



**UNWIND BRAKE TENSION CONTROLLER
MWP – 12662 - 0**

**Instruction Manual
AO-70173 (Rev BA)**

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WebPro Unwind Brake Tension Controller

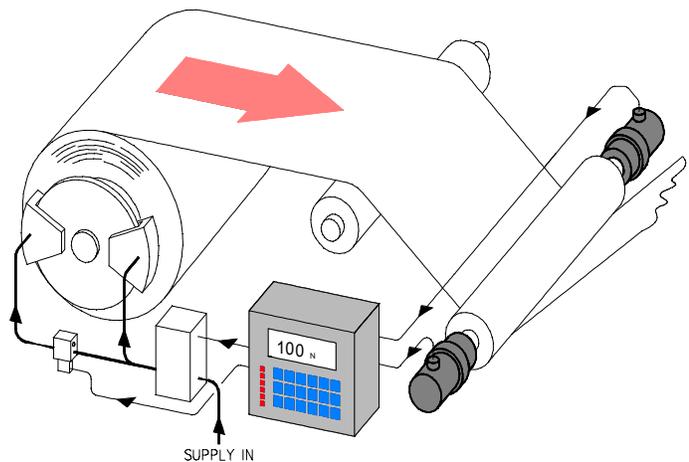
General Description

The **WebPro** Digital Tension Controller is part of a closed loop tension control system with transducer feedback. The Controller continuously controls the web tension to the TENSION SET POINT value and displays the true web tension on an LCD screen, either as a percentage or in engineering units. The screen will display the tension applied to each transducer separately by pressing the < LEFT tension or > RIGHT tension key. The sum of the LEFT and RIGHT tensions is displayed when the < > TOTAL key is pressed. The Controller will control to the TOTAL tension value even when the LEFT or RIGHT tension is being displayed. The Controller also has a dual range tension indication feature.

The measurement of actual web tension is made by sensing, with strain gauge transducers (sometimes referred to as "load cells"), the force on a sensing roller caused by the tension in the web. The electrical signal from the transducers is a combination of tension force and sensing roller weight. The weight of the sensing roller is zeroed out electrically, leaving the tension force only to be displayed on the screen. For wide web applications two transducers are recommended, one on each end of the sensing roller; for narrow web, wire, cable and filaments one transducer can usually be used.

Unwind Brake System

The Controller may be used with an Electro-pneumatic converter for pneumatic brakes or a High Current Driver for electric brakes. The torque of a center coupled unwind brake must be reduced as the reel diameter reduces in order to maintain constant tension. It is the tension force alone which pulls the web from the reel and overcomes the unwind reel inertia on start up from rest and during acceleration. The residual drag torque of the brake added to any losses in the machine will result in a minimum operating tension. When the LOW tension range is selected the Controller LOW output may be used to disconnect pads from a multipad brake for optimum performance.



Motor Powered Unwind System

Motor powered unwind systems can operate at tension levels lower than those of a brake system and can generate tension when the machine is at rest (stall tension) provided the machine is designed to allow this. The motor and drive must be suitable for continuous regenerative operation. The Controller requires either tachogenerators (tachos) or encoders or a combination of both, for the unwind reel speed and for the line speed. These speed signals are used by the Controller to calculate the reel diameter.

The Unwind Brake Controller has the software loaded for motor powered unwind control. If the Controller is to be used for these applications contact CMC Inc for the AO-70172 handbook for these systems.

WebPro Unwind Brake Tension Controller

Quickstart

The Controller is supplied with the software loaded for the application as ordered but it will require commissioning before use.

For more detailed information refer to the various sections later in this manual.

1. Carefully unpack the Controller, remove the rear cover and detach the bag containing the accessories. Attach the cable gland to the large hole in the rear cover. Mount the Controller in the operators panel using the two keyhole brackets provided.

2. Position the links LK1 to LK5 on the Printed Circuit Board correctly for the type of transducer used.

Ensure that the mains voltage selector is set correctly.

3. Thread the mains supply cable through the gland and connect to the orange two part connector. Thread the transducer cables, machine interlock cables, output cable and any other cables through the most convenient of the four smaller holes and connect to the terminal strips. If an encoder is to be used, thread the encoder cable through the rear cover and connect to the header using the crimps provided. Additional holes may be drilled and extra glands for the cables may be fitted by the user.

Ensure that the encoder is connected correctly to prevent damage to the power supply.

4. Fix the rear cover to the Controller and tighten the gland to retain the mains cable for safety purposes.

5. Switch on, the POWER LED will light, the company logos will be shown briefly then the Introduction screen will be shown.

6. Press 4, Commissioning, enter the default password, by pressing 5678 then press the ENTER key. Press 1, Machine parameters, then scroll through and enter the parameters for the installation.

By default only one transducer, the LEFT transducer, is enabled. For installations with two transducers, which is the normal situation for web applications, the RIGHT transducer must be enabled.

If a tachometer is used the **MAXIMUM** input voltage is +10V DC.

If an encoder is used the number of pulses per second at maximum machine speed must be entered.

To accept and save the Machine parameters the CONFIRM key **MUST** be pressed.

7. Calibration for the sensing roller weight and maximum tension to be used is required; calibration for the speed of the machine may also be required.

8. The default Product number is 1 with a PI stability of SLOW. This should be sufficient to put the machine into service. To change the stability, open the Adjust PI stability screen from the Commissioning menu, start the machine and observe the bar graph. Reduce the PI stability to MEDIUM or FAST until the bar graph fluctuations just start to increase, then press CONFIRM.

WebPro Unwind Brake Tension Controller

Installation

The following parts are supplied:-

1. Controller, with software loaded for the application but requiring commissioning by the user.
2. Two keyhole mounting brackets.
3. Cable gland to be fitted to the rear cover and header connector kit for encoders.
4. Cabinet, if ordered.
5. Electro-pneumatic (E/P) Converter kit or High Current Driver, if ordered.
6. Manual (this document).

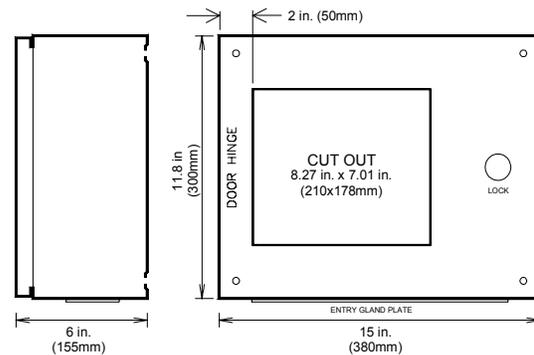
Transducers and cables may also be supplied to complete the system

The Controller should be installed using 'best practice' and in accordance with all relevant regulations. The Controller must be installed in a dry, non-hazardous location. A panel cut out 8.27in (210mm) wide X 7.01in (178mm) high is required. The Controller is 3.94in (100mm) deep, additional space for the cables is needed.

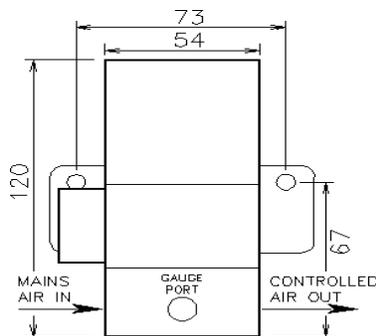
The Controller is retained by two mounting brackets. Remove the four screws securing the mounting brackets to the Controller. Insert the Controller into the cut out in the panel. Refit the four screws, attach the mounting brackets to the Controller and tighten the two nylon screws to retain the Controller.

Cabinet Installation

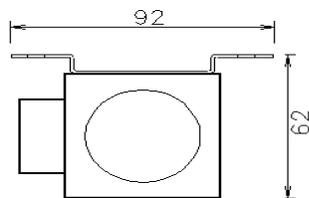
The cabinet has rear mounting holes for M8 fixing. When the Controller is supplied as a cabinet version the mains supply is terminated inside the cabinet on a three way terminal block. The incoming mains cable should be securely fastened by the gland plate cord grip.



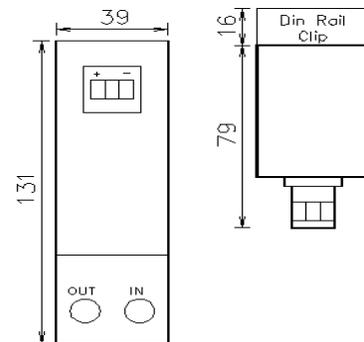
Electro-Pneumatic (E/P) Converter Installation



IMI 101X converter



Do NOT use PTFE tape for sealing. The converter must be mounted vertically.



Fairchild TA6000-406 converter

CLEAN DRY OIL-FREE air of instrument quality, maximum supply pressure 100 PSI/7 Bar, filtered to 5 micron or better is required. The air line distance between the E/P Converter and the brake or clutch should not exceed 5 metres or degradation of performance may occur.

High Current Driver (HCD) Installation

Use an HCD when the **WebPro** is used to drive a magnetic brake. Consult the manufacturer of the magnetic brake for HCD recommendations. The HCD must be capable of delivering the rated brake current and also be capable of supplying the rated brake voltage – usually 24 or 90 volts. Control of the HCD output current must be controllable with a 0 to +10 volt signal.

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Before connecting the HCD to the mains supply, ensure that the mains voltage matches the HCD requirements. Connect the HCD control input common to the **WebPro** controller “0V analog” mTB4 and the HCD control + signal input to the **WebPro** controls “control out 0/+10V” or TB4.

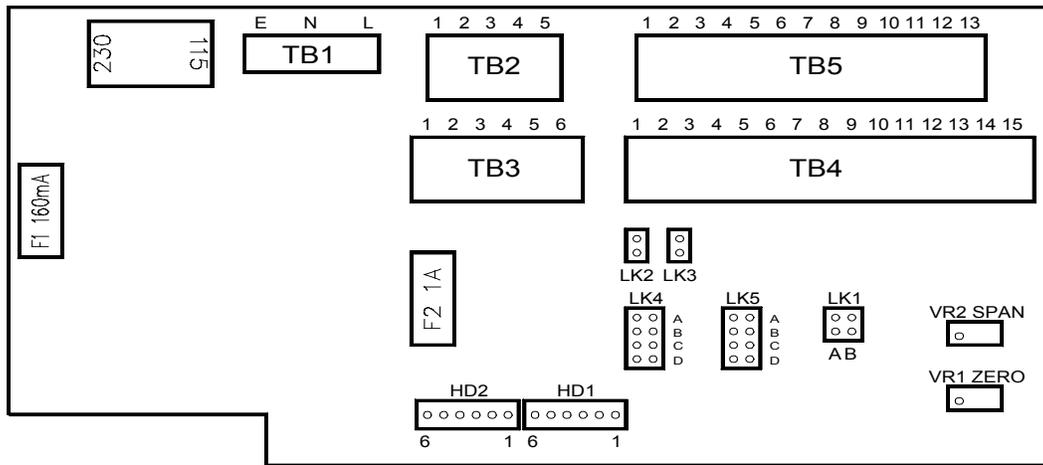
Caution: The HCD controller signal input connections must be isolated from the mains supply connections or damage to the **WebPro** and the HCD will occur.

PCB Link Positions

The links LK1 to LK5 **MUST** be in the proper positions for correct operation. It may be found more convenient to position the links before connecting the Controller.

LK1	Excitation Voltage	Position B	This gives 5.6V for Cleveland-Kidder transducers
LK1	Excitation Voltage	Position A	This gives 10V for ACDF and foil transducers
LK2 and LK3		IN	For Cleveland-Kidder transducers to complete the bridge
LK2 and LK3		OUT	For full bridge transducers, the bridges are complete
LK4 and LK5	Gain	Position A	Normal gain for Cleveland-Kidder transducers
LK4 and LK5	Gain	Position B	High gain for Cleveland-Kidder transducers
LK4 and LK5	Gain	Position C	Normal gain for ACDF and foil transducers
LK4 and LK5	Gain	Position D	High gain for ACDF and foil transducers

The high gain positions providing three times the normal gain are used if the transducers are oversized and there is insufficient signal level for accurate calibration.



Controller Connections

WARNING - Disconnect the Controller completely before any electric welding is undertaken on the machine. Failure to carry out this precaution could damage the Controller and will invalidate the warranty.

WARNING - The PCB uses devices sensitive to electrostatic voltages. Do **NOT** touch any components without first using proper electrostatic discharge ESD precautions.

The Controller uses Wago Cage Clamp terminals, it is recommended that the correct tool is used when inserting the cables. Wago part number 210-120 is available from Wago or CMC Inc.

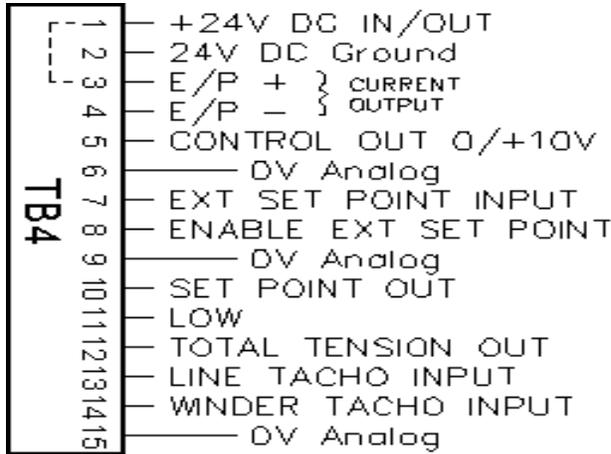
Do **NOT** strain the terminals or the PCB. The terminals are suitable for cable sizes 12-24 AWG, 0.1-2.5sqmm. The cable ends should be terminated with ferrules or crimp tags.

It is necessary to remove the rear cover to connect the Controller, set the links and select the mains supply voltage. Remove the rear cover and fit the cable gland (supplied loose) to the rear cover. Feed the mains cable through the cable gland and connect to the two part connect as shown. Feed the transducer

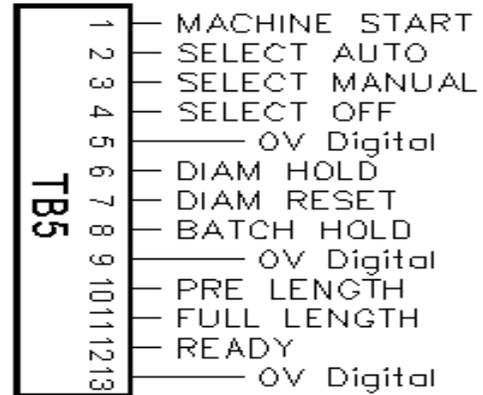
WebPro Unwind Brake Tension Controller

cables and other cables through the most convenient holes in the rear cover and connect to the terminals. Replace the rear cover and secure the cable gland to retain the mains cable for safety purposes.

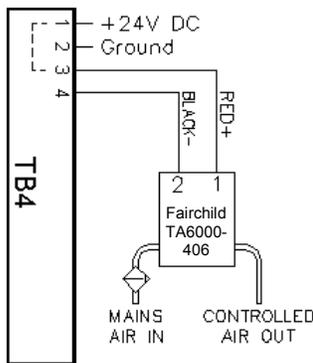
All the Controller 0V commons, analog and digital, are connected to earth E and to the metal case.



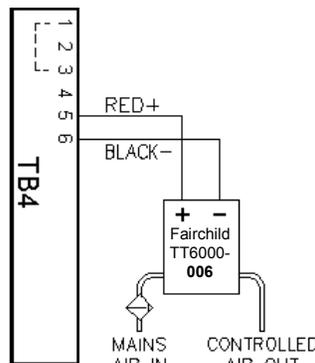
TB4 – Analog I/O



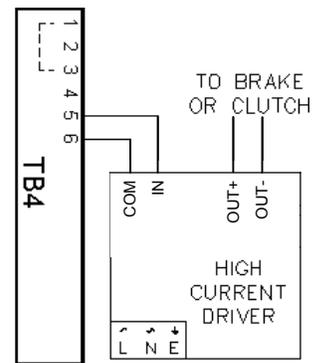
TB5 – Digital I/O



Fairchild TA6000-406 connections for 4-20mA input



Fairchild TT6000-006 connections for 0-10V input



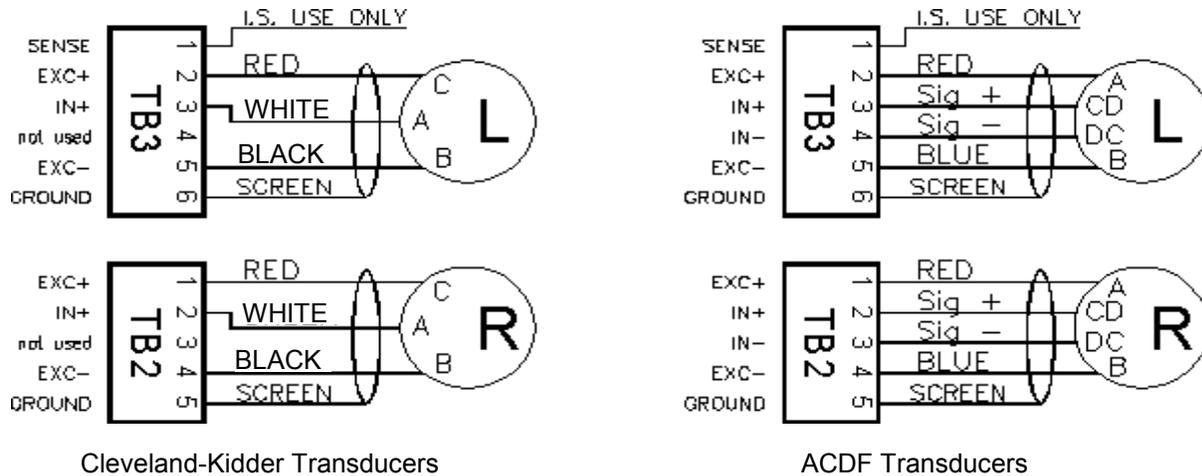
High Current Driver connections for 0-10V input

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Transducer Connections

The Controller may be used with one half bridge transducer, two half bridge transducers, one full bridge transducer or two full bridge transducers. The strain gauges may be semiconductor with 5.6V or 10V DC excitation, each half bridge resistance 230Ω minimum; or foil with 10V DC excitation, each bridge resistance 350Ω minimum.

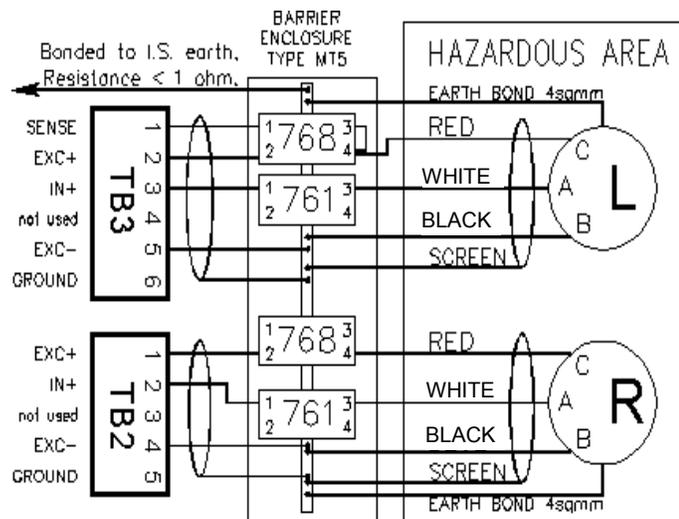
For systems with a single transducer connect the transducer to TB3 Left and disable the Right transducer, see Machine Parameters; Right transducer - Disabled/Enabled.



Intrinsically Safe Transducer Connections for Hazardous Area Installations

CMC Inc tension transducers can be located in a hazardous area to provide an Intrinsically Safe installation to EN 50039 when a proprietary Zener Barrier module, **Part Number 4503**, is used. Tension transducers are passive components and are classified as simple apparatus by EN 50014. Strain gauge transducers (load cells) will be damaged if subjected to the 500 volt insulation test required by EN 50020. To comply with Intrinsic Safety regulations the body of the transducer must be bonded to the I.S. earth using 4 square millimetre green/yellow insulated cable.

Consult CMC Inc for connections to ACDF transducers in I.S. installations.



I.S. connections for Cleveland-Kidder transducers

NOTE It is the responsibility of the user to ensure that all relevant safety regulations are complied with. The integrity of all connections particularly the I.S. earth should form part of any maintenance procedure.

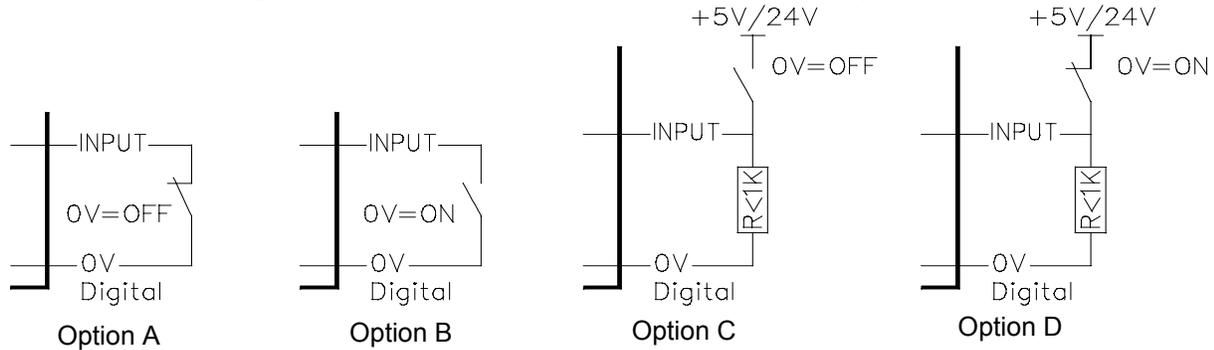
WebPro Unwind Brake Tension Controller

Machine Sequence Logic and Connections, Digital Inputs

WARNING - Do **NOT** connect the digital inputs to a negative or AC supply, this will cause damage and will invalidate the warranty.

The digital inputs are opto-isolated and over voltage protected. The maximum input voltage is +24V DC.

The MAN/AUTO/OFF functions may be selected from the keypad if Enable MAN/AUTO/OFF keys is Enabled. The full range of Machine Sequence Logic is selected externally, see Machine Parameters.



The digital input is shown in the OFF position

Disabled, the input is inactive.

OV=OFF, requires the input to be open to 0V with a volt free contact closure or logic switch - Option A, or alternatively taken high (+5 to +24V) with a pull down resistor $R < 1K\Omega$ to function - Option C.

OV=ON, requires the input to be taken to 0V with a volt free contact closure or logic switch - Option B, or alternatively open to high (+5 to +24V) with a pull down resistor $R < 1K\Omega$ to function - Option D.

Machine Start, this toggles between AUTO and tension OFF, 'Soft Start' and 'Soft Stop' features apply.

Select Auto, a pulse greater than 100mS will put the Controller into the Automatic control mode.

Select Manual, a pulse greater than 100mS will put the Controller into the Manual control mode.

Select Off, a pulse greater than 100mS will put the Controller into the tension OFF mode.

Diameter Hold, this will hold the current reel diameter value.

Diameter Reset, a pulse greater than 100mS will reset the held diameter value to the full reel value.

Batch Hold, this will hold the current output value and start from this value when released.

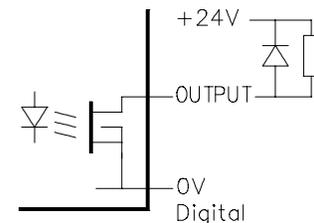
Enable Ext SP, this will allow an external tension set point to be used and will disable the keypad setting.

Select Auto; Select Man; Select Off; the Controller will remain in the selected mode until an alternative input is selected even after the primary contact closure or logic level is removed. However, if the contact is maintained closed this will override any other contact or key.

Digital Output Connections

The digital outputs use open drain mosfets. The maximum that each output can switch is +24V DC at 100mA. The output may be used as a TTL output with a suitable pull up resistor. A freewheel diode should be connected across any load inductance to prevent damage to the mosfet and to suppress EMI.

When the low tension range is selected by pressing the LOW key the digital output on TB4/11 will be switched OFF, switched ON in high tension range. This may operate a relay to disconnect pads from a multipad brake.



When mains powered, the total current that can be taken from the Controller 24V DC supply by the digital outputs is 50mA maximum. When 24V DC powered this current will depend on the users supply.

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Power Supply Connections

The Controller may be powered by 110-120V, 220-240V 50/60Hz AC at 15VA or by 22-26V DC at 1A.

Before connecting the Controller to the mains ensure that the mains voltage selector switch is set correctly. The mains supply is terminated on TB1, a two-part connector. The mains fuse F1 is 160mA.

The 24V DC supply must be smooth and free from noise. The 24V supply is terminated on TB4; positive to pin 1, negative to pin 2. Pin 2 is connected to ground and the metal case. The 24V fuse F2 is 1A.

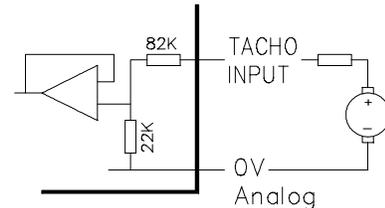
WARNING - Under no circumstances apply a voltage in excess of 36V between TB4/1 and 0V ground, this will cause serious damage and will invalidate the warranty.

Do not connect the AC mains and the 24V DC supplies to the Controller at the same time.

Tacho Connections

The Controller accepts a tacho input of +10V DC **MAXIMUM**. If the tacho voltage is higher than this, insert a resistor of appropriate value and dissipation in series with the Controller input. The Controller input resistance is 100K Ω . The input common 0V is connected to earth.

The tachos must be Enabled, see Machine Parameters.



Encoder Connections

Low pass filters should not be included in the encoder signal leads, these may degrade the pulse edges and introduce errors. The line speed encoder is terminated on header HD1.

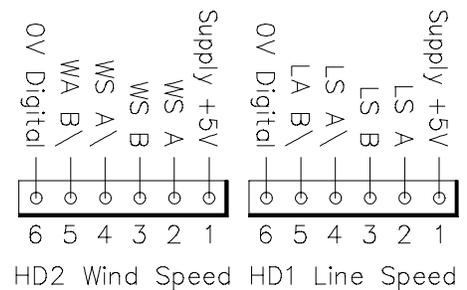
A +5V DC supply at 100mA is provided by the Controller on the headers, the Controller +24V DC supply may also be used.

Encoders of 100 to 1000 pulses per revolution are suggested.

The maximum input frequency of the Controller is 100kHz.

The encoder must be Enabled, see Machine Parameters.

The encoder wires **MUST** be crimped correctly using the proper tool to ensure reliable operation.



Length Counter

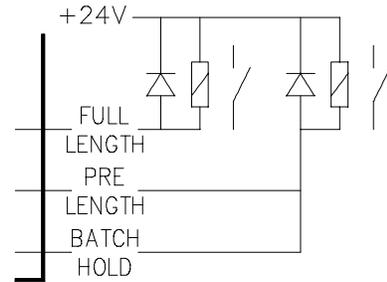
If an encoder is available for the line speed this may be used as the input to the Length Counter feature. The length is counted up. If the Length Outputs in the Product Parameter menu are enabled, at the Preceding Length coincidence the output from TB5/10 is switched OFF, at the Full Length coincidence the output from TB5/11 is also switched OFF, see Digital Output above for more details. These outputs may be used to slow and then stop the machine. **NOTE** the Preceding Length is the value before the Full Length, for example if the Full Length is 500 metres and the machine needs to slow down at 480 metres, set the Preceding Length to 20 metres. The outputs may also be used to operate the BATCH HOLD feature. Encoder compliment outputs are not necessary for the Length Counter feature. The count may be reset manually at any time by pressing the RESET LENGTH key. 9999 pulses/metre or 3000 pulses/foot maximum.

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Batch Hold

This feature is used when winding small rolls from one large parent roll, as for cash register or till rolls where the machine stops and starts frequently. When enabled and the input is operated, the output level from the Controller is held in memory on slow down and the Controller output starts from this level when the input is released. This prevents a tension dip due to the normal operation of the "Soft Start" feature.

As shown alongside, the output will be held at the Pre Length and will be released when the RESET LENGTH key is pressed.



System Set Up

The system must be set up before the Controller is used for the first time. The on screen prompts are very easy to follow and will guide the user through the Controller system set up and commissioning. The parameters can be easily changed later if necessary.

Press the SYSTEM SET UP key (called SET UP) to cancel an action or entry and return to the previous screen. Press the CONFIRM key when finished with a screen to confirm the entries. If the CONFIRM key is not pressed, the entries will not be saved to the memory and the existing parameters will be used. Pressing CONFIRM will also exit that screen and return to the previous screen.

When entering Commissioning values and Product Parameters, some values are entered by the numeric keys, some are entered by the +/- keys; this will be shown in the relevant sections later.

Use the Scroll keys to move the cursor up or down the menus. Enter a value using the ENTER key, the cursor will move down to the next item. The CONFIRM key must be pressed to save values to memory.

When the Controller is switched on, the program is loaded, the company logos are shown briefly then the Introduction screen below is shown. This sequence can be changed, see "Start in control screen" later.

CMC Advanced Digital Tension Controller
<ol style="list-style-type: none"> 1. Control 2. Change product 3. Product parameters 4. Commissioning

- | | | |
|---------|--|--|
| Press 1 | This will show the Control screen. | To exit the Control screen press SET UP. |
| Press 2 | Enter a product number (1-20) | Product 1 is the default |
| Press 3 | Enter the SET UP password 1234 (factory default) and then press ENTER | |

Product # Parameters	(SET UP = cancel)
Minimum diameter	<i>Enter a value</i>
Full scale diameter	<i>Enter a value</i>
Length outputs	Disabled, Enabled
Preceding length	<i>(if a line encoder is available)</i>
Full length	<i>(if a line encoder is available)</i>
PI stability setting *	
Inertia time constant	<i>(if a line tacho or encoder is available)</i>
Inertia coefficient	<i>(if a line tacho or encoder is available)</i>
Maximum trim	<i>(Speed and Torque control modes only)</i>
Current tension set point	<i>(The last tension value used)</i>

An asterisk * indicates that a further menu will open if this item is selected.

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Press 4 Enter the Commissioning password 5678 (factory default) and then press ENTER

Commissioning Menu
1. Machine parameters * 2. Calibrate tension * 3. Calibrate speed * 4. Adjust PI stability * 5. Change passwords * 6. Diagnostics *

An asterisk * indicates that a further menu will open if this item is selected.

Machine Parameters

From the Commissioning Menu; press 1 to show the **Machine Parameters** screen

Machine Parameters	(SET UP = cancel)	changed by using	default value
Language	English Deutsch Français Italiano Español	+/-	English
Unit system	S.I. / Metric kgf / Pound/foot / Percent	+/-	S.I.
Controller application	Unwind		
Unwind type *	Brake / Speed / Torque	+/-	Brake
Output range	0-10V / 0-20mA / 4-20mA / 0-50mA	+/-	0-10V
Start in control screen	No / Yes	+/-	No
Enable MAN/AUTO/OFF keys	No / Yes	+/-	No
Dual tension range	No / Yes	+/-	No
Full scale (low)	<i>Enter a value</i>	numeric key	5000
Full scale (normal)	<i>Enter a value</i>	numeric key	5000
Minimum tension	3% minimum, 20% maximum	numeric key	6%
Static friction	Torque mode only, 10% maximum	numeric key	0%
Dynamic friction	Torque mode only, 20% maximum	numeric key	0%
Output level bias	20% maximum	numeric key	0%
Output level limit	100% maximum	numeric key	100%
Diameter adjustment	50% minimum, 200% maximum	numeric key	100%
Set point ramp rate	1% per second, 100% per second	numeric key	5%/sec
Soft stop time	10 seconds maximum	numeric key	6 secs
Display damping time	0.1 seconds, 3 seconds	numeric key	2 secs
Display precision	0.1, 0.5, 1, 5, 10	+/-	1
Digital inputs			
MACHINE START	Disabled, 0V=OFF, 0V=ON	+/-	Disabled
SELECT AUTO	Disabled, 0V=OFF, 0V=ON	+/-	Disabled
SELECT MANUAL	Disabled, 0V=OFF, 0V=ON	+/-	Disabled
SELECT OFF	Disabled, 0V=OFF, 0V=ON	+/-	Disabled
DIAMETER HOLD	Disabled, 0V=OFF, 0V=ON	+/-	Disabled
DIAMETER RESET	Disabled, 0V=OFF, 0V=ON	+/-	Disabled
BATCH HOLD	Disabled, 0V=OFF, 0V=ON	+/-	Disabled
ENABLE EXT SP	Disabled, 0V=OFF, 0V=ON	+/-	Disabled
Show internal calibration *	No / Yes	+/-	No
Right transducer	Disabled, Enabled	+/-	Disabled
Line tacho or encoder *	Disabled, Tacho, Encoder	+/-	Disabled
Winder tacho or encoder *	Disabled, Tacho, Encoder	+/-	Disabled

An asterisk * indicates that a further menu will open if this item is selected.

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Remember to press the CONFIRM key, otherwise the parameters will not be saved to the memory.

Note Start in Control Screen

The Controller is despatched with this item set to "No". We recommend that after all commissioning is finished that this is then set to "Yes". When the Controller is now switched on, the program is loaded, the company logos are shown briefly and then the Control or operating screen ready for use by the operator.

Note

The Controller will not accept an invalid input value which is outside the limits of operation. If an invalid input is attempted the Controller will revert to the previous valid input.

Language

(English, Deutsch, Français, Italiano, Español)

The default language is English. If changed, all text shown on the Controller will be changed to that language and an extra item "5 - Translations" will be added to the Introduction screen.

Unit system

(SI (newtons), Kgf, pounds/foot, percent)

Select a unit system. All items which use units will be changed accordingly.

Unwind type

(Brake, Torque, Speed)

Select the unwind type. In Torque and Speed control modes tachos or encoders must be available for line speed and winder (reel) speed signals.
Contact CMC Inc for the AO-70172 handbook for motor powered unwind systems.

Output range

(0-10V / 0-20mA / 4-20mA / 0-50mA)

The 0-10V has a maximum output of 2mA and the 0V common is connected to ground.
The 0-20mA / 4-20mA high is connected internally to +24V DC, maximum load 250Ω
The 0-50mA is intended for the IMI Electro/Pneumatic converter type 101X.

Start in control screen

(No / Yes)

The Controller is despatched from the factory with this set to "No". We recommend that after all commissioning and set up is finished that this is then set to "Yes". When the Controller is now switched on, the program is loaded, the company logos are shown briefly and then the Control or operating screen is shown ready for use by the operator.

Enable MAN / AUTO / OFF keys

(No / yes)

When using the Digital Inputs to control the sequence of the system, this item should be set to "No" to prevent accidental operation.

Dual tension range

(No / Yes)

Select "Yes" if required. Enter two values of tension. The (normal) value must be the same value as entered during Calibrate tension. The (low) value should not be less than one third of the (normal) value. Terminal TB4/11 is switched OFF when LOW is selected from the front panel.

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TB4/11 is an open drain mosfet which may be used with a suitable electrical relay to select the pads of a multipad brake or when the Controller is in Torque Control to select the motor torque range. See Digital Output Connections for more details.

Minimum tension

Enter a value, the minimum tension is 3%, the maximum is 20%. The system may not function correctly and may be unsafe if it is operated at zero tension (the motor may run forwards).

Output level bias

Unwind Brake mode. Enter a value equivalent to that at minimum diameter at the minimum tension. The procedure for establishing this value is explained in Controller Tuning, below.

Output level limit

If the unwind brake is oversized the control action may be unstable. Enter a value equivalent to that at maximum reel diameter at maximum tension and at constant machine speed. The procedure for establishing this value is explained in Controller Tuning, below.

Diameter adjustment

(Unwind Brake mode only)

In Unwind Brake mode, the Controller will self calculate the reel diameter without additional inputs. This self calculated diameter is used to adjust the PI stability settings in proportion to the reel diameter for optimum performance. The self-calculation is approximately 20% accurate and this is usually sufficient for the Unwind Brake mode. The Diameter % bar graph can be set more accurately by changing the Diameter Adjustment value.

Set point ramp rate

It may cause an unacceptable disturbance and be unsafe if the tension is changed too quickly. Enter a value which is slightly slower than the PI stability rate so that the system can maintain the desired tension value as the set point is changed.

Soft stop time

Enter a value of time in seconds such that the Controller remains active after the Machine Start or Select OFF contact is opened. This will maintain control as the machine slows to rest. The Controller is de-activated immediately the Tension Off key is pressed.

Display damping time

If the tension is fluctuating enter a value between 0.1 and 3 seconds so that the display is steady. The Display Damping operates on the analog bar graph and the digital display.

Display precision

(1, 5, 10 (0.1, 0.5 and 1 for percent units))

Enter a value so the display can be read easily and the tension set point easily entered. This item also sets the resolution of the tension set point value.

Right transducer

(Disabled, Enabled)

Select "Disabled" when a single transducer is used, for example in wire and cable or narrow web applications. The single transducer must be connected to the "Left" terminals using TB3.

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Line Tacho or Encoder *

For Unwind Brake mode this input is may be used to improve the system performance while the machine is accelerating and decelerating. The system will operate quite well without this feature provided the acceleration or deceleration rate is not excessively fast.

If an encoder is selected enter the maximum number of pulses per second when the machine is at maximum speed. This allows for the encoder pulses per revolution and the gear ratio used. Enter the number of pulses per metre or foot if the Length Counter feature is required. The tacho or encoder must be Enabled in order to function

Winder Tacho or Encoder *

(For motor powered unwind system, consult CMC Inc)

All Machine Parameters and Product Parameters, including the current TENSION SET POINT value are saved to non-volatile memory. This ensures that when the Controller is switched off or if the power is removed, the parameters are saved.

Calibrate Tension

To calibrate the Controller correctly a spring balance or weights to provide the required tension force and some flat webbing or rope to simulate the web will be required. If the force is insufficient for the maximum required tension value, the Controller may be calibrated proportionally. The force should be no lower than 25% of the maximum or the accuracy of tension measurement will be reduced.

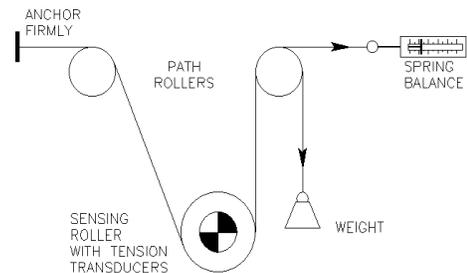
Switch on and allow to thoroughly warm up.

From the Commissioning Menu; press 2 to show the **Calibrate tension** screen.

Follow the on screen prompts. **Note** The Tension must be calibrated before the Speed is calibrated.

The Auto zero will compensate for the sensing roller weight and for any of the other analog zero offset voltages. Ensure that the line speed and reel speed signals and the external tension set point (if used) are at zero.

The Controller will calibrate both transducers simultaneously. The rope must be in the exact center of the web path so that each transducer is equally loaded.



After calibrating the tension, return to the Control screen and verify that the display shows zero when no tension is being measured and that the display shows the correct tension value when the weight or spring balance force is applied.

On first calibration two or three load applications may be necessary to "seat" the transducers.

Possible error messages:

Calibration has failed. Either the weight or spring balance force was much too small for accurate calibration, or the transducers are not operating correctly.

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Press the SET UP key to return to the Commissioning menu

Calibration aborted

This is shown if the SET UP key is pressed during the calibration. The Controller will return to the Commissioning Menu screen.

The controller has not been calibrated or the settings are no longer valid. Press any key to continue.

Calibration of the Total Tension Analog Output

The Total Tension analog output provides 0 to +10V at 2mA for a remote meter or chart recorder. Make sure that no tension is being measured, then adjust VR1 until zero volts are measured at TB4/12. Using a known weight or spring balance apply the maximum tension and adjust VR2 to give +10V. The output is not damped. These adjustments must be done with the rear cover removed.

Calibrate Speed

From the Commissioning Menu; press 3 to show the **Speed calibration** screen.

Follow the on screen prompts. **Note** the Tension must be calibrated before the Speed is calibrated.

Possible error messages:

Calibration has failed. Either the speed was much too low for accurate calibration, or the tachos and/or encoders are not operating correctly.

Press the SET UP key to return to the Commissioning menu

Calibration aborted.

This is shown if the SET UP key is pressed. The Controller will return to the Commissioning Menu screen.

**Tension must be calibrated before speed.
Select Calibrate tension from the menu.**

The controller has not been calibrated or the settings are no longer valid. Press any key to continue.

WebPro Unwind Brake Tension Controller

Product Parameters

The default is Product Number 1.

Product # Parameters	(SET UP = cancel)
Minimum diameter	<i>Enter a value</i>
Full scale diameter	<i>Enter a value</i>
Length outputs	Disabled, Enabled
Preceding length	<i>(if a line encoder is available)</i>
Full length	<i>(if a line encoder is available)</i>
PI stability setting *	
Inertia time constant	<i>(if a line tachometer or encoder is available)</i>
Inertia coefficient	<i>(if a line tachometer or encoder is available)</i>
Maximum trim	<i>(Speed and Torque control modes only)</i>
Current tension set point	<i>(The last tension value used)</i>

An asterisk * indicates that a further menu will open if this item is selected.

Enter a value for the Minimum Diameter (core) using the selected units.
 Enter a value for the Full Scale Diameter (maximum) using the selected units.
 If an encoder is available enable the Length Outputs and set the Preceding Length and Full Length.
 The procedure for the PI stability settings is explained in Controller Tuning, below.
 The Maximum Trim setting is used only for motor powered unwind systems.

Controller Tuning - Unwind Brake Mode

Ensure that all motor drives are correctly set. The Controller will not compensate for incorrectly set drives.

Output Level Bias

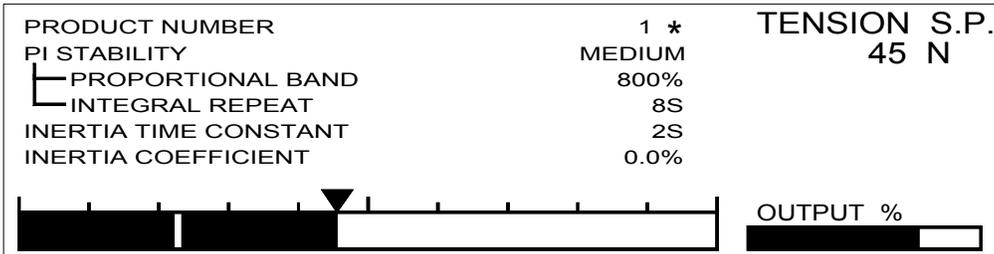
Thread up and run the machine slowly with a reel at minimum diameter (core). Select MANUAL and adjust the output level using the +/- keys until the measured tension digital display and bar graph shows the minimum desired tension as previously set in the Machine Parameter menu. Record the output % value.
 Stop the machine and enter this % value as the Output Level Bias in the Machine Parameter menu.

Output Level Limit

Thread up and run the machine slowly with a reel of maximum diameter. Select high tension and select MANUAL from the keypad and increase the output level using the +/- keys until the measured tension digital display and bar graph shows 100%, maximum. Record the output % value.
 Stop the machine and enter this % value as the Output Level Limit in the Machine Parameter menu.

PI Stability Settings

There are two methods of setting the PI stability; through the Product Parameter menu with the machine at rest or through the Adjust PI stability menu with the machine running.



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Access the Adjust PI stability menu from the Commissioning menu. Run the machine with the Controller in Auto at a Tension Set Point of approximately 50%. Use the SCROLL keys to select the parameter to be changed and adjust the parameter using the numeric keys or the +/- keys. Press the CONFIRM key to implement and save the change. An asterisk alongside the Product Number indicates that a parameter has been changed and that the CONFIRM key must be pressed to implement and save the change. When the best performance is achieved stop the machine, remember to press CONFIRM and then press SET UP to return to the Commissioning menu.

To simplify the tuning there are five factory set PI values. One of these values should be suitable for most applications. If it is found necessary to apply different PI values, select Custom and starting from PI values that gave stable but sluggish operation, reduce the P band % value and reduce the I time value until the desired performance is achieved. Remember to press the CONFIRM key before exiting the Product Parameter or the Adjust PI stability menus in order to implement and save any changes.

The five preset PI values are:

	very slow	slow	medium	fast	very fast
Proportional band	2000%	1200%	800%	500%	200%
Integral time	20 sec	12 sec	8 sec	5 sec	2 sec

Inertia Compensation

This feature is only available in Unwind Brake mode if a line speed tacho or encoder is available and is used to reduce the tension error caused by the reel inertia when the machine accelerates or decelerates. While accelerating or decelerating the machine at the normal maximum rate observe the measured tension bar graph and the desired tension set point triangle. If these differ by more than 10% adjust the Inertia Time Constant and the Coefficient to compensate for any increase in tension while accelerating or decrease in tension while decelerating. The Inertia Time Constant determines the rate of correction; the Coefficient determines the amount of correction.

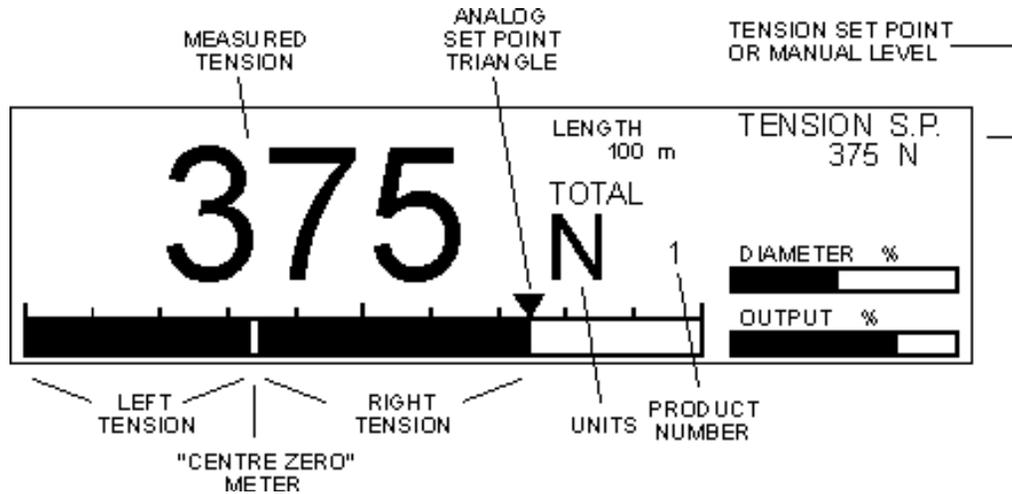
"Soft Start"

The Unwind Brake "Soft Start" feature will prevent web snatch on start up from rest if the web is slack. The "Soft Start" feature is enabled by the Machine Start input, Select Auto input or by the Auto key but the Controller is only activated when the measured tension exceeds 5% of maximum tension. This 5% tension is generated when the machine starts by the reel inertia and the Output Level Bias. The 5% level is part of the program and is not adjustable.

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Operating

A typical Control screen is shown below.



The maximum rate of change of the manual output is determined by the "Set point ramp rate" value. The Set Taper key does not operate. The Manual feature is only available in Unwind Brake mode. The Auto Tension set point may be set with the numeric keys followed by ENTER or by the +/- keys. The analog tension set point triangle is only visible when the Controller is in Auto control. The measured tension analog bar graph and the set point triangle should coincide when in control.

Adjusting the screen contrast

There are two unmarked keys, one below the CONFIRM key the other below the TENSION OFF key. Press both together and release, the KEY LED will flicker. Whilst flickering press one or the other unmarked key as required to adjust the screen contrast, release and allow the flickering to terminate.

Change Passwords

From the Commissioning Menu; press 5 to show the **Change Passwords** screen.

Commissioning password:	Enter the number and press ENTER
Enter new set up password:	Enter up to four digits and press ENTER
New password again	Enter the same number and press ENTER
** Password changed **	
New commissioning password:	Enter up to four digits and press ENTER
New password again	Enter the same number and press ENTER
** Password changed **	

The factory default SET UP password is 1234

The factory default COMMISSIONING password is 5678

A password may be up to nine digits long, alternatively a single digit is a valid password.

Safety and EMC

Safety is paramount at all times.

The Controller has a number of built in safety features; password protection for the Product Parameters, a different password for Commissioning, the MAN/AUTO/OFF keys may be disabled, the Controller may only be changed to LOW tension when the tension is OFF and all SET UP keys are disabled when MAN or AUTO are selected. The KEY LED will confirm if any key is pressed. The Controller will not accept an invalid input value which is outside the limits of operation; if an invalid input is attempted the Controller will

WebPro Unwind Brake Tension Controller

revert to the previous valid input. The Controller has been designed to meet UL and CSA requirements.

The Controller is self-certified as compliant with the EC Low Voltage Directive 73/23 and is CE marked. The Controller is self-certified as compliant with the EC EMC Directive 89/336. However the EMC performance will depend on the installation and environment and CMC Inc can give no guarantee that the installation will be free of problems. The Controller must be installed using best EMC practice and in particular the earth connection must provide a good EMC path to earth.

Additional Information

The CCFL (cold cathode fluorescent light) has a minimum expected life of 20,000 hours. The non-volatile memory is battery backed. The battery has an expected life of one year without a recharge. The battery will recharge when the Controller is powered. During power up the Controller may output a signal which may cause the machine to move if the controlled drive is powered and enabled.

External tension set point input

This is an analog signal of 0 to +10V DC, for Master - Slave applications. The input resistance is 100K Ω . The EXT SET POINT must be enabled in Machine Parameters to use this feature.

Tension set point output

This is an analog signal of 0 to +10V DC at 2mA maximum, for Master - Slave applications.

Diameter calculation

To avoid interaction with the control function the diameter calculator has a time constant of approximately 60 seconds from full reel diameter to core diameter. Should the unwind reel diameter reduce quicker than 60 seconds consult CMC Inc. The diameter-reset function has an instantaneous action.

Troubleshooting

With the exception of the fuses, F1 - 160mA and F2 - 1A, there are no user replaceable or serviceable parts in the Controller. If a fuse is ruptured the cause should be investigated before replacement.

1. If the POWER LED is lit, the incoming supply and fuses F1 rated at 160mA and F2 rated at 1A are correct. If the screen is blank or the backlight is not functioning the Controller must be returned to CMC Inc.
2. Check that the transducers are wired correctly and that the excitation voltage between TB2 (1 and 4), and between TB3 (2 and 5) is correct for the type of transducers used. Reset link LK1 if required.
3. Check that the Machine Sequencing switching is wired correctly and enabled from the Machine Parameters screen.
4. Check that the Output Level Limit is not set to zero, 0%.
5. Observe if the tension bar graph is fluctuating while in MANUAL mode. If the fluctuation is greater than +/-5% of maximum tension, investigate the brake to confirm that it is of a type suitable for tension control with adequate torque rating and this torque is constant as it rotates, that all shafts and rollers are concentric and rotate freely, the reels are not excessively out of round and the web speed is constant.
6. Can the output to the E/P converter or High Current Driver be adjusted by the Output Level Bias and Manual feature. If so, check the air supply and E/P or the electrical supply and the High Current Driver.

