Lockheed Martin

Mittal Steel

A.C. squirrel cage induction motors are characterized as being "constant-speed" when they are run from of a typical 50Hz or 60Hz power source. If the power source frequency (Hz) can be adjusted, the motor speed can be varied and the actual running speed of the motor and other functions can be controlled. This is where Power Electronics International, Inc. comes in.

Simply put, Micro-Speed® variable speed crane drive uses the existing A.C. (alternating current) and changes it into D.C. (direct current) then via an electronic technique called PWM (pulse width modulation) the D.C. is then turned back into Variable Frequency Alternating Current (V.F.A.C.). By varying the frequency (Hz) the motor speed can be controlled. And by adding modern state of the art microprocessor computer technology, all types of extra features are added to make your crane, through the Micro-Speed® drive, have an "intelligence" of its own. Older retrofit cranes and new cranes can be inexpensively converted to have almost "Star Wars" type of robotic control. All with just a standard, off the shelf, a.c. motor which already comes on your a.c. bridge/trolley or hoist! These drives, through many hardware and software features, have become the single most productive and cost effective method for updating overnment and commercial job sites.

licro-Speed $^{
m s}$ series MULT-VECTOR $^{
m s}$. CX $^{
m s}$ & SMART-MOVE $^{
m s}$ drives are the the key components of our future crane electronic drive system. Incredibly robust, PE equipment is well known to be reliable, easiest to use and install and the "gold standard" for crane control.

in the many users of Power Electronics International, Inc. ere are just a few names you might recognize:

Ford & GM Fermi Labs **Morton Thiokol USS Kobe Steel** NASA

Boeing **US Navy US Air Force**

SOFT-STARTING

PRECISION SPOTT

& INCHING

MULTI-SPEED

/ari-Easy-Speed **3**™

And So Much More.

QUIK-JOG™

INTERFACE

to come loose!)

FEATURES & OPERATIONAL BENEFITS

Exclusive GANG-SET™ instant programming of 38 PLUS basic DC INJECTION crane/hoist parameters. A push of a button in GANG-SET™ mode BRAKING and the Micro-Speed® "self-programs" for 99% of crane applications in less than 3-seconds! Simply "plug and play"! In many cases you don't even have to have the manual to be up and running! The GOLD-STANDARD OF CRANE CONTROL!

current - instantly. YOU NEED MICRO-SPEED®!

Tough and powerful, all Micro-speed® drives will give up to

Even wound rotor motors with slip-rings can be utilized with

This feature alone can save thousands of dollars per year.

Up to five independent field adjustable and "repeatable"

Utilizing 2 or 3-speed pendant (or radio control) any infinite

speed range can be selected. The crane operator can easily

motions (see detailed description inside). Available on all models!

DC current is momentarily injected into the a.c. motor, which effectively freezes the motor into position without the use of a mechanical brake. This feature allows a mechanical brake (if used) to see little or no wear. This feature can also decrease or completely eliminate brake failures. On motions without mechanical brakes, "electronic braking" increases crane safety and performance.

✓ Worry free from PE! 300% current or more when you need it the most. Other types of systems may instantly fault out in the middle of your crane or hoist run, at anywhere between 150 and 250% You need this!

Crane motion can never be started without a control input signal to the drive. No chance of accidental starting and running of the crane as in other types of systems. Another PE Exclusive, "must have" safety feature!

STANDARD A.C. Use existing motors or use economical and readily available standard motors for most applications (certain hoists with INTEGRATED Multi-Vector® drive require quadrature encoder feedback).

simple modifications.

dramatically reduced.

Dynamic Brake

All Micro-Speed® models regardless of horsepower have built in regeneration circuitry outputs. NO add-ons needed. Simply connect dynamic brake resistors on p1, p2 terminals with no additional costs involved! All Smart-Move® models & CX® through 5hp 460vac have regeneration resistors built-inside for heavy-duty CMMA D crane duty cycles. Class C duty cranes get the added bonus of increased reliability – ability to get your crane out of the tough spots that always happen when you least expect it!

Multiple motors on same motion can be controlled for all horizontal applications. No need to de-rate motors for needed-ever! most applications

Increase life of bearings, drive trains and dramatically decrease crane maintenance. Product breakage is

Learn it once Speeds are settable along with acceleration and deceleration and learn it forever rates. Depending on crane system down to 40:1 or greater
Vour control future speed range is possible with encoder feedback on the

Multi-Vector® units! Production is more efficient and safe!

speeds FROM 1-SPEED MOTORS with adjustable acceleration | | Electrical connec

and deceleration rate. Includes QUIK-STOP™ and QUIK-PLUG[™] safety reversal. Smart-Move[®] units have 3 speed inputs, CX® styles have up to 7 speed inputs and Multi-Vector® have up to 9 independently adjustable speed

After installation of PE drives on your equipment, you will not lose past training knowledge as a result of our exclusive UP-GRADE PATH™ philosophy. It is our, unique to the industry, concept to engineer our equipment for quick easy UPGRADE or future replacement in the field. This includes both Physical sizes, Electrical connections and basic software settings. The present and future methods of programming some NEW state of the art features will be offered which introduced. Years from now you can be confident that your crane, investment and company will not be left behind! CX®. programming is a cinch! program similarly - how much easier can it get! Your ✓ Worry free from PE! technicians will love it! And your future technical and service personnel, now and many years down the road, will be pleased you chose PE the only 100% crane designed drive.

select any speed within the range of operation as easy as a push of a button! Infinitely variable Vari-Easy-Speed™ modes are SAFE-PARAMET available on both hoist (vertical) and travel (horizontal) BLOCKING™

Unauthorized resetting of the crane parameters can be 100% locked out with the LOCKOUT SETTING. With SAFE-PARAMETER-BLOCKING™ the setting ranges can be limited. Individual adjustments, for different crane uses, can be set quickly, on-site, yet only within predetermined safe operating parameters for that crane.

CMAA CLASS D duty cycles are standard. Standard

Micro-speed® drives will handle heavy-duty cranes. This

is an added bonus on CLASS C medium duty cycle cranes

RANE PROBLEMS

Unique "CRANE DIAGNOSTICS" help crane service technicians HAVE PE EXCLUSIVE FEATURE!

inputs available for special application uses.

diagnose many crane maintenance needs with a push of a button! Includes memory storage up to 396 messages CMAA CLASS [(including history). Wear on hoist Weston load brakes can also be detected in many applications using PE crane diagnostics - a PE exclusive! Multi-Vector® models have (Standard) extensive external encoder diagnostics – another MUST Class E & F available

Exclusive PE function, which does not allow damage to

brake system via "machine gunning-on-off-on-off" of the

brakes via the pushbutton station by crane operators. This QUIK-STOP™

for added safety and reliability - No more faults or trip outs during high usage or critcal production runs! No more need to settle for less or to "take a chance". Your crane works every time not only when "going slow"! Quicker deceleration times possible on lower duty cycle cranes!

feature alone can pay for itself by eliminating just one brake 2nd quick-smooth decel to stop Crane control inputs are designed right into the main QUIK-PLUG™ printed circuit board. Say no more to unreliable Reverse smoothly and very after-market "interface /option cards" or poor performance quickly when required. (No add on boards

relay logic inputs to raffle loose or fall off.

Fully adjustable, fast and smooth *deceleration to stopping*. This is a separate function besides the deceleration rate between speeds. Gives incredible control! Fully adjustable *fast reverse* gets crane down to zero speed

accelerating in the reverse direction normal rates.

Another PE Exclusive!

quickly. Crane operator can either set the brake or continue

Left and Right limit switch inputs require no external "logic" or isolation for operation. Simply connect limit switch wires LIMIT SWITCH to the appropriate terminals. Two basic functions can be selected: 1.) Immediate stop or brake setting. 2.) Adjustable NPUTS FOR Ramp-Down to stop. Internal logic only allows motion in opposite direction until limit switch is disengaged.

All Micro-speed® include a large high intensity LED displa which includes an anti-glare filter. The display is designed for ease in reading in various lighting conditions. This is especially useful in dark or out of the way locations for easy readibility even at a distance.



Power Electronics* International, Inc.

Micro-Speed® MV

Multi-Vector

Pulse Watth Modulated Variable Speed Drive With GANG-SET^{IM}

POWER ELECTRONICS®

INTERNATIONAL, INC.

0

Micro-Speed®

their high quality and reliability.

Customize your crane! Robotic control at the tip of your fingers

> Micro-Speed® drives are specifically designed for hoist and bridge/trolley/monorail or similar applications. Both hardware and software are designed exclusively for the overhead crane and hoist industry.

> > Over 35 years of hoist & crane control engineering experience have been invested in Micro-Speed CX®, Smart-Move® & Multi-Vector® drives. PE drives are known worldwide for

These drives, through many hardware and software features, have become the single most productive and cost effective method for updating industrial, government and commercial job sites.

Save thousands of dollars each year in increased productivity, safety and reduce crane maintenance.

No complicated wiring is needed. Micro-Speed® drives self-configure when connected according to standard electrical drawings.



International, Inc.

· Over 40 Years of Quality Manufactured Crane Controls

561-8 Plate Drive, East Dundee, Illinois 60118-2467 USA Phone: (847) 428-9494 • Fax: (847) 428-7744 • www.PEinfo.com

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Vari-Easy-Speed 2[™] & ADVANCED Vari-Easy Speed 2[™]

2-step Infinitely Variable Speed Control

ANY SPEED YOU DESIRE!

Imagine using a simple and inexpensive 2-speed push-button and In standard Vari-Easy-Speed 2[™] hoist mode, "letting go" of the obtaining hundreds of different speeds effortlessly on your crane! Use a Micro-speed[®] and any 2-step pushbutton (or radio control) and vou've got it!!!

The Vari-Easy-Speed 2[™] 2-step infinite variable speed control feature does just as described! The internal microprocessor intelligently locks in any speed that the crane operator accelerates or decelerates to - effortlessiv!

Essentially the pendant control acts like a motorized potentiometer. In other words, on horizontal travel motions such as a bridge or trolley, what would normally be the 2nd speed point becomes an ACCELERATION command and the 1st step on the button becomes the HOLD THAT SPEED command. A simple push of the button to 2nd step (accelerate) and back to the 1st step (hold) will incrementally accelerate the crane and run at that new speed! As long as the operator stays on the 1st position that new speed can be held constant or varied "at will" throughout the crane run. To "slow down" or decelerate the operator simply "lets go" of the button until the crane slows to the point they like. By pushing back to the 1st position (1st step) the Micro-speed® drive will then keep the crane running at that new intermediate speed. When the motor is at a stop, the selection of the first step on both hoisting and trolley modes "intelligently" tells the Micro-Speed® that it should run your crane at your user selectable low speed setting. The crane operator now has complete control of the crane!

button will normally instantly set the hoist electromechanical brake instead of decelerating the hoist. The acceleration is the same as described above. The hoist is stopped and re-accelerated to the desired speed and held (go to step 2 then back off to step 1).

Exclusive NEW PE Feature ADVANCED Vari-Easy-Speed 2[™] §

Micro-speed® drives (version 2.1 and greater) & the Multi-Vector® drive have "ADVANCED Vari-Easy-Speed 2™ **Hoist Control**" which allows setting of both acceleration and deceleration to a stop with spotting control. The hoist will be infinitely variable speed and have both acceleration and deceleration. Deceleration is available during a predetermined (settable) speed range. This "hoist with complete variability in both the acceleration and deceleration" is a solution to using all standard two-step buttons on all motions with high control. Nothing could be simpler or easier! ADVANCED Vari-Easy-Speed 2[™] for hoisting is nothing but *superb!*

Remember, all this control with a standard 1-speed a.c. motor. These features can simply and inexpensively turn your crane or hoist into an even bigger asset for your company!

GANG-SET™ #2 for horizontal bridge/trolley GANG-SET™ #8 for hoist motion

GANG-SET™ #2

Accelerate or Decelerate to any speed desired!

LET GO of Button - DECELERATE

Motor is decelerated and then stopped with DC Electronic braking. Electromechanical brake is then "Set". Deceleration will ultimately go to stopping the motor if no other STEP is energized.

HOLD THAT SPEED

(initially goes to low speed if motor is at rest)

up to the highest speed *vou* set!



Standard 2-Step Push-Button (or Radio Control)

Accelerate to any speed desired! *"Advanced mode" allows deceleration

T GO of Button - standard = stop

*NEW! "Advanced Vari-Easy-Speed 2™ for Hoisting" allows both acceleration and deceleration of the hoist to any speed desired -without a "stop". Standard mode "stops" the hoist when the pushbutton is

GANG-SET™ #8

initially goes to low speed if motor is at rest)

up to the highest speed *vou* set!

Micro-Speed Multi-Vector Smart-Move & CX®

Multi-Speeds from a 1-speed motor

FOR BOTH HORIZONTAL & HOIST MOTIONS

From a standard one-speed crane you can achieve variable 1, 2, 3, 4 or 5 speeds (or more). Smart-Move® has up to 3 speed points, CX® up to 7 speed points and Multi-Vector™ up to 9 speed points (if needed). Speed control with each speed level is independently adjustable to your exact needs.

Simply add the Micro-speed® and a multi-speed push-button station or radio control having the appropriate speed points. Acceleration and deceleration rates (3 Plus types) are fully adjustable along with many other crane specific parameters. Potentiometer "analog" control is also available.

Acceleration and deceleration between speeds is beautifully smooth in all bridge/trolley and hoist motor speed transitions. Standard 1 -speed motors. or even a modified wound rotor/slip ring motors can have nearly load insensitive and repeatable speeds - instantly! Multiple motors can be controlled on horizontal motions with only one drive.

The setting of the Micro-Speed[®] is also very simple. Just choose a Gang-Set[™] # on the display and you're ready to go! Each speed setting can be separately adjusted along with many other crane specific parameters to make your crane operate perfectly for your exact application!

is not intended to be an

Can be used

with pendant,

cab or

radio control

Hoist

Motion

Decrease

load swing.

increasing crane

accuracy and safety

GANG-SET™ #1,2,3,4 for horizontal bridge & trolley GANG-SET™ #5,6,7,8 for hoist motion

HORIZONTAL MOTIONS BRIDGE - TROLLEY - MONORAIL

the crane operator. It has been termed "robot-like control" which is often out all the different variable speed possibilities from straight used to describe the incredible increase in precision and productivity gains "multi-speed" to "Vari-Easy-Speed" infinitely variable speed which become apparent after only a short time of use. Your bridge/trolley control and many more not even mentioned here for lack of motion will be smooth, soft and have an added degree of precision. Crane maintenance will decrease because your crane won't experience the with the simple setting of a GANG-SET™. If you wish to "jerking and jumping" it used to do! Even brake wear decreases. Product breakage and damage is reduced, safety concerns are decreased and productivity and throughput are dramatically increased - even on light duty cranes! You now have computerized a.c. motor control, speed control, acceleration and deceleration control, brake control and hundreds

With Micro-Speed® installed, your crane becomes a "virtual" extension of of other unbelievable functions! Keep reading and check space. All these are available in the Micro-Speed[®] drives change to another more "sophisticated" speed control method it is all there – just a push of a button away.

GANG-SET™ #1, 2, 3, or 4 for horizontal motions

DC ELECTRONIC BRAKING CRANE DIAGNOSTICS™

With DC electronic braking, the Micro-Speed® control actually electronically PE CRANE DIAGNOSTICS™ will actually help your crane technician test crane stops the motor from rotating as it approaches zero speed. This incredible functions along with drive functions. The large LED lighted display can show feature will extend mechanical brake life almost indefinitely since the whether the push-button station is sending proper signals to the drive. Have mechanical crane may never have to stop the crane. The mechanical brake a mechanical brake problem? The CRANE DIAGNOSTICS™ system can help becomes relegated to merely a "holding" brake. Imagine the hundreds the technician test the crane or hoist brake - all from the Micro-Speed® keypad! and even thousands of dollars which will be saved over the life of a crane On hoisting, internal load brake wear can sometimes also be detected. With with little or no mechanical brake wear! In addition, those motions without over 13 Plus basic different crane Diagnostic codes a technician will be any brake mechanism (trolleys for example) get the extra benefit of able to quickly pinpoint areas of concern for further checking. Micro-Speed® is more than a drive, it is an invaluable tool to the trained crane mechanic which can save thousands of dollars in labor charges and replacement parts over the life of your crane. Another PE exclusive!

Three-motion variable speed crane control pane

s shown with a representative from each PE style drive utilizing a Micro-Speed® Multi-Vector®(MMV) closed loop style variable speed drive on the hoist, Micro-speed Smart-Move® (MSM) on the trolley and Micro-Speed CX® on the bridge motions. This panel will completely control a typical overhead crane in all 3 motions. Your combination of styles will vary based on the crane/hoist requirements. Complete control panels are available from Power Electronics[®] as shown or manufactured by your local dealer utilizing high quality PE components. The panel at right, includes other electrical parts used on overhead equipment such as mainline disconnects, fusing etc. Explosion proof enclosures, air conditioners or other options etc., are readily available from PE.



BRIDGE TROLLEY

Power Electronics International, Inc

HOIST MOTION

With Micro-Speed® installed, your hoist will gain almost robot-like qualities. A standard 1-speed motor or modified wound rotor/slip ring hoist motor can have nearly load insensitive and repeatable lifting speeds - instantly! Efficiency will increase along with greater safety and reliability. The small investment in a Micro-Speed® system will have an enormous payoff in hoist safety and productivity gains. Most hoists require either a mechanical load brake (or similar) or worm gearing for safety when using the Smart-Move® or CX® style drive to safeguard against electromechanical brake failure and other reasons.

Micro-Speed® Multi-Vector® drives are the finest, state of the art, NO LOAD BRAKE (closed loop) hoist **controls available.** It is the only completely hoist designed drive in the world. All other types are simply modified "multi-purpose" drives. In the Multi-Vector® both the hardware and all the software have been totally designed for hoist control (which is not true of any other drive brand in the industry). Not only is the Multi-Vector® drive robust, it is the easiest to install and use. Famous Gang-Set™ system is fully incorporated. Set up and installation, in many cases, has been done without even having to read the manual (although highly recommended). Your equipment and installation are up and running in as low as 5% of the time! All with Power Electronics International, Inc., reliability and quality. WORRY FREE FROM PE!

GANG-SET™ TECHNOLOGY.... You Need This!

EASY 1-2-3 Hassle Free programming system *No Ph.D. necessary*.

Exclusive GANG-SETTM technology allows the user to set up the Micro-Speed® drive with little or no training! A few key strokes and the operator is able to have the Micro-Speed® drive practically self-program for the specific type of crane application that it is being applied to. Don't be fooled...only from Power Electronics!



Just hold down 3 buttons for 3 seconds Choose a number 1,2,3 or 4 (Pb 0) for bridge/trolley or 5,6,7 or 8 (Ph 0) for hoist



Press once the "LOAD" BU modes. Pushing the scroll button once. It only takes a few seconds to do what for each increment. This automatically usually would be hours of programming pulls in all the proper drive functions from time (not to mention reading long the microprocessor and all the general manuals). Individual settings of speed settings you will need to run your crane acceleration and deceleration can be changed just as easily if necessary

Vari-Easy-Speed 3[™]

to get to Pb 0 Initial GANG-SET™.

3-step Infinitely Variable Speed Control

Vari-Easy-Speed 3™ is the more "sophisticated" version of the fast safety reverse mode also becomes operational on bridge/trolley HOLD THAT SPEED step. The 1st step is the DECELERATE button variable system as previously described command. When taking the finger off of the button completely in horizontal travel mode (bridge/trolley) the **Quik-Stop™** feature is engaged which decelerates quickly down to zero speed, in a smooth and controlled fashion, and sets the brake. The Quik-Plug™

already described Vari-Easy-Speed 2TM. Using an additional motions (descriptions on back). The compelling advantage of the pushbutton step (3rd step) instructs the internal microprocessor 3-step method on hoisting is that the hoist operator can smoothly that the crane operator wants finer deceleration control on hoisting. accelerate or decelerate the hoist to any speed desired at any time Or on travel motions for a "Quik-Stop™" fast smooth stop down without ever stopping - incredible! Common, but not required, the to zero speed. Complete acceleration and deceleration control is Vari-Easy-Speed 3™ 3-step variable mode on bridge/trolley is used available at all times without ever setting the brake, for both hoisting in conjunction with a hoist also using Vari-Easy-Speed 3TM. The and travel motions. Here is how it works: Third step is the 3-step button gives an increase in actual control of the bridge/trolley ACCELERATION command with the 2nd (middle) step being the or hoist increasing productivity gains over the standard 2-step

> GANG-SET™ #3 for the bridge/trolley GANG-SET™ #5 for hoisting

TE OF TROLLEY (____)

GANG-SET™ #3

Accelerate **or** Decelerate to any speed desired! Including Quik-Stop™ & Quik-Plug[™] features

FT GO of button - DECELERATE to stop

Motor is decelerated and then stopped with DC Electronic braking. Electromechanical brake is then ''Set''. Quik-Stop™ for faster stopping and Quik-Plug[™] fast safety reverse are both adjustable.

DECELERATE to low speed

______ (initially drives motor to low speed if motor is at rest

HOLD THAT SPEED

ACCELERATE to High Speed

initially drives motor to low speed if motor is at rest)

GANG-SET™#5

Accelerate or Decelerate to any

speed desired!

Electromechanical brake is instantly set & Hoist

GO of button - Instant stop

Step HOLD THAT SPEED



Standard 3-Step

Push-Button

(or Radio Control)







