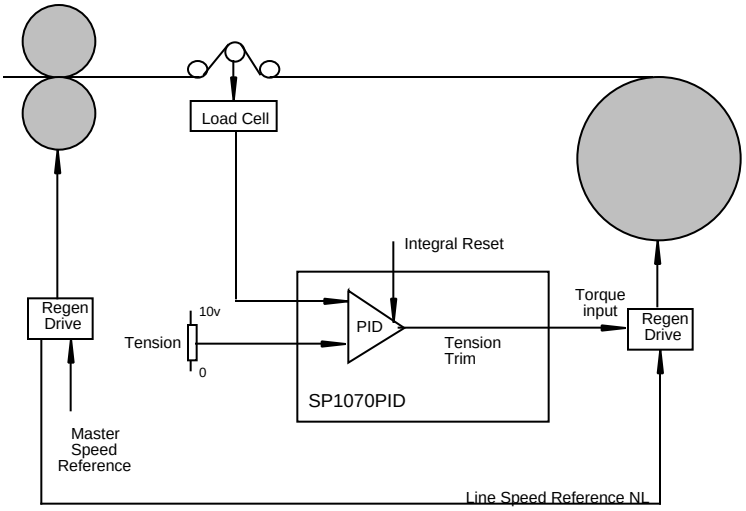
SP1070PID
Basic PID Controller

Loadcell Tension Control

In this application the SP1070PID provides constant tension control by means of loadcell feedback trim of the reference speed.

This method of tension control can be used either with a medium performance center winder (as illustrated), or between nip rolls, or with a surface winder.



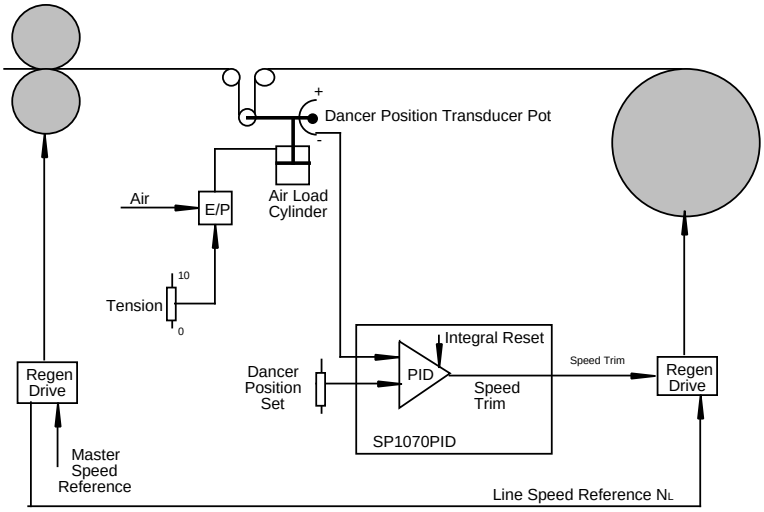
BASIC PID LOAD CELL TENSION CONTROL

Dancer Position Control

Here the SP1070PID is used to control dancer position by sensing arm movement and trimming drive speed.

Tension is adjusted by changing the load on the dancer arm (usually by means of a low friction air cylinder or balance weights).

This method of control can be used either with a medium performance center winder (as illustrated), or between nip rolls, or with a surface winder.

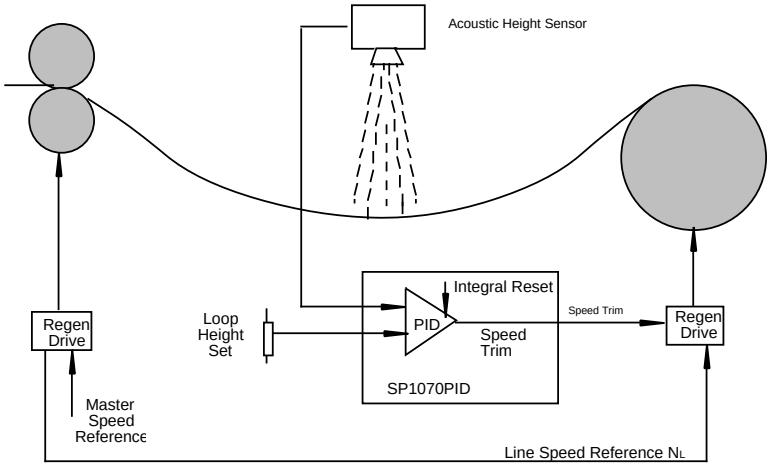


BASIC PID DANCER SYSTEM

Position Control with Acoustic Sensor

This application is a non-contacting method of controlling the height of the web for use where the surface could be marked by a conventional dancer or idler roll.

Other applications for the SP1070PID include position, height, and fluid level control.



BASIC PID LOOP HEIGHT CONTROL

Model SP1070PID
- Basic PID Controller -

SET-UP PROCEDURE

1. Reference Documentation

1.1 SP1070PID Block Diagram 500298, wiring and assembly drawing 500299.

1.2 SP1070PID configuration drawing HC101767, & basic specification sheet UG101496.

1.3 Drive Manuals

2. Installation

2.1 **This equipment incorporates high voltage supplies, and powerful machinery which are potentially very dangerous, and it is very important that the installation and set up must be carried out by qualified personnel.**

2.2 The installation and set up for this winder system are written for use with Bardac drives and are not necessarily appropriate when used with other manufacturers' drives.

2.3 This equipment must be installed in a suitable electrical enclosure with the required protection, control, and operator components. It is the users responsibility to complete the system design, and to ensure that all applicable codes are met.

3. Setting Up The System

Please read the entire setting up instructions before starting the procedure to familiarize yourself with the general requirements.

3.1 Before attempting to proceed with the winder configuration and start up, disconnect the drive from this equipment and fully complete its start up in a basic speed control mode according to the instructions in the drive manual. Normally the drive should be configured to prevent accidental reverse operation if it is a 4-quadrant, regenerative controller.

3.2 Select correct AC supply voltage tap the card modules.

3.3 Initial settings for the equipment:

SP1070PID Card Settings:

Ramp	MIN<<<<
Input Offset	>>MID<<
Differential Gain	MIN<<<<
Integral Zero	>>MID<<
Proportional Gain	MIN<<<<
Integral Reset	OPEN

External Components

Operator Position/Tension Reference Pot MIN<<<<

3.5 Set the Operator Reference Pot to MIN<<<<, and check that the input at terminal 17 is 0v.

With 0v on SP1070PID card terminal 17, and with no load on the Load Cell or with the Dancer in the fully extended position, adjust the Input Offset Pot to give 0v at terminal 16.

3.6 With the Prop Gain pot set to zero on the SP1070PID card, close the Integral Reset and check that the voltage on terminal 9 is 0v. Open and close the Integral Reset contact and observe the drift of the output at terminal 9. Adjust the Integral Zero pot to give minimum drift when the Integral Reset contact is opened. Remember that if there is a diode clamp on the Integral Output that will prevent the output from going negative, the drift should be set to be slow positive.

3.7a Tension Control

Check the polarity of signals to ensure that increase in Load Cell output gives decreasing motor current (torque) demand signal.

OR…

3.7b Position Control

Check the polarity of signals to ensure that rising loop or dancer output gives decreasing motor speed demand signal.

3.9 Check the set up of the rest of the system, splice sequences, standstill, hold, preset logic, jog, winder direction of rotation, etc.

4 Powering Up The System

4.1 Use extreme caution when powering up and be prepared to stop the drive at all times during this phase.

4.2 Thread material through the machine with all power turned off.

4.3 Take up material slack,

4.4 Turn power on

4.5a Tension Control

Set low tension, start winder and check the standstill tension

OR…

4.5b Position Control

Set low position reference, start winder and check that the winder applies tension and controls the dancer height as required.

Adjust the position reference to set the dancer about mid position.

4.6 Set slow line speed and start line. Adjust PROP GAIN and DIFF GAIN terms to give stable winder performance with repeated Line Start/Stop operation.

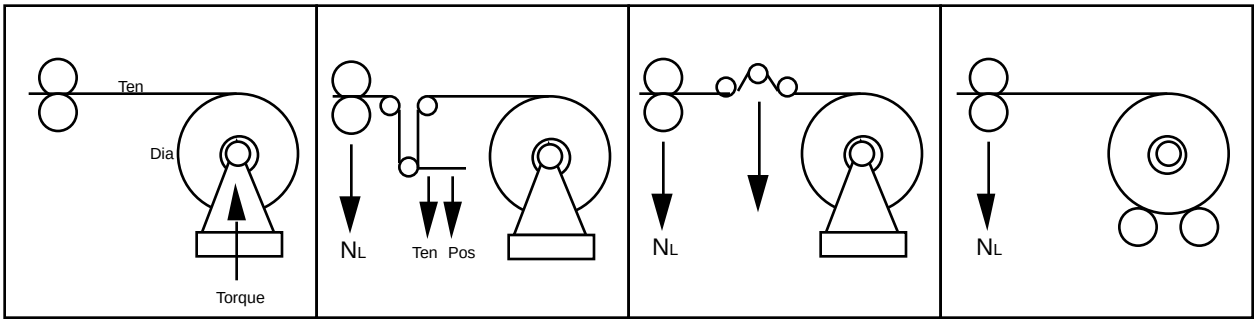
4.7 Gradually increase line speed and optimize the performance over the complete range of Line Speeds, Tensions, Taper, Roll Build-up, and materials.

5 Documentation

5.1 Make a complete record of your system set up and file securely with your manuals and drawings for future reference.

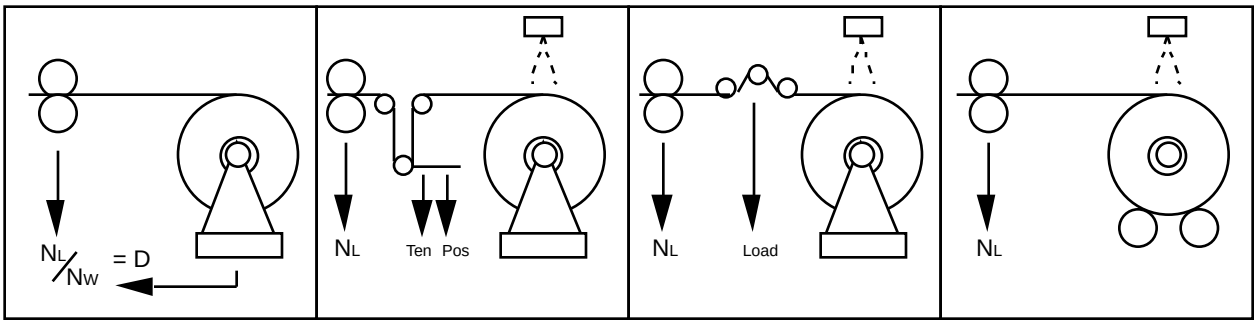
BASIC WINDER TYPES WINDER or UNWINDER
SINGLE WEB or MULTIPLE SLIT WEB
SINGLE CORE or TWIN TURRET
INDEXING: MANUAL - AUTO
SPLICING: MANUAL - AUTO

5.2 BASIC CONFIGURATIONS



Center Winder Basic Torque Control Torque Armature current Tension Torque÷Dia	Center Winder Basic Dancer Control Dancer position by PID or proportional feedback. Tension Dancer force Optional Taper Tension	Center Winder Basic Loadcell Tension Control Tension by PID trim speed Optional Taper Tension	Surface Winder Basic Tension Control Torque control of support rolls Tension Armature current
Requirements: Standard Drive	Requirements: Drive + SP1070PID Optional: E/P converter 430 Dia. Calc.	Requirements: Drive + SP1070PID Optional: 430 Dia. Calc.	Requirements: Standard Drive

5.3 PERFORMANCE CONFIGURATIONS



Constant Tension Center Winder (CTCW) Dia calculated $N_L \div N_W$ Torque Armature current Tension Torque÷Dia with Taper Tension	Center Winder Dia Comp. Dancer Control Dancer position by PID or proportional feedback. Dia by acoustic sensor Tension Dancer force Optional Taper Tension	Center Winder Dia Comp. Loadcell Tension Control Dia by acoustic sensor Tension by PID trim speed Optional Taper Tension	Surface Winder Dia Comp. Tension Control Dia by acoustic sensor Torque control of support rolls Tension Armature current Optional Taper Tension
Requirements: Drive 430 CTCW	Requirements: Drive+SP1070PID+Sensor Optional: E/P converter 430 Taper Tens	Requirements: Drive+SP1070PID+ Acoustic Sensor Optional: 430 Taper Tens	Requirements: Drive+430(1/Dia)+ Acoustic Sensor

5.4 CONTROL FUNCTIONS AVAILABLE

Constant Tension Center Winder (CTCW)	Center Winder Dia Comp. Dancer Control	Center Winder Dia Comp. Loadcell Tension Control	Surface Winder Dia Comp. Tension Control
Static Friction Dynamic Friction Inertia Compensation Web Break Sensing Core Speed Matching Max & Min Dia limits Digital diameter memory	Web Break Sensing Core Speed Matching Max & Min Dia limits Digital diameter memory Electrical-to-Pressure converter.	Web Break Sensing Core Speed Matching Max & Min Dia limits Digital diameter memory	Static Friction Dynamic Friction Inertia Compensation Web Break Sensing Core Speed Matching Max & Min Dia limits Digital diameter memory

5.5 BASIC WINDER SYSTEM SPECIFICATIONS

MECHANICAL DATA

LINE SPEED	MAX _____ FPM	MIN _____ FPM	
ROLL DIAMETER	MAX _____ IN	MIN _____ IN	RATIO ___:___
WEB TENSION	MAX _____ LBF	MIN _____ LBF	
	CONTROL ACCURACY +/- _____ LBF		
TAPER TENSION	YES / NO	INCREASING - DECREASING _____%	
MOTOR COUPLING	TIMING BELT - GEARBOX - DIRECT		
	ESTIMATED FRICTION CHARACTERISTICS		
REVERSING	YES - NO		

ELECTRICAL DATA

SUPPLY	___PHASE, _____VOLTS, 50/60HZ
BASIC MOTOR DATA	ARMATURE _____VDC, FIELD _____VDC, SPEED_____RPM

ENVIRONMENTAL DATA

INDOORS or OUTDOORS

CLEAN - DUST - WATER - EXPLOSION PROOF

DANCER SPECIFICATION

DANCER TRAVEL _____INCHES

DANCER INERTIA _____MD^2

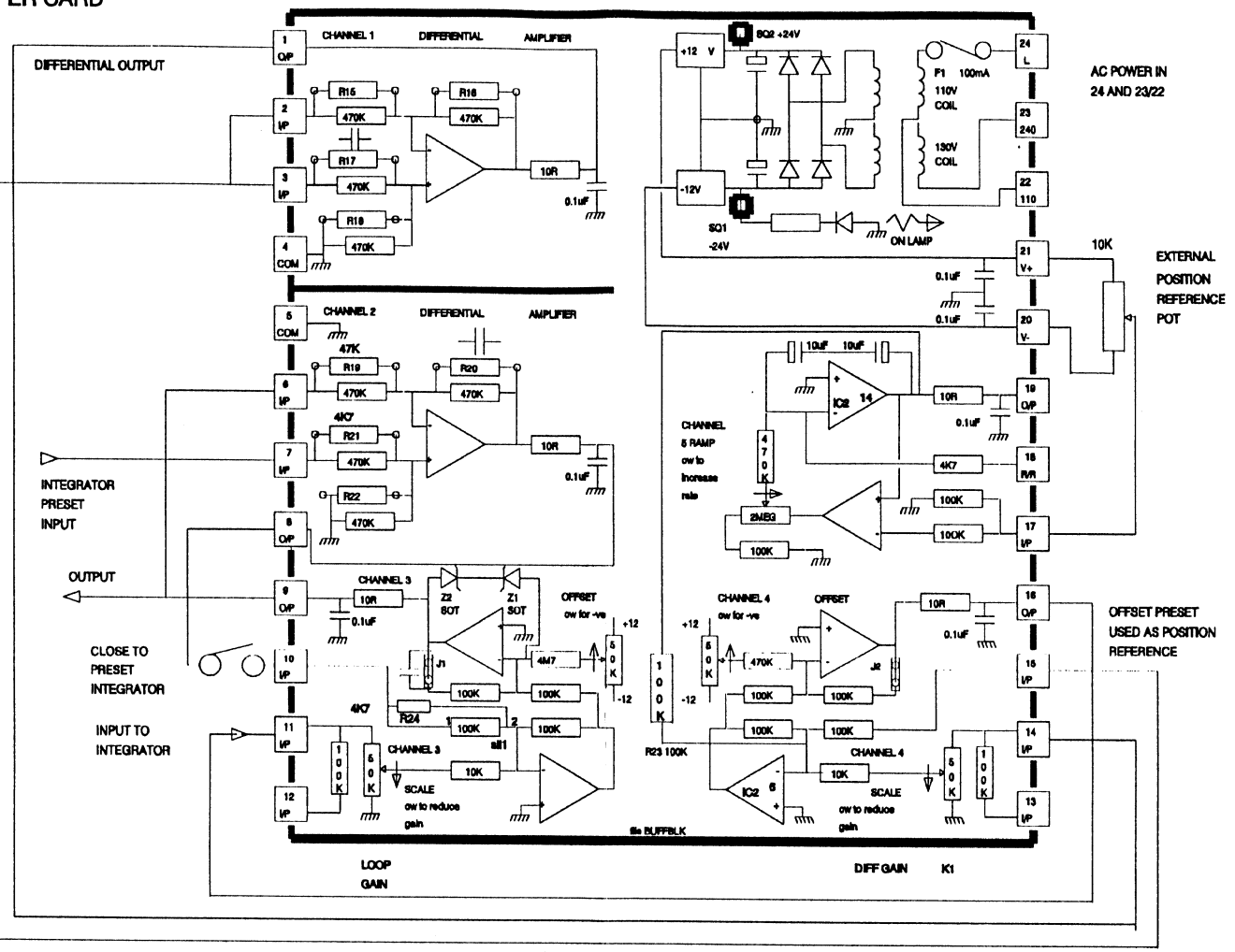
TRANSDUCER: ____K OHMS HIGH O/P ____V, LOW O/P _____V

LOAD CELL SPECIFICATION

TRANSDUCER: HIGH O/P ____V, LOW O/P _____V

UG101913 ISS13

PID SYSTEM USING BUFFER CARD
THIS OPTION IS
CON113



PRESET FUNCTIONS

CHANNEL 5 RAMP RATE
this sets the rate of the position reference change.

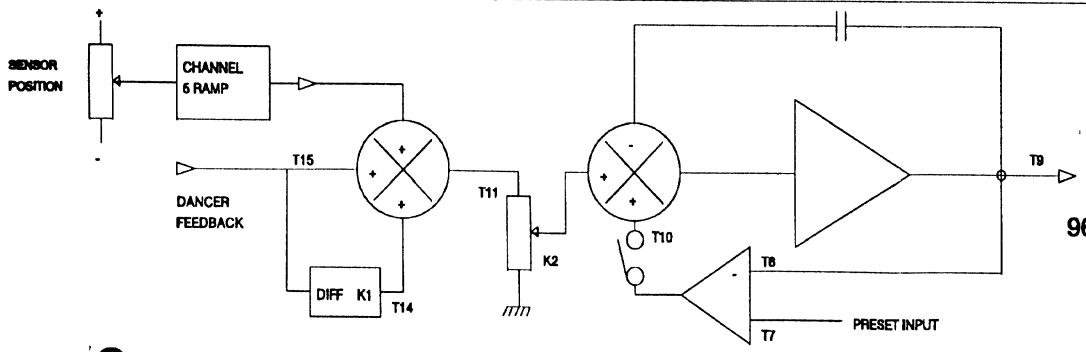
A long ramp time will give a gradual change to a new dancer position.

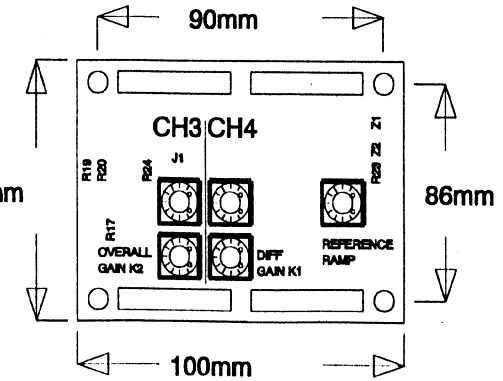
CHANNEL 4 SCALE
This sets the differential gain. Start at minimum gain. K1

CHANNEL 4 OFFSET
This may be used as an on board position reference set midway for centre position.

CHANNEL 3 SCALE
This sets TOTAL GAIN. K2

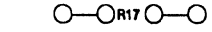
CHANNEL 3 OFFSET
may be used to zero integrator drift. Normally set midway (unless factory preset and sealed)





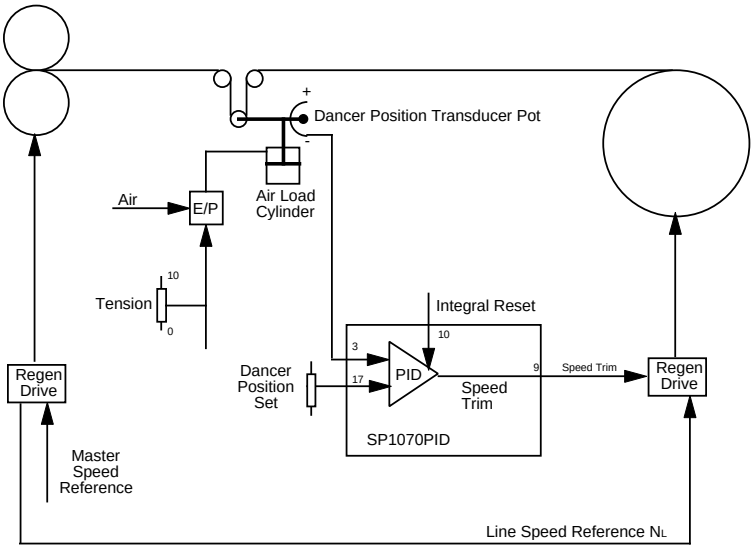
MOD LIST TO STANDARD BUFFER CARD

1) Add a 100K 1% resistor in position R23 and change R5 to 4M7
2) Fit 1uF bipolar capacitor in position R17. This sets differential time constant (Use standoff lugs)

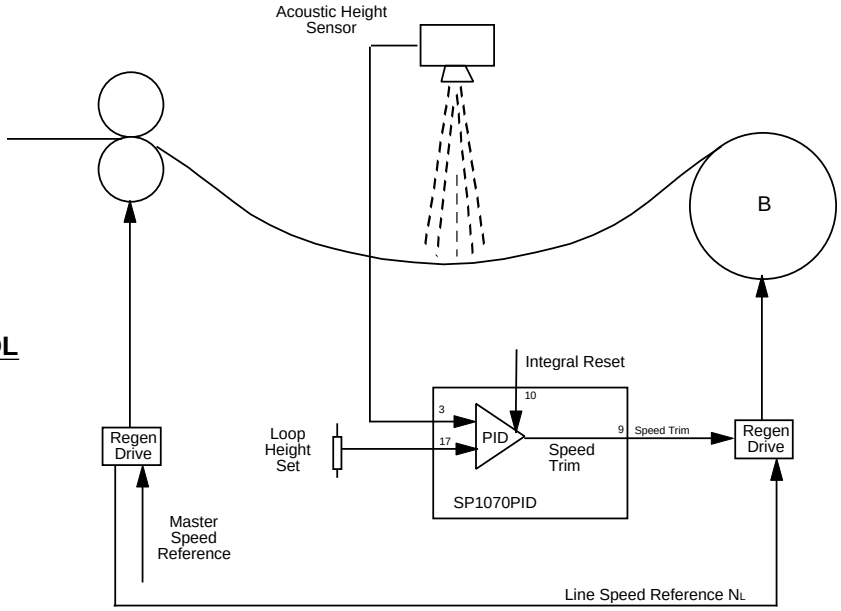


(Use standoff lugs) See channel 1. With this cap fitted channel 1 gives an output which is proportional to the rate of change of the input.
3) Fit 47K resistor in position R19. This sets gain around the integrator preset loop Channel 2.
4) Fit a 4K7 resistor in position R24. This sets gain of integrator input for preset signal. Channel 3.
5) Fit a 4K7 resistor in position R21. This gives unity gain to the preset signal. Channel 2
6) Remove the J1 link and fit a 2.2uF bipolar capacitor in the J1 position. This sets the integrator time constant. Channel 3. (use standoff lugs). Some systems may be unstable and slowly oscillate. If this occurs increase the capacitance in this position. Try adding another 1uF.
7) Fit 100nF capacitor in position R20. This stabilises the preset loop
8) The output swing of the final stage may be clamped by fitting zeners in the Z1 Z2 positions if required. Channel 3.
9) R9 changed to 100R

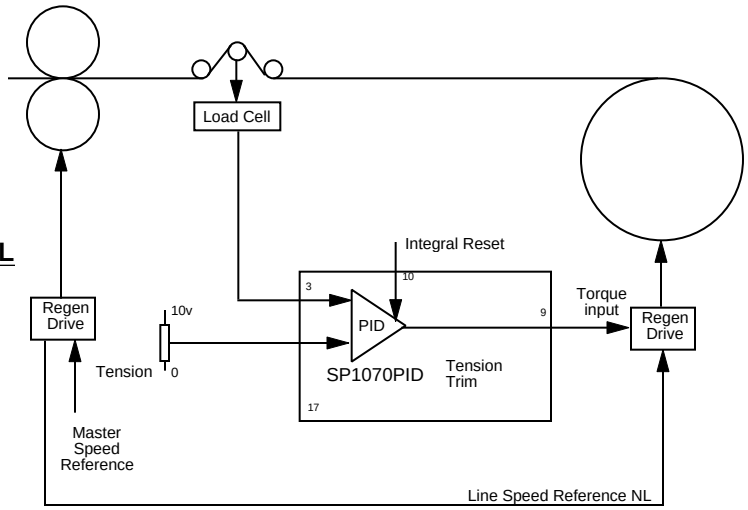
BASIC PID DANCER SYSTEM



BASIC PID LOOP HEIGHT CONTROL



BASIC PID LOAD CELL TENSION CONTROL

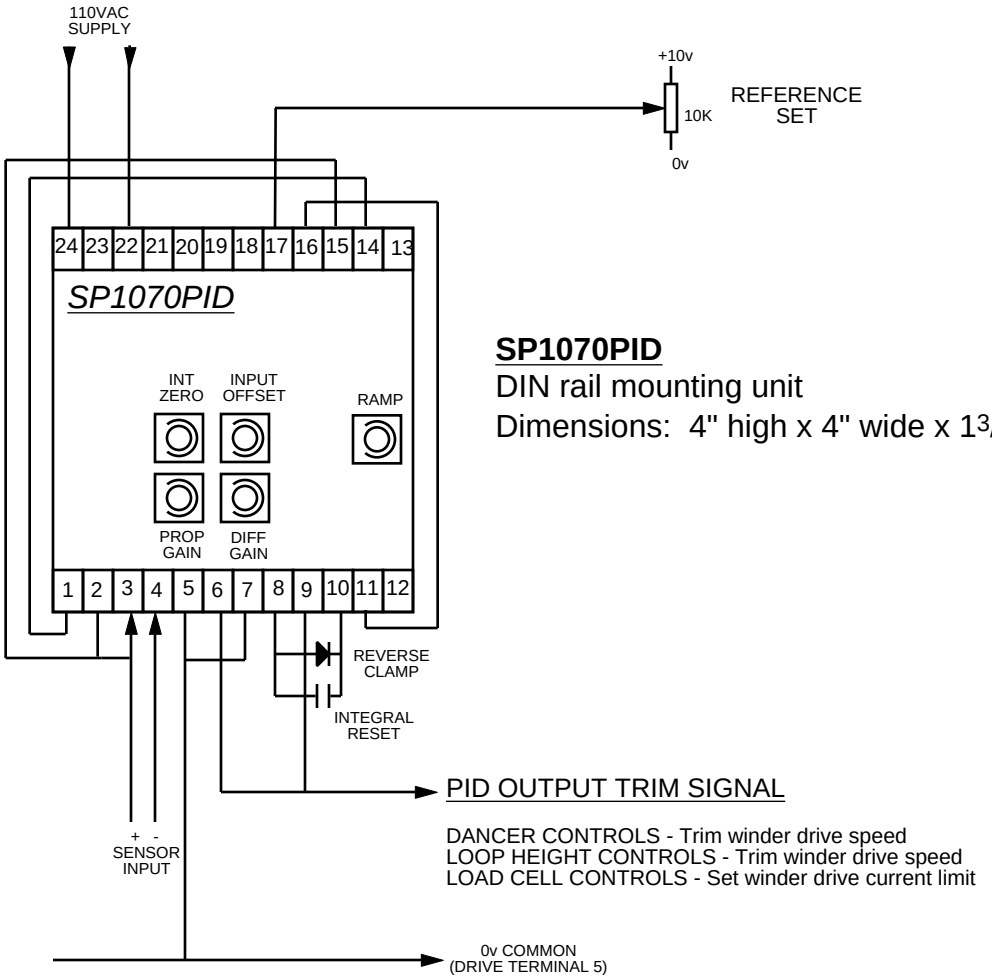


Bardac

Title	SP1070PID BASIC PID WINDER CONTROLS BLOCK DIAGRAMS
Dwg. No.	500298

Issue	Date
A	9/11/94
B	4/1/98
C	3/25/98

40 Log Canoe Circle, Stevensville, Maryland, 21666 USA
Phone (410) 604-3400 Fax (410) 604-3500



SP1070PID
DIN rail mounting unit
Dimensions: 4" high x 4" wide x 1 3/4" deep

DANCER CONTROLS - Trim winder drive speed
LOOP HEIGHT CONTROLS - Trim winder drive speed
LOAD CELL CONTROLS - Set winder drive current limit

SP1070PID SPECIFICATIONS:

Power Supply: 120VAC or 240VAC
Dancer Pot Supply: +/-10VDC 25mA max
Output: -10V to +10VDC (Output can be clamped for single direction operation.)

Scalable Functions:
Derivative Gain
Proportional / Integral Gain
Position Reference
Reference Ramp

Bardac
40 Log Canoe Circle, Stevensville, Maryland, 21666 USA
Phone (410) 604-3400 Fax (410) 604-3500

Title	SP1070PID BASIC PID CONTROLS INSTALLATION DRAWINGS
Dwg. No.	500299

Issue	Date
A	9/11/94
B	4/1/98
C	3/25/98
D	11/2/00