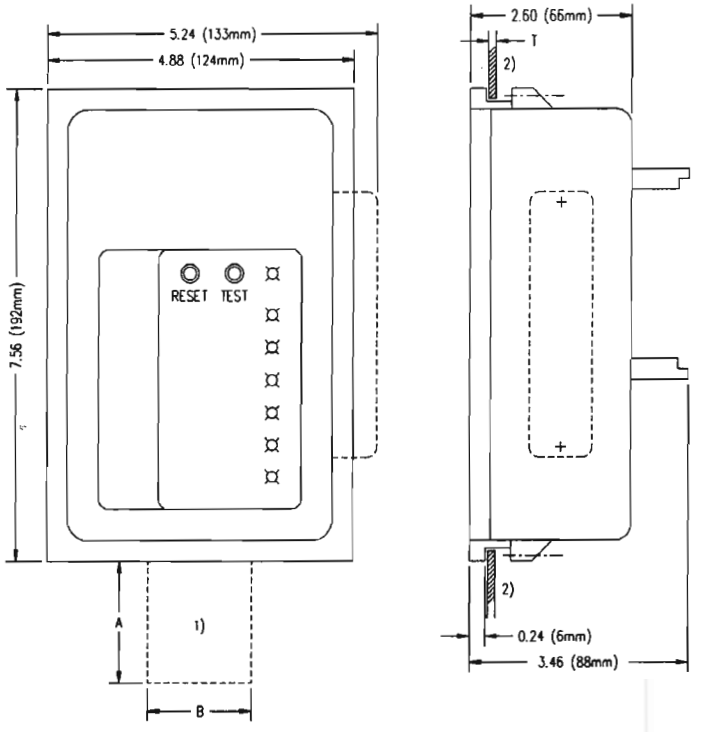
THE CET 3 CONTACTS ARE SHOWN IN THE READY STATE WITH CONNECTED SUPPLY VOLTAGE SO AS TO MATCH THOSE OF A NORMAL AND OPERATIONALLY READY THERMAL OVERLOAD RELAY.

NOTES:
1). INTERPOSING RELAYS ARE TO BE USED IN THE CIRCUITS FOR THE CA1-630 THRU CA1-1250 CONTACTORS.
2). RCD: STANDS FOR REMOTE CONTROL DEVICE BY CUSTOMER.
3). X2 TERMINAL GROUNDED AS STANDARD, REMOVE IF NOT REQUIRED.
4). TERMINAL NUMBERS IN ( ) APPLIES ONLY ON CA1 CONTACTORS.

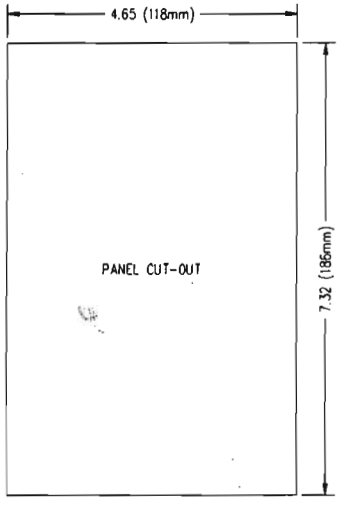
B

Dimensions

ELECTRONIC MOTOR PROTECTION UNIT CET 3

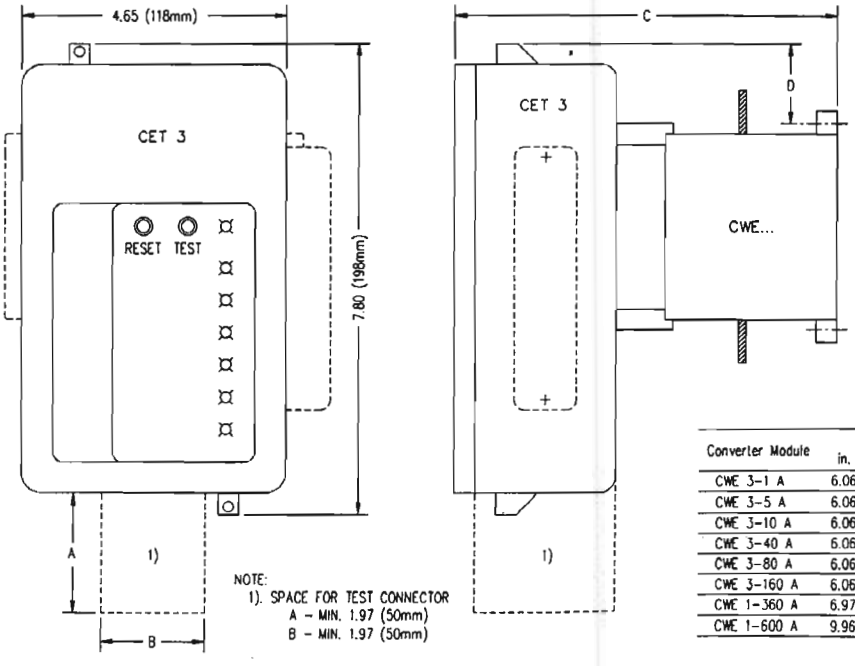


PANEL CUT-OUT FOR CET 3 SEPARARTELY MOUNTED IN PANEL FRONT



NOTES:
1). SPACE FOR TEST CONNECTOR
A – MIN. 1.97 (50mm)
B – MIN. 1.97 (50mm)
2). PLATE THICKNESS
T – 0.08 (2mm) MIN.
0.31 (8mm) MAX.

ELECTRONIC MOTOR PROTECTION UNIT CET 3 FITTED ONTO CWE... CONVERTER MODULE

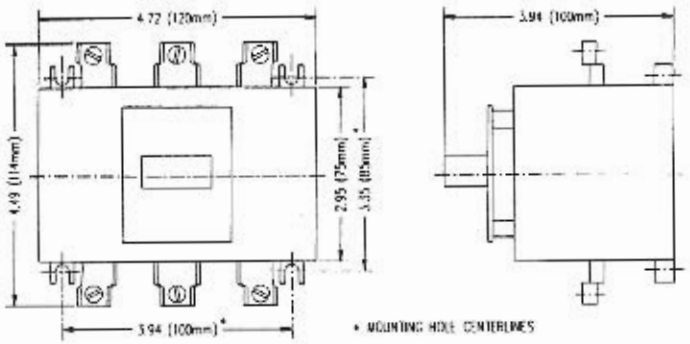


NOTE:
1). SPACE FOR TEST CONNECTOR
A – MIN. 1.97 (50mm)
B – MIN. 1.97 (50mm)

Converter Module	C		D	
	in.	mm	in.	mm
CWE 3-1 A	6.06	154	0.98	25
CWE 3-5 A	6.06	154	0.98	25
CWE 3-10 A	6.06	154	0.98	25
CWE 3-40 A	6.06	154	0.98	25
CWE 3-80 A	6.06	154	0.98	25
CWE 3-160 A	6.06	154	0.98	25
CWE 1-360 A	6.97	177	0.94	24
CWE 1-600 A	9.96	253	0.67	17

Dimensions

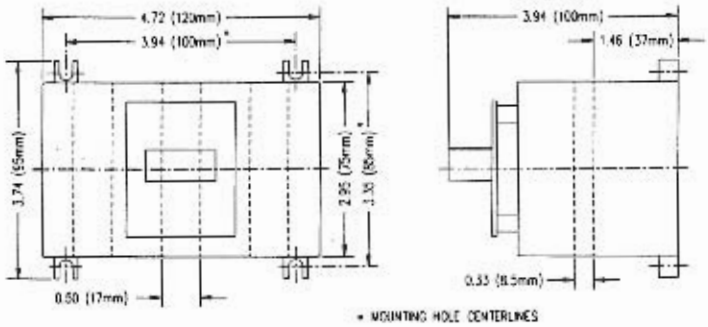
CONVERTER MODULE CME 3-1 A-T
CME 3-5 A-T
CME 3-10 A-T



* MOUNTING HOLE CENTERLINES

MOUNTING HOLES DIA:
CME 3-1 – 0.17 (4.4mm) DIA.
CME 3-5 – 0.17 (4.4mm) DIA
CME 3-10 – 0.17 (4.4mm) DIA

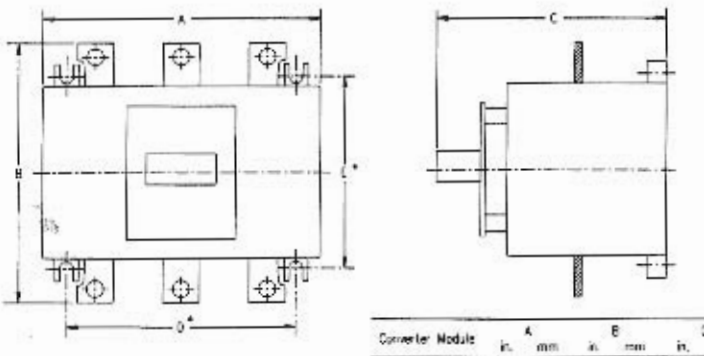
CONVERTER MODULE CME 3-40 A-T



* MOUNTING HOLE CENTERLINES

MOUNTING HOLES DIA:
CME 3-40 – 0.17 (4.4mm) DIA.

CONVERTER MODULE CME 3-80 A-T
CME 3-160 A-T
CME 1-360 A-T

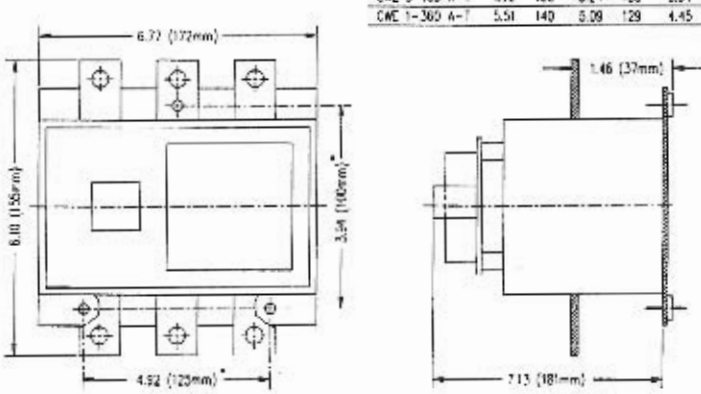


MOUNTING HOLES DIA:
CME 3-80 – 0.17 (4.4mm) DIA.
CME 3-160 – 0.17 (4.4mm) DIA
CME 1-360 – 0.23 (5.8mm) DIA.

* MOUNTING HOLE CENTERLINES

Converter Module	A		B		C		D		E	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
CME 3-80 A-T	4.72	120	5.24	133	3.94	100	3.94	100	3.35	85
CME 3-160 A-T	4.72	120	5.24	133	3.94	100	3.94	100	3.35	85
CME 1-360 A-T	5.51	140	5.09	129	4.45	113	4.92	125	2.95	75

CONVERTER MODULE CME 1-600 A-T



MOUNTING HOLES DIA:
CME 1-600 – 0.23 (5.8mm) DIA

* MOUNTING HOLE CENTERLINES

sprecher+ schuh

Electronic Motor Protection

Type CET3

Solid State (Smooth) Starting & Warm Starting Applications

Application Of CET3 For Special Conditions

The version for smooth starting enables the CET3 to be used in conjunction with thyristor-controlled motor starters. In this case, the phase failure protector and the blocking protector of the standard CET3 would erroneously trip.

When restarting high-inertia motors at operating temperature, the warm start version allows the permissible short term overload to be utilized to the same extent as when starting the motor cold.

CET3 For Smooth Starting

This version of the CET3 is used to protect motors whose starting mode is thyristor-controlled (phase-angle control).

The single-phase protection and, if present, the blocking protection feature are ineffective as long as current pulses (in one direction) are detected at intervals of 6.7 ms (at 50Hz) or 5.6 ms (at 60Hz). As soon as the phase control start is over and sinusoidal current begins to flow, the single phase protection and the stall protection functions are reactivated. All other protection functions remain unaffected.

The starting time is not critical, which means that very long starting times are possible. However, motors that are continuously operated with phase-angle control are insufficiently protected since their losses deviate excessively from the CET3 characteristics.

CET3 For Warm Starting

The thermal characteristic of a motor in CET3 is matched to the condition in the stator. In the stator winding, the difference between the limiting and the continuous operating temperature is dependent on the winding insulation and is normally relatively small. This small temperature difference permits only short run-ups after a short interval.

In contrast with larger motors, the permissible run-up time is dependent on the thermal capacity of the rotor. The rotor's limiting temperature is considerably higher than its continuous operating temperature. For this reason, the permissible run-up time for the motor at operating temperature is normally only slightly shorter than when the motor is cold.

The version of the CET3 for warm starting permits the utilization of the characteristics of large motors in that the time/current curve is changed for the run-up that follows uninterrupted operation during a specified period of time. The time/current curve remains unchanged if switching-off and running-up take place before the elapse of the specified operating period. Thus, the motor can not be damaged by fast and repetitive run-up cycles.

Also, the time/current curve change is limited in time; the standard curve is enabled 3 minutes after the motor has been switched on again.

Selection Of The CET3 For Warm Starting

The following motor data must be known:

- rated operating current
- blocking current
- permissible blocking time from cold condition
- permissible blocking time from the operating temperature condition
- permissible number of starts per hour

The rated operating current and the tripping time are adjusted on the CET3 at start-up in the normal manner.

The permissible "warm" blocking time is converted to a percentage of the "cold" blocking time. The associated operating duration in minutes is determined from the permissible number of starts per hour. Both values must be set on the CET3 at the factory and therefore must be specified when ordering.

Contact your nearest Sprecher + Schuh Sales Office for complete details on applying the CET3 in Solid-State (Smooth) & Warm Starting applications.