



WELDING SYSTEMS LTD

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TMS 2000 Press Tool Protection System

System Description

This is the latest development in our popular range of press tool monitoring equipment, descended from our earlier model TMS06. Microprocessor technology is used to provide a cost effective monitoring system, with increased user flexibility, able to cover a wider variety of applications.

A range of standard sensors are used to monitor stripper plate position, either with reference to the punch plate or the die plate. Other sensors can be fitted for mispitch detection, incorrect feeder travel, part or scrap detection etc. the unit can operate in either active or passive (instantaneous) modes.

All TMS2000 units feature:

- Robust die cast aluminium box, housing all electronic components
- 9 fault channels, 8 of which are user selectable.
- Separate reference sensor input for press synchronisation.
- Inbuilt over current monitor of sensor power.
- Plug/ socket for connecting into stop circuit of press.
- Reset button.
- Key switch to select reset availability: - operator reset, setter reset or override modes.
- Seven segment LED display of fault

The TMS unit operates by monitoring the nine input channels throughout the rotation of the press. Input number 9 is always an instantaneous input, i.e. as soon as a signal is received on channel 9, the TMS will trip and stop the press. This can be used as an external stop, or as an interlock with other TMS units, or as an end of strip or buckled strip detector using a normally open sensor.



The other eight inputs are user selectable as either instantaneous trip (trip immediately upon detection of an input signal) or as an active input. In active mode, that channel must detect an input for each revolution of the press, or the unit will trip upon reaching the reference sensor. This is usually used for part ejection monitoring, to see a part goes through a detector once per revolution, or as a monitor of feeder travel by checking that sensors at both ends of the feeder stroke are made once per revolution.

Instantaneous channels do not require the use of a reference input (channel 10). Active channels do require this input, as it is this that tells the TMS unit that a full revolution has been completed, and that whichever channels are set as active should now have received an input.

Upon receipt of the reference signal, the unit will trip if all active inputs have not received a signal- please note that this means that the unit will effectively trip when the reference sensor is first made, and so the position of that sensor will control the point at which the press stops for the active channel fault. This sensor can normally be set at Top Dead Centre (TDC), but can be moved dependant upon the timing of events within the press tool, e.g. how long it takes parts to fall out of the tool, or at which point the feeder finishes its stroke.

Stripper plate position can be monitored in either active or instantaneous mode. In instantaneous mode, sensors are fitted to the punch plate facing blocks on the stripper plate. These are set so that when the tool is at Bottom Dead Centre (BDC) and the stripper plate is lifted against its springs, these sensors do not quite make. Anything which lifts the stripper higher, debris in the tool etc will then cause the sensor to make and trip the TMS. This mode has the advantage that if the sensor or cable failed, than an input might not be given.

Stripper plate position can therefore also be monitored actively by fitting sensors on the die plate or the facing blocks on the stripper. At BDC these sensors must just make. Anything that causes the stripper to lift higher will then mean that the sensors will not make and when the reference sensor is detected the unit will trip. This method has the advantage that both sensor



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and cable are effectively tested each cycle- the unit is fail safe. However, it has the disadvantage that the press will not trip until the reference sensor is made, which dependant upon its position within the cycle, will be later.

Upon request, we can program the units to operate with more than one reference channel, to allow for the fastest response on active stripper plate monitoring using one reference, and have a second reference for part eject or feeder monitoring. This is available at extra cost.

Installation

The unit needs to be connected to a suitable power supply (in accordance with the voltage specified), and positioned at some convenient point close to the press. The fifteen way D Socket is for the sensor splitter box, which should be securely connected and screw locked. The splitter box should be located within the press throat. The sensors are then plugged into the splitter box as required.

Please note: The sensors will not be powered up until the TMS unit has been set ready to run.

The press interrupt socket on the side of the unit features a voltage free, 'made when good' relay contact. This contact opens in the event of a fault being detected and should therefore be wired in series with the press stop system using the plug provided (maximum rating 240 volts AC, 1 amp).

As a further fail safe, if power is switched off with the key switch in the setter position, and then subsequently turned back on again, the unit will not allow the press to run, but will stay tripped until the key switch is turned back to operator reset.

Upon power up, the unit will perform a small self test routine, during which it tests the LED display. This produces a pattern of all horizontal bars followed by all vertical bars, repeated three times. After this, the key switch position is checked.



If the unit is in operator reset mode, then the output relay will energise, allowing the press to run as normal. If it is in the override mode, then the display will flash '0' with the relay energised and the press will be allowed to run with no protection. If it is in setter reset mode, the display will flash 'A', followed by the numbers in sequence of whichever channels are set as active DIP switches. This is a useful confirmation of the user's setting. The display then reverts back to test mode. As long as the unit is in setter reset position, this sequence will repeat and the press will not run.

Setting

Ease of setting is a feature of the TMS unit and is carried out according to this example.

- a) Assuming that the stripper position sensors are mounted on blocks attached to the punch plate, install the sensors by screwing them through the mounting blocks until the sensor face is flush with the underside of the block. They can be then locked in position by tightening the locking nut onto the shake proof washer.
- b) Fit bolt and locknut to the stripper plate, with the bolt screwed as far down as possible.
- c) Ensure that the upper face of the tool die plate and lower side of the stripper plate are clean and clear of any debris. Place a piece of the strip to be used in the press tool using, if possible, material which is of the highest acceptable thickness i.e. upper tolerance material.
- d) With the TMS unit switched to override, turn the press over slowly by hand until it reaches the bottom of its stroke. At exactly BDC the stripper plate is lifted towards the punch plate by the maximum amount that it will encounter under normal conditions. With the press stopped in this position, adjust each bolt up towards the sensor face until the sensor just operates- this is indicated by a small LED on the sensor body or on the plug connector depending on the sensor type. Back the screw off until the lights just goes out and then in again by half the distance between the switch on and switch off point. The indicator should still be off; this is the setting for maximum sensitivity.



- On 12mm diameter standard sensors the difference between the switch on and switch off points is about 0.008 of an inch. Setting as above will enable reliable tripping at 0.004 extra on strip thickness (or any other problems such as unwanted material in the tool). This will result in the stripper plate being lifted higher than normal at the bottom of the stroke.
- e) Once in position, lock the bolt with nut and shake proof washer. This procedure should be followed carefully for each sensor bolt combination on the tool.
 - f) The mismatch sensor operates via a spring loaded pin. Failure of the pin to enter the appropriate hole on the strip will lift the pin, displacing sideways a sensor operating rod. The sensor for mismatch only has to operate when the rod is displaced towards. this displacement will normally be by a fixed amount, the adjustment is simply that of screwing the sensor into the mounting block until the operating rod almost touches (within 0.5mm) the sensor face with the pilot pin fully pushed up into the tool. The cable should then be connected and the sensor checked that it switches as the pilot pin is operated.

The unit is now ready to run.

NB We suggest that each sensor and cable is tested manually once per day simply by introducing a piece of steel to the sensor face and observing that the correct channel number is displayed on the TMS unit.

The TMS units can normally be installed completely trouble free by a competent person with some degree of technical knowledge but we also offer a complete installation and training service, if required, at extra cost.

The TMS is designed and built to the highest standards to give years of reliable operation and protection. A full years guarantee is given on parts and labour but does not include abuse, third party intervention etc and is subject to the seal on the TMS unit being unbroken.



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Warranty is limited only to the TMS and sensors supplied by ourselves. We do not accept any liability for press tool damage or faulty parts produced howsoever caused.

Operating Instructions

The user must decide which of the channels are to be active or instantaneous. Upon removing the plastic cover next to the fifteen way socket, a bank of eight miniature DIP switches can be seen. These allow the user to select, from one to eight, which channels are active and which are instantaneous. These switches are numbered from right to left when viewed from the underneath. If the switch is up, that channel is instantaneous, if down then active. Switches are best changed using a pen or pencil point with the power disconnected. Replace cover when finished.

Confirmation of which channels are active will be displayed when the unit is powered up.

In the event of a fault, the unit will display the relevant channel number, or if more than one fault the highest channel number. If the unit is operator reset mode, the fault can be cleared by pressing the reset button. The press can then be restarted. If more than one fault has occurred, then, upon pressing reset the next failed channel will be displayed and then reset. Channel numbers are displayed in numerical sequence which will not be necessarily the sequence in which the channels failed.

Sensor power is automatically removed a second after the TMS trips.

Override Setting- the Display will flash '0' on and off to indicate that NO protection is available. The press will run irrespective of any faults that have occurred, although the fault channel will be displayed alternatively with the flashing '0'. This mode is intended for setting only and should only be used, with care, by skilled personnel only. To clear any faults, the unit must be switched back to Operator Reset.



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The Override function is not available in the event of an over current failure. The TMS unit incorporates a continuous sensor monitor which will trip in the event of an over current being detected; this could occur if a cable is damaged for example. On over current the display will show a 'C' and this cannot be overridden. Upon reset the unit will trip immediately if the fault is still present.

Operator and setter reset modes- these offer normal protection and are identical except that the unit can only be reset and the press restarted in operator reset mode. If unskilled operators are supervising the press, it can be left to setter reset mode and the key removed. If a fault then occurs, the operator must call a skilled person to reset the TMS by switching back to operator reset.

For more information, Please call:

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