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THE 1/16 DIN TIMER

MODEL C48T INSTRUCTION MANUAL

INTRODUCTION

The C48 Timer (C48T) is a multi-purpose series of industrial control products that are field-programmable for solving various applications. This series of products is built around the concept that the end user has the capability to program different personalities and functions into the unit in order to adapt to different indication and control requirements.

The C48T unit, which you have purchased, has the same high quality workmanship and advanced technological capabilities that have made Red Lion Controls the leader in today's industrial market.

Red Lion Controls has a complete line of industrial indication and control equipment, and we look forward to servicing you now and in the future.

CE

and

UL Recognized Component,
File #E137808

CAUTION:
Read complete instructions prior to installation and operation of the unit.

CAUTION:
Risk of electric shock.

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GENERAL DESCRIPTION

The Model C48 Timer is available in Single or Dual Preset models. The C48T features a 7 segment, 2 line by 6 digit reflective or backlit LCD display. For the backlit versions, the main display line is red and shows the timer value. The smaller secondary display line is green and can be used to view the preset values or output time values.

The C48 Timer can be configured for a variety of different operating modes to meet most timing application requirements. Twelve timing ranges are available from thousandths of a second to hours and minutes. Decimal Points are used to separate the time units (hours, minutes, seconds). Timing can be cumulative or can reset and start upon each power cycle. “On Delay” or “Off Delay”, “Single Shot”, and “Repetitive auto cycling” modes are all supported.

Four front panel push-buttons are used for programming the operating modes and data values, changing the viewed display, and performing user programmable functions, e.g. reset, etc. The C48T can be configured for one of two numeric data entry methods, digit entry or automatic scrolling. The digit entry method allows for the selection and incrementing of digits individually. The automatic scrolling method allows for the progressive change of one through all digit positions by pressing and holding the “up” or “down” button.

The C48 Timer has a Run/Stop Input, 3 programmable User Inputs, and a programmable front panel function key. The Run/Stop and User Inputs can be configured as sinking (active low) or sourcing (active high) inputs via a single plug jumper. The following functions are available for user inputs and the front panel function key:

Reset	Print Request
Store and Reset	Change Display
Program Disable	Reset Outputs
Store	

The Dual Preset models are available with solid-state or Relay outputs. The Single Preset model has a solid-state and relay output in parallel. All solid-state outputs are available in a choice of NPN current sinking or PNP current sourcing, open-collector transistor outputs.

The Timer can also be configured to Continue or Stop timing upon reaching Preset. The display can be programmed to stop at the preset value (Reset to Zero mode) or zero (Reset to Preset mode), or automatically reset to zero or preset and hold. Once stopped, the timer can be restarted by manually resetting it, or it can be programmed to restart when power is reapplied.

Optional RS485 serial communication capabilities allow for interrogation and modification of the preset and timer values.

Optional programming software (SFC48) is available to program all unit configuration parameters. The software allows unit configurations to be created, uploaded, downloaded, and saved to a file for later use or multi-unit programming.

The unit is constructed of a lightweight, high impact plastic case with a textured front panel and a clear display window. When properly installed, the front panel meets NEMA 4X/IP65 specifications for indoor use. Multiple units can be stacked horizontally or vertically. Modern surface-mount technology, extensive testing, plus high immunity to noise interference makes the C48 Timers extremely reliable in industrial environments.

Safety Summary

All safety related regulations, local codes and instructions that appear in the manual or on equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Do not use this unit to directly command motors, valves, or other actuators not equipped with safeguards. To do so, can be potentially harmful to persons or equipment in the event of a fault to the unit.

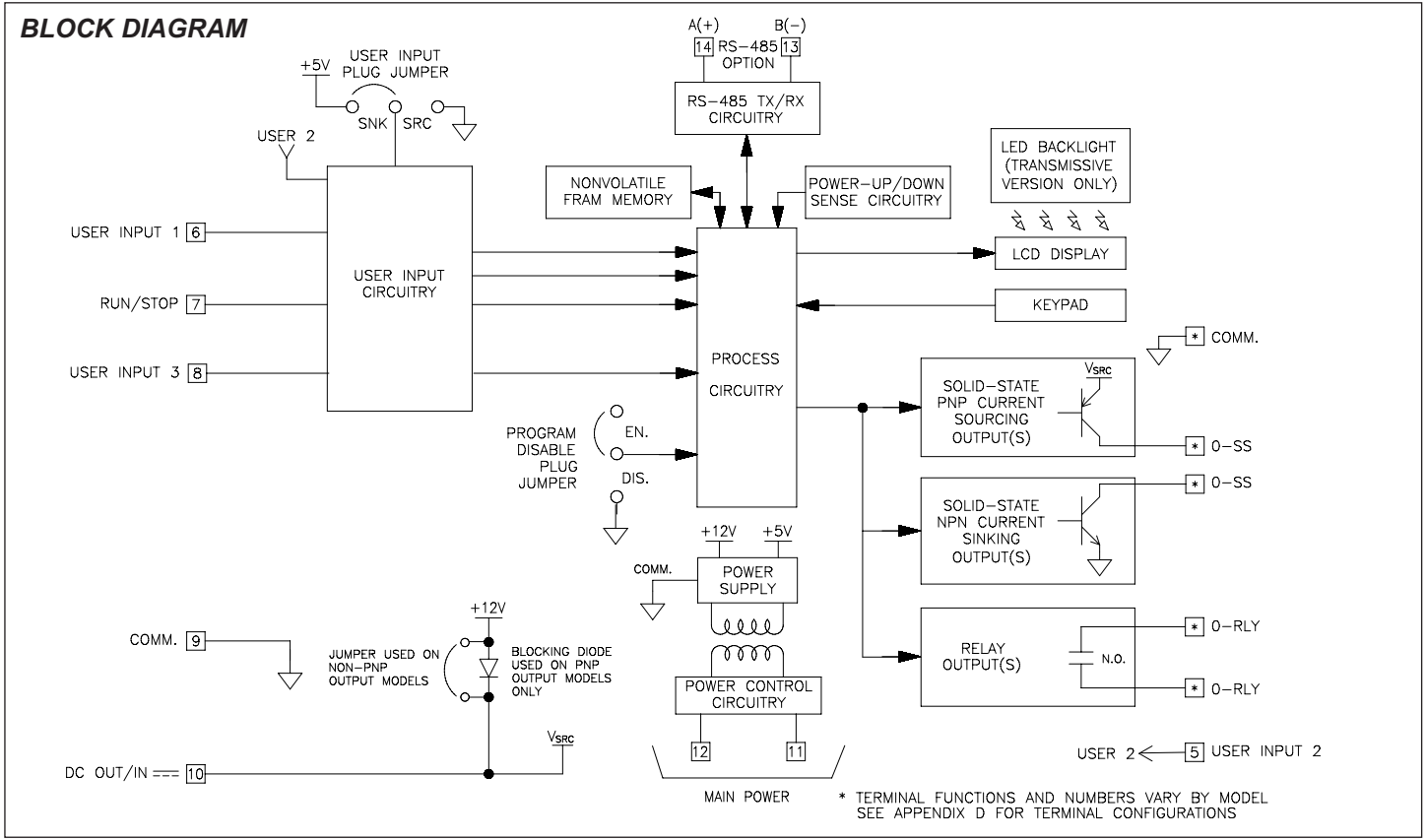


Figure 1, Block Diagram

INSTALLATION & CONNECTIONS

The C48 Timer meets NEMA 4X/IP65 requirements for indoor use to provide a watertight seal in steel panels with a minimum thickness of 0.09 inch, or aluminum panels with a minimum thickness of 0.12 inch. The units are intended to be installed into an enclosed panel. The complete unit assembly (i.e. PC boards and bezel), MUST be in the case when mounting the unit.

Multiple Unit Stacking

The C48T is designed for close spacing of multiple units. Units can be stacked either horizontally or vertically. For vertical stacking, install the panel latch with the screws to the sides of the unit. For horizontal stacking, the panel latch screws should be at the top and bottom of the unit. The minimum spacing from center line to center line of units is 1.96" (49.8 mm). This spacing is the same for vertical or horizontal stacking.

Note: When stacking units, provide adequate panel ventilation to ensure that the maximum operating temperature range is not exceeded.

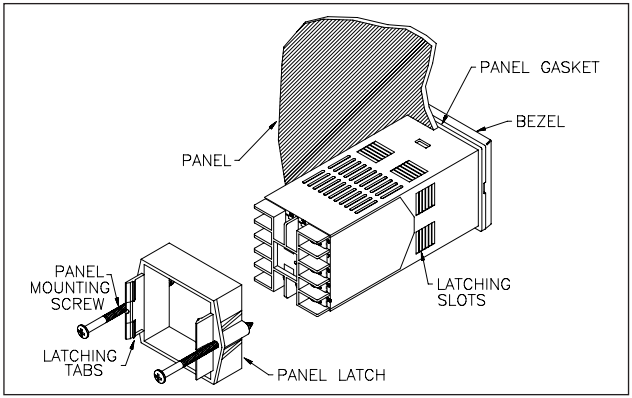


Figure 2, Panel Installation

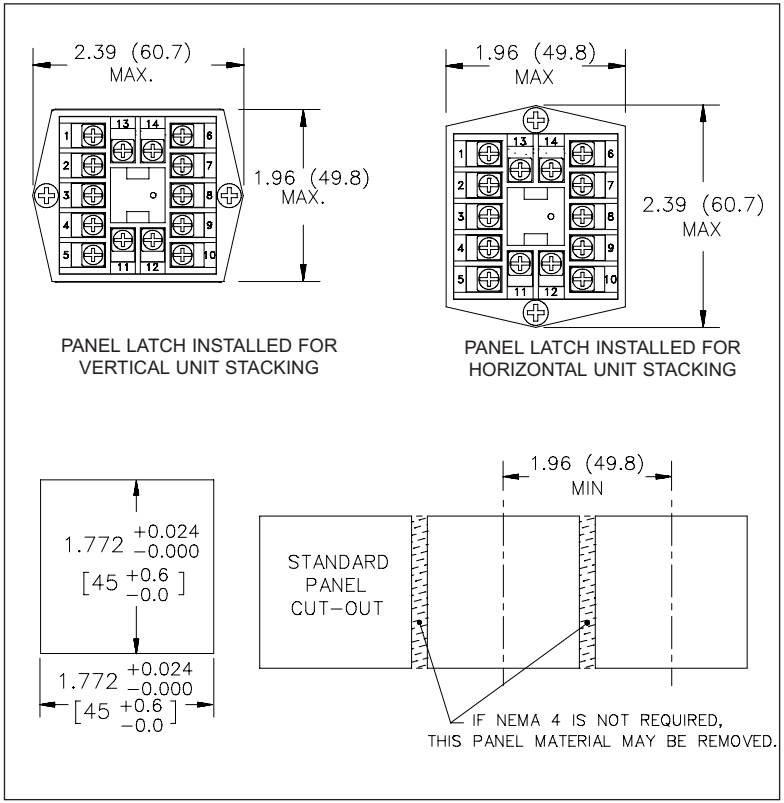


Figure 3, Multiple Unit Stacking

Mounting Instructions

1. Prepare the panel cutout to the dimensions shown in Figure 3, Multiple Unit Stacking.
2. Remove the panel latch from the unit. Discard the cardboard sleeve.
3. Carefully remove the center section of the panel gasket and discard. Slide the panel gasket over the unit from the rear, seating it against the lip at the front of the case.
4. Insert the unit into the panel cutout. While holding the unit in place, push the panel latch over the rear of the unit, engaging the tabs of the panel latch in the farthest forward slot possible.
5. To achieve a proper seal, tighten the panel latch screws evenly until the unit is snug in the panel, torquing the screws to approximately 7 in-lbs. Overtightening can result in distortion of the panel, and reduce the effectiveness of the seal.

Note: The installation location of the timer is important. Be sure to keep it away from heat sources (ovens, furnaces, etc.), and away from direct contact with caustic vapors, oils, steam, or any other process by-products in which exposure may affect proper operation.

Caution: Disconnect power to the unit and to the output control circuits to eliminate the potential shock hazard when removing the entire unit or unit assembly.

Unit Removal Procedure

To remove the entire unit (with case) from the panel, first loosen the panel latch screws. Insert flat blade screwdrivers between the panel latch and the case on either side of the unit, so that the latches disengage from the grooves in the case. Push the unit through the panel from the rear.

Removing Unit Assembly

The unit assembly, shown in Figure 4, must be removed from the case to change plug jumper settings or to replace the relay output board. To remove the unit assembly, insert a flat blade screwdriver into the pry slot on either side of the unit. Twist the screwdriver handle until the unit is ejected enough to allow removal.

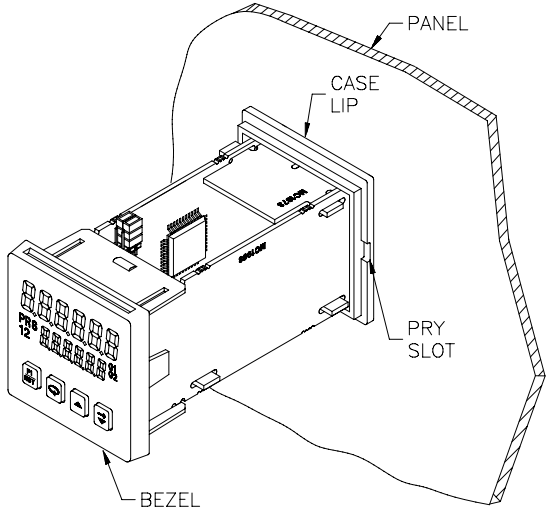


Figure 4, Unit Assembly

Caution: The unit assembly contains electronic circuits that can be damaged by static electricity. Before removing the assembly, discharge static charge on your body by touching an earth ground point. It is also important that the unit assembly be handled only by the bezel. Additionally, if it is necessary to handle a circuit board, be certain that hands are free from dirt, oil, etc., to avoid circuit contamination that may lead to malfunction. If it becomes necessary to ship the unit for repairs, place the unit in its case before shipping it.

Installing Unit Assembly

To install the unit assembly, insert the assembly into the case until the bezel is fully seated against the lip of the case. Properly installing the unit assembly is necessary for watertight sealing.

Output Board

The C48T is supplied with an output board installed. The output board is preconfigured for the type of output needed, based upon the Model ordered. See Ordering Information, page 35, for available models. All relay output boards are field replaceable.

Replacing Relay Output Board

1. Remove the unit assembly. (See Removing Unit Assembly, page 4).
2. Lift up on the top bezel board latch while gently pulling out on the bezel/display board assembly. Do NOT remove the display board from the bezel.
3. Remove the output board by pulling it away from the other boards. Replace the output board by aligning the board to board connectors. Be certain connectors are fully mated.
4. Connect the bezel/display board assembly by guiding the board ends into the bezel latches. Slide the assembly on evenly until the display board connector is completely engaged and bezel latches are fully seated onto the boards.

Note: When replacing the relay output board, be certain to install a new output board of the same type.

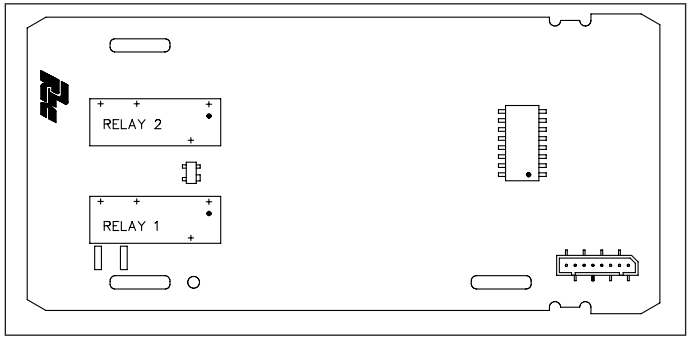


Figure 5, Relay Output Board

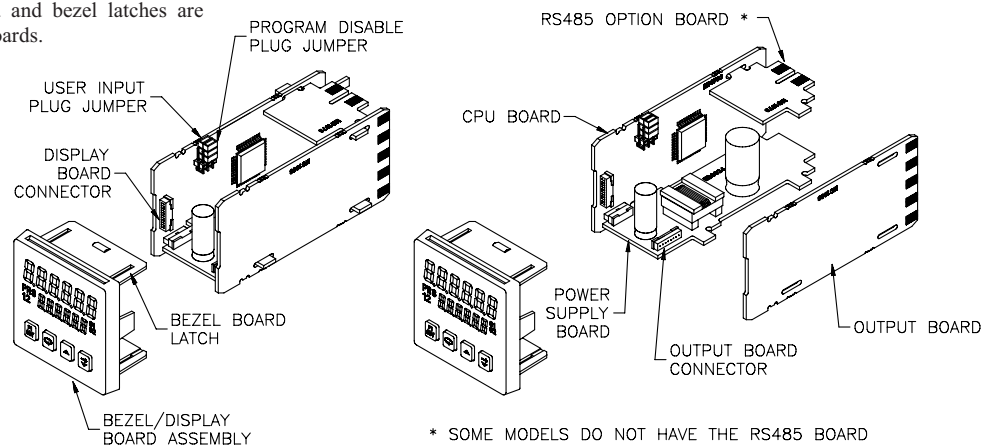


Figure 6, Relay Output Board Replacement

EMC INSTALLATION GUIDELINES

Although this unit is designed with a high degree of immunity to ElectroMagnetic Interference (EMI), proper installation and wiring methods must be followed to ensure compatibility in each application. The type of the electrical noise, source or coupling method into the unit may be different for various installations. The unit becomes more immune to EMI with fewer I/O connections. Cable length, routing and shield termination are very important and can mean the difference between a successful installation or a troublesome installation. Listed below are some EMC guidelines for successful installation in an industrial environment.

1. The unit should be mounted in a metal enclosure, that is properly connected to protective earth.
2. Use shielded (screened) cables for all Signal and Control inputs. The shield (screen) pigtail connection should be made as short as possible. The connection point for the shield depends somewhat upon the application. Listed below are the recommended methods of connecting the shield, in order of their effectiveness.
   a. Connect the shield only at the panel where the unit is mounted to earth ground (protective earth).
   b. Connect the shield to earth ground at both ends of the cable, usually when the noise source frequency is above 1 MHz.
   c. Connect the shield to common of the unit and leave the other end of the shield unconnected and insulated from earth ground.
3. Never run Signal or Control cables in the same conduit or raceway with AC power lines, conductors feeding motors, solenoids, SCR controls, and heaters, etc. The cables should be run in metal conduit that is properly grounded. This is especially useful in applications where cable runs are long and portable two-way radios are used in close proximity or if the installation is near a commercial radio transmitter.
4. Signal or Control cables within an enclosure should be routed as far away as possible from contactors, control relays, transformers, and other noisy components.
5. In extremely high EMI environments, the use of external EMI suppression devices, such as ferrite suppression cores, is effective. Install them on Signal and Control cables as close to the unit as possible. Loop the cable through the core several times or use multiple cores on each cable for additional protection. Install line filters on the power input cable to the unit to suppress power line interference. Install them near the power entry point of the enclosure. The following EMI suppression devices (or equivalent) are recommended:
   Ferrite Suppression Cores for signal and control cables:
   Fair-Rite # 0443167251 (RLC #FCOR0000)
   TDK # ZCAT3035-1330A
   Steward #28B2029-0A0
   Line Filters for input power cables:
   Schaffner # FN610-1/07 (RLC #LFIL0000)
   Schaffner # FN670-1.8/07
   Corcom #1VR3
   Note: *Reference manufacturer's instructions when installing a line filter.*
6. Long cable runs are more susceptible to EMI pickup than short cable runs. Therefore, keep cable runs as short as possible.
7. Switching of inductive loads produces high EMI. Use of snubbers across inductive loads suppresses EMI.
   Snubbers:
   RLC #SNUB0000

Wiring Connections

All conductors should meet voltage and current ratings for each terminal. Also cabling should conform to appropriate standards of good installation, local codes and regulations. It is recommended that power supplied to the unit (AC or DC) be protected by a fuse or circuit breaker.

After the unit has been mechanically mounted, it is ready to be wired. All wiring connections are made to rear screw terminals. When wiring the unit, use the numbers on the label and those embossed on the back of the case, to identify the position number with the proper function (See page 35, for terminal descriptions). Strip the wire, leaving approximately 1/4″ (6 mm) bare wire exposed (stranded wires should be tinned with solder). Insert the wire under the clamping washer and tighten the screw until the wire is clamped tightly.

Caution: Unused terminals are NOT to be used as tie points. Damage to the timer may result if these terminals are used.

POWER WIRING

AC Versions (C48TXX0X)

AC Power Wiring

Primary AC power is connected to terminals 11 and 12, labeled AC. To reduce the chance of noise spikes entering the AC line and affecting the timer, an AC feed separate from that of the load should be used to power the timer. Be certain that the AC power to the timer is relatively "clean" and within the specified range. Connecting power from heavily loaded circuits or circuits that also power loads that cycle on and off, (contacts, relays, motors, etc.) should be avoided.

DC Power Wiring (Non PNP Output models)

The DC power is connected to terminals 9 & 10, marked COMM. and DC OUT/IN. The DC power source must be capable of supplying the unit's rated current (150 mA max.) and be within the specified 11 to 14 VDC range. The C48T has non-volatile memory, that stores information on power down, thereby eliminating the need for battery back-up.

Note: AC versions with PNP outputs cannot be powered from DC.

Caution: Observe proper polarity when connecting DC voltages. Damage to the unit will occur if polarity is reversed.

DC Versions (C48TXX1X)

DC power (18 to 36 VDC) or low voltage AC power (24 VAC) is connected to terminals 11 and 12, labeled DC+ (AC) and DC- (AC) respectively.

Output Power

For DC/ Low Voltage units that do not have PNP current sourcing outputs, Terminal 10, DC OUT (V_{SRC} IN), provides a DC output for sensor power (+12 VDC +/-15%). The maximum sensor current is 100 mA.

For units with PNP current sourcing outputs, this terminal serves a dual purpose depending on the application's PNP output voltage level and current requirements.

1. The terminal may be used as a +12 VDC output for sensor power. In this case, the PNP output voltage level will be +12 VDC (±15%). A maximum of 100 mA is available for the combination of sensor current and PNP output sourcing current.
2. If a higher PNP output voltage level or additional output sourcing current is desired, an external DC supply may be connected between the "DC OUT (V_{SRC} IN)" and "COMM." terminals. This supply will determine the PNP output voltage level, and must be in the range of +13 to +30 VDC.

   An external DC supply can also provide the additional output sourcing current required in applications where two or more PNP outputs are "ON" simultaneously. However, the maximum current rating of 100 mA per individual output must not be exceeded, regardless of external supply capacity.

Serial Communications Wiring

It is recommended that shielded (screened) cable be used for serial communications. This unit meets the EMC specifications using Alpha #2404 cable or equivalent. There are higher grades of shielded cable, such as, four conductor twisted pair, that offer an even higher degree of noise immunity.

Refer to RS-485 Serial Communications, page 24, for wiring and operational procedures.

Run/Stop Input

The RUN/STOP input can be configured as a current sinking (active low) or current sourcing (active high) input using the User Input plug jumper. The timer will RUN when RUN/STOP (terminal #7) is connected to the active logic level. See chart on Page 8, for active and inactive voltage levels for each User Input plug jumper setting.

In some operating modes, the timer will automatically STOP timing when the main output is triggered. (See Timer Operating Modes in the programming section, Page 13.) In these modes, the RUN/STOP input can be used to restart the timer by momentarily taking the input to the STOP state (inactive logic level) and then back to the RUN state (active logic level). Cycling the RUN/STOP terminal, however, will not reset or affect the output(s).

User Inputs

The three external user inputs are programmable inputs that can be configured as current sinking (active low) or current sourcing (active high) inputs via a single plug jumper. Programmable external user inputs are digital inputs. The use of shielded cable is recommended. Follow the EMC Installation Guidelines for shield connection. See User Inputs, page 19, for a description of all available user input functions. The active logic state of ALL user inputs is dictated by the position of the User Input plug jumper. The plug jumper is located on the CPU board (See Figure 9, User Input and Program Disable Jumper Locations).

User Input State	Input Voltage Level for Jumper Position	
	Source	Sink *
Active	Vin > 3.5 VDC	Vin < 1.5VDC
Inactive	Vin < 1.5 VDC	Vin > 3.5VDC

** Factory Setting*

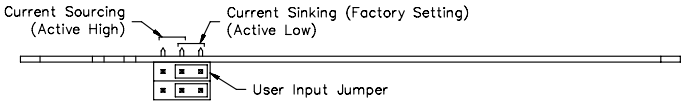


Figure 7, User Input Jumper Settings

OUTPUT WIRING

Relay Connections

To prolong contact life and suppress electrical noise interference due to the switching of inductive loads, it is good installation practice to install a snubber across the contactor. Follow the manufacturer's instructions for installation.

Note: Snubber leakage current can cause some electro-mechanical devices to be held ON.

Program Disable Plug Jumper

The program disable plug jumper is used to enable and disable front panel programming of the C48T. See Front Panel Accessible Functions With Program Disable, page 11, for a description of available functions. The plug jumper is located on the CPU board (See Figure 9, User Input and Program Disable Jumper Locations).

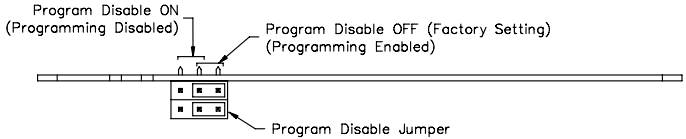


Figure 8, Program Disable Jumper Settings

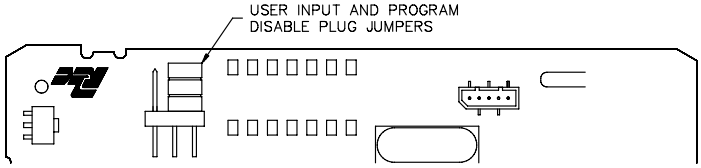


Figure 9, User Input and Program Disable Jumper Locations

FRONT PANEL DESCRIPTION

The front panel bezel material is flame and scratch resistant, textured plastic with clear viewing window that meets NEMA 4X/IP65 requirements, when properly installed. Continuous exposure to direct sunlight might accelerate the aging process of the plastic material used in the bezel. The bezel should be cleaned only with a soft cloth and neutral soap product. Do NOT use solvents.

The display is a dual line, 6 digit LCD. On units with backlighting, the upper Main Display is red and the lower Secondary Display is green.

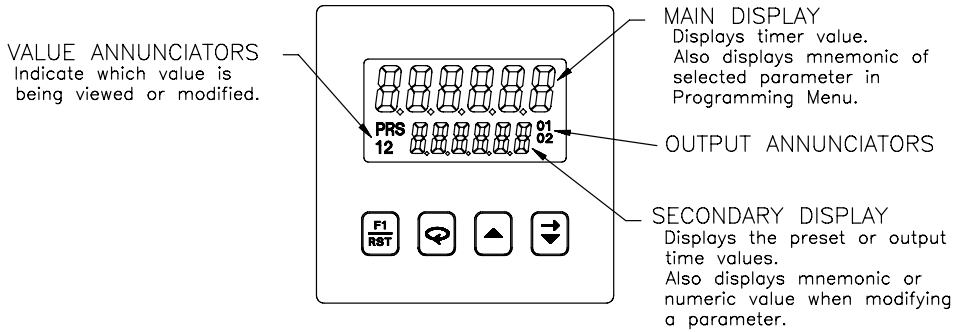


Figure 10 , Front Panel

There are up to five annunciators available in the lower display that illuminate to inform the operator of the timer and output status. See Figure 10, Front Panel, for a description of the annunciators.

Four front panel keys are used to access different modes and parameters. The following is a description of each key.

Do not use tools of any kind (screwdrivers, pens, pencils, etc.) to operate the keypad of this unit.

Keypad Functions

F1 RST - This key is a user programmable key. When the key is pressed, the unit performs the appropriate function as programmed. The RST printing on this key is used as a quick reference for the operator if the function key is selected for a reset function.

- This key is used to access programming, enter changes to data values, and scroll through the available parameters in any mode.

- This key selects the next available mode option during programming. When programming a numerical value in digit entry mode, this key is used to increment the selected digit position. In auto scrolling entry mode, it increments the value. When in the operating mode, this key is pressed to allow changing of the data value viewed in the secondary display.

- When programming a numerical value in digit entry mode, this key accesses the value and selects the digit to the right. In auto scrolling entry mode, it decrements the value. When in the operating mode, this key is pressed to allow changing of the data value viewed in the secondary display.

BASIC OPERATION

Normal Operating Mode

In the normal operating mode, the timer value is shown on the main display. By successively pressing the key, the accessible presets or output time values can be viewed in the secondary display.

Each of these values can be independently programmed to be viewable only, viewable and changeable, or locked (not viewable) in the normal operating mode. If all values are locked, the secondary display will be blank. Only from the normal operating mode can access be gained to the Programming Menu or Protected Value Menu.

Modifying A Secondary Display Parameter From the Front Panel

Secondary display parameters can be modified from the normal operating mode if the Operator Access privileges allow it.

To modify a parameter, it must be viewed in the secondary display. When the parameter to be modified is viewed, press the or key. Leading zeros appear and the least significant digit blinks. The value can now be modified as described in Programming Numeric Data Values, page 12.

Protected Value Menu

The Protected Value Menu allows access to selected presets and output time values without having them viewable or changeable from the main display. To enter the protected menu, the key is pressed and held, and a code value is entered. The Protected Value Menu and the Programming Menu are not available at the same time. See Front Panel Accessible Functions With Program Disable, page 11, for available options.

Access value parameters that are programmed for “P” or “n” are accessible in the Protected Value Menu. Parameters selected as “n” (no) are viewable from the main display, but can only be changed in the protected menu. Parameters selected as “P” (protected) are not viewable from the main display, but can be viewed and changed in the protected menu.

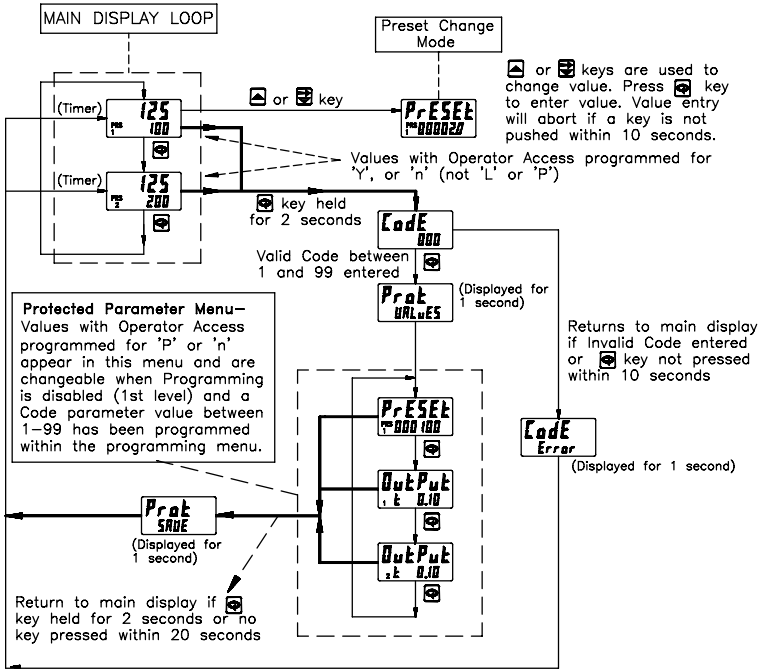


Figure 11, Protected Value Menu

Front Panel Accessible Functions With Program Disable

There are several ways to limit the programming of parameters from the front panel keypad. The Accessible Value parameter is used with the Program Disable plug jumper and an external programmable User Input selected for Pro.d 15 to limit programming. To enter the programming mode, a code number may need to be entered, depending on the Program Disable Setting. Front Panel Function Key F1 cannot be selected for program disable. The following table describes the possible program disabling functions.

PGM.DIS. JUMPER	USER INPUT TERMINAL	PROGRAM CODE NUMBER	PROTECTED VALUE MENU	OPERATOR ACCESS AT MAIN DISPLAY	PROGRAMMING ENABLED	PROGRAM DISABLE LEVEL
OFF (EN)	INACTIVE or Not Programmed for Pro.dis	ALL	No	All displayed values changeable	Yes	None
OFF (EN)	ACTIVE	0	No	Per Access Privileges programmed	No	Level 1
OFF (EN)	ACTIVE	1 to 99	Yes W/code	Per Access Privileges programmed	No	Level 1
OFF (EN)	ACTIVE	100 to 199	No	Per Access Privileges programmed	Yes W/code	Level 1
ON (DIS)	INACTIVE or Not Programmed for Pro.dis	0	No	Per Access Privileges programmed	No	Level 1
ON (DIS)	INACTIVE or Not Programmed for Pro.dis	1 to 99	Yes W/code	Per Access Privileges programmed	No	Level 1
ON (DIS)	INACTIVE or Not Programmed for Pro.dis	100 to 199	No	Per Access Privileges programmed	Yes W/code	Level 1
ON (DIS)	ACTIVE	ALL	No	Viewable only	No	Level 2

PROGRAMMING GENERAL DESCRIPTION

Programming of the C48T is done through the front panel keypad. English language prompts, flashing parameter values, and the front panel keypad aid the operator during programming.

Although the unit has been programmed at the factory, the parameters generally have to be changed to suit the desired application. In order to access the Programming Menu, the Program Disable jumper and/or any User Input programmed for **Prod IS** may need to be turned off or deactivated. When shipped from the factory, all programming is enabled. See Front Panel Accessible Functions With Program Disable, page 11, for program disabling options. With programming enabled, to enter the programming menu, the [⟲] key is pressed and held for two seconds. Once in the programming menu, the [⟲] key is used to sequence through the list of programming parameters. To loop backwards one item in the Programming Menu, press and hold the [⟲] key, then quickly press and hold the [⇉] key while releasing the [⟲] key. Repeatedly pressing the [⟲] key with the [⇉] key held will continue the backwards sequencing.

Programming Option Values

The operator can scroll through the available options for a selected parameter by pressing the [▲] or [⇉] key to enter parameter change mode, and then pressing the [▲] key repeatedly until the desired option is viewed. The option is entered by pressing the [⟲] key, which returns the operator to the Programming Menu.

Programming Numeric Data Values

The Presets and output time values may be accessible when the unit is in the normal operating mode (not programming mode), providing that the Program Disable input is not activated. Pressing the [⟲] key will sequence the secondary display through the available presets and output time values.

To change a numeric data value, it must be visible on the secondary display. Pressing the [▲] or [⇉] key will allow changing of the value. The two methods for changing numeric data values are “digit entry” and “auto scrolling”.

Digit Entry

If the preset entry method has been set to “digit entry”, the least significant digit will blink. Pressing the [⇉] key multiple times will select other digits. Pressing the [▲] key will increment the selected digit. The data value will be entered when the [⟲] key is pushed, or the old value will be retained if no key activity is detected for 10 seconds.

Short-Cut - Decrementing Value

To decrement a digit value, press and hold the [▲] key and then press the [⇉] key. This will decrement the selected digit to zero if held.

Auto Scrolling

If the data entry method is set to “auto scrolling”, the data value can be progressively changed by pressing and holding the [▲] or [⇉] keys. If one of the keys is pushed and held, the value will scroll automatically. After 5 counts, the unit enters fast scroll mode. If a key remains pushed, a digit shift occurs every one hundred counts until the maximum value or zero is reached. When the digit shift occurs, the previously scrolling digit goes to zero. When scrolling at the higher order digit locations, you can switch directions by quickly pressing the other key ([▲] or [⇉]) within a second following the release of previous direction key.

Short-Cut - Quick Digit Shift

To quickly select higher order digits while incrementing or decrementing numeric values (with [▲] or [⇉] held), press and hold the [⟲] key. This sequences the selected digit from the least to the most significant digit. As each digit is passed, it changes to zero. When the desired digit is reached, release the [⟲] key to increment or decrement from the new digit location.

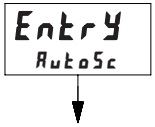
Saving Program

All parameter values changed in programming mode are saved when exiting. To exit programming mode, press and hold the [⟲] key for two seconds. The display will momentarily display **Prog SAVE** while the parameter values are saved in non-volatile memory. The unit then returns to the indication display that was last viewed.

USER INTERFACE/PROGRAMMING MODES

The operating modes of the C48T are programmed using the front panel keypad. (See page 12, for details on using the keypad to program the unit) Accessibility to the Programming Menu depends on the Program Disable Function setting (See page 11, for available program disable settings).

PROGRAMMING MENU



Numeric Value Entry Method

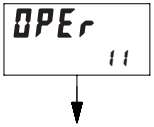
Configures push button response for entering numeric data values such as Presets and Output Times

MODE	DESCRIPTION
AutoSc	The auto scrolling method allows pressing and holding the “up” or “down” keys to progressively change all digits of the data value, similar to incrementing or decrementing a counter.
digit	The digit entry method allows the selecting and incrementing of each numeric digit on an individual digit-by-digit basis.

Timer Range

The timer range determines the time units to be used.

MODE	RANGE	RESOLUTION
SEC.000	999.999 Seconds	0.001 sec
SEC.00	9999.99 Seconds	0.01 sec
SEC.0	99999.9 Seconds	0.1 sec
SEC	999999 Seconds	1 sec
n.000	999.999 Minutes	0.001 min
n.00	9999.99 Minutes	0.01 min
n.0	99999.9 Minutes	0.1 min
n.SEC	9999.59 Minutes.Seconds	1 sec
n.SEC.0	999.59.9 Minutes.Seconds.0	0.1 sec
hn.SEC	99.59.59 Hours.Minutes.Seconds	1 sec
hn.00	99.59.99 Hours.Minutes.00	0.01 min
hn.0	999.59.9 Hours.Minutes.0	0.1 min
hn	9999.59 Hours.Minutes	1 min
h.00	9999.99 Hours	0.01 hr
h.0	99999.9 Hours	0.1 hr
h	999999 Hours	1 hour



Timer Operating Mode

The charts on the following pages, show operating modes for the Single Preset and Dual Preset Timer Models. In the descriptions below, the “Main Preset” or “Output” refers to “Preset 1” or “Output 1” on the Single Preset Model. On the Dual Preset Model it refers to “Preset 2” or “Output 2”.

Reset Type:

Auto - Unit automatically resets as programmed, when timer triggers main preset’s output or at it’s timed output end.

Manual - Unit does not reset when timer triggers main preset’s output or at it’s timed output end. The timer value can be manually reset by a User Input or by Serial Communications command.

Reset to:

Zero - When reset (manually or automatically) timer value goes to zero. The Main Preset Output is triggered when timer value reaches main Preset Value.

Preset - When reset (manually or automatically), the main Preset value is loaded into the timer value. The main Preset Output is triggered when timer value reaches zero.

At Timed Output End:

When this mode is selected, Auto Reset occurs when the main preset’s Output time elapses and the main output deactivates. If not selected, Auto reset occurs when the main output is triggered.

Continue Timing at Main Output:

The timer continues timing when main output is triggered. To stop timing, the “Run/Stop” terminal is put into the “Stop” state. This mode is useful for repetitive, auto-cycling applications.

Stop Timing at Main Output:

The timer will stop when the main preset’s output is triggered. To resume timing, a manual reset (User Input - rSt-E) is performed, which resets the output and the stop condition. The Run/Stop input can also be used to restart the timer by putting it in the “Stop” state and then back to the “Run” state. Cycling the Run/Stop however, will not reset or affect any outputs. This mode is used to provide “one-shot” capability.

Output 1: (Main Output for Single Preset Model)

Latched - When Output 1 activates it stays activated or latched until it is manually reset.

Timed - When Output 1 is activated it stays activated for the time specified by the Output 1 Time Value. Output 1 deactivates after the Output 1 time elapses.

O1 Off at O2: (Dual Preset only)

Output 1 activates at Preset 1. It deactivates when Output 2 is activated. (Does not apply to activation from Serial command.)

Output 2: (Dual Preset Model only; Main Output)

Operates similarly to Output 1 Latched and Timed modes.

SINGLE PRESET OPERATING MODES

Use either of the two charts on this page for more information on specific operating modes.

SINGLE PRESET OPERATING MODES	
1	- Continue Timing at 01, Manual Reset to Zero, Latched Output
2	- Continue Timing at 01, Manual Reset to Zero, Timed Output
3	- Continue Timing at 01, Manual Reset to Preset 1, Latched Output
4	- Continue Timing at 01, Manual Reset to Preset 1, Timed Output
5	- Continue Timing at 01, Auto Reset to Zero, Timed Output
6	- Continue Timing at 01, Auto Reset to Preset 1, Timed Output
7	- Continue Timing at 01, Auto Reset to Zero at 01 End, Timed Output
8	- Continue Timing at 01, Auto Reset to Preset 1 at 01 End, Timed Output
9	- Stop Timing at 01, Manual Reset to Zero, Latched Output
10	- Stop Timing at 01, Manual Reset to Zero, Timed Output
11	- Stop Timing at 01, Manual Reset to Preset 1, Latched Output
12	- Stop Timing at 01, Manual Reset to Preset 1, Timed Output
13	- Stop Timing at 01, Auto Reset to Zero, Latched Output
14	- Stop Timing at 01, Auto Reset to Zero, Timed Output
15	- Stop Timing at 01, Auto Reset to Preset 1, Latched Output
16	- Stop Timing at 01, Auto Reset to Preset 1, Timed Output
17	- Stop Timing at 01, Auto Reset to Zero at 01 End, Timed Output
18	- Stop Timing at 01, Auto Reset to Preset 1 at 01 End, Timed Output

MODE#			RESET TYPE		RESET			OUTPUT 1	
Single Preset Modes	CONTINUE Timing at 01	STOP Timing at 01	Manual	Auto	To Zero	To Preset 1	at Timed Output End	Latched	Timed
1	✓		✓		✓			✓	
2	✓		✓		✓				✓
3	✓		✓			✓		✓	
4	✓		✓			✓			✓
5	✓			✓	✓				✓
6	✓			✓		✓			✓
7	✓			✓	✓		✓		✓
8	✓			✓		✓	✓		✓
9		✓	✓		✓			✓	
10		✓	✓		✓				✓
11		✓	✓			✓		✓	
12		✓	✓			✓			✓
13		✓		✓	✓			✓	
14		✓		✓	✓				✓
15		✓		✓		✓		✓	
16		✓		✓		✓			✓
17		✓		✓	✓		✓		✓
18		✓		✓		✓	✓		✓

DUAL PRESET OPERATING MODES

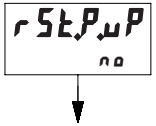
Use either of the two charts on the next two pages for more information on specific operating modes.

DUAL PRESET OPERATING MODES	
1	- Continue Timing at 02, Manual Reset to Zero, Latched Outputs
2	- Continue Timing at 02, Manual Reset to Zero, 01 Timed, 02 Latched
3	- Continue Timing at 02, Manual Reset to Zero, 01 and 02 Timed
4	- Continue Timing at 02, Manual Reset to Zero, 01 off at 02, 02 Latched
5	- Continue Timing at 02, Manual Reset to Zero, 01 off at 02, 02 Timed
6	- Continue Timing at 02, Manual Reset to Preset 2, Latched Outputs
7	- Continue Timing at 02, Manual Reset to Preset 2, 01 Timed, 02 Latched
8	- Continue Timing at 02, Manual Reset to Preset 2, 01 and 02 Timed
9	- Continue Timing at 02, Manual Reset to Preset 2, 01 off at 02, 02 Latched
10	- Continue Timing at 02, Manual Reset to Preset 2, 01 off at 02, 02 Timed
11	- Continue Timing at 02, Auto Reset to Zero, 01 and 02 Timed
12	- Continue Timing at 02, Auto Reset to Zero, 01 off at 02, 02 Timed
13	- Continue Timing at 02, Auto Reset to Preset 2, 01 and 02 Timed
14	- Continue Timing at 02, Auto Reset to Preset 2, 01 off at 02, 02 Timed
15	- Continue Timing at 02, Auto Reset to Zero at 02 End, 01 and 02 Timed
16	- Continue Timing at 02, Auto Reset to Zero at 02 End, 01 off at 02, 02 Timed
17	- Continue Timing at 02, Auto Reset to Preset 2 at 02 End, 01 and 02 Timed
18	- Continue Timing at 02, Auto Reset to Preset 2 at 02 End, 01 off at 02, 02 Timed

MODE#		RESET TYPE		RESET			OUTPUT 1			OUTPUT 2	
Dual Preset Modes	CONTINUE Timing at 02	Manual	Auto	To Zero	To Preset 2	at Timed Output 2 End	Latched	Timed	01 off at 02	Latched	Timed
1	✓	✓		✓			✓			✓	
2	✓	✓		✓				✓		✓	
3	✓	✓		✓				✓			✓
4	✓	✓		✓					✓	✓	
5	✓	✓		✓					✓		✓
6	✓	✓			✓		✓			✓	
7	✓	✓			✓			✓		✓	
8	✓	✓			✓			✓			✓
9	✓	✓			✓				✓	✓	
10	✓	✓			✓				✓		✓
11	✓		✓	✓				✓			✓
12	✓		✓	✓					✓		✓
13	✓		✓		✓			✓			✓
14	✓		✓		✓				✓		✓
15	✓		✓	✓		✓		✓			✓
16	✓		✓	✓		✓			✓		✓
17	✓		✓		✓	✓		✓			✓
18	✓		✓		✓	✓			✓		✓

DUAL PRESET OPERATING MODES		
19	-	Stop Timing at 02, Manual Reset to Zero, Latched Outputs
20	-	Stop Timing at 02, Manual Reset to Zero, 01 Timed, 02 Latched
21	-	Stop Timing at 02, Manual Reset to Zero, 01 and 02 Timed
22	-	Stop Timing at 02, Manual Reset to Zero, 01 off at 02, 02 Latched
23	-	Stop Timing at 02, Manual Reset to Zero, 01 off at 02, 02 Timed
24	-	Stop Timing at 02, Manual Reset to Preset 2, Latched Outputs
25	-	Stop Timing at 02, Manual Reset to Preset 2, 01 Timed, 02 Latched
26	-	Stop Timing at 02, Manual Reset to Preset 2, 01 and 02 Timed
27	-	Stop Timing at 02, Manual Reset to Preset 2, 01 off at 02, 02 Latched
28	-	Stop Timing at 02, Manual Reset to Preset 2, 01 off at 02, 02 Timed
29	-	Stop Timing at 02, Auto Reset to Zero, Latched Outputs
30	-	Stop Timing at 02, Auto Reset to Zero, 01 Timed, 02 Latched
31	-	Stop Timing at 02, Auto Reset to Zero, 01 and 02 Timed
32	-	Stop Timing at 02, Auto Reset to Zero, 01 off at 02, 02 Latched
33	-	Stop Timing at 02, Auto Reset to Zero, 01 off at 02, 02 Timed
34	-	Stop Timing at 02, Auto Reset to Preset 2, Latched Outputs
35	-	Stop Timing at 02, Auto Reset to Preset 2, 01 Timed, 02 Latched
36	-	Stop Timing at 02, Auto Reset to Preset 2, 01 and 02 Timed
37	-	Stop Timing at 02, Auto Reset to Preset 2, 01 off at 02, 02 Latched
38	-	Stop Timing at 02, Auto Reset to Preset 2, 01 off at 02, 02 Timed
39	-	Stop Timing at 02, Auto Reset to Zero at 02 End, 01 and 02 Timed
40	-	Stop Timing at 02, Auto Reset to Zero at 02 End, 01 off at 02, 02 Timed
41	-	Stop Timing at 02, Auto Reset to Preset 2 at 02 End, 01 and 02 Timed
42	-	Stop Timing at 02, Auto Reset to Preset 2 at 02 End, 01 off at 02, 02 Timed

MODE#	STOP Timing at 02	RESET TYPE		RESET			OUTPUT 1			OUTPUT 2	
Dual Preset Modes		Manual	Auto	To Zero	To Preset 2	at Timed Output 2 End	Latched	Timed	01 off at 02	Latched	Timed
19	✓	✓		✓			✓			✓	
20	✓	✓		✓				✓		✓	
21	✓	✓		✓				✓			✓
22	✓	✓		✓					✓	✓	
23	✓	✓		✓					✓		✓
24	✓	✓			✓		✓			✓	
25	✓	✓			✓			✓		✓	
26	✓	✓			✓			✓			✓
27	✓	✓			✓				✓	✓	
28	✓	✓			✓				✓		✓
29	✓		✓	✓			✓			✓	
30	✓		✓	✓				✓		✓	
31	✓		✓	✓				✓			✓
32	✓		✓	✓					✓	✓	
33	✓		✓	✓					✓		✓
34	✓		✓		✓		✓			✓	
35	✓		✓		✓			✓		✓	
36	✓		✓		✓			✓			✓
37	✓		✓		✓				✓	✓	
38	✓		✓		✓				✓		✓
39	✓		✓	✓		✓		✓			✓
40	✓		✓	✓		✓			✓		✓
41	✓		✓		✓	✓		✓			✓
42	✓		✓		✓	✓			✓		✓

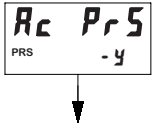


Timer Reset at Power-up

This parameter determines whether or not the timer is reset when power is applied to the unit.

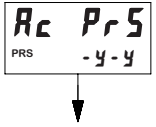
MODE	DESCRIPTION
no	Timer is not reset at power-up. The timer value saved at the previous power-down is restored to the display.
YES	Timer is reset at power-up.

Single Preset Model



-OR-

Dual Preset Model



Access Preset Values

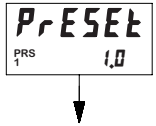
This parameter configures the type of access given to each Preset Value when in normal operating mode and at Program Disable Level 1. The accessibility of each Preset can be individually configured. For more information on Program Disable, see Front Panel Accessible Functions With Program Disable, page 11.

MODE	DESCRIPTION
-L	**Locked**; Preset is not viewable at main display or in Protected Value Menu. The Preset can only be viewed or changed in the Programming Menu.
-P	**Protected Value**; Preset value is viewable and changeable in Protected Value Menu only. It is not viewable at Main Display.
-n	**No**; Preset value is viewable only and not changeable from main display when Programming is Disabled. Value is viewable and changeable in Protected Value Menu.
-y	**Yes**; Preset value is viewable and changeable at main display when at 1st level program disable. Value is not shown in Protected Value Menu.

Programming Keys:

- Selects Preset Value being configured as indicated by the number on the left side of the bottom display line.

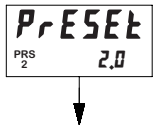
- Changes mode selection for selected Preset.



Preset 1 Value

The Preset 1 value is used to control the activation of Output 1.

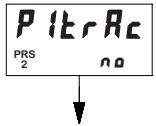
Dual Preset Model



Preset 2 Value (Dual Preset Model only)

The Preset 2 value is used to control the activation of Output 2.

Dual Preset Model

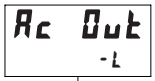


Preset 1 Track Preset 2 (Dual Preset Model only)

This parameter configures whether or not the Preset 1 value tracks or follows the Preset 2 value.

MODE	DESCRIPTION
no	Preset 1 does not track Preset 2
YES	Preset 1 tracks Preset 2 value. When Preset 2 value is changed, the Preset 1 value will change to maintain the same offset. Changing Preset 1 will modify the offset.

Single Preset Model



-OR-

Dual Preset Model

Access Output Time Values

This parameter configures the type of access given to each Output Time Value when in normal operating mode and at Program Disable Level 1. The accessibility of each Output Time Value can be individually configured.

For more details on Program Disable, see the Front Panel Accessible Functions With Program Disable, page 11.

MODE	DESCRIPTION
-L	**Locked**; Output Time Value is not viewable at main display or in Protected Value Menu. The Output Time Value can only be viewed or changed in the Programming Menu.
-P	**Protected Value**; Output Time Value is viewable and changeable in Protected Value Menu only. It is not viewable at Main Display.
-n	**No**; Output Time Value is viewable only and not changeable from main display when Programming is Disabled. Value is viewable and changeable in Protected Value Menu.
-Y	**Yes**; Output Time Value is viewable and changeable at main display when at 1st level program disable. Value is not shown in Protected Value Menu.

Programming Keys:

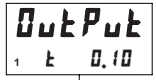
⇉ - Selects Output Time Value being configured as indicated by the number on the left of the bottom display.

▲ - Changes mode selection for selected Output Time Value.

Output Resolution

This parameter configures the timed output resolution for all available Outputs. Use the **0.0 1SEC** resolution if all Output Time Values are below 99.99 seconds.

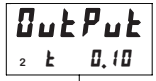
MODE	DESCRIPTION
0.0 1SEC	0.01 Second Output Resolution; Maximum Output time: 99.99 Seconds
0.1 SEC	0.1 Second Output Resolution; Maximum Output time: 999.9 Seconds



Output 1 Time Value

The Output 1 Time Value controls the Output 1 duration, when Output 1 is set for timed mode of operation (**OPEr** parameter). The Output time value range will be 0.01-99.99 Seconds or 0.1-999.9 seconds, depending on the setting of the Output Resolution (**OutrES**) parameter.

Dual Preset Model



Output 2 Time Value (Dual Preset Model only)

The Output 2 Time Value controls the Output 2 duration, when Output 2 is set for timed mode of operation (**OPEr** parameter). The Output time value range will be 0.01-99.99 Seconds or 0.1-999.9 seconds, depending on the setting of the Output Resolution (**OutrES**) parameter.

Single Preset Model

-OR-

Dual Preset Model

Reverse Output Logic

This parameter individually configures whether or not the Output Logic is reversed, for all Preset Outputs.

MODE	DESCRIPTION
-n	**No**; Output Logic is not Reversed. Output / Relay will turn ON at Preset Value or Zero (Reset to Preset modes) and turn OFF when Reset or Output Time expires.
-Y	**Yes**; Output Logic is Reversed. Output / Relay will turn OFF at Preset Value or Zero (Reset to Preset modes)and turn ON when Reset or Output Time expires.

Programming Keys:

⇉ - Selects Output being configured as indicated by the number on the left of the bottom display line.

▲ - Selects Output Logic mode for selected Output.

Single Preset Model

-OR-

Dual Preset Model

Reverse Annunciator Logic

This parameter controls the logic state of the Output Display Annunciators ('01' and '02').

MODE	DESCRIPTION
-n	**No**; Output Annunciator Logic is not Reversed. Output Annunciator will be ON when the Output is ON.
-Y	**Yes;** Output Annunciator Logic is Reversed. Output Annunciator will be ON when the Output is OFF.

Programming Keys:

⇄ - Selects Output Annunciator being configured as indicated by the number on the left side of the bottom display line.

▲ - Selects Output Annunciator Logic for selected Output.

Single Preset Model

-OR-

Dual Preset Model

Output Power-Up State

This parameter controls the Power-Up State of the Outputs.

MODE	DESCRIPTION
-F	**Off;** The output will be off at power-up.
-O	**On**; The output will turn on at power-up.
-P	**Previous State**; For latched output modes only. The output will power-up in the state it was in at power-down. For non-latched modes, the output will power-up in the off state.

Programming Keys:

⇄ - Selects Output being configured as indicated by the number on the left side of the bottom display line.

▲ - Selects Output Power-up state for selected Output.

User Inputs

Three external User Inputs plus the front panel function key are available on the C48 Timer. The parameter list below shows all available user input functions. The Input Pull-Up / Pull-down resistor and Active logic level for all of the User Inputs is configured with the Snk/Src jumper (See page 8).

MODE	DESCRIPTION
StorE	**Store**; When the user input is activated, the main display will 'freeze' and remain frozen until user input is released. See Note 1.
St,S-L	**Store&Reset** (Level Active Reset); When the user input is activated, the timer display will freeze and the internal Timer value will reset. The timer value will be frozen and internally held reset as long as the user input is held active. See Notes 1 and 2.
St,S-E	**Store&Reset** (Edge Triggered Reset); When the user input is activated, the display will freeze and be held until the user input is released. The internal Timer value resets momentarily and then continues to time while the input is held active. If the timer had previously stopped as a result of the timer operating mode (See Timer Operating Mode, page 13), it will restart immediately following the edge triggered reset. See Notes 1 and 2.
rSt. -L	**Reset** (Level Active); When the user input is activated, the timer value and outputs will be reset and held reset until the user input is released. See Note 2
rSt. -E	**Reset** (Edge Triggered); When the user input is activated, the timer value and outputs will be momentarily reset and then continue to time and activate while the input is held active. See Note 2
ChgdSP	**Change Display** (Edge Triggered); When the user input is activated, the secondary display will sequence to the next available value.
Prod,S	**Program Disable** [Level Active] (not available for F1 Key); See page 10 for details of Program Disable options.
dn-L	**Down** (Level Active); (User Input 1 only) When User Input 1 is active, the unit will time down. When User Input 1 is inactive, the unit will time up. This mode is normally not necessary, unless the application requires both up and down timing.