CT220 COUNTER
USER MANUAL

NORTECH
A division of Electromatic (PTY) Ltd

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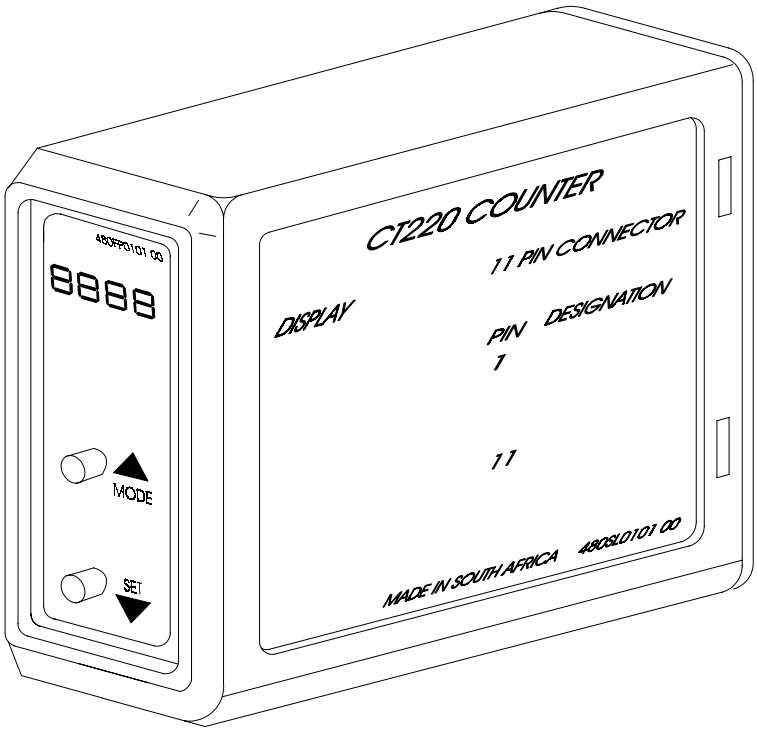
SAFETY PRECAUTION : - Ensure that Electric Power has been turned off before opening the unit.

1. INTRODUCTION

The CT220 Counter is a microprocessor based sequential counter module designed using the most up-to-date technology in order to meet the requirements of a vast number of counting applications.

The integral electronics are buffered and isolated from a possible hostile external environment using optically coupled devices on the inputs and a heavy duty switching relay on the output.



Extensive filtering on the inputs ensures immunity to induced spikes and pulses on the input lines which could otherwise cause erratic operation.

An active memory system ensures that the last count is stored during power failures of relatively long duration.

The front panel controls enable the operator to single step the counter up or down, or to rapidly arrive at a required count by setting each digit individually. The controls also allow for the output relay to be manually overridden in either the **Full** or **Space** modes. The visual output is achieved with a four digit, seven segment display which clearly indicates current modes of operation and total counts.

2. TECHNICAL DATA

2.1 Functional Data

Input Protection	Optical Isolation 2500VRMS Isolation Voltage
Spike Filter	On all inputs. Protects against induced voltages on long input lines
Output Relay	5A @ 230V AC
Input Actuation	By contact closure.
Input Signal	Absolute minimum duration: 50ms Absolute maximum duration: no limit
Display	Four digit, 7-segment LED display Character height = 10mm Maximum count: 9999
Output	Relay energises on 0001 to 0000 transition. Relay de-energises on 0000 to 0001 transition Relay has manual override
Controls	Two pushbuttons Extra functions operate after 1 sec actuation
Memory	Retains last data prior to a power failure Duration (Min): 1 hour Duration (Typ): 1 day

2.2 Electrical Data

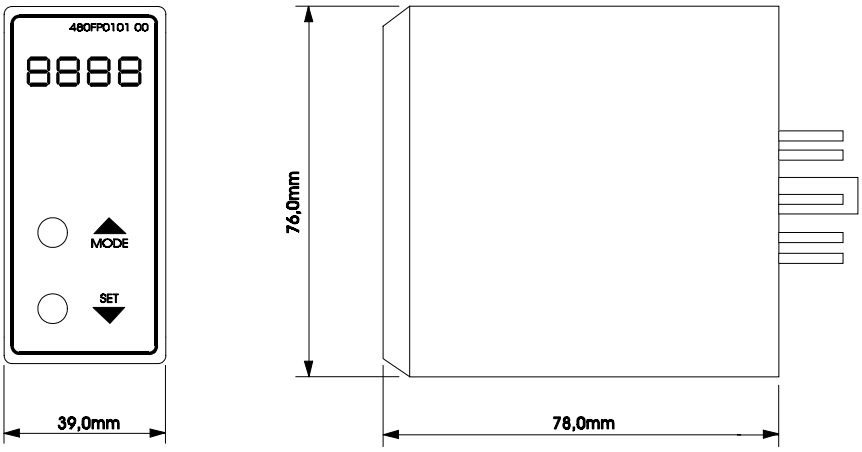
Power requirements	12 - 24V AC/DC (CT224) 120V AC ± 15% (48 to 60Hz) 230V AC ±15 % (48 to 60Hz) Requirement: 1.5 VA Maximum @ 230V

2.3 Environmental Data

Storage Temperature	-40°C to +85°C
Operating Temperature	-40°C to +65°C
Humidity	Up to 95% relative humidity without condensation
Circuit protection	Conformal coating over the PCB and all components

2.4 Mechanical Data

Housing Material	ABS blend
Mounting Position	Shelf or DIN rail mounting
Connections	11-pin submagnal type (86CP11)
Size of Housing	78mm (H) X 39mm (W) X 78mm (D)



3. OPERATING CONTROLS

3.1 Hardware Set-up

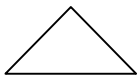
The CT220 Counter is designed to be shelf or DIN rail mounted with the controls and display at the front and wiring at the rear of the enclosure.

The power, input lines and relay outputs are all connected to the single 11-pin plug which is mounted at the rear of the enclosure.

3.2 Controls

The controls consist of 2 pushbutton switches situated on the front of the unit. These are the up (MODE) key and the down (SET) key.

3.2.1 The Up (MODE) Key



MODE

The Up key is used to step the count up by one. This is done by pressing the key (< 1sec). The second function of this key is the **MODE** function and is obtained by holding down the key for longer than one second. By doing this the following 3 modes may be selected:

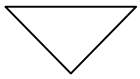
The first mode is the full (**FULL**) mode. In this mode the relay output is overridden to be permanently energised to show a full condition. The count is not visible while this mode is in operation although the unit continues to maintain the count status.

The second mode is the space (**SPCE**) mode. In this mode the relay output is overridden to be permanently de-energised to show a space condition. The count is not visible while this mode is in operation although the unit continues to maintain the count status.

The third mode (which is the default mode on start-up) is the automatic (**AUTO**) mode. When set to this mode the unit will display "**AUTO"** for 5 seconds after which the actual count value is permanently displayed. In this mode the output relay is automatically controlled and is dependant on the count value. A transition from a 0001 count to a 0000 count results in the output relay being energised and the display begins to alternately flash between **FULL** and the count value (which will show a negative value for any further down counts). The relay remains energised for the duration of the negative count and only de-energises on the transition from a 0000 count to a 0001 count. At this point the display stops flashing and returns to showing the actual count value.

The third function of the Up key is the **RESET** function. If the Up key is pressed for longer than 3 seconds, the unit will reset to a count of 0001.

SET

3.2.2 The Down (SET) Key 

The Down key is used to step the count down by one. This is done by pressing the key (< 1sec). The second function of this key is the **SET** function and is obtained by holding down the key for longer than one second. This option allows the operator to set each individual digit separately. Due to the large capacity of the counter (9999 counts) the set function is used to pre-set the counter without the operator having to step up through the counts manually.

When the Down key is pressed for longer than one second, the first digit (units) begins to flash. While it is flashing the Up and Down keys may be used to alter the value of the digit by short presses (< 1sec). If no keys are pressed for 5 seconds the display returns to normal. If however the set key is held down again for longer than 1 second the next digit (tens) begins to flash. This digit may then be altered. The same may be done for the next two digits (hundreds and thousands). If at any time no key is pressed for 5 seconds the display returns to normal and the counter returns to normal operation. This may also be achieved if the set key is held down for longer than 1 second while on the thousands digit (if this method is used, the counter stores the current count value, which may be retrieved using the **restore** function).

The third function of the Down key is the **RESTORE** function. If the Down key is pressed for longer than three seconds, the stored value (as mentioned above) is retrieved and the count is set to this value.

3.3 Front Panel Display

The front panel display is a red (LED), four digit, seven segment display. The display shows counts from -999 to 9999 as well as the modes of operation (FULL, SPCE and AUTO).

4. OPERATING INSTRUCTIONS

4.1 Operating Instructions

STEP 1

Pre-set the display to the desired number by using the **Up** and **Down** keys together with the **SET** function. This may be done by either stepping the count up or down in single steps, or selecting the count by setting each individual digit.

STEP 2

The internal relay energises when the display indicates a zero count and remains energised while the count is zero or negative. At this point the display flashes between "**FULL**" and the actual count value. The display and the relay return to normal when a positive count of 0001 is reached. In order to manually override the relay, the mode function may be used to place the unit in **FULL** or **SPCE** modes.

NOTE:

The unit has a built-in memory which will remember the count during a power failure. The memory will hold the count for at least 1 hour. (Typically 1 day).

The control pushbuttons and inputs, as well as the display are disabled during a power failure and the relay remains in the **SPCE** condition.

5. CONFIGURATION

5.1 CT221 Counter

11-pin connector wiring

Pin	Colour	Designation	
1	Red	Live	120V AC input
2	Black	Neutral	50/60 Hz
3	Grey	Add Input 1	
4	Violet	Add Input 2	
5	Yellow	Output Relay N/O	
6	Brown	Output Relay Common	
7	Blue	Subtract Input 1	
8	Blue	Subtract Input 2	
9	Green	Common	
10	Pink	Output Relay N/C	
11	-	Not Used	

5.2 CT222 Counter

11-pin connector wiring

Pin	Colour	Designation	
1	Red	Live	230V AC input
2	Black	Neutral	50/60 Hz
3	Grey	Add Input 1	
4	Violet	Add Input 2	
5	Yellow	Output Relay N/O	
6	Brown	Output Relay Common	
7	Blue	Subtract Input 1	
8	Blue	Subtract Input 2	
9	Green	Common	
10	Pink	Output Relay N/C	
11	-	Not Used	

5.3 CT224 Counter

11-pin connector wiring

Pin	Colour	Designation	
1	Red	Live	12 - 24V
2	Black	Neutral	AC/DC
3	Grey	Add Input 1	
4	Violet	Add Input 2	
5	Yellow	Output Relay N/O	
6	Brown	Output Relay Common	
7	Blue	Subtract Input 1	
8	Blue	Subtract Input 2	
9	Green	Common	
10	Pink	Output Relay N/C	
11	-	Not Used	

6. FEATURES

Suitable for floor counting or total capacity count

Integral Power Supply available in standard 230V and 110V AC and a universal 12-24V AC/DC option

Large, clear uncomplicated digital display.

Full memory retention of count even during extended power breaks.

Long life expectancy.

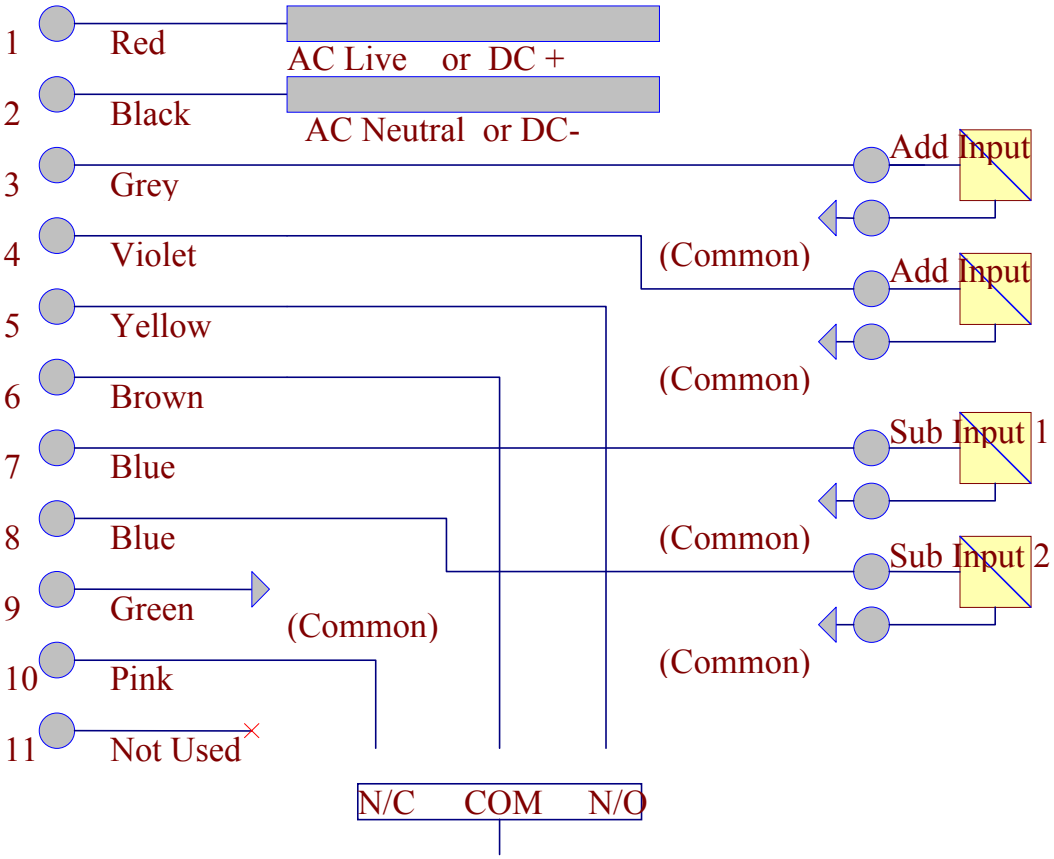
Buffered and Filtered Inputs.

Manual override for output relay.

7. CUSTOMER FAULT ANALYSIS

FAULT	CAUSED BY	REMEDY
Display does not glow on power up.	If the display is off then there is a fault on the power connection to the unit.	Check power feed to the unit.
Add and Subtract inputs not working or erratic.	Different earth potentials at counter and remote unit. External Input signals not long enough.	Use separate lead from pin 9 on the counter (Earth/Common) to Common on the remote. Ensure Input signals are at least 50ms in duration.

8. CT220 COUNTER - WIRING SCHEMATIC



Note:

- ADD and SUBTRACT inputs :- Under all conditions, a separate lead must be run from pin 9 on the counter to the common on the remote point control contact.
- All count inputs are protected against false counting by induced spikes and therefore require an input signal of greater than 50ms duration in order to open the respective counting gate.