Options and Modifications for DC Controllers

Option No.	Description	For Use with Series
CL	**MAGNETIC CONTROL INTERFACE (115V)** The standard magnetic control run logic excitation is 24 VDC, obtained from a self-contained power supply in the VEplus controllers. This option provides a means of interfacing a controller with pushbuttons or external logic powered by a 115 or 230 VAC excitation source. The interface circuit includes three control relays with 115 VAC coils for use in both unidirectional and reversing applications.	VEplus
IAB	**INTERFACE, SIGNAL OPTIONS** Series VEplus units incorporate as standard many of the functions that were formerly offered as extra cost options on the products they replace. However, some special applications may still require the use of signal options. Option IAB enables the use of these options by providing a power supply, mounting area and an electrical connector to interface and mate with these options. This option mounts within the VEplus chassis. Space limitations prevent mounting this option within the BETA units and therefore it may be mounted externally with brackets provided in a kit.	BETA II BETAplus VEplus
LS	**LINE STARTING** A modification which will defeat the internal "anti-restart" feature of the controller. An external AC line contactor may then be used to start and stop controller	BETA II BETAplus VEplus
MK	**OPTION CARD GUIDE KIT** This option is required when mounting the option cards in the enclosure or if the option cards are mounted external.	VEA-RG
RI	**LIMIT SWITCH REVERSING** This option board allows interfacing the controller with a variety of external devices, such as limit switches, push buttons and potentiometers. There are two (2) speed potentiometers on this board, one (1) for forward speed and one (1) for reverse speed. These internal potentiometers can be switched out if external potentiometers are required. In addition, this board will allow a controlled stop feature with an adjustable speed dropout.	VEA-RG RBA-RG
SK	**SPACER KIT FOR 3 HP RBA-RG ENCLOSED CONTROLLER** This spacer kit is required for mounting controllers when they are to be used for their maximum 3 HP rating.	RBA-RG
SKO	**OPTION MOUNTING KIT** This kit contains standoffs for mounting an optional contactor or option board onto an Angle Bracket chassis.	RBA-RG
14	**MASTER OVERRIDE (FOLLOWER, EXTERNAL AC SIGNAL)** Provides necessary impedance matching, isolation, signal conversion and filtering as required to adjust the speed of the drive (or drives) from an external AC signal source. Option 14 permits full range speed control from an external 0 to 115 VAC adjustable signal source manually controlled by a potentiometer, variable autotransformer or some other suitable means. This option is required for each controller which is to be controlled by the external AC signal. Included in this option are minimum and maximum speed adjustments, with the normal drive run speed potentiometer functioning as a ratio setting when following the external AC signal. This option is useful for multiple section machines where a definite speed relationship must be maintained between sections, while the entire machine is varied over a specified speed range by a common manual speed control device. This option consists of a small plug-in circuit board which inserts into the input connector of the control board. *The option does not include the external AC signal source.* Master Override Station Cat. No. 62317 provides the required master signal and also includes master run-stop pushbuttons. (Option 14A) If the controls are to be started with individual pushbutton stations, Master Station Cat. No. 62311 may be used to provide master speed control only. (Option 14B)	VEplus
17	**FOUR-QUADRANT ACCELERATION/DECELERATION** This option board has four (4) adjustment potentiometers consisting of a forward acceleration potentiometer, a forward deceleration potentiometer, a reverse acceleration potentiometer and a reverse deceleration potentiometer. The potentiometers have an adjustment range of .3 to 30 seconds. Also, the board has a bypass mode to disable the four (4) potentiometers on the option board and switch to the two (2) potentiometers (acceleration and deceleration) on the control board. This option board mounts on the control board and does not take up the option slot in the casting base.	VEA-RG RBA-RG

Options and Modifications for DC Controllers

Option No.	Description	For Use with Series
18	**TORQUE TAPER** This option consists of a plug-in circuit board. This board provides an inverse-linear speed-torque relationship when operating in the braking (regenerative) mode, and provides constant torque in the motoring mode of operation. Motoring torque and braking torque are individually adjustable as well as forward and reverse torque taper. Applications include the following: 1. Winders where the material being wound travels at a constant speed during winder roll buildup. 2. Unwinders, since this option provides relatively constant holdback tension (±20%) from full roll to empty roll.	VEA-RG RBA-RG
18A	**TORQUE TAPER** Center driven winders ideally require a reciprocal speed torque relationship (constant horsepower) to maintain constant tension throughout the range of material build-up. Acceptable performance can be economically achieved for many applications with an inverse-linear speed-torque relationship provided by this option. Tension control accuracy of approximately 20% can normally be maintained from empty to full roll at a given machine speed. *This option consists of a plug-in circuit board which replaces the FEEDBACK board in the control and a torque potentiometer for installation in the operator's panel. Independent potentiometers are provided for:* TORQUE ADJUST—Establishes maximum low speed torque. The TORQUE ADJUST in combination with the SLOPE ADJUST establishes the torque available at any point throughout the operating speed range SLOPE ADJUST–Establishes the rate of torque increase with decreasing speed, throughout the operating range. Adjustable from 0 to 100% torque at maximum motor speed with minimum effect on low speed torque. The SLOPE ADJUST potentiometer is mounted within the controller on the option circuit board. **Use caution in the selection of motors for center driven windup applications where torque loads increase in inverse proportion to motor speed. Web break or other process material detectors are recommended to prevent a dangerous overspeed should the process material break.** *Option 18A normally provides acceptable performance in applications where the material being wound travels at a constant speed during winder roll buildup. If the process is such that the speed of the material being wound varies during winder roll buildup or if more accurate tension control is desired, see Option 36A.* *This Option Kit is also used for constant torque applications where conventional operation of the current limit is required and remote mounting of the torque (current) potentiometer is desired. When used in this manner, the Slope adjustment is set for a vertical cutoff of motor (maximum setting) torque (current). See Option 18B.*	VEplus
18B	**TORQUE (CURRENT) LIMIT CONTROL** Provides the ability to adjust the drive current limit setting and thus the motor torque over a range of 50-150% by a remote mounted TORQUE ADJUST potentiometer. (See Option 18A).	VEplus
18C	**FOLLOWER, CURRENT REGULATOR** Provides a means of controlling motor armature current and torque by a manually adjusted potentiometer or an external DC voltage reference signal. The circuit includes internal isolation permitting direct connection to a grounded signal source. Since torque is directly controlled independent of motor speed, provision is included for limiting maximum motor speed. Multiple motor applications typically involve master speed regulated drive which establishes the speed of the system and one (1) or more current regulated follower drive units. The follower units obtain their current reference signal from the master controller. Typical applications include: a. Load sharing between two (2) or more drive units with their motors mechanically coupled. b. Load sharing between two (2) or more drive units coupled by the process material itself such as steel bar stock being pulled by multiple drive units through separately powered sections of a machine.	VEplus
18C	**FOLLOWER, CURRENT REGULATOR (LESS ADJUSTMENTS)** ***(Continued)***	

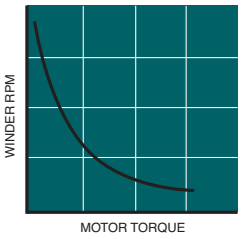


FIGURE A. "Ideal" Constant HP curve for a winder application

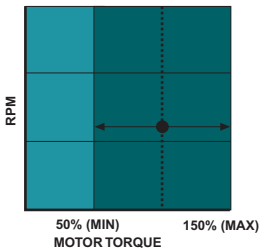


FIGURE B. Torque Adjust with slope adjust at maximum

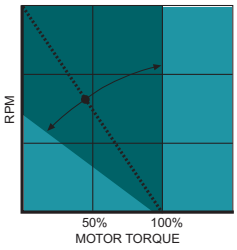
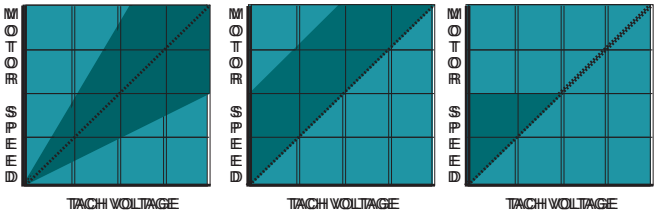


FIGURE C. Slope Adjust with torque adjust at 100% torque setting

Option No.	Description	For Use with Series
	c. Tension control of a web of process material being transferred between sections of a multiple section machine. **APPLICATION INFORMATION** **1. Current response time** Zero to full-load current ..... 150 Milliseconds **2. Output current control** Range ..... 10:1 **3. Signal input required for maximum current output** Range 1 ..... 3.35 to 36.5 VDC Range 2 ..... 0.34 to 3.7 VDC Range 3 ..... 0.04 to 0.44 VDC **4. Transfer linearity** Input signal to output current ..... 1% *This option consists of a plug-in circuit board which inserts into both input and feedback connectors of the control board. Included are separate adjustments for:* **Maximum Speed** ..... 0-Motor Base Speed **Maximum Current** ..... 0-150% of rated(1) **Input Scaling** ..... Adjustable to match the input signal (0.04 to 36.5 VDC) for maximum current output. **Current offset** ..... Adjustable for zero current output with minimum signal input. (1) 0-75% of rated achieved by adjustment of the unit current limit.	**VEplus**
18E	**TORQUE (CURRENT) REFERENCE** A modification that will allow the controller to function as a torque regulator. This modification allows the use of an external potentiometer to set maximum motor torque (0-150% of rated).	**BETA II** **BETAplus** **VEplus**
21	**POTENTIOMETER, SINGLE TURN MOTOR SPEED** Provides a single turn, 2W potentiometer, knob and analog dial plate. Not intended for bidirectional operation via speed potentiometer.	**ALL**
21A	**POTENTIOMETER, TEN-TURN MOTOR SPEED (ANALOG)** Provides a Ten-Turn, 2W potentiometer, knob and analog dial. Not intended for bi-directional operation via speed potentiometer.	**ALL**
21B	**POTENTIOMETER, TEN-TURN MOTOR SPEED (DIGITAL)** Provides a Ten Turn, 1/2W Potentiometer with digital dial and knob. Not intended for bi-directional operation via speed potentiometer.	**ALL**
22A	**FOLLOWER, AC OR DC TACHOMETER GENERATOR** Intended for automatic control systems where it is necessary for the drive to follow the speed of a preceding drive unit or rotating machine coupled to an AC or DC tachometer generator. The tachometer voltage signal provides the speed reference for the "follower" drive. Option 22A is not recommended for use where multiple drive controllers are required to operate from a common signal source, unless the controllers are isolated. A more economical approach if the controllers are not isolated would be the use of the MIRC master isolated reference controller which is intended for use with multiple drive controllers. See Option 35. Adjustments are provided to adapt the unit to a wide range of system requirements. Included are independent adjustments for: TACH SCALING – Adjustable to interface the tachometer generated voltage with the required controller reference voltage when the FOLLOWER RATIO potentiometer is set on maximum. If a plus ratio is required (i.e.: the follower drive is at full speed when the master drive is at half speed) set the FOLLOWER RATIO potentiometer at its midpoint and adjust TACH SCALING for the required controller reference voltage and then adjust the FOLLOWER RATIO potentiometer toward 100. FOLLOWER RATIO – Adjustable to permit tracking the tachometer signal voltage at a plus or minus ratio. The FOLLOWER RATIO potentiometer is mounted in the operator control panel. MINIMUM SPEED (Additive)–Adjustable to permit tracking the tachometer signal at a fixed offset voltage. MINIMUM SPEED ADDITIVE potentiometer is mounted on the Option 22A circuit board.	**VEplus**

Option No.	Description	For Use with Series
22A	**FOLLOWER, AC OR DC TACHOMETER GENERATOR *(Continued)*** MINIMUM SPEED (Override)–Adjustable by the MOTOR SPEED potentiometer to establish a minimum drive speed independent of tachometer signal voltage. The MOTOR SPEED potentiometer is also used as a manual speed setting control when no tachometer signal is present. The MOTOR SPEED potentiometer is mounted in the operator control station. A MANUAL/FOLLOWER selector switch is therefore unnecessary for most applications and is not included with this option. See Option 38 when a switch is desired. The MOTOR SPEED potentiometer is mounted in the operator control station. *Option 22A consists of a small plug-in circuit board which inserts into the input connector of the Control Circuit Board and a FOLLOWER RATIO potentiometer for separate mounting.* *This option does not include the tachometer generator which must provide 30 volts at base speed and not to exceed 180 volts at maximum speed.*  **FIGURE A. TACH SCALING AND FOLLOWER RATIO** **FIGURE B. MINIMUM SPEED ADDITIVE** **FIGURE C. MINIMUM SPEED OVERRIDE**	VEplus
22B	**FOLLOWER, DIGITAL PULSE GENERATOR** This option provides signal conditioning and isolation for accepting a signal from a magnetic pulse pick-up mechanically coupled to a preceding drive motor, rotating machinery or various static pulse generators permitting the drive to follow at an adjustable ratio. *This option consists of:* *a. Digital to analog conversion circuit board which inserts into the INPUT connector of the control circuit board.* *b. A signal conditioning circuit board which is mounted in the base of the controller or remotely mounted.* *c. MANUAL/FOLLOWER selector switch for separate mounting.* *d. Interconnection wire harness.* Two (2) modes of operation are provided: Manual and Follower, as selected by the MANUAL/FOLLOWER switch. In the Manual mode, the MOTOR SPEED potentiometer controls motor speed. In the Follower mode, the motor follows the digital pulse signal, and the MOTOR SPEED potentiometer functions as the follower ratio adjust potentiometer. The signal conditioner circuit board accepts the output of any one of the following devices: 1. Magnetic pulse pick-up capable of providing 450 pulses/second at motor base speed and not exceeding a maximum of 2500 pulses/second at motor base speed. Recommended input: 100 tooth gear on a 1150 RPM motor. 60 tooth gear on a 1750 RPM motor. 30 tooth gear on a 2400 RPM motor. 2. Pulse generator (TTL) with a 0 to +5V output, capable of providing a minimum of 450 pulses/second at motor base speed and not exceeding a maximum of 2500 pulses/second at motor base speed. 3. Pulse generator with an open collector output, capable of conducting 2 milliamperes at 24 VDC. This option does not include the magnetic pick-up assembly, pulse gear or other signal source, or the motor speed potentiometer.	VEplus
24	**TACHOMETER FEEDBACK** An internal modification which provides impedance matching from a DC tachometer generator which is directly coupled to the motor armature. This option improves speed regulation with respect to changes in load, line voltage, ambient temperature and motor field heating. The tachometer generator must be capable of providing 5 to 120 VDC/1000 RPM. The tachometer generator is not part of this option.	BETA II BETAplus VEplus
24A	**FEEDBACK, TACHOMETER AC OR DC** Provides impedance matching and terminals for accepting a signal from a 2-phase AC or DC tachometer generator, mechanically coupled to the drive motor armature. The tachometer signal defeats the IR compensation circuitry in the	VEplus

Options and Modifications for DC Controllers

<table>
<tr><th>Option No.</th><th>Description</th><th>For Use with Series</th></tr>
<tr><td>24A</td><td>FEEDBACK, TACHOMETER AC OR DC (Continued)
drive controller making the unit directly sensitive to motor speed. This results in expanded speed range, improved speed regulation with load changes and reduced sensitivity to operating conditions such as line voltage variations, ambient temperature changes, motor field heating and other operating variables. The controller will automatically switch to armature feedback if the tachometer signal is lost.
Tachometer generator must provide 30 to 180 volts at maximum motor speed. A MAXIMUM SPEED TACHOMETER potentiometer is provided to scale the tachometer signal.
Option 24A consists of a small plug-in circuit board which inserts into the FEEDBACK connector on the control circuit board, replacing the armature feedback circuit board. Option 24A does not include the tachometer generator.
Caution: Do not use a single-phase AC Tachometer.</td><td>VEplus</td></tr>
<tr><td>24B</td><td>FEEDBACK, DIGITAL PULSE GENERATOR
Provides signal conditioning and isolation for accepting a signal from a magnetic pulse pick-up mechanically coupled to the drive motor armature. The magnetic pulse pickup must provide a minimum of 450 pulses per second at motor speed (60 tooth gear on a 1750 RPM motor). The pulse pick-up signal defeats the IR compensation circuitry in the drive controller, making the unit directly sensitive to motor speed. Speed range is limited to 35:1.
The option results in improved speed regulation with load changes (equal to DC tachometer feedback) and reduced sensitivity to operating conditions such as line voltage variations, ambient temperature changes, motor field heating and other variables.
Option 24B consists of:
a. Digital to analog conversion circuit board which inserts into the FEEDBACK connector of the control circuit board.
b. A signal conditioner circuit board which is mounted on the base of the controller or remotely mounted.
This option does not include the pulse pick-up assembly.</td><td>VEplus</td></tr>
<tr><td>24B</td><td>PULSE TACHOMETER FEEDBACK/FOLLOWER
This option is interfaces the controller to a pulse train for speed reference or as a feedback signal. It allows the use of a 60 tooth gear for either speed reference or feedback. It is capable of providing digital pulse tach reference an/or feedback functions. The sensor can be a magnetic pickup (2 wire), proximity sensor (3 wire), AC tachometer generator (18 cycles/revolution), two-phase AC tachometer generator, or digital tachometer generator or encoder (240 pulses/revolution) Note: two-phase AC tachometer generator can be used for follower or feedback applications, but not both.</td><td>VEA-RG
RBA-RG</td></tr>
<tr><td>25</td><td>ISOLATED INPUT AND FOLLOWER
This option board isolates the motor speed potentiometer from the non-isolated controller for operator and equipment safely. Also, it will allow the controller to follow a 4-20 DCMA current signal and a wide range of DC voltage signals (±.05 to ±500 VDC). This makes the option ideal for following signal transducers, motor shunts, DC tachometer generators and the armature voltage from DC motors.</td><td>VEA-RG
RBA-RG</td></tr>
<tr><td>25A</td><td>FOLLOWER, DC PROCESS
Provides necessary impedance matching circuitry to interface a customer supplied DC signal source with the drive controller reference input. Typical applications are those where motor speed must be controlled as a function of a process variable such as temperature, weight, flow, pressure, etc.
In many applications, the reference signal is obtained from a process instrument controller or other commercially available transducer with a DC milliampere output. Devices of this type normally provide signal levels compatible with requirements listed in the table:
<table><tr><th>DC Input Signal Range (ma)</th><th>Option Input Impedance (Ohms)</th></tr><tr><td>0-5</td><td>80</td></tr><tr><td>0-10</td><td>40</td></tr><tr><td>0-25</td><td>16</td></tr><tr><td>0-50</td><td>8</td></tr><tr><td>1-5</td><td>80</td></tr><tr><td>2-10</td><td>40</td></tr><tr><td>4-20</td><td>16</td></tr><tr><td>10-50</td><td>8</td></tr></table>Included are suitable adjustments for linear transfer of instrument output current to motor speed. The adjustments will normally be set so minimum transducer signal results in minimum or zero motor speed and maximum signal produces maximum motor speed. Also provided is an adjustment to extend or compress the transducer signal output so a 5:1 transducer output signal range, for example, could provide a 10:1 or 20:1 drive speed range. Included are individual potentiometer adjustments for:
MINIMUM SPEED (Override) – Adjustable by the MOTOR SPEED potentiometer to establish a minimum drive speed independent of the external reference signal. The MOTOR SPEED potentiometer is also used as a manual speed setting control when no external reference signal is present.</td><td>VEplus</td></tr>
</table>

Options and Modifications for DC Controllers

Option No.	Description	For Use with Series
25A	**FOLLOWER, DC PROCESS *(Continued)***	VEplus

A MANUAL/FOLLOWER selector switch is therefore unnecessary for most applications and is not included with this option. See Option 38 when a switch is required. The MOTOR SPEED potentiometer is mounted in the operator control station.

IMPEDANCE MATCH - Provides a means of matching the impedance of the signal source and also functions as GAIN adjustment.

OFFSET - Trims minimum input signal.

IMPEDANCE MATCH and OFFSET potentiometers are mounted on the Option Circuit Board

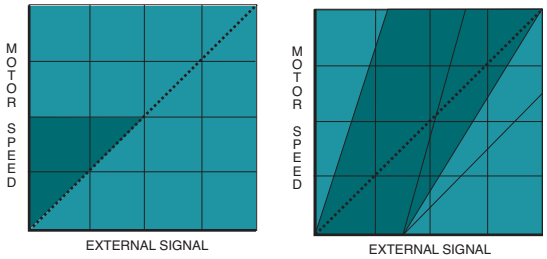


FIGURE A **FIGURE B**

Option consists of a small plug-in circuit board which inserts into the INPUT connector of the control circuit board. Option does not include the external signal source, Motor Speed potentiometer or optional Manual Follower selector switch.

25C	**FOLLOWER, AC CURRENT TRANSDUCER**	VEplus

Intended for automatic control systems where it is necessary for the drive to follow an AC signal proportional to the load current of a constant speed, AC induction motor. Typical examples are conveying systems where the material feed rate has a direct influence over the loading of the AC motor, i.e.: the carriage or conveyor feeding logs to a saw powered by an AC motor. Since the thickness and density of the wood is not uniform this option permits automatic adjustment of conveyor speed to the highest feed rate which will not overload the saw motor.

In order that a proper current transformer may be supplied it is necessary that nameplate data such as horsepower, voltage, load current, etc. be provided from the AC motor.

AUTO/MANUAL SELECTOR SWITCH (1)–Selects the operation function. When the switch is in AUTO position, the drive functions as an AC current follower unit. When the switch is in MANUAL position the drive functions as an adjustable speed unit. When the AUTO function is selected, the separately furnished Motor Speed potentiometer provides speed adjustment of the DC motor at a ratio from 0 to 100% of the AC input signal. When the MANUAL function is selected, the Motor Speed potentiometer provides normal manual speed adjustment of the DC motor.

DIRECT/INVERT SLIDE SWITCH (2)–Selects the operation mode. When the switch is in DIR position, the speed of the DC drive motor varies directly proportional to the load current drawn by the AC motor. When the switch is in INVT position the speed of the DC drive motor varies inversely proportional to the AC motor load current, i.e., when the load of the AC motor increases causing it to draw more current, the DC motor speed decreases.

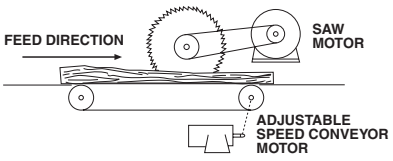
BIAS (2)–Set the maximum DC motor speed for the INVERT mode of operation.

CURRENT SCALING (2)–Matches the range of the AC input signal to the input signal range requirements of the controller.

INTEGRATION RATE (2)–Sets the response rate of the system when the AUTO function is selected.

MINIMUM SPEED (2)–Sets minimum speed independently of the input control signal.

PROPORTIONAL GAIN (2)–Sets the gain of Circuit Board when the AUTO function is selected.



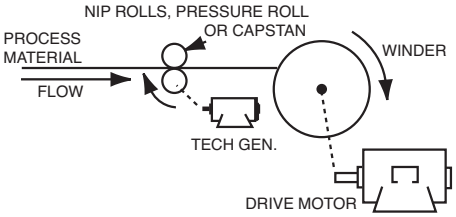
This option consists of:

a. Toroidal current transformer for separate mounting by the user for sensing AC motor load current.
b. A small plug-in circuit board which inserts into the input connector of the control circuit board.
c. AUTO/MANUAL selector switch for mounting remotely.

Options and Modifications for DC Controllers

Option No.	Description	For Use with Series
25C	**FOLLOWER, AC CURRENT TRANSDUCER *(Continued)*** *NOTES:* *(1) Mounted in operator control station.* *(2) Located on circuit board.* *This illustration shows an application which requires an inverse elationship between AC motor load current and the follower drive motor speed. This option may also be programmed for a direct relationship where the follower drive would increase in speed with increasing AC motor load current.*	VEplus
30	**AC LINE CIRCUIT BREAKER, TWO POLE** Provides a two-pole, magnetic only, fast trip circuit breaker as a means of manually disconnecting controller from the AC line. The high interrupting capacity fuse in the basic unit is retained as primary short circuit protection.	VEA-RG
34	**MASTER ISOLATED REFERENCE CONTROLLER** This is a master system housed in a VEL/H size cabinet including a circuit breaker for use as an on-off switch, a run-stop control relay, operator's controls consisting of run and stop pushbuttons and a master speed pot. Input voltage may be 115 or 230 VAC, 60/50 Hz. The control provides an adjustable frequency signal for each control in the system with a suitable follower board (see below). The master control also accepts input options and thus can provide system acceleration-deceleration, external signal, etc. Order Cat. No. 60174.	VEplus
35	**FOLLOWER, MASTER ISOLATED REFERENCE CONTROLLER (MIRC)** Provides an input circuit board to interface a controller with speed reference signals transmitted by the Model MIRC master controller. The receiver circuit board includes necessary isolation, impedance matching and frequency to analog conversion. This option is required for each controller whenever one or more is to be controlled by the MIRC. Option 35 includes adjustments for maximum ratio, minimum speed and offset as well as the separately furnished MOTOR SPEED potentiometer. The MIRC is a versatile master controller suggested for use whenever isolation is required between a controller and a grounded external signal source and/or signal isolation is required between multiple controllers which must track a common speed reference signal. All adjustments excepting the MOTOR SPEED potentiometer are mounted on the option circuit board. The MOTOR SPEED potentiometer functions as a manual speed setting device with the MASTER/LOCAL selector switch in the LOCAL position. In the MASTER position the potentiometer provides a ratio or draw adjustment. See Option 34 for additional information on the MIRC Master Controller. *Option 35 consists of a small plug-in circuit board which inserts into a prewired connector provided for this purpose and a MASTER/LOCAL selector switch.* *The MIRC follower option will control motor speed for unidirectional operation only.* *This option does not include the MIRC Master Controller or the MOTOR SPEED potentiometer. See Option 34.*	VEplus
36A	**CENTERWIND TORQUE CONTROL** This option offers a more sophisticated solution to controlling the tension of center driven winders than Torque Taper Options 18 & 18A. Tension control is more accurate since this option produces a reciprocal speed-torque relationship which closely matches the ideal constant horsepower curve required to maintain constant tension. Option 36A has provisions to accept a signal proportional to web speed from either a tachometer generator driven from the production machine feeding the winder or a potentiometer ganged to the production machine speed control. Tension control accuracy of better than 20% can normally be maintained from empty to full roll, and the control automatically compensates for changes in production machine speed. *This option consists of a plug-in circuit board which inserts into both the INPUT and the FEEDBACK connectors of the control board, and a TORQUE ADJUST potentiometer pre-wired for installation in the operator control panel. Included are independent potentiometer adjustments for:* TORQUE ADJUST – Sets the desired tension in the material being wound. This potentiometer is mounted in the operator control panel. TACH SCALING (1) – Scales the production machine tachometer signal voltage to the control requirements. MAX TORQUE EMPTY ROLL (1) – Establishes the torque required to maintain proper tension at high winder speed. MAX TORQUE FULL ROLL (1) – Establishes the torque required to maintain proper tension at low winder speed. TORQUE BOOST TIME (1) – Establishes the time that additional torque is supplied to accelerate the winder when the production machine speed is increased.	VEplus

Options and Modifications for DC Controllers

Option No.	Description	For Use with Series
36A	**CENTERWIND TORQUE CONTROL *(Continued)***	VEplus
	Use caution in the selection of motors for center driven windup applications where torque loads increase in inverse proportion to motor speed. Also, web break or other process material detectors are suggested to prevent a dangerous overspeed should the process material break.	
	An AC or DC tachometer generator with a minimum output of 30 volts at base speed and not exceeding 180 volts at maximum production machine speed or a 5K ohm potentiometer ganged to the production machine speed control is required, but not furnished as part of this option	
	(1) These potentiometers are mounted on the option circuit board.	
36B	**CONSTANT VELOCITY WINDER**	VEplus
	This option provides an economical but accurate method of automatically controlling the tension of process material in strip, web, wire or cable form as wound by a center driven winder.	
	The option requires the use of a DC tachometer generator coupled to the process material by nip rolls, a pressure roller or capstan in a manner that will provide a continuous feedback of the velocity of the process material.	
	A manually set MOTOR SPEED potentiometer establishes the desired line speed of the process material. As material builds up on the winder core, the diameter increases which would tend to increase the line speed of the material. This will produce a higher voltage output from the tachometer generator which will cause the drive motor and winder to slow down to maintain a constant velocity and uniform winder tension.	
	Should a break occur in the process material, this option will automatically transfer to an adjustable minimum take up speed to minimize damage to the product and winder machinery.	
	RATINGS	
	1. Regulation Accuracy .....2% of motor base speed	
	2. Maximum Line Speed Range..... 30 Build Ratio	
	Example: a 3:1 build ratio (3 ft. dia. full roll, 1 ft. dia. empty roll) = 10:1 line speed range.	
	3. MOTOR SPEED potentiometer.....5,000 ohms	
	This option consists of a plug-in circuit board which inserts into both the INPUT and the FEEDBACK connectors of the control board. Included are independent potentiometer adjustments for:	
	ADJUSTMENTS	
	1. Take-Up Speed .....0 to 50% of maximum speed	
	2. Maximum Speed .....Sets maximum range of MOTOR SPEED potentiometer	
	3. Acceleration (Response Time) .....1-60 sec.	
	Use caution in the selection of motors for center driven windup applications where torque loads increase in inverse proportion to motor speed.	
	A DC Tachometer Generator with a minimum output of 1.0 volt at base speed and not to exceed 120 volts at maximum production machine speed and a 5K MOTOR SPEED potentiometer are required but not furnished as part of this option.	
		
38	**MANUAL/FOLLOWER MODE SELECT (TOGGLE SWITCH)**	ALL
	This option is intended as a companion to Option 22, Option 25A and Option 25B.	
	Option 22, 25A and 25B do not include a selector switch and rely upon a zero speed setting of the MOTOR SPEED potentiometer to transfer to full automatic control by the external signal.	
	Option 38 when used with these options, allows manual switch selection of either the MOTOR SPEED potentiometer or automatic control by the external signal.	
	Option 38 includes a switch with a MANUAL/FOLLOWER legend plate for installation in the operator control panel.	

Options and Modifications for DC Controllers

Option No.	Description	For Use with Series
47	**REFERENCE, PRECISION** This option provides a high stability, precision reference circuit that replaces the function of the standard internal reference circuit in the drive controller. This circuit offers important benefits for critical applications where sensitivity to operating variables such as load changes, temperature, line voltage variations, etc. must be held to an absolute minimum. This option may be used in combination with Option 24A, Feedback, Tachometer AC or DC. *This option consists of a small plug-in circuit board which replaces the standard input board.*	VEplus
50	**HINGE, ENCLOSURE COVER** Enclosed models include a screw fixed, gasketed cover which is removable for increased accessibility during installation, troubleshooting or repair. When desired the cover may also be provided with optional hinges making servicing more convenient. *This option may be provided factory installed or a kit is offered for simple field installation.*	VEplus VEA-RG