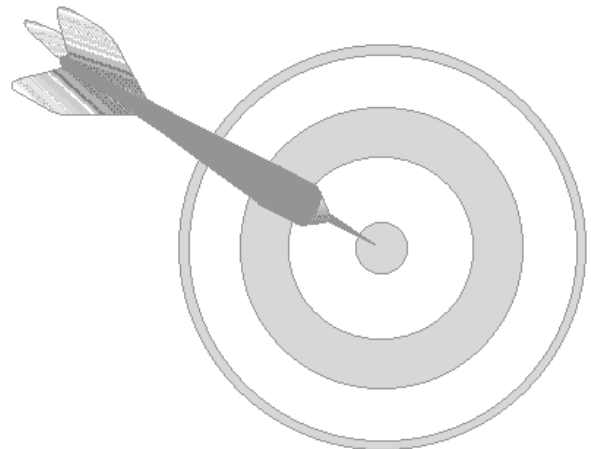


# Digital Hydraulic Pressure Gage

*T-3030 Operating Instructions*



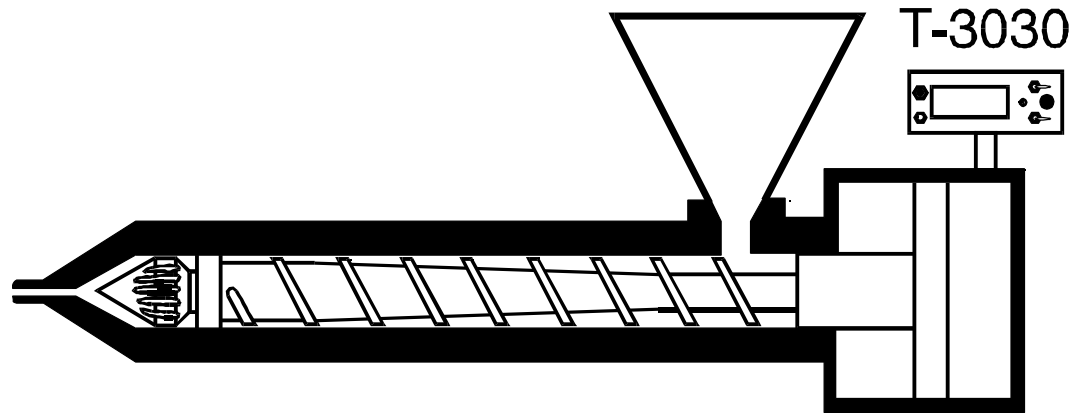
***“We Make Molding Simple!”***

Rev 3.10 01/99

by Janice A. Walters

Filename: K:\Digital Gage\Current\Manual\T-3030 Manual.wpd

## T-3030 Digital Hydraulic Pressure Gage Quick Step Installation & Operation Instructions



1. Install the gage on the injection cylinder of the machine (or at an available port which taps cylinder pressure.)
2. Set the Mode Select switch (Left hand knob) in the TRACK <TRK> position.
3. With no pressure built-up in the cylinder, toggle momentarily the Set switch (Right hand lever) down [▼] one (1) time to zero the display.
4. Run the machine and the display on the gage will follow the injection pressure.
5. Set the Mode Select switch to PEAK <PK> to catch peaks on the display, if so desired.

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## Introduction

The T-3030 Digital Hydraulic Pressure gage has a built-in pressure transducer for sensing pressure directly from a hydraulic, water, air or gas source and displaying the reading digitally. Generally, in an injection molding application the unit is installed to sense pressure at the injection cylinder of the machine. The display will track or follow the pressure or will catch and hold the peak. A level detector set-point can be adjusted to automatically reset the peak each cycle. Also, the set-point option can be used as an output to activate an external device, such as a conveyor or robot, for high alarming. Models are pre-calibrated at the factory for 1 psi resolution in ranges from 200 psi up to 10,000 psi. The gage also has an analog output signal available which is user-selectable to a full scale level of 2, 5, or 10 Volts.

## T-3030 Technical Specifications

INPUT RANGE	From 100 to 10,000 psi Capacities
OVERLOAD CAPACITY	200% F.S.
PROOF TEST	300% F.S.
OPERATING TEMPERATURE	32° to 150°F
ACCURACY (NL, H, R)	.5% F.S.
REPEATABILITY	.1 F.S.
RESOLUTION	1 Part in 4095
SAMPLE RATE	250 Samples Per Second
ZERO ADJUSTMENT RANGE	-5% to +100% F.S.
INPUT POWER	See Model Number Designation Above
TRANSDUCER CAVITY MATERIAL	17-4PH Stainless Steel
FITTING	HF2000F Female Quick Disconnect; Male Mating HF2000M

Table 1

## T-3030 Front Panel Description

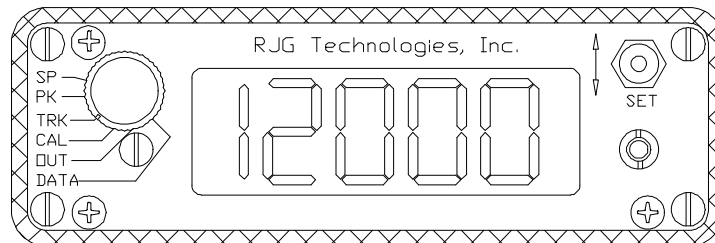


Figure 1

T-3030 Digital Pressure Gage Front Panel

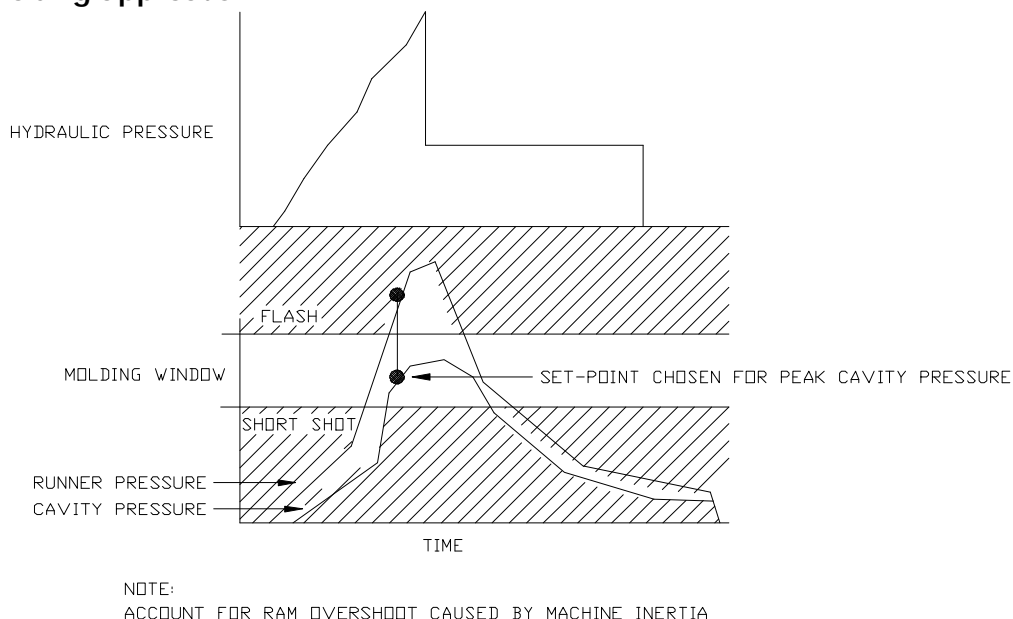
Refer to Figure 1 for the following description of the front panel controls:

### Mode Select Switch

This is a rotary switch (knob located on left hand side of faceplate) which defines the function to be displayed on the readout. There are six (6) features available from which to choose, as described below:

## SP (Set-Point)

This is the threshold level of pressure the gage will measure in order to trip a set-point. The letter "L" appears on the left hand side of the display indicating "level." The set-point can be used as a high alarm to turn on an open collector transistor output to interface to a conveyor, parts flipper, or robot for diverting parts. The set-point is also used to select a level where the peak/hold reading on the display will automatically reset each cycle. When the incoming pressure drops below the set-point, the Peak is reset, and the display will track the incoming pressure. Figure 2 shows an example of using the set-point as a peak reset function in an injection molding application.



**Figure 2**

Set-Point (Peak Reset)

**Note: If the Set-point Is Set at Zero, the Signal Conditioner Will Hold the Peak Value until an Autozero Signal Is Applied or the Set Switch on the Front Panel Is Pressed. Negative (-) Values Entered for a Set-point Value Will Default to Zero.**

## PK (Peak)

The PK setting displays and holds the peak detected for a cycle based on the duration of time the incoming pressure is above the selected set-point. The letter "P" appears on the left hand side of the display indicating peak. When the incoming pressure is below the set-point, the display tracks the pressure, thus the symbol "+-" appears on the left hand side of the display. The peak is reset when the input falls below the set-point.

## TRK (Track)

This displays the incoming pressure by tracking or following it as it goes up or down

over time.

## **CAL (Calibration)**

This mode displays the scale factor the gage is calibrated to at the factory. The number 1.000 represents a 1:1 relationship between the pressure applied to the transducer and the readout. The CAL number can be changed to adjust the relationship to satisfy particular applications.

### *Setting The Intensification Ratio For Reading Plastic Pressure*

The gage can be used on the injection cylinder of a molding machine and calibrated to readout in the representative plastic pressure in front of the ram at the nozzle. By considering the injection ram intensification ratio and applying it to the CAL of the gage, the gage will readout in plastic pressure even though it senses hydraulic pressure. If the intensification ratio was 11.2:1, reset the CAL number to 11.200 to accomplish the appropriate scaling. Use the Set switch to change the CAL number.

**NOTE: Changing the CAL number will only be recognized if the change is made when there is no pressure being applied to the gage, and the gage has first been zeroed.**

To assure accurate calibration, a provision is made to assure signal stability before accepting a new CAL number change. When attempting to calibrate, the display may show "U----" or "F----" at times. This represents an unstable condition or a problem with the transducer, respectively. The operator may need to attempt the CAL procedure again in order for the new CAL number to be accepted.

The CAL number can be changed to have the display readout in differing engineering units other than psi.

## **OUT (Analog Output)**

This allows setting of the analog output voltage to correspond to the full scale number on the display. This feature is pre-set at the factory for either a 0-2, 5, or 10 VDC output signal corresponding to the rated full scale pressure range of the gage identified on the part number. For example, a T- 3030-02T-3K is set for 2 VDC (-02T) at 3000 psi full scale (-3K).

The output voltage can be changed to correspond to any selected display reading. There are two possible ways to reset this feature. Option I allows the output voltage to be kept the same and the full scale to be changed. When the Mode Select switch is initially set in the OUT position, the symbol "F" appears on the left hand side of the display to represent the full scale reading, which when reached, will output the full scale analog voltage. Typically, the display will read

"F 3000" for a 3,000 psi gage. It can be changed to any value by entering the security code (outlined in *T-3030 Front Panel Descriptions - Set Toggle Switch - Security Sequence Activation* section,) and using the Set switch. The value will then correspond to the full scale voltage setting.

Option II allows the output voltage to be changed, but the full scale to be kept the same. To change the full scale voltage setting, rotate the Mode Select switch back and forth from the CAL position to the OUT position until a "V" symbol appears on the left hand side of the display to represent the full scale output voltage of the track signal display. It can be changed to 2, 5, or 10 Volts F/S by entering the security code (outlined in *T-3030 Front Panel Descriptions - Set Toggle Switch - Security Sequence Activation* section,) and using the Set switch. The full scale voltage setting can also be taken from the Peak <PK> value instead of from the Track value. In the Track Output mode, the analog output follows or tracks the TRK display. In the Peak Output mode, the output follows the PK display and holds peaks when the set-point is reached.

## DATA

The DATA position shows multiple pieces of information. Toggling the Set switch UP [ ] while in the DATA position will make the symbol "+" appear on the left side of the display. When "+" appears, the number to the right indicates the version of the program chip being used internal to the unit.

If a Trigger (Autozero) Input is being applied to the T-3030, then Fill Time can be monitored on the display (See Section VI for: *Hardwiring A Trigger Input*.) While in the DATA position, toggling the Set switch UP [ ] until the letter "F" appears on the left of the display selects Fill Time. The Fill Timer starts when a Trigger Input is applied, and is stopped by one of three (3) operating methods:

*Reaching The Set-Point Value.*

This method stops the clock when the pressure reaches the set-point. It is appropriate if the T-3030 is being used to transfer a molding machine from 1st stage to 2nd stage injection pressure.

*Reaching A Peak.*

This method is generally used when making measurements of hydraulic pressure where the peak pressure occurs at transfer from 1st stage to 2nd stage on the machine thus stopping the clock. This is the default configuration set up at the factory.

*Trigger (Autozero) Input "OFF".*

In this mode, the timer will run for the duration that the Trigger signal stays on. Using a "Boost" solenoid signal off of a molding machine will allow a fill time reading on the T-3030.

To determine which mode the Fill Timer is in, or to change the Fill Timer mode, perform the following:

1. From the DATA position of the Mode Select switch, toggle the Set switch UP [ ] twice to show the T-3030 program version number.
2. With the version number displayed, enter the security code (5 seconds UP [ ], 3 seconds DOWN [▼]) with the Set switch. The display will show a "P," "h," or "t" to the left, and a zero to the right. (The zero has no meaning.)
3. Press the Set switch DOWN [▼] to change between "P" (Time to Set-Point mode), "h" (Time to Peak mode), and "t" (Trigger Time Duration mode).
4. Switch the Mode Select switch out of the DATA position to "save" the selected Fill Time mode operation.

The DATA position also displays a reading for an integral calculation. This is used in injection molding applications for reading relative viscosity of the material during filling of the part. Toggling the Set switch UP [ ] while in the DATA position will make the symbol "\*" appear on the left of the display. This signifies the number on the display is a relative viscosity reading calculated from the start of the pressure reaching the set-point setting until the peak reading is reached. In this application, the set-point should be set to a low reading, such as 100, so the viscosity measurement will begin shortly after injection.

### Set Toggle Switch

The Set switch is an UP [ ] and DOWN [▼] toggle switch (located on right hand side of front panel) utilized for changing each numerical digit on the display after the Mode Select switch has been selected. All changes are only registered when switching out of the Mode Select switch of interest. To prevent accidental changing of the numbers, there is a security sequence which must be followed to activate toggling only when in the OUT mode. The security sequence is outlined below. There are two (2) primary uses for the switch: Zeroing and Number Changing.

*Zeroing (Security Sequence Not Required)*

With no pressure applied and with the Mode Select switch in the Track <TRK> position, toggle the Set switch DOWN [▼] once to zero the display. The signal conditioner is ready to be used after zeroing. Move the Mode Select switch to the Peak <PK> position to read peaks, if so desired, or leave the Mode Select switch in the Track <TRK> position, and apply pressure.

*Number Changing (Prior Security Sequence Required For OUT)*

In the Mode Select switch positions SP, CAL, and OUT, the user may need to set different numbers for differing uses. After entering the security sequence (this applies to OUT only), the flashing digit is the one active for incrementing or

decrementing by momentarily toggling the Set switch UP [ ] and DOWN [▼], respectively. To move the flashing digit to another position, toggle and hold the Set switch down and after about 1 second the flashing digit will scroll across the display. Release the Set switch when the flashing digit is at the appropriate position for the required number change.

#### *Security Sequence Activation*

In the OUT Mode Select switch position, the Set switch must be activated by a security sequence to allow changing of the numbers on the display. This prevents accidental changing of the numbers while the signal conditioner is in use. The security sequence is as follows: Press and hold the Set switch UP [ ] for about 5 seconds, release, then press and hold the same switch DOWN [▼] for about 3 seconds and release. The display will show a flashing digit to indicate the security has been passed, and the Set switch can now be used for changing the numbers.

## **T-3030 Fill Kit**

The schematic below (Figure 3) shows the output and input connections required for powering the T-3030 Digital Hydraulic Pressure Gage and utilizing the Fill Timer function.

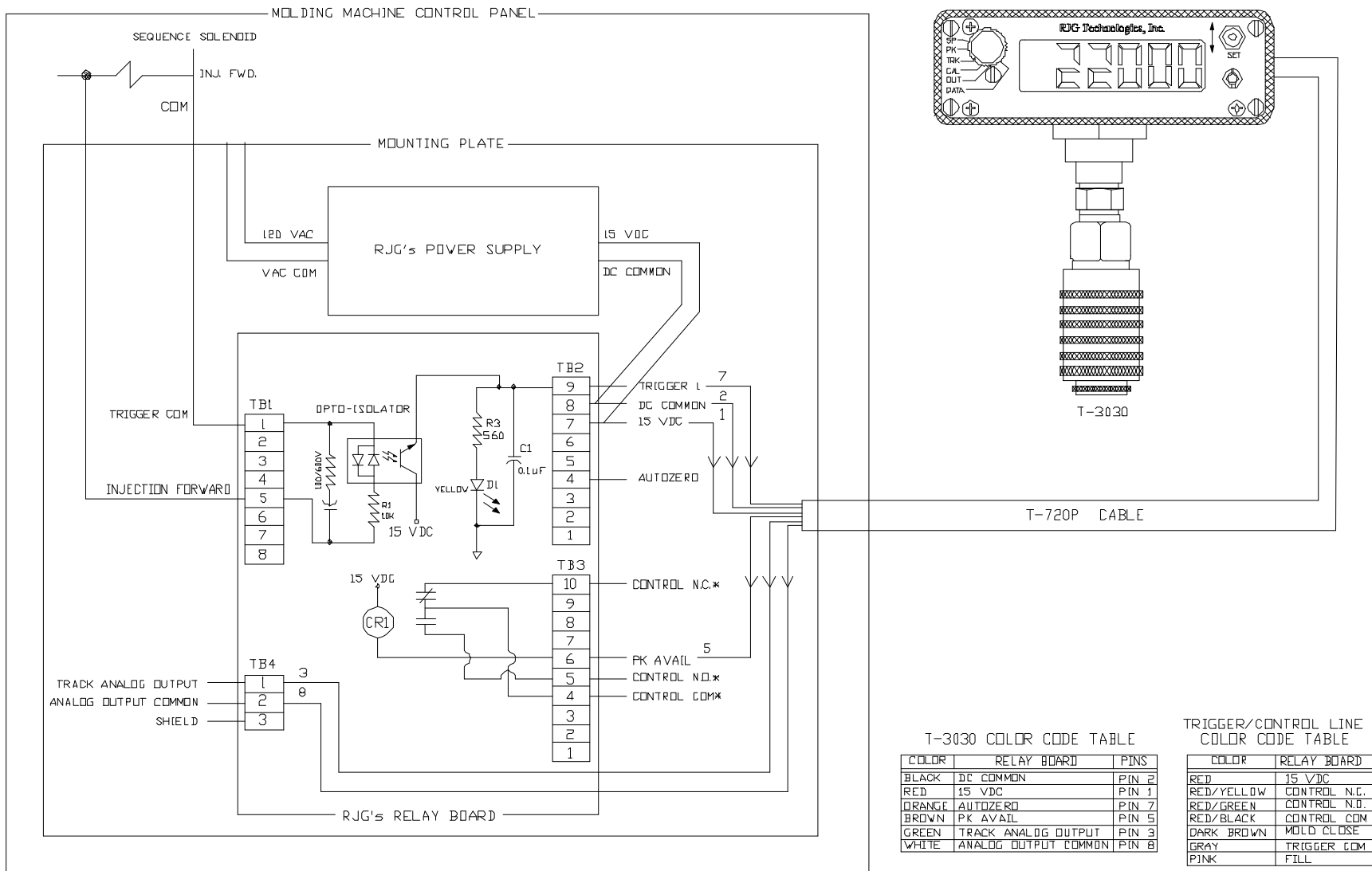
### **Power**

TB2 Pin 7 (+ 15 VDC) and Pin 8 (DC Common) is input for + 15 VDC power from the regulated power supply provided as part of the equipment package. The power supply needs to be sourced with 120 VAC power from an isolated AC power source inside of the machine panel.

### **Alarm**

TB3 Pin 6 provides a current return path to the T-3030 Digital Gage to allow energizing of CR-1 when reaching the Alarm set-point on the T-3030. TB3 Pins 4, 5 and 10 are relay contacts used to turn on a light or audible alarm, or abort the machine. Logic Input for transfer. The contacts close (or open) when CR-1 is energized. The contacts can optionally be used to control transfer of the machine with a hydraulic pressure set-point.

**NOTE: RJG, Inc. does not recommend using hydraulic pressure as a basis to transfer the machine.**



## Fill Time Start/Autozeroing

TB1 Pin 5 and 1 require a 120 VAC or 24 VDC input (momentary or continuous each cycle), when Injection Forward occurs. This signal energizes Trigger 1 and autozeros the T-3030 for maximum repeatability. The trigger signal is supplied through TB2 Pin 9. When an Injection Forward signal is applied to TB1 Pin 5 and 1, TB2 Pin 9 goes high, signaling the Model T-3030 to begin timing and to autozero the display.

## Model Number Designation

The following tables identify the pressure capacity and options for particular models of the 5 digit display T-3030X-XX-XX.

### Power Requirements

**T-3030D-XX-XX**

C D	15-24 VDC 115 VAC	100mA Power Requirements 60Hz, 20 Watts (Version Includes Model T-1115 Wall Plug-In Power Supply)
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Table 2

### Analog Output Full Scale

**T-3030D-02-XX**

00	No Analog Output
02	2 V A/O Jack
05	(Standard)
10	5 V A/O Jack
	10 V A/O Jack

Table 3

### Pressure Range

**T-3030D-02-30**

01	0-100 psi F.S.
05	0-500 psi F.S.
10	0-1000 psi F.S.
20	0-2000 psi F.S.
30	0-3000 psi F.S.
50	0-5000 psi F.S.
10K	0-10000 psi F.S.

Table 4

# Connector Pin Assignments

RECEPTACLE

AMP CPC-205841-2

MATING PLUG: AMP CPC-205838-1

## POWER INPUT CONNECTOR PIN ASSIGNMENTS

1	RED	+ Power
2	BLACK	Power Common
3	GREEN	Track Analog Output
4	--	N/C
5	BROWN	Set-point Output (Open Collector
6	--	Transistor)
7	ORANGE	N/C
8	WHITE	Trigger In (Autozero) Analog Output Common

Table 5

## Hardwiring A Trigger (Autozero) Input

Pins 7 and 1 are used on the power input connector for enabling a trigger, or autozero function of the gage. These short pin wires can be found under the heat shrink on the connector end of the power supply cable. Remove the heat shrink and wire as outlined below:

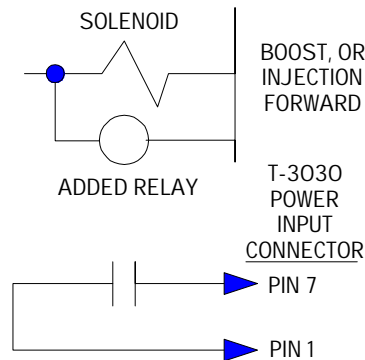


Figure 4

Hardwiring Schematic

Wire the T-3030 to the machine by interfacing with a relay. As shown in Figure 4, connect the relay dry N.O. contacts to Pins 7 and 1, so the contact closure will enable the trigger, or autozero. The relay coil should be wired to a sequence signal from the machine at the start of the cycle, such as Injection Forward, or Boost on an injection molding machine.

Any residual pressure present on the gage will be zeroed out with each autozero (Trigger) cycle, and also the gage will begin timing at the start of this trigger. The timer will stop timing based on either reaching a peak pressure (standard configuration preset at the factory), or when the trigger turns "OFF." See the *T-3030 Front Panel Description - Mode Select Switch - Data* section for how to select the appropriate mode.

## ***Hydraulic Fittings***

The gage is outfitted with a Parker female quick disconnect part number PD-242 which mates with a male PD-323. The male fitting is installed on the machine allowing the gage to swivel at the female/male connection so the application is forgiving of accidental contact which could possibly damage the unit. The gage can be plumbed permanently into a hydraulic circuit without use of the quick disconnect, but precautions should be taken to protect the unit from accidental contact.

**NOTE:** If the female quick disconnect is removed, care should be taken to separate the 1/4" NPTM from the disconnect without loosening the bronze colored pressure transducer. Accidental loosening of the transducer from the case may twist and stress the wires inside causing damage.

## ***Product Disclaimer***

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