V5

ELECTRONIC SOFTSTARTER

Easy to drive

POWER ELECTRONICS®

We had always dreamt about an integral service that included, commissioning support, 24 hour technical assistance, rapid workshop response with less than 1 day repair or replacement commitment.
Three year warranty, immediate delivery, customized training and professional application engineering.

A dream a promise, the commitment.

POWER ELECTRONICS®

INDEX V5 SERIES

V5
ELECTRONIC SOFTSTARTER

MOUNTING SIMPLICITY AND VERSATILITY

Its cabinet format provides a fast installation and easy access to power and control terminals. Only one common Control PCB is enough to service all V5 Series.

24 HOURS TECHNICAL ASSISTANCE

Power Electronics assures technical assistance service to all his customers and users 24hrs.

2,2kW - 1,5MW
230 - 690V

01 V5 SERIES
>electronic softstarter

V5 Series is the 4th POWER ELECTRONICS Softstarter generation. A new electronic softstarter that integrates most advanced control systems to assure a perfect motor operation at any industrial application.

NEW CONCEPT OF SOFTSTARTER

After 25 years of experience and more 100.000 softstarters actually working, POWER ELECTRONICS V5 Series has achieved a new concept of softstarter.

CONTROL FLEXIBILITY

Commissioning via local display unit or PC (PowerCOMS Program). Two analogue and five digital inputs, three relays and one analogue output provide the V5 with plenty of control possibilities.

RS232/RS485 serial communications and Modbus are built-in. Profibus, DeviceNet and Johnson Controls (Metasys) protocols are available.

02 V5 SERIES
>one softstarter for all applications

High performance and results

The V5 Series provides immediate and exceptional results in most of industrial applications.

Mechanical costs reduction as consequence of shaft damages, hammer effects, belts or mechanical coupling wear elimination.

Electrical maintenance reduction by simplifying electrical installation concept and by eliminating electrical stress due to starting current surges.

Applications

PUMPING SYSTEMS

Low starting torque and controlled stop avoids water hammer surge effect of the hole hydraulic installation. Limited starting current reduces mechanical and electrical stress.

MILLS AND CRUSHERS

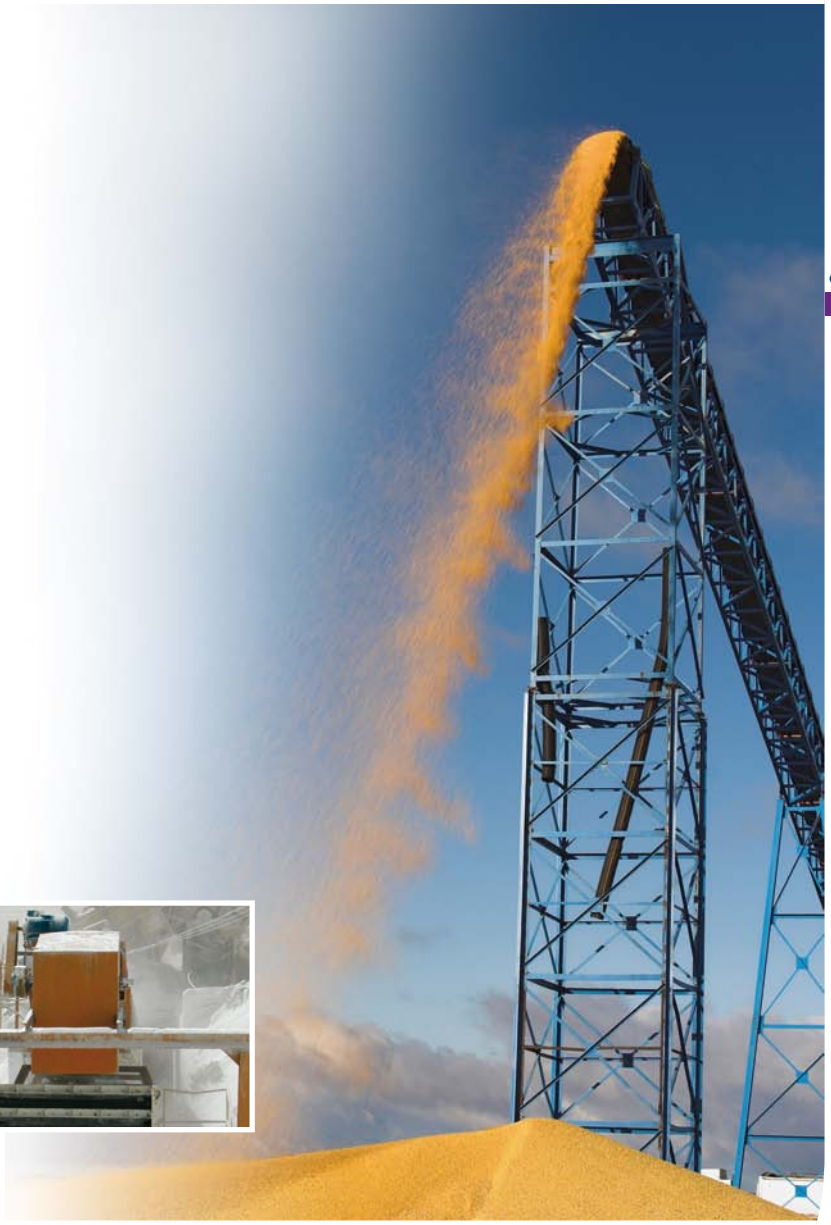
Typical applications where the Power Electronics exclusive CDP (Dynamic Torque Control) provides aceleration without overloads, starting these types of machines with load by controlling a soft start even with very high starting torque.

VENTILATION AND COOLING SYSTEMS

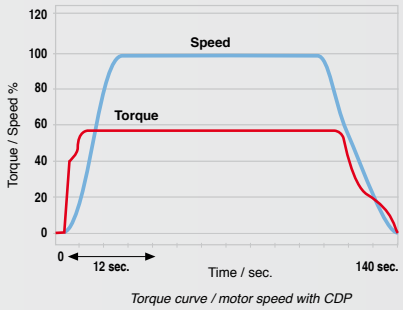
Fan lifetime can be increased by improving the starting torque and reducing starting current.

PRODUCTION AND PROCESS SYSTEMS

Conveyors, mixers, extruders, and all those applications requiring any mechanical load shock elimination during controlled soft start and stop.



03 V5 SERIES
> advanced features and functions



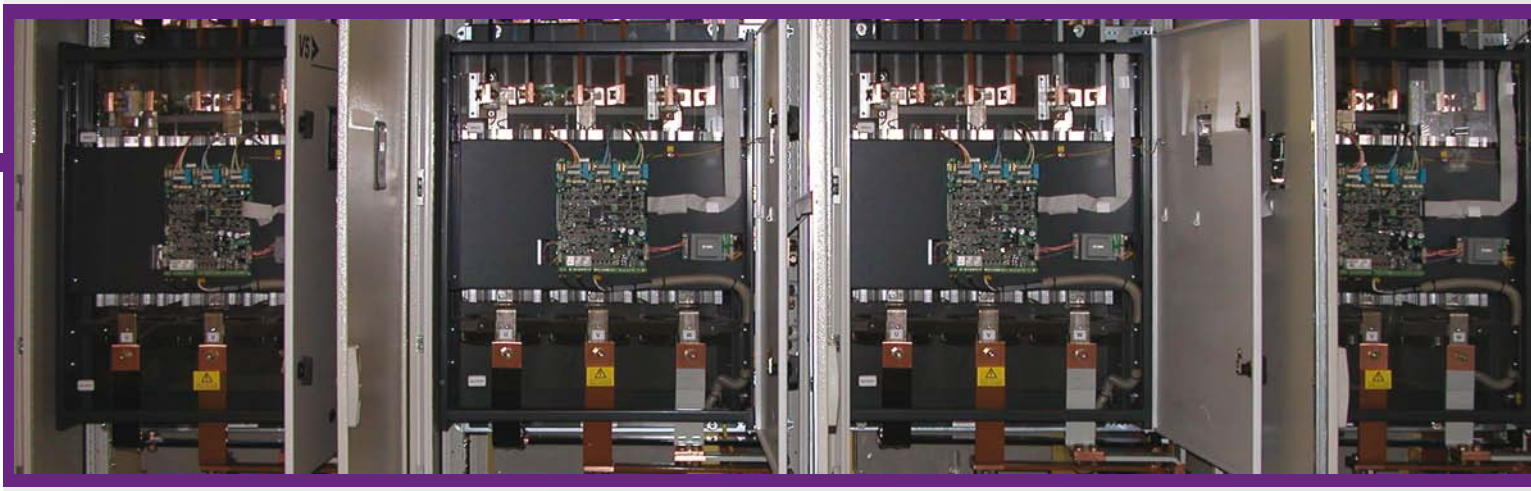
Torque curve / motor speed with CDP

SLOW SPEED

V5 Series allows torque adjustment (CDP) at slow speed, thus it will adapt to any type of load requirement. This setting is ideal for machine positioning, as ceramic mills, etc.

CDP: DYNAMIC TORQUE CONTROL

V5 Series are featured with "Dynamic Torque Control, exclusive starting method from Power Electronics, it means progressive soft starting in those high inertia applications. With this control algorithm, progressive acceleration and optimization of starting current peak is achieved.



SERIAL COMMUNICATIONS

V5 is available with in-built RS232/485 serial ports, developed for integration into the most commonly used industrial communication protocols.
While MODBUS protocol is standard, other protocols are supported including PROFIBUS-DP, DeviceNet.

EXTERNAL OR BUILT IN BYPASS

V5 softstarter offers both possibilities. The user can chose the standard model offering the possibility of installing an **external** contactor for bridging the power stage once acceleration ramp is finished, until the start of deceleration ramp. Otherwise the user can chose the new V5 model with **built in** bypass which will offer the same functionality without requiring any external device installation.

In any case, V5 **control** stage remains monitoring all control operations and motor **protections**.

D.C. BRAKE

In some applications the deceleration ramp is not enough. DC Injection setting is provided in V5 Series for those, specially in high load inertia machines.

PUMP CONTROL

An special designed control algorithm for decelerating pumps is provided in V5 Series. This special adjustment does not operate in function of lineal stop curve for quadratic torque loads, as it is normally operated, but automatically it will adapt to hydraulic system curve.

FULL PROTECTIONS

All protections included in V5 Series are translated to a better control and motor security.

- Input phase loss
- Rotor locked
- Phase imbalance > 40%
- High input voltage
- Low input voltage
- Motor overload
- Motor underload
- Motor overtemperature PTC
- Shearpin current
- Input phase sequence

PERMANENT INFORMATION

V5 Series displays constantly, motor status and complete information of the installation where it is integrated. The user will access locally (keypad unit) or remote (serial communications) to the following information:

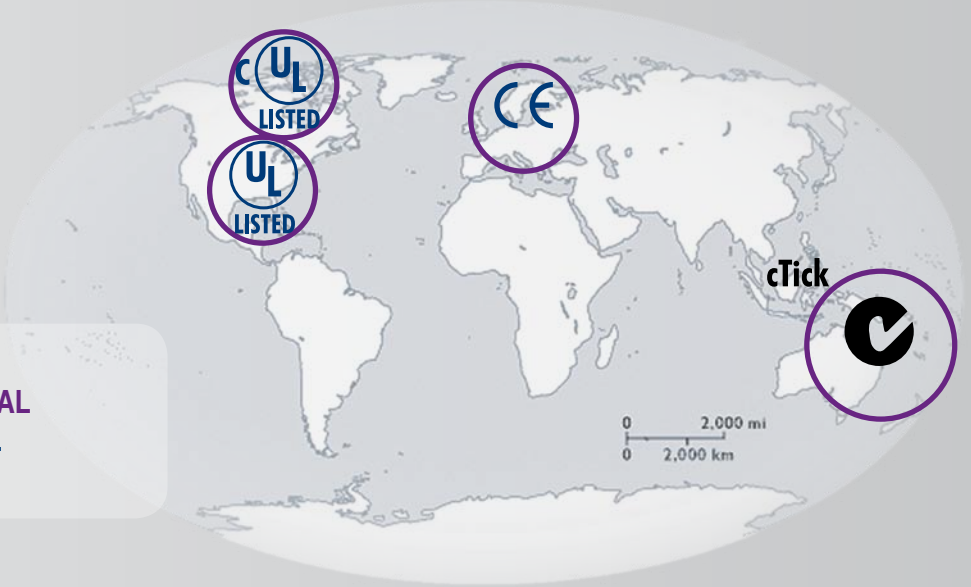
- Voltage in each phase
- Number of starts
- Total and partial
- Power (kW) and current (I) in each phase
- Analogue input / output status
- Motor phi cosine (Power Factor)
- Digital input / output status
- Motor shaft torque
- Timer, total and partial
- Fault history (5 most recent faults)

INTEGRATION AND CONTROL

V5 Series make easy its integration into any automation process. Via 2 analogue inputs 0-10V and 4-20mA, 5 configurable digital inputs, 1 PTC input, 1 analogue output 4-20mA and 3 changeover configurable relays.

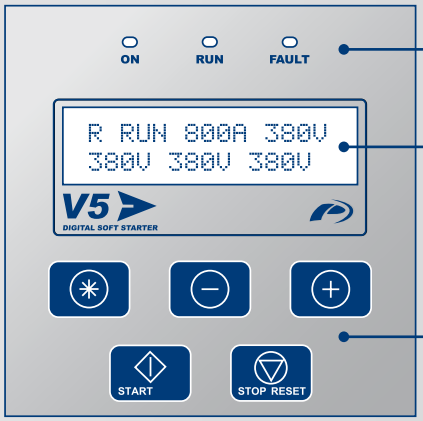
MULTIVOLTAGE

Only one softstarter for 230V / 400V / 440V and 500V, simply adjusting V5 current to motor's. For 690V, please consult tables available at *standard ratings* section.



COMPLIES WITH INTERNATIONAL STANDARDS CE, cTick, UL, cUL

Display Unit + Keypad Control



INDICATING LEDS	ON	Indicate power in the control board.
	RUN	**Flashing**: Accelerating/Decelerating. **Lighting**: The motor is running at nominal speed.
	FAULT	The V5 has tripped on fault protection.
LCD DISPLAY	STATUS LINE	(Top)
	CONTROL LINE	(Bottom)
CONTROL KEYPAD	✳	To unfold the screen groups.
	+	To scroll between screen groups.
	−	To scroll between screen groups.
	◇	Motor Start.
	▽	Motor Stop/Reset.

04 V5 SERIES > technical specifications

INPUT	Input voltage	(~3 Phase) 230-500V (-20% to +10%) (~3 Phase) 690V (-20% to +10%)
	Supply frequency	47 to 62 Hz
	Control voltage	230V ±10%, others under demand
OUTPUT	Output voltage	0 to 100% supply voltage
	Output frequency	Same as the input
	Efficiency (at full load)	>99%
ENVIRONMENTAL CONDITIONS	Ambient temperature	Minimum: -10°C / Maximum: +50°C
	Storage Temperature	0°C to +70°C
	Ambient Humidity	< 95%, non-condensing
	Altitude losses	>1000m, 1% each 100m; 3000m max
	Protection degree	IP20
	Degree of Pollution	Degree of Pollution 3
MOTOR PROTECTIONS	Input phase missing	
	High current	
	Low input voltage	
	Starting current limit	
	Rotor locked	
	Motor overload (thermal model)	
	Underload	
	Phase umbalance	
	Motor overtemperature (PTC, normal status 150R-2K7)	
	Shearpin current	
	Number of start /hour	
SOFTSTARTER PROTECTIONS	Thyristor fault	
	V5 over temperature	
ADJUSTMENTS	Torque surge	
	Initial torque	
	Initial torque time	
	Acceleration time	
	Current limit: 1 to 5 In	
	Overload: 0.8 to 1.2 In, Overload slope: 0 to 10	
	Deceleration time / Freewheel stop	
	DC braking	
	Slow Speed (1/7 fundamental frequency)	
	Dual setting	
	Number of starts allowed	
	Torque control	
	Water hammer surge control stop	
	For additional information consult the technical manual	
INPUT SIGNALS	2 analogue inputs, 0-20mA or 4-20mA, 0-10V	
	5 configurable digital inputs	
	1 PTC input	
OUTPUT SIGNALS	1 analogue output 0-20mA or 4-20mA	
	3 changeover output relays (250VAC, 10A non inductive)	
SERIAL COMMUNICATIONS	Phisical level RS232/RS485	
	Modbus communication industrial protocol	
	Profibus and DeviceNet via interface (options)	
DISPLAY INFORMATION	Phase current	
	Supply voltage	
	Relays status	
	Digital inputs / PTC status	
	Analogue inputs value	
	Analogue output value	
	Overload status	
	Motor supply frequency	
	Motor power factor	
	Developed power, motor shaft torque	
	Fault history (5 most recent faults)	
SOURCES CONTROL	Local via keypad	
	Remote via digital inputs	
	Remote via Serial Communications (MODBUS, RS232/RS485)	
LED'S INDICATIONS	LED1 Green, voltage present on control board	
	LED2 Orange, Blinking, Motor accelerating / decelerating On, motor running	
	LED3 Red, fault present	

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05 V5 SERIES

> control & power wiring configuration

V5 Series includes multiple control possibilities, not only due to a large number of inputs and outputs, but for the configuration versatility of each one of them.

DIGITAL INPUTS

Five digital multifunction inputs available. All of these can be set as preset configuration or individually. The 6th digital input is designed to be the PTC input (motor). All of digital inputs can be used as an emergency stop. Digital inputs common is 24VAC.

ANALOGUE INPUTS

Two analogue inputs available. Each of the analogue inputs is configurable as 0 to 10V, 0-20mA and 4-20mA. Each of the analogue inputs scale can be set via software.

OUTPUT RELAYS

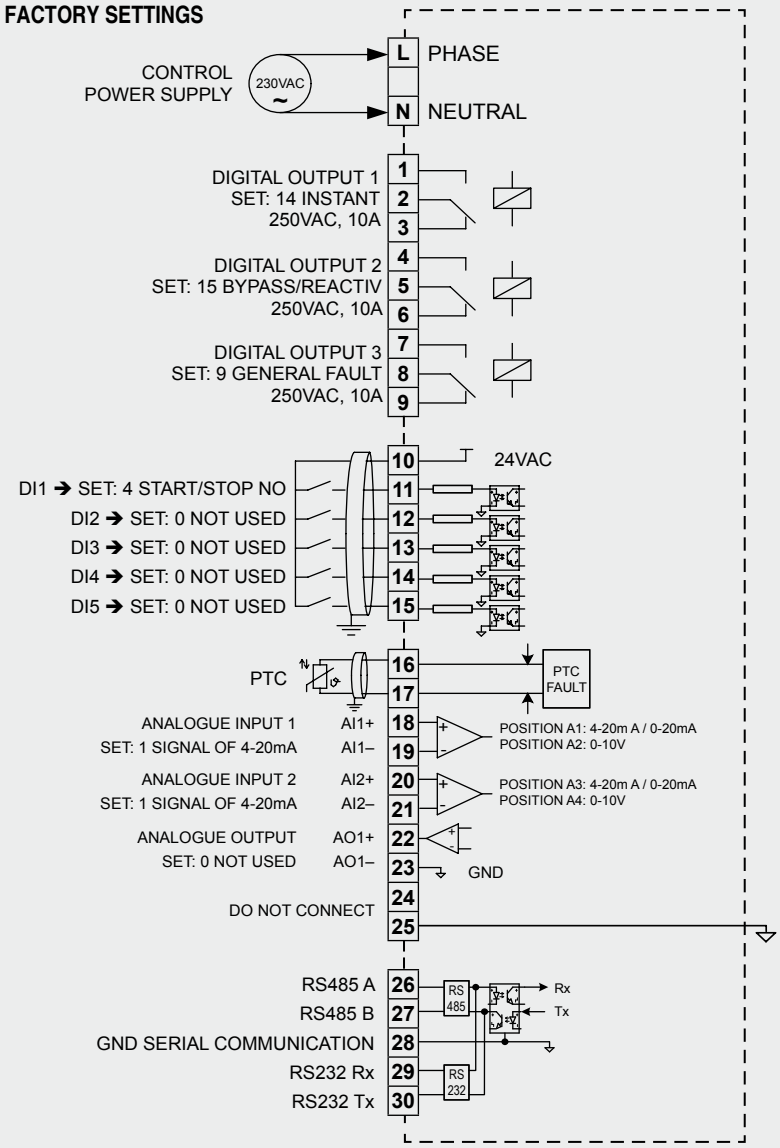
Three changeover output relays available. Contact specifications are 250VAC, 10A, non inductive. Three comparators available, each of them configurable from eight different sources.

ANALOGUE OUTPUT

One analogue output configurable to operate as 0-20mA, 4-20mA. Analogue output gain can be set as desired.

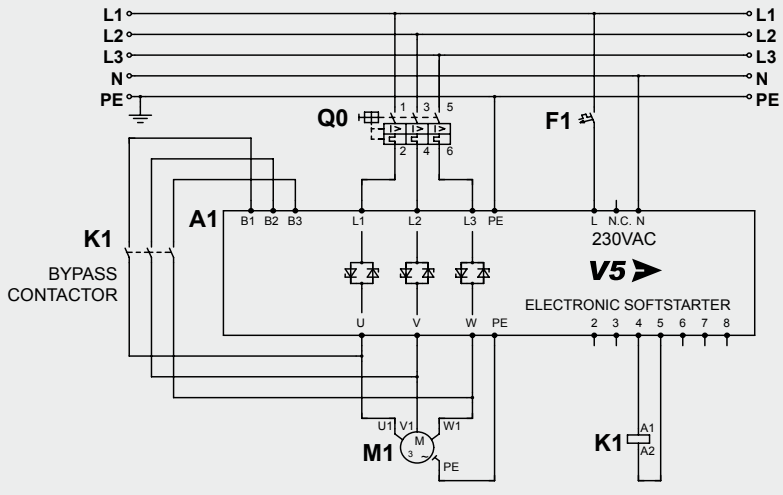
Standard softstarter

CONFIGURATION OF CONTROL WIRING FOR STANDARD SOFTSTARTER OF THE V5 SERIES



V5DTC0001BI

CONFIGURATION OF POWER WIRING FOR STANDARD SOFTSTARTER WITH EXTERNAL BYPASS OF THE V5 SERIES



V5DTP0002BI

06 V5 SERIES

> bypass built in

The new V5 model offers the Bypass contactors already built in, making easy the required external hardware and consequently saving space in the electrical cabinets, as well as reduces the installation time and the wiring verification.

Therefore, those **errors** derivate of the external installation will be **avoided** and no additional documentation will be required either.

On the other hand, **heat dissipation** during operation is much more **reduced** which means the corresponding **saving in ventilation** components in the implemented electrical cabinets.

Because of the **current measurement** of the softstarter does **not** suffer any **change** and the **internal protections are active**, the motor **protection is ensured** during operation regardless the bypass activation.

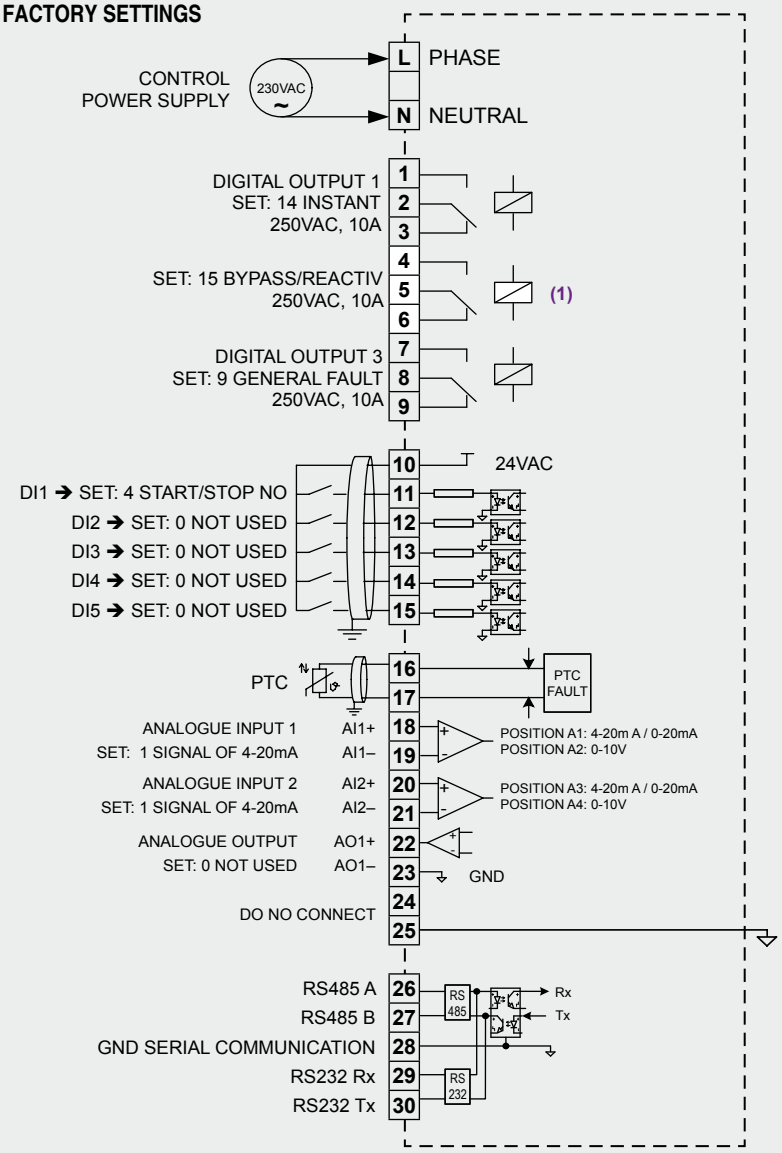
The **internal bypass** is automatically switched on **after** the **acceleration** ramp, bridging the internal SCRs but **without interrupting** the normal **operation** of the softstarter and the motor.

At the end, the connection is easy, safe and effective.

Softstarter with internal Bypass

CONFIGURATION OF POWER WIRING FOR SOFTSTARTER WITH INTERNAL BYPASS

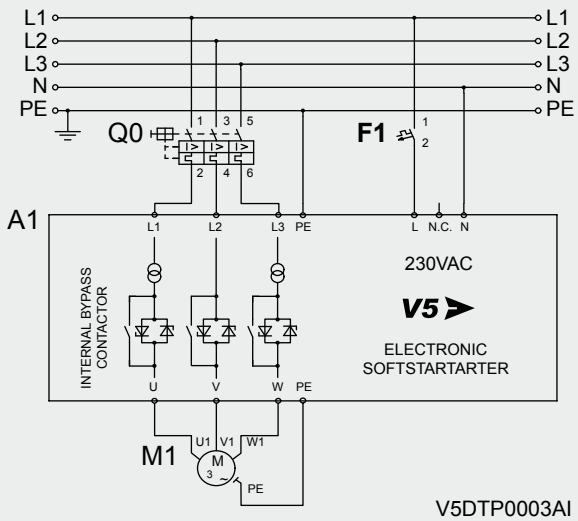
FACTORY SETTINGS



(1) **Reserved for internal Bypass activation**

V5DTC0002AI

CONFIGURATION OF POWER WIRING FOR SOFTSTARTER WITH INTERNAL BYPASS



V5DTP0003AI

THE NORM IEC60947-4-2 DESCRIBES CLASSIFICATION FOR ELECTRONIC SOFTSTARTERS.

According to this information, there are two utilisation categories for the Electronics Softstarters, described as follow:

- AC53a: Softstarters which support the nominal current through the SCRs during continuous operation.
- AC53b: Softstarters which support the starting current through the SCRs during the starting while the SCRs will be bypassed during steady status.

Basically, the capacity limitation of Softstarters is mainly thermal limitation. It is important to consider that there are five different factors which will affect to the internal temperature of thyristors:

a) Starting Time
b) Starting Current
c) Ambient Temperature
d) Time at OFF status
e) Number of Startings per Hour

EXAMPLE

110	:	AC53b	4.5	–	30	:	330
①		②	③		④		⑤

① Rated Current of the Softstarter under the described conditions: In, (110 Amps)
② The thyristors will be bypassed
③ Starting Current, as multiple of the nominal current (In), that means: 4.5xIn
④ Starting Time, in seconds, (30s)
⑤ Seconds between the end of starting and the beginning of next starting (10 startings per hour)

This classification explains why the same softstarter offers many current rates and also explains why it is necessary to consider the operation conditions in each single application.

Power Electronics can provide some basic recommendations to select the correct V5 model depending on the application.

It is important to consider that this application must be a standard industrial application in which the softstarter will operate within the **standard rates** of 10 startings per hour, 50% of duty cycle, 50°C and the altitude ≤1000m.

Note: In case your application cannot be classified under the above mentioned conditions, please, contact with Power Electronics.

SELECTION OF SOFTSTARTER

a) Select the characteristics current in the attached table according to the application.
b) After this, consult the column for this current rate in the rating tables shown in the next section (3x, 4x, or 4.5 times starting current).
c) Chose the correct model, considering also the maximum rated current, the rated power and the supply voltage.

EXAMPLE

The application is: Refiner Pumps, 400VAC, 83A, 45kW motor.

Characteristics starting current of Refiner Pumps if 10 startings per hour, 50% duty cycle, 50°C and altitude ≤1000m: 4.0 x In

Look at 400VAC table, central column (AC53b 4.0-30:330) 45kW means one softstarter coded V50075B with nominal current of 85A

COMMON APPLICATIONS	CHARACTERISTIC STARTING CURRENT
WATER AND WASTEWATER	
Centrifugal Pumps	3.0 x In
Mono and High Pressure Pumps	4.0 x In
Multistage Pumps	4.0 x In
Vertical Pumps	3.0 x In
Split Chamber Pumps	3.5 x In
Submersible Pumps	3.5 x In
VENTILATION	
Fans (extraction)	3.5 x In
Fans (fresh air)	4.5 x In
Condensor Fans	3.5 x In
Climatization Turbine	4.5 x In
PULP AND PAPER INDUSTRY	
Refiner Pumps	4.0 x In
Pulp Pumps	4.0 x In
Vacuum Pumps	4.0 x In
Pulp Machines	4.5 x In
Trommels	4.0 x In
Pulp Mixers	4.0 x In
Filters	4.0 x In
METALS, AGGREGATES AND MINERALS	
Dust Filters Fans	3.5 x In
Conveyor Belts	4.5 x In
Crushers	3.0 x In
Hammer Mills	4.5 x In
Jaw Crushers	4.0 x In
Rotor Bar Mills	4.5 x In
Ball Mills	4.5 x In
Secondary Mills and Sand Pulverizers	3.5 x In
Eccentric Feeder	4.5 x In
Trommels	4.0 x In
Vibrators	4.0 x In
Separators	4.0 x In
Feeders	3.5 x In
FOOD INDUSTRY	
Air Compressors	4.0 x In
Sorters	3.5 x In
Bottle Wash Machines	3.0 x In
Driers	4.5 x In
Centrifuges	4.0 x In
Crushers, punchers	4.5 x In
Palletizers	4.5 x In
Separators	4.5 x In
Cutters	3.0 x In
Material Handling	3.5 x In
TOOLING MACHINES	
Arm Saws	4.5 x In
Buzz Saws	3.5 x In
Stamping Presses	4.5 x In
Crumbing Machines	3.5 x In
Chamfering Tools	3.5 x In
Flatters	3.5 x In
Sanding Machines	4.0 x In
Lathes	4.5 x In
Crusher Machines	3.5 x In
Palletizers	4.5 x In
Presses	4.0 x In
Turn Tables	4.0 x In
Transporters	4.0 x In
PETRO-CHEMICAL	
Centrifugal Machines	4.0 x In
Screw Pumps	4.0 x In
Gas Pumps (propane, butane, ...)	3.0 x In
Crude Oil Extraction Pumps	4.5 x In
Crude Oil Transfer Pumps	4.5 x In
Hydrocarbon Transfer Pumps (liquid stage)	3.5 x In
Transport and Packaging	3.5 x In
Conveyors	3.5 x In
GENERAL	
Hydraulic Equipment	3.5 x In
Agitators	4.0 x In
Compressors (Screw compressor, without load)	3.0 x In
Compressors (Reciprocating compressors, without load)	4.0 x In
Conveyors	4.0 x In
Mixers	4.5 x In

07 V5 SERIES
> standard ratings

V5 standard softstarter

230V to 500V (-20% to +10%)

FRAME	CODE	Rated I (A)	Power motor until (kW)			
			230V	400V	440V	500V
1	V50009	9	2	4	5	5.5
	V50017	17	5	7	9	11
	V50030	30	9	15	18.5	18
	V50045	45	14	22	25	30
	V50060	60	18	30	35	40
	V50075	75	22	37	45	50
	V50090	90	25	45	55	65
2	V50110	110	35	55	65	80
	V50145	145	45	75	90	100
	V50170	170	50	90	110	115
	V50210	210	65	110	120	150
	V50250	250	75	132	160	180
3	V50275	275	85	150	170	200
	V50330	330	100	185	200	220
	V50370	370	115	200	220	257
	V50460	460	145	250	270	315
4	V50580	580	185	315	375	415
	V50650	650	200	355	425	460
	V50800	800	250	450	500	560
	V50900	900	280	500	560	630
	V51000	1000	322	560	616	700
5	V51200	1250	400	710	800	900
	V51500	1500	500	800	900	1100

690V (-20% to +10%)

FRAME	CODE	Rated I (A)	Power motor until (kW)
			690V
1	V50009.6	9	7.5
	V50017.6	17	15
	V50030.6	30	30
	V50045.6	45	45
	V50060.6	60	60
	V50075.6	75	75
	V50090.6	90	90
2	V50110.6	110	110
	V50145.6	145	140
	V50170.6	170	160
	V50210.6	210	200
	V50250.6	250	230
3	V50275.6	275	250
	V50330.6	330	315
	V50370.6	370	355
	V50460.6	460	450
4	V50580.6	580	560
	V50650.6	650	630
	V50800.6	800	800
	V50900.6	900	900
	V51000.6	1000	960
5	V51200.6	1250	1250
	V51500.6	1500	1500

NOTES:
- The values of the tables are valid for 4-pole AC motors.
- For current values which are not in accordance with the values in these tables, please contact Power Electronics.
- For higher power ratings, contact to Power Electronics customer support.

V5 softstarter with built in Bypass

400Vac (-20% to +10%)

FRAME	CODE	AC53b 3.0-30:330		AC53b 4.0-30:330		AC53b 4.5-30:330	
		Max. Rated I (A)	Motor Power (kW) at 400Vac	Max. Rated I (A)	Motor Power (kW) at 400Vac	Max. Rated I (A)	Motor Power (kW) at 400Vac
1	V50009B	14	7,5	10	5,5	9	4
	V50017B	26	15	19	11	17	7,5
	V50030B	45	22	34	18,5	30	15
	V50045B	68	37	51	30	45	22
	V50060B	90	45	68	37	60	30
	V50075B	113	55	85	45	75	37
	V50090B	135	75	101	55	90	45
2	V50110B	165	90	140	75	110	55
	V50145B	218	110	164	90	145	75
	V50170B	255	150	192	110	170	90
	V50210B	315	185	237	132	210	110
	V50250B	375	200	281	150	250	132
3	V50275B	412	220	310	185	275	150
	V50330B	495	280	370	200	330	185
	V50370B	555	315	416	220	370	200
	V50460B	690	400	518	280	460	250
4	V50580B	870	450	650	355	580	315
	V50650B	975	500	731	400	650	355
	V50800B	1200	630	900	500	800	450

NOTE: Rated power and currents at 400VAC (-20% to +10%) for motors of 1500rpm

V5 softstarter with built in Bypass

500Vac (-20% to +10%)

FRAME	CODE	AC53b 3.0-30:330		AC53b 4.0-30:330		AC53b 4.5-30:330	
		Max. Rated I (A)	Motor Power (kW) at 500Vac	Max. Rated I (A)	Motor Power (kW) at 500Vac	Max. Rated I (A)	Motor Power (kW) at 500Vac
1	V50009B	14	11	10	7,5	9	5,5
	V50017B	26	18,5	19	15	17	11
	V50030B	45	30	34	22	30	18,5
	V50045B	68	45	51	37	45	30
	V50060B	90	55	68	45	60	37
	V50075B	113	75	85	55	75	45
	V50090B	135	90	101	75	90	55
2	V50110B	165	110	140	90	110	75
	V50145B	218	150	164	110	145	90
	V50170B	255	185	192	132	170	110
	V50210B	315	220	237	185	210	150
	V50250B	375	250	281	200	250	185
3	V50275B	412	280	310	220	275	200
	V50330B	495	355	370	250	330	220
	V50370B	555	400	416	280	370	250
	V50460B	690	500	518	355	460	315
4	V50580B	870	560	650	450	580	400
	V50650B	975	630	731	500	650	450
	V50800B	1200	710	900	630	800	560

NOTE: Rated power and currents at 500VAC (-20% to +10%) for motors of 1500rpm

690Vac (-20% to +10%)

FRAME	CODE	AC53b 3.0-30:330		AC53b 4.0-30:330		AC53b 4.5-30:330	
		Max. Rated I (A)	Motor Power (kW) at 690Vac	Max. Rated I (A)	Motor Power (kW) at 690Vac	Max. Rated I (A)	Motor Power (kW) at 690Vac
1	V50009.6B	14	15	10	11	9	7,5
	V50017.6B	26	22	19	18,5	17	15
	V50030.6B	45	45	34	37	30	30
	V50045.6B	68	75	51	55	45	45
	V50060.6B	90	90	68	75	60	55
	V50075.6B	113	110	85	90	75	75
	V50090.6B	135	132	101	110	90	90
2	V50110.6B	165	150	140	132	110	110
	V50145.6B	218	200	164	150	145	132
	V50170.6B	255	250	192	200	170	150
	V50210.6B	315	315	237	220	210	200
	V50250.6B	375	355	281	250	250	220
3	V50275.6B	412	400	310	315	275	250
	V50330.6B	495	450	370	355	330	315
	V50370.6B	555	500	416	400	370	355
	V50460.6B	690	630	518	500	460	450
4	V50580.6B	870	800	650	630	580	560
	V50650.6B	975	900	731	710	650	630
	V50800.6B	1200	1000	900	900	800	800

NOTE: Rated power and currents at 690VAC (-20% to +10%) for motors of 1500rpm

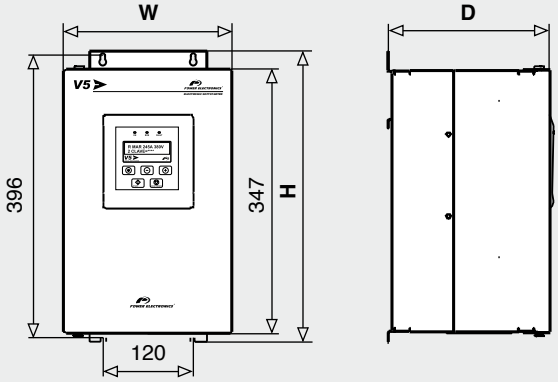
08 V5 SERIES >accessories

ACCESSORIES

REFERENCE	DESCRIPTION
I001	PROFIBUS Communication module
A002	DEVICENET Communication module
A003	JOHNSON CONTROL Communication module
A005	Ethernet Modbus
P0015(X3)*	Bypass Kit V50060-V50090
P0016(X3)*	Bypass Kit V50110-V50250
L051*	Bypass terminal 9-17A
L057*	Bypass terminal 30-45A
V01	Display kit 2m extender with casing
V02	Display kit 1m extender with casing
V09	Display kit 3m extender with casing
V16	Display kit 5m extender with casing
MFV50275	DC braking module 275A

(*) Accessories for external Bypass in standard V5 softstarter

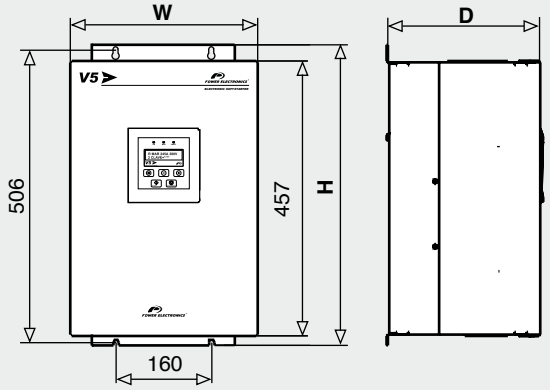
09 V5 SERIES >dimensions

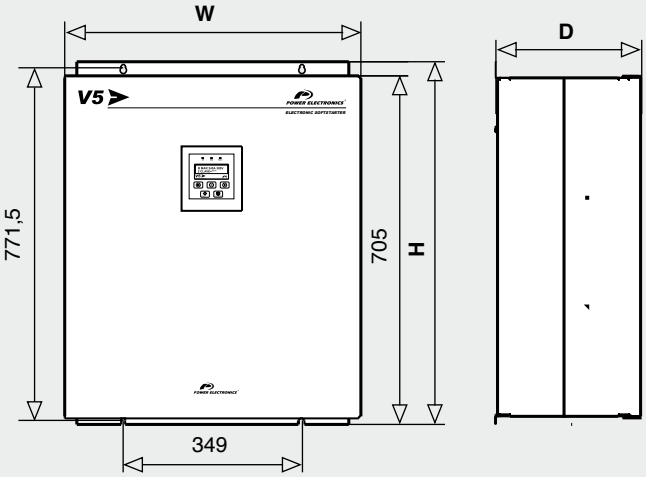


FRAME 1

REFERENCE	DIMENSIONS (mm)			WEIGTH (kg)
	H	W	D	
V50009 - V50090	414	226	230	11,6
V50009.6 - V50090.6	414	226	230	11,6
V50009B - V50090B	414	226	230	12,1
V50009.6B - V50090.6B	414	226	230	12,1

>dimensions



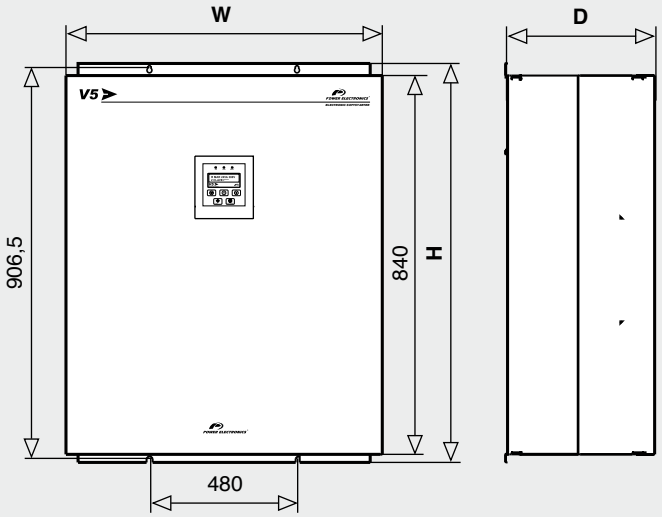


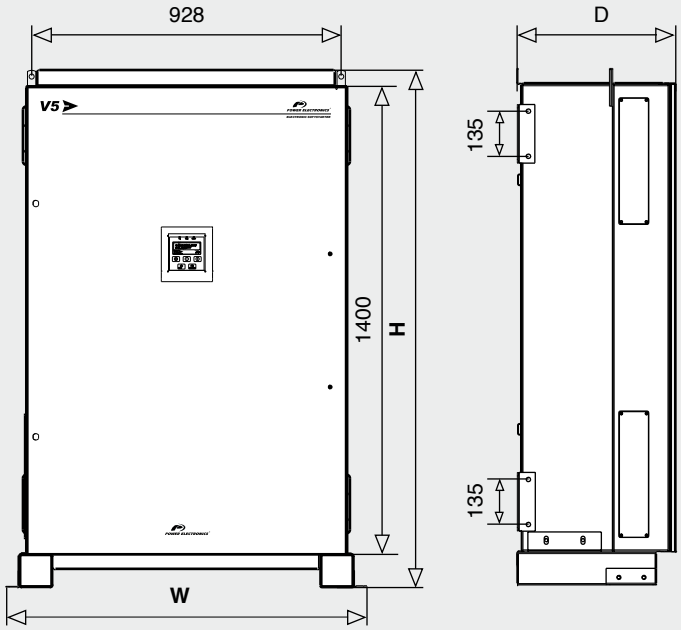
FRAME 2

REFERENCE	DIMENSIONES (mm)			WEIGTH (kg)
	H	W	D	
V50110 - V50250	523	314	260	19
V50110.6 - V50250.6	523	314	260	19
V50110B - V50250B	523	314	260	21
V50110.6B - V50250.6B	523	314	260	21

FRAME 3

REFERENCE	DIMENSIONS (mm)			WEIGTH (kg)
	H	W	D	
V50275 - V50460	791	580	309	53,6
V50275.6 - V50460.6	791	580	309	53,6
V50275B - V50460B	791	580	309	60,6
V50275.6B - V50460.6B	791	580	309	60,6





FRAME 4

REFERENCE	DIMENSIONS (mm)			WEIGTH (kg)
	H	W	D	
V50580 - V51000	926	640	324	77,6
V50580.6 - V51000.6	926	640	324	77,6
V50580B - V50800B	926	640	324	86,6
V50580.6B - V50800.6B	926	640	324	86,6

FRAME 5

REFERENCE	DIMENSIONS (mm)			WEIGTH (kg)
	H	W	D	
V51200 - V51500	1552	1084	475	300,0
V51200.6 - V51500.6	1552	1084	475	300,0

www.power-electronics.com

HEAD OFFICE

SPAIN
Leonardo da Vinci, 24 - 26
Parque Tecnológico
46980 • PATERNA
VALENCIA • ESPAÑA
Tel. 902 40 20 70
Tel. (+34) 96 136 65 57
Fax (+34) 96 131 82 01

BRANCHES

AUSTRALIA
Power Electronics Australia Pty Ltd
U6, 30-34 Octal St, Yatala,
BRISBANE, QUEENSLAND 4207
P.O. Box 3166,
Browns Plains, Queensland 4118 •
AUSTRALIA
Tel. (+61) 7 3386 1993
Fax. (+61) 7 3386 1997

BRAZIL
Power Electronics Brasil Ltda
Av. Guido Caloi, 1985 - Galpão 09
CEP 05802-140
SÃO PAULO • BRASIL
Tel. (+55) 11 5891 9612
Tel. (+55) 11 5891 9762

CHILE
Power Electronics CHILE Ltda
Los Productores # 4439 - Huechuraba
SANTIAGO • CHILE
Tels. (+56) 2 244 0308 - 0327 - 0335
Fax. (+56) 2 244 0395

Oficina Petronila # 246, Casa 19
ANTOFAGASTA • CHILE
Tel. (+56) 55 793 965

CHINA
Power Electronics BEIJING
Room 509, Yiheng Building,
No. 28 East Road, Beisanhuan
100013, Chaoyang District
BEIJING • P.R. CHINA
Tel. (+86) 10 6437 9197
Fax. (+86) 10 6437 9181

Power Electronics Asia Limited
20/F Winbase Centre
208 Queen's Road Central
HONG KONG • P.R. CHINA

GERMANY
Power Electronics Deutschland GmbH
Dieselstraße, 77
90441 NÜRNBERG • GERMANY
Tel. (+49) 911 99 43 99 0
Fax. (+49) 911 99 43 99 8

INDIA
Power Electronics India
No. 26, 3rd Cross.
Vishwanathapuram
MADURAI - 625014
Tel. (+91) 452 434 7348
Fax. (+91) 452 434 7348

KOREA
Power Electronics Asia HQ Co.
Room #305, SK Hub Primo Building
953-1, Dokok-dong, Gangnam-gu
SEOUL, 135-270 • KOREA
Tel. (+82) 2 3462 4656
Fax. (+82) 2 3462 4657

MEXICO
Power Electronics Internacional México
S. de R.L. de C.V.
José Vasconcelos, 9
Colonia Tlalnepantla Centro
Tlalnepantla de Baz
CP 54000, Estado de México
Tel. (+52) 55 5390 8818
Tel. (+52) 55 5390 8363
Tel. (+52) 55 5390 8195

V5CA01HI