Control Modes
- Profile Position-Velocity-Torque, Interpolated Position (PT,PVT), Homing
- Indexer, Point-to-Point, CPL
- Camming, Gearing
- Position, Velocity, Torque

Command Interface
- CANopen
- ASCII, Serial Binary, and discrete I/O
- Stepper or Quad A/B position commands
- PWM Velocity/Torque command
- Master encoder (Gearing/Camming)

Communications
- CANopen
- RS-232

Feedback
- Dual Absolute Encoder Ports
  SSI
  EnDat 2.1, 2.2
  Absolute A
  Tamagawa Absolute A
  Panasonic , Sanyo Denki Absolute A Format
  BiSS
- Incremental
  Digital quad A/B/X encoder
  Analog Sin/Cos encoder
- Other
  Digital Halls

I/O
- 7 High-speed digital inputs
- 6 High-speed digital outputs
- 1 Differential analog input

Safe Torque Off (STO)
- SIL 3, Category 3, PL e

Dimensions: in [mm]
- 2.5 x 1.6 x .69 [64 x 41 x 17.6]

Model	Ic	Ip	Vdc
R43-090-14	7	14	9~90
R43-090-30	15	30	9~90
R43-090-50	25	50	9~90
R43-090-50-C	50	50	9~90
R43-180-10	5	10	20~180
R43-180-20	10	20	20~180

DESCRIPTION

R43 sets new levels of performance, connectivity, and flexibility. CANopen communication provides a widely used cost-effective industrial bus. A wide range of absolute encoders are supported. Safe Torque Off (STO) eliminates external contactors and wiring, reducing system cost and complexity. For safety critical applications, redundant STO disable inputs can be employed.

RUGGEDIZED STANDARDS CONFORMANCE

Ambient Temperature	Non-Operating	-50ºC to 85ºC
	Operating	-40ºC to 70ºC
Thermal Shock	Operating	-40ºC to 70ºC in 1 minute
Relative Humidity	Non-Operating	95% non-condensing at 60ºC
	Operating	95% non-condensing at 60ºC
Vibration	Operating	5 Hz to 500 Hz, up to 3.85 *g*rms
Altitude	Non-Operating	-400 m to 16,000 m
	Operating	-400 m to 16,000 m
Shock	Crash Safety	75 *g* peak acceleration
	Operating	40 *g* peak acceleration
MIL-STD specifications	MIL-STD-	461, 704, 810, 1275, 1399
IEC specifications	IEC-	60068, 60079

GENERAL SPECIFICATIONS

Test conditions: Load = Wye connected load: 1 mH + 1Ω line-line. Ambient temperature = 25 °C. +HV = HVmax

MODEL	R43-090-14	R43-090-30	R43-090-50	R43-090-50-C	R43-180-10	R43-180-20	
OUTPUT POWER							
Peak Current	14 (9.9)	30 (21.2)	*50 (35.4)	*50 (35.4)	10 (7.1)	20 (14.2)	Adc (Arms)
Peak time	1	1	1	n/a	1	1	Sec
Continuous current	7 (5.0)	15 (10.6)	*25 (17.7)	*50 (35.4)	5 (3.5)	10 (7.1)	Adc (Arms)
Peak Output Power	1.26	2.7	4.5	4.5	1.8	3.6	kW
Continuous Output Power	0.63	1.35	2.25	4.5	0.9	1.8	kW
			* *R43-090-50 & R43-090-50-C must be soldered to a mounting board for these ratings.*				
INPUT POWER							
HVmin to HVmax	+9~90	+9~90	+9~90	+9~90	+20~180	+20~180	Vdc
Ipeak	14	30	50	50	10	20	Adc
Icont	7	15	25	50	5	10	Adc
Vlogic	+9~60	+9~60	+9~60	+9~60	+9~60	+9~60	Vdc
Vlogic Power	Vlogic @ 9 Vdc 3.4 W, @ 24 Vdc 3.5 W, @ 60 Vdc 4.2 W with 2 encoders @ +5 V, 500 mA total						
PWM OUTPUTS							
Type	MOSFET 3-phase inverter, 16 kHz center-weighted PWM carrier, space-vector modulation						
PWM ripple frequency	32 kHz						

BANDWIDTH

Current loop, small signal	2.5 kHz typical, bandwidth will vary with tuning & load inductance
HV Compensation	Changes in HV do not affect bandwidth
Current loop update rate	16 kHz (62.5 µs)
Position & Velocity loop update rate	4 kHz (250 µs)

COMMAND INPUTS

CANopen:

Profile Position/Velocity/Torque, Interpolated Position (PVT), Homing

Stand-alone mode

Digital position reference	Pulse/Direction, CW/CCW	Stepper commands (4 MHz maximum rate)
	Quad A/B Encoder	2 M line/sec, 8 Mcount/sec (after quadrature)
Digital torque & velocity reference	PWM , Polarity	PWM = 0% - 100%, Polarity = 1/0
	PWM 50%	PWM = 50% ±50%, no polarity signal required
	PWM frequency range	1 kHz minimum, 100 kHz maximum
	PWM minimum pulse width	220 ns
Indexing	Up to 32 sequences can be launched from inputs or ASCII commands	
Camming	Up to 10 CAM tables can be stored in flash memory	
ASCII	RS-232, 9600~230,400 Baud, 3-wire	

DIGITAL INPUTS

Number	7
All inputs	High-speed Schmitt trigger with 100 ns RC filter, 10 kΩ pull-up to +5 Vdc, max input voltage = +6 Vdc 2.50 minimum pulse-width, RC time-constants assume active drive on inputs and do not include 10 kΩ pull-ups
IN1~IN6	V_T+ = 1.42~2.38 Vdc, V_T- = 0.68~1.6 Vdc, V_H = 0.44~1.26
IN7	V_T+ = 1.30~2.00 Vdc, V_T- = 0.55~1.30 Vdc, V_H = 0.40~0.79

ANALOG INPUT

Number	1
Type	Differential, ±10 Vdc range, 16 bits, 14 kHz input filter bandwidth, sample-rate 16 kHz
Function	Torque, velocity, or position command. Or, as general purpose analog input

DIGITAL OUTPUTS

Number	6
OUT1~3	CMOS HCT inverters, functions programmable, +5 Vcc Source -8 mA @ VOH = 2.4 Vdc, Sink 6 mA @ VOL = 0.5 Vdc
OUT4~6	CMOS LVC inverters, functions programmable, for SLI port, +3.3 Vcc Source -24 mA @ VOH = 2.3 Vdc, Sink 24 mA @ VOL = 0.55 Vdc

RS-232 COMMUNICATION PORT

Signals	RxD, TxD, Sgnd
Mode	Full-duplex, DTE serial communication port for drive setup and control, 9,600 to 230,400 Baud
Protocol	ASCII or Binary format
Isolation	Non-isolated. Referenced to Signal Ground

CANOPEN PORT

Format	Galvanically isolated from drive circuits: CAN_H, CAN_L, CAN_GND, 1 mBit/sec maximum
Protocol	CANopen, CiA 402

GENERAL SPECIFICATIONS

DC POWER OUTPUT

+5 Vdc	500 mA maximum. Protected for overload or shorts. Shared by dual encoders.

SAFE TORQUE OFF (STO)

Function	PWM outputs are inactive and current to the motor will not be possible when the STO function is asserted
Standard	Designed to IEC-61508-1, IEC-61508-2, IEC-61800-5-2, ISO-13849-1
Safety Integrity Level	SIL 3, Category 3, Performance level e
Inputs	2 two-terminal: STO-IN1+,STO-IN1-, STO-IN2+, STO-IN2-
Type	Opto-isolators, 5 V compatible, Vin-LO ≤ 2.0 Vdc or open, Vin-HI ≥ 3.3 Vdc
Input current (typical)	STO-IN1, STO-IN2: 11 mA each
Response time	2 ms from Vin ≤2.0 Vdc to interruption of energy supplied to motor
Muting	Driving STO inputs with +5V will mute (bypass) the STO function (see page 7)

PROTECTIONS

HV Overvoltage	+HV > +95 ±1 Vdc	Drive outputs turn off until +HV is < +95 ±1 Vdc (90 V models)
	+HV > +185 ±1 Vdc	Drive outputs turn off until +HV is < +185 ±1 Vdc (180 V models)
HV Undervoltage	+HV < +8.5 ±0.5 Vdc	Drive outputs turn off until +HV > +8.5 Vdc ±0.5 Vdc (90 V models)
	+HV < +19.5 ±0.5 Vdc	Drive outputs turn off until +HV > +19.5 Vdc ±0.5 Vdc (180 V models)
Drive over temperature	PC Board > 90 °C +3/-0 ºC	Programmable as latching or temporary fault
Short circuits	Output to output, output to ground, internal PWM bridge faults	
I^2T Current limiting	Programmable: continuous current, peak current, peak time for drive and motor	
Latching / Non-Latching	Programmable response to errors	

MECHANICAL & ENVIRONMENTAL

Size	2.5 x 1.6 x 0.69 in [64 x 41 x 17.6 mm] Weight: ≤ 0.16 lb (0.073 kg), +0.106 lb (0.048 kg) for Pins htsink, +0.304 lb (0.138 kg) for Tall Pins htsink
Ambient temperature	0 to +45 °C operating, -40 to +85 °C storage
Humidity	0 to 95%, non-condensing
Altitude	≤ 2000 m (6,500 ft)
Vibration	2 *g* peak, 10~500 Hz (sine)
Shock	10 *g*, 10 ms, half-sine pulse
Contaminants	Pollution degree 2
Cooling	Forced air cooling required for continuous power output

AGENCY STANDARDS CONFORMANCE

Standards and Directives

Functional Safety

IEC 61508-1, IEC 61508-2, IEC 61508-3, IEC 61508-4 (SIL 3)
Directive 2006/42/EC (Machinery)
ISO 13849-1 (Cat 3, PL e)
IEC 61800-5-2 (SIL3)

Product Safety

Directive 2014/35/EU (Low Voltage)
IEC 61800-5-1

EMC

Directive 2014/30/EU (EMC)
IEC 61800-3
IEC 61800-5-2

Approvals

UL and cUL recognized component to:

UL 61800-5-1, UL 61800-5-2
IEC 61800-5-1, IEC 61800-5-2

FUNCTIONAL SAFETY

ISO 13849-1
Up to PL e (Cat 3)
IEC 61800-5-2
Up to SIL 3

All of the agency approvals are pending at this time.

DANGER	***Refer to the 16-01687 Accelnet Plus Micro Modules AEV/APV User Guide***
	The information provided in the *16-01687 Accelnet Plus Micro Modules AEV & APV User Guide* must be considered for any application using the R43 drive STO feature. ***Failure to heed this warning can cause equipment damage, injury, or death.***

GENERAL SPECIFICATIONS

MOTOR CONNECTIONS	
Motor U,V,W	Drive outputs to 3-phase brushless motor, Wye or delta connected For DC brush motor use outputs U & V Minimum inductance: 200 µH line-line
Encoder	Digital encoders, incremental and absolute (see FEEDBACK below) Analog Sin/Cos incremental
Halls	see *Commutation* (below)
Motemp	Inputs are programmable to disable the drive if motor sensor drives input HI or LO (programmable)
FEEDBACK	
Incremental encoders	
Digital Incremental Encoder	Quadrature signals, (A, /A, B, /B, X, /X), differential (X, /X Index signals not required) RS-422 line receivers, 5 MHz maximum line frequency (20 M counts/sec)
Analog Incremental Encoder	Sin/Cos format (Sin+, Sin-, Cos+, Cos-), differential, 1 Vpeak-peak ±20% BW > 300 kHz, 16-bit resolution, with zero-crossing detection
Absolute encoders	
EnDat 2.1, 2.2, SSI	Serial Clock (X, /X), and Data (A, /A) signals
Absolute A Format	SD+, SD- (A, /A) signals, 2.5 or 4 MHz, half-duplex Position feedback: 13-bit resolution per rev, 16 bit revolution counter (29 bit absolute position data) Status data for encoder operating conditions and errors
BiSS (B&C)	MA+, MA- (X, /X), SL+, SL- (A, /A) signals, clock output from drive, data returned from encoder
Terminators	All encoder data inputs and clock outputs are differential and require external terminators
Commutation	Hall signals (U,V,W), 15 kΩ pull-up to +5V, 15 kΩ/100 pF RC to 74LVC3G14 Schmitt trigger at +5 Vcc
Encoder power	+5 Vdc ±2% @ 500 mAdc max, shared by dual encoders
HALLS	
Digital	U, V, W: Single-ended, 120° electrical phase difference between U-V-W signals Schmitt trigger, 1.5 µs RC filter from active HI/LO sources, 24 Vdc compatible, 15 kΩ pull-up to +5 Vdc Vt+ = 2.5~3.5 Vdc, VT- = 1.3~2.2 Vdc, VH = 0.7~1.5 Vdc
Analog	U & V: Sin/Cos format (Sin+, Sin-, Cos+, Cos-), differential, 1 Vpeak-peak ±20% BW > 300 kHz, 121 Ω terminating resistors between Sin+ & Sin-, Cos+ & Cos- inputs 16-bit resolution, BW > 300 kHz, with zero-crossing detection
MULTI-MODE ENCODER PORT	
As Input	See Digital Incremental Encoder above for electrical data on A, B, & X channels, or Absolute encoders using X or A channels. External terminators required as shown above
As Emulated Output	Quadrature A/B encoder emulation with programmable resolution to 4096 lines (65,536 counts) per rev from analog Sin/Cos encoders or resolvers A, /A, B, /B, outputs from MAX3032 differential line driver, X, /X, A, /A from MAX 3362 line drivers
As Buffered Output	Digital A/B/X encoder signals from primary digital encoder are buffered as shown above 5 MHz max, 20 mega count/sec
5V OUTPUT	
Number	1
Ratings	+5 Vdc @ 500 mA thermal and overload protected

CME QUICK STARTS

These are some common topics with the key topics that are configured in CME with page numbers shown for quick access.

CANopen Communications: (p. 6)
CME > Settings > Operating Mode Options
Operating Mode = Position
Command Source = CAN

Serial RS-232 Setup (p. 6)
CME > Tools > Communication Wizard
Select Device = Serial Ports
Select Ports > Available Ports
Configure Ports > Select > Baud

CANopen Settings: (p. 26)
CME > Amplifier > Network Configuration
CAN Configuration > Address Configuration > Use Switch
[Input / Output] > Digital Inputs >
[x] Use Switch & LED Interface (SLI)

Digital Command Inputs: Position (p. 8)
CME > Settings > Operating Mode Options
Operating Mode = Position
Command Source = Digital Input
Digital Input Source = High Speed Inputs

Digital Command Inputs: Velocity / Current (p. 8)
CME > Settings > Operating Mode Options
Operating Mode = Velocity, Current
Command Source = PWM Command
Digital Input Source = High Speed Inputs
[PWM Command]
Input Type = 50% Duty Cycle, 100% Duty Cycle

Multi-Mode Port as Pos/Vel/Curr Command Input (p. 9)
CME > Settings > Operating Mode Options
Feedback Options
Motor Feedback > Primary
Load Feedback > None
Operating Mode Options
Operating Mode = Position, Velocity, Current
Command Source = Digital Input
Digital Input Source = Multi-mode Port

Multi-Mode Port as Secondary Encoder Input (p. 9)
CME > Settings > Feedback Options
Motor Feedback = Selections > Primary
Load Feedback = Selections > Secondary
Operating Mode Options:
Operating Mode = Position, Velocity, Current
Command Source = Digital Input, PWM Command
Digital Input Source = High Speed Inputs

Multi-Mode Port as an Output)p. 10)
CME > Settings > Operating Mode Options
Feedback Options = Motor Feedback > Primary
Load Feedback > None
Operating Mode Options
Operating Mode = Position
Command Source = CANopen
Miscellaneous Options
Multi-Mode Port = Emulated Motor Feedback

Position Mode from CANopen (p. 6)
CME > Settings > Operating Mode Options
Operating Mode = Position
Command Source = CAN

Pos/Vel/Curr Mode from Analog Input (p. 13)
CME > Settings > Operating Mode Options
Operating Mode = Position, Velocity, Current
Command Source = Analog Input

CANOPEN COMMUNICATIONS

CANOPEN

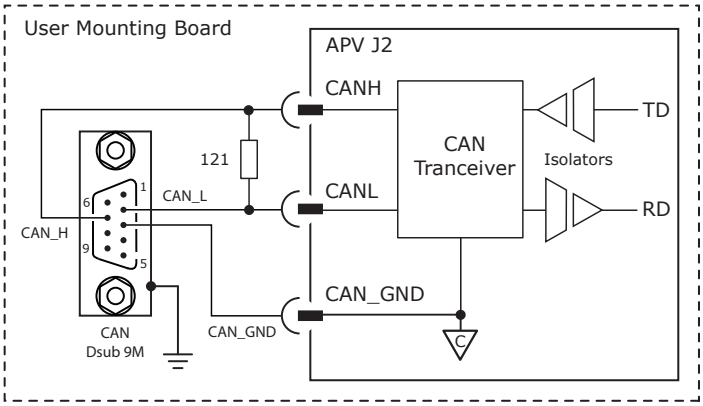
Based on the CAN V2.0b physical layer, a robust, two-wire communication bus originally designed for automotive use where low-cost and noise-immunity are essential, CANopen adds support for motion-control devices and command synchronization. The result is a highly effective combination of data-rate and low cost for multi-axis motion control systems. Device synchronization enables multiple axes to coordinate moves as if they were driven from a single control card.

CANOPEN COMMUNICATION

R43 uses the CAN physical layer signals CANH, CANL, and CAN_GND for connection, and CANopen protocol for communication. Before installing the drive in a CAN system, it must be assigned a CAN Node-ID (address). A maximum of 127 CAN nodes are allowed on a single CAN bus. Up to seven digital inputs can be used to produce CAN Node-IDs from 1~127, or the Node-ID can be saved to flash memory in the module. Node-ID 0 is reserved for the CANopen master on the network.

CANOPEN COMMAND INPUTS

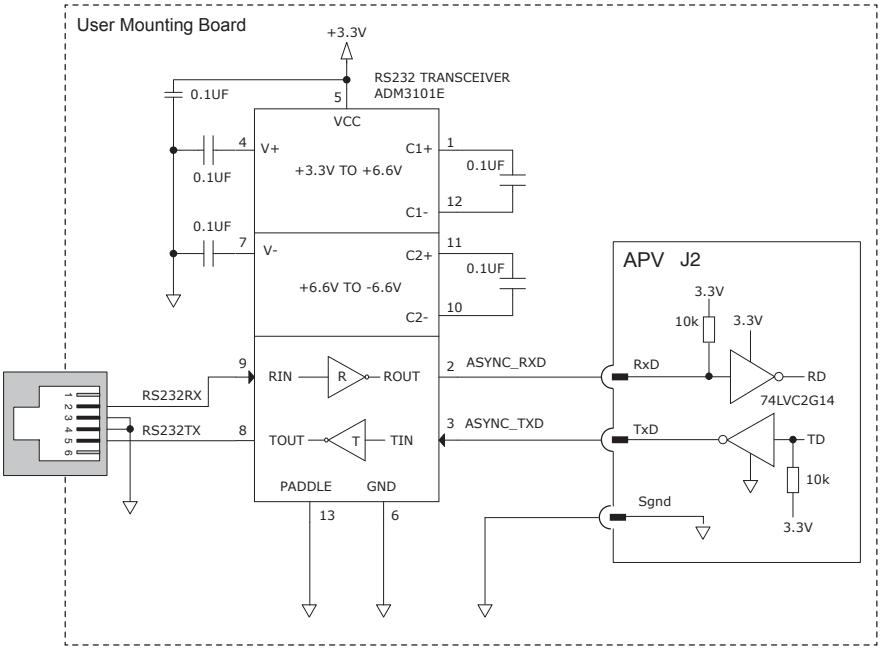
The graphic shows connections between the R43 and a Dsub 9M connector on a CAN card. If the R43 is the last node on a CAN bus, the internal terminator resistor can be used by adding a connection on the PC board as shown. If there are multiple R43 on the mounting PCB then the terminating resistor should be near the R43 that is farthest from the CAN network connection to the PCB. The node Node-ID of the R43 may be set by using digital inputs, or programmed into flash memory in the drive.



Signal	J2 Pins
CANH	29
CANL	27
CAN_GND	25,26

R43 RS-232 COMMUNICATIONS

RS-232 PORT



The serial port is a full-duplex, three-wire (RxD, TxD, Sgnd) type that operates from 9,600 to 230,400 Baud.
It can be used by CME for drive configuration and setup or by external equipment sending ASCII commands.

The circuit shown here is used on the EZ board and is recommended for user's PC boards. It converts the single-ended TTL signals levels in the R43 into the ANSI RS-232 levels which are the standard for serial communications and computer COMM ports.

Signal	J2 Pins
RxD	28
TxD	30
Sgnd	32

SAFE TORQUE OFF (STO)

The Safe Torque Off (STO) function is defined in IEC 61800-5-2. Two channels are provided which, when de-energized, prevent the upper and lower devices in the PWM outputs from producing torque in the motor.

This provides a positive OFF capability that cannot be overridden by the control firmware, or associated hardware components. When the opto-couplers are energized (current is flowing in the input diodes), the control core will be able to control the on/off state of the PWM outputs to produce torque in the motor.

INSTALLATION

DANGER	***Refer to the 16-01687 Accelnet Plus Micro Modules AEV/APV User Guide***
	The information provided in the *16-01687 Accelnet Plus Micro Modules AEV & APV User Guide* must be considered for any application using the R43 drive STO feature. ***FAILURE TO HEED THIS WARNING CAN CAUSE EQUIPMENT DAMAGE, INJURY, OR DEATH.***

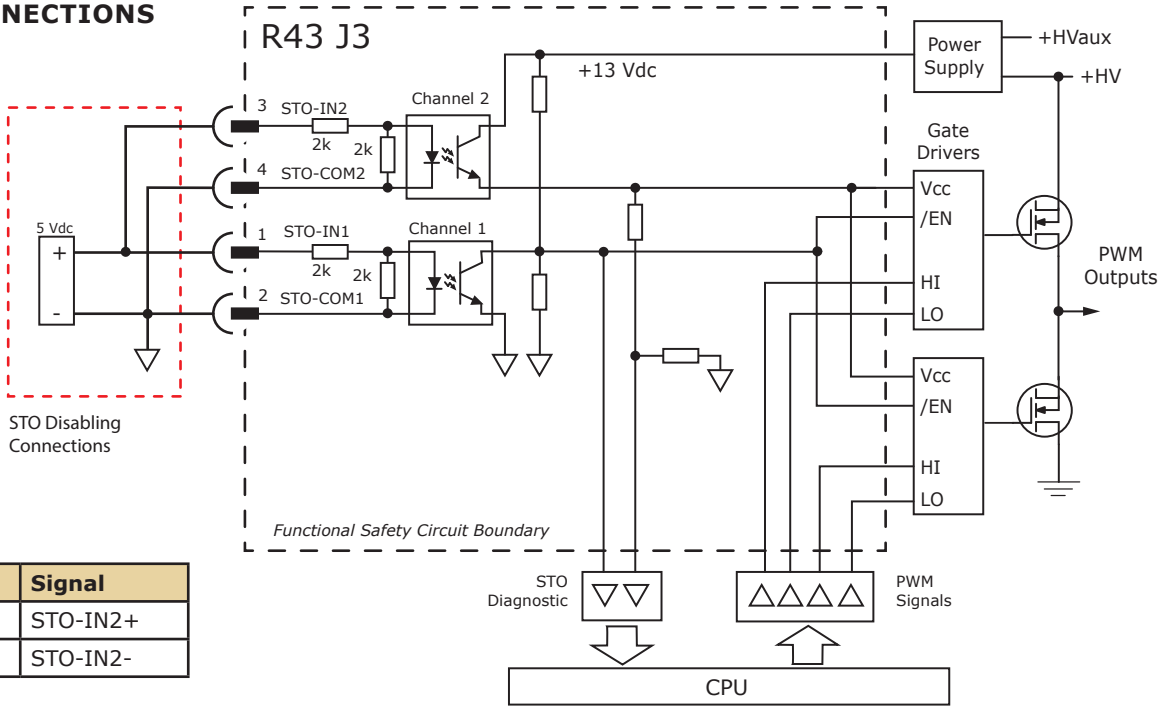
STO DISABLE

In order for the PWM outputs of the R43 to be activated, current must be flowing through the opto-couplers that are connected to the STO-IN1 and STO-IN2 terminals and the drive must be in an ENABLED state. When either of the opto-couplers are OFF, the drive is in a Safe Torque Off (STO) state and the PWM outputs cannot be activated by the control core to drive a motor.

This diagram shows connections that will energize all of the opto-couplers from a +5V source. When this is done the STO feature is disabled and control of the output PWM stage is under control of the digital control core.
If not using the STO feature, these connections must be made in order for the drive to be enabled.

STO DISABLE CONNECTIONS

Current must flow through all of the opto-couplers before the drive can be enabled



FUNCTIONAL DIAGRAM

J3 STO

Signal	Pin		Signal
STO-IN1+	1	3	STO-IN2+
STO-IN1-	2	4	STO-IN2-

STO OPERATION

STO Input Voltage	STO State
STO-IN1 *AND* STO-IN2 ≥ 3.3 Vdc	STO Inactive. Drive can be enabled to produce torque
STO-IN1 *OR* STO-IN2 ≤ 2.0 Vdc	STO Active. Drive cannot be enabled to produce torque
STO-IN1 *OR* STO-IN2 Open	

Note: Voltages in the table above are referenced between an STO-INx+ and an STO-INx-.
E.g. V(STO-IN1) = V(STO-IN1+) - V(STO-IN1-)

STO STATUS

A digital output can be programmed to be active when the drive is disabled by the STO function. The active level of the output is programmable to be HI or LO.
Note: STO Status is not part of the STO Safety Function.

DIGITAL COMMAND INPUTS: POSITION

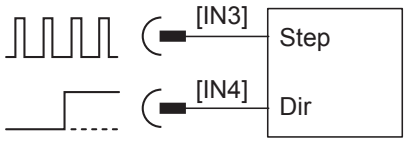
STAND-ALONE MODE DIGITAL POSITION-CONTROL INPUTS

R43 works with motion controllers that output pulses to command position.
These formats are supported:

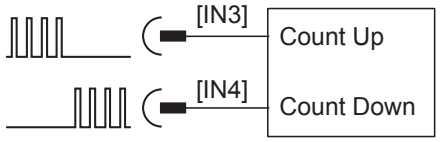
- Step/Direction
- Count-Up/Count-Down (CU/CD)
- A/B Quadrature Encoder

In Step/Direction mode, a pulse-train controls motor position, and the direction is controlled by a DC level at the Direction input. CU/CD (Count-Up/Count-Down) signals command the motor to move CW or CCW depending on which input the pulse-train is directed to. The motor can also be operated in an electronic gearing mode by connecting the inputs to a quadrature encoder on another motor. In all cases the ratio between input pulses and motor revolutions is programmable.

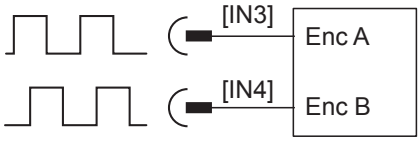
STEP/DIRECTION INPUTS



COUNT-UP/COUNT-DOWN INPUTS



QUAD A/B ENCODER INPUTS



Signal	J2 Pins
IN3	7
IN4	8

Sgnd
3,4,18,19,20,21,22,23,24, 31,32,33,34,42,49,50,59,60

DIGITAL COMMAND INPUTS: VELOCITY, TORQUE

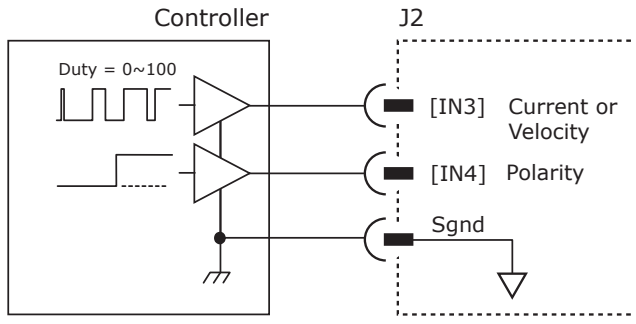
STAND-ALONE MODE DIGITAL VELOCITY/TORQUE CONTROL INPUTS

R43 works with motion controllers that output pulses to command velocity and torque (current).
These formats are supported:

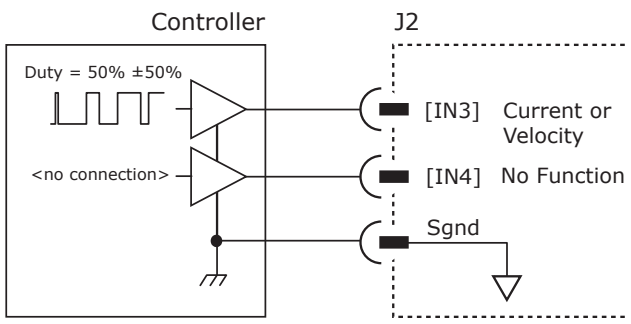
- PWM/Direction
- 50 % PWM

In PWM/Direction mode, a pulse-train with variable duty-cycle controls motor Vel/Trq, and the polarity or direction is controlled by HI/LO levels at the Direction input. With 50% PWM operation there is a single signal.
A 50% duty cyle produces zero output. Increasing the duty cycle to 100% produces a full-scale output in one direction and 0% duty cycle produces a full-scale output in the opposite direction.

PWM & DIRECTION



50% PWM

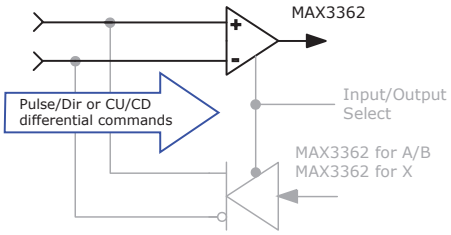


MULTI-MODE PORT AS AN INPUT

COMMAND INPUT

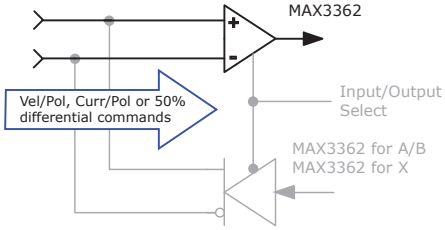
POSITION COMMANDS: DIFFERENTIAL

- Pulse & Direction
- CW & CCW (Clockwise & Counter-Clockwise)
- Encoder Quad A & B
- Camming Encoder A & B input

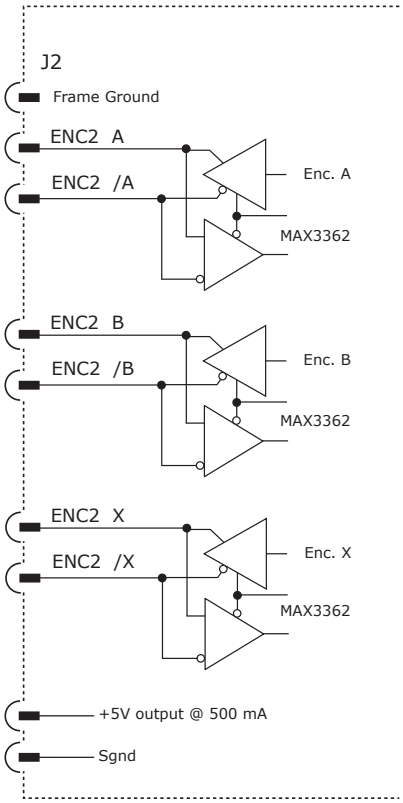


CURRENT or VELOCITY COMMANDS: DIFFERENTIAL

- Current/Velocity Magnitude & Direction
- Current/Velocity 50%



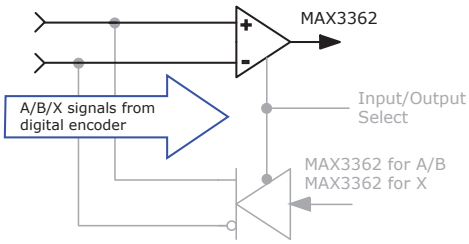
Command Signals	J2 Pins
Pulse, CW, Quad Encoder A, Vel-Curr-Magnitude, Vel-Curr-50%	51
/Pulse, /CW, Quad Encoder /A, /Vel-Curr-Magnitude, /Vel-Curr-50%	52
Direction, CCW, Quad Encoder B, Vel-Curr-Direction	53
/Direction, /CCW, Quad Encoder /B, /Vel-Curr-Direction	54



FEEDBACK INPUT: ENCODER 2

SECONDARY FEEDBACK: INCREMENTAL

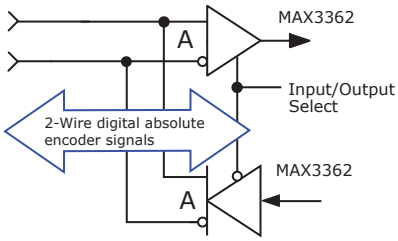
- Quad A/B/X incremental encoder

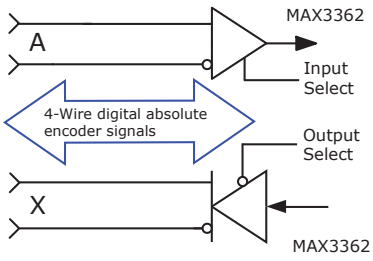


SECONDARY FEEDBACK: ABSOLUTE

- Half-Duplex: Absolute A encoders (2-wire)
  The A channel first transmits a Clock signal and then switches to a receiver to receive data from the encoder.
- Full-Duplex: SSI, BiSS, EnDat encoders (4-wire)
  The X channel sends the Clock signal to the encoder, which initiates data transmission to the A-channel.

Feedback Signals	J2 Pins
Quad Encoder A, Half-Duplex CLK-DATA, Full-Duplex DATA	51
Quad Encoder /A, Half-Duplex /CLK-DATA, Full-Duplex /DATA	52
Quad Encoder B	53
Quad Encoder /B	54
Quad Encoder X, Full-Duplex CLOCK	55
Quad Encoder /X, Full-Duplex /CLOCK	56





J2 Sgnd Pins
3,4,18,19,20,21,22,23,24, 31,32,33,34,42,49,50,59,60

MULTI-MODE PORT AS AN OUTPUT

OUTPUT TYPES

BUFFERED FEEDBACK OUTPUTS: DIFFERENTIAL

An incremental encoder connected as primary feedback from the motor is internally connected to the multi-port configured as an output. This can then be wired to a motion controller that needs position data without the need for split-wiring cables from the encoder alone.

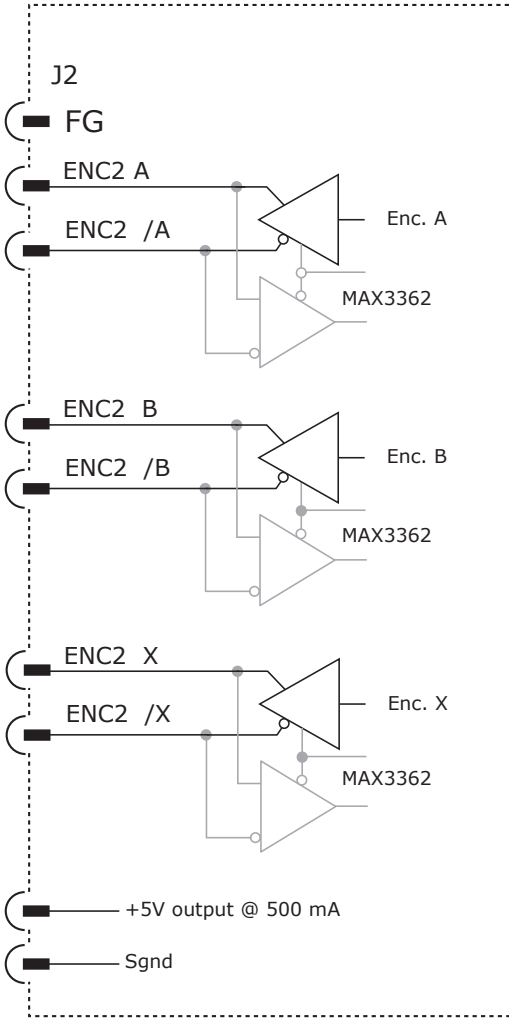
- Encoder Quad A, B, X channels
- Direct internal connection between quad A/B/X encoder feedback and differential line drivers for A/B/X outputs

EMULATED FEEDBACK OUTPUTS: DIFFERENTIAL

Firmware produces emulated quad A/B signals from feedback data from the following devices:

- Absolute encoders
- Analog Sin/Cos incremental encoders

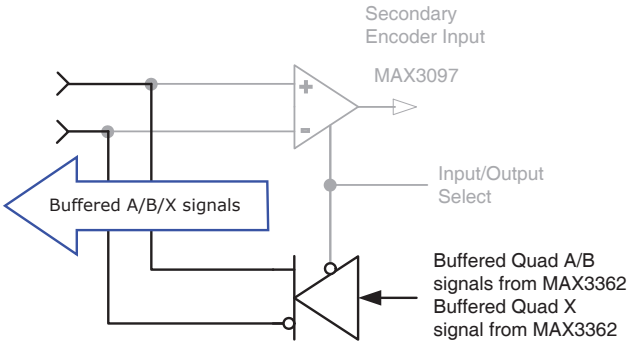
The X channel is not used in this mode



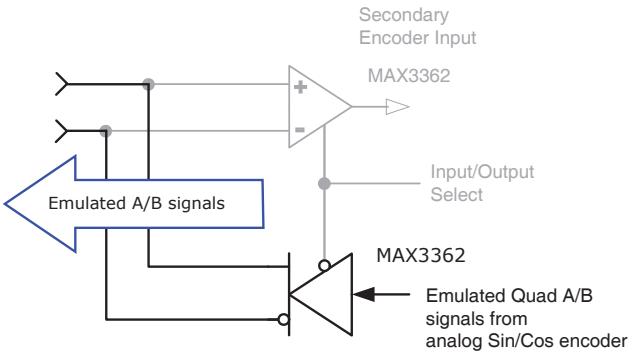
Signal	J2 Pins
Enc2 A	51
Enc2 /A	52
Enc2 B	53
Enc2 /B	54
Enc2 X	55
Enc2 /X	56

J2 Sgnd Pins
3,4,18,19,20,21,22,23,24, 31,32,33,34,42,49,50,59,60

BUFFERED QUAD A/B/X OUTPUTS



EMULATED QUAD A/B OUTPUTS



CME DEFAULTS

These tables show the CME default settings. They are user-programmable and the settings can be saved to non-volatile flash memory.

Input / Output > Digital Inputs

Name	Configuration
IN1	Amp Enable-LO Enables with Clear Faults
IN2	Not Configured
IN3	Not Configured
IN4	Not Configured
IN5	Motor Temp-Hi Disables
IN6	Encoder Fault-Active HI
IN7*	SLI MISO (Master Input Slave Output)

*If not used for an SLI port, this input can be programmed for other functions.

Input / Output > Digital Outputs

Name	Notes
OUT1	Fault-Active LO
OUT2	Not Configured
OUT3	Brake-Active Low
OUT4*	SLI MOSI (Master Output Slave Input)
OUT5*	SLI CLK (Clock)
OUT6*	SLI SS (Slave Select)

*If not used for an SLI port, these outputs can be programmed for other functions.

Configure Filters > Filter Settings

Name	Notes
Analog Reference	Disabled
V Loop Input	Disabled
V Loop Output 1	Low Pass, Butterworth, 2 poles, 200 Hz
V Loop Output 2	Disabled
V Loop Output 3	Disabled
I Loop Input 1	Disabled
I Loop Input 2	Disabled
Input Shaping	Disabled, 0.1 Poles

Configure Faults > Latched Faults

Active	Notes
√	Short Circuit
√	Amp Over Temperature
√	Motor Over Temp
	Over Voltage
	Under Voltage
√	Feedback Error
	Motor Phasing Error
√	Following Error
	Command Input Fault
	Motor Wiring Disconnected
	STO Active

Configure Faults > Optional Faults

	Over Current (Latched)

√ These are the default settings for Latched Faults. Using CME, these can be checked or unchecked.

Home

Software Limits	Positive, Negative, Deceleration
Method	Set Current Position as Home
Fast Velocity	RPM
Slow Velocity	RPM
Accel / Decel	RPS
Offset	Counts
Homing Adjustment	Counts

HIGH SPEED INPUTS: IN1, IN2, IN3, IN4, IN5, IN6

The six digital inputs to the R43 are programmable to a selection of functions.
All have 100 ns RC filters when driven by active sources (CMOS, TTL, etc) and all have 10 kΩ pull-up resistors to +5 Vdc.
In addition to the selection of functions, the active level for each input is individually programmable.
Input *level* functions have programmable HI or LO to activate the function.
Input *transition* functions are programmable to activate on LO -> HI, or HI -> LO transitions.

INPUT LEVEL FUNCTIONS

- Drive Enable, Enable with Clear Faults, Enable with Reset
- PWM Sync
- Positive Limit Switch
- Negative Limit Switch
- Home Switch
- Encoder Fault
- Motor Temperature Sensor Input
- Motion Abort
- High-Resolution Analog Divide

INPUT TRANSITION FUNCTIONS

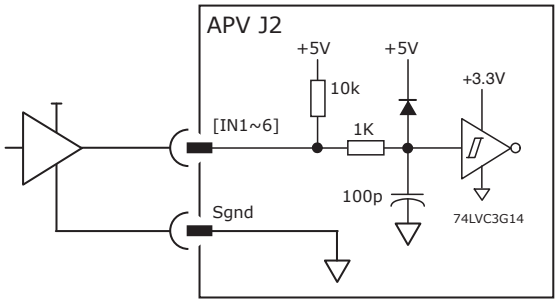
- Clear Faults and Event Latch
- Drive Reset
- PWM Sync Input
- Trajectory Update
- Count Input Edges, Save to Register
- High-Speed Position Capture
- Simulated Absolute Encoder Burst
- Abort Move if > N Counts From Destination in Register

SPECIFICATIONS

Input	Data	Notes
Input Voltages	HI	V_T+ = 1.42~2.38 Vdc
	LO	V_T+ = 0.68~1.6 Vdc
	Hys	V_H = 0.44~1.26
	Max	+6 Vdc
	Min	0 Vdc
Pull-up	R1	10 kΩ
Low pass filter	R2	1 kΩ
	C1	100 pF
	RC[1]	0.1 µs

CONNECTIONS

Signal	J2 Pins
IN1	5
IN2	6
IN3	7
IN4	8
IN5	9
IN6	10



J2 Sgnd Pins
3,4,18,19,20,21,22,23,24, 31,32,33,34,42,49,50,59,60

HIGH SPEED INPUTS: IN7

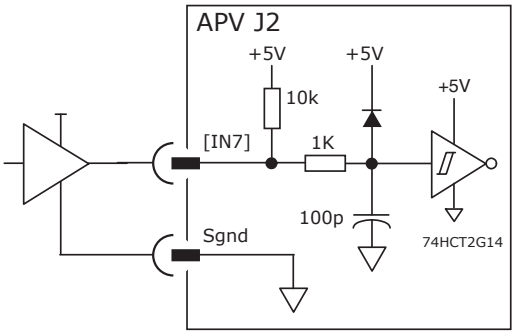
- Digital, non-isolated
- Programmable functions
- MISO Input when SLI port is in use.

SPECIFICATIONS

Input	Data	Notes
Input Voltages	HI	VT+ ≥ 1.3~2.0 Vdc
	LO	VT- ≤ 0.55~1.3 Vdc
	Hys	VH 0.40~0.79 Vdc
	Max	+6 Vdc
	Min	0 Vdc
Pull-up	R1	10 kΩ
Low pass filter	R2	1 kΩ
	C1	100 nF
	RC[1]	0.1 µs

CONNECTIONS

Signal	J2 Pins
IN7	11



* RC time constant applies when input is driven by active high/low device

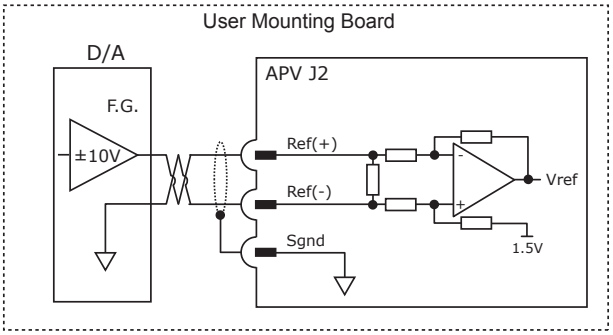
ANALOG INPUT: AIN1

As a reference input it takes Position/Velocity/Torque commands from a controller.
If not used as a command input, it can be used as general-purpose analog input.

SPECIFICATIONS

Spec	Data	Notes
Input Voltage	Vref	±10 Vdc
Input Resistance	Rin	5.09 kΩ

Signal	J2 Pins
AIN(+)	2
AIN(-)	1

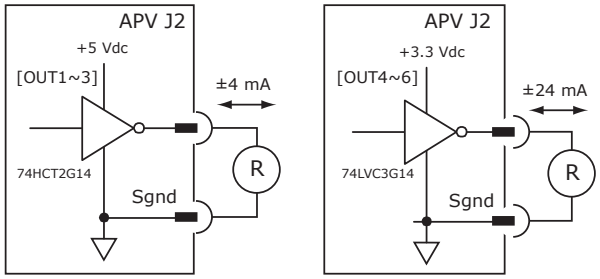


DIGITAL OUTPUTS: OUT1, OUT2, OUT3, OUT4

Digital outputs [OUT1~3] are HCT CMOS inverters. They operate from +5V and can source/sink 4 mAdc.
[OUT4~6] are LVC CMOS inverters. They operate from 3.3V and can source/sink 24 mA.
The output functions shown below are programmable to turn the output ON (HI) or OFF (LO) when active.

OUTPUT FUNCTIONS

- Fault
- Brake
- Custom event
- PWM Sync
- Custom Trajectory status
- Custom position-triggered output
- Program control



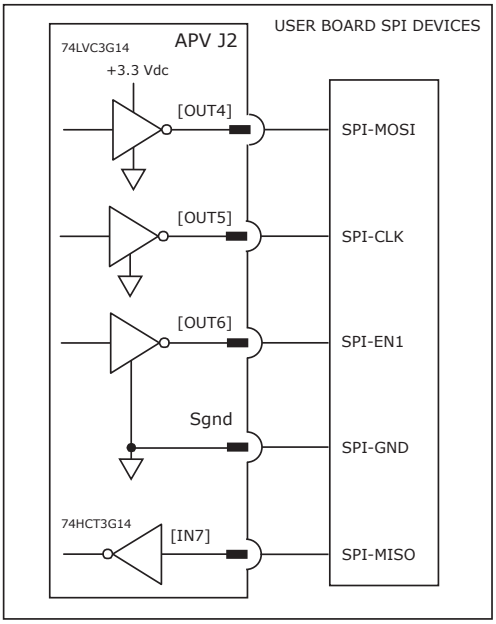
Signal	J2 Pins
OUT1	13
OUT2	12
OUT3	15
OUT4	14
OUT5	17
OUT6	16

SLI (SWITCH & LED INTERFACE) PORT

These three outputs and one input operate as an SLI (Switch and LED Interface) port for controlling LEDs and reading the settings the network address switches. The graphic below shows them in SLI mode. If not used for SLI they are programmable for other functions to turn the output ON (HI) or OFF (LO) when active. [IN7] is shown here for completeness as part of the SLI function.

OUTPUT FUNCTIONS

- Fault
- Brake
- Custom event
- PWM Sync
- Custom Trajectory status
- Custom position-triggered output
- Program control

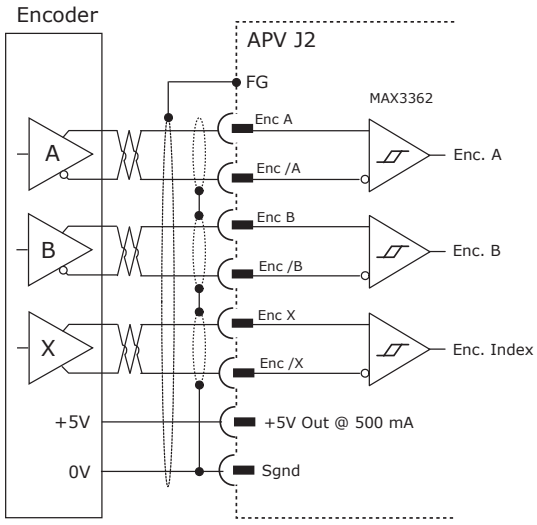


Signal	J2 Pins
SLI-MOSI	14
SLI-CLK	17
SLI-EN1	16
SLI-GND	18
SLI-MISO	11

J2 Sgnd Pins
3,4,18,19,20,21,22,23,24, 31,32,33,34,42,49,50,59,60

ENCODER 1 (PRIMARY FEEDBACK)

QUAD ENCODER WITH INDEX



A/B/X SIGNALS

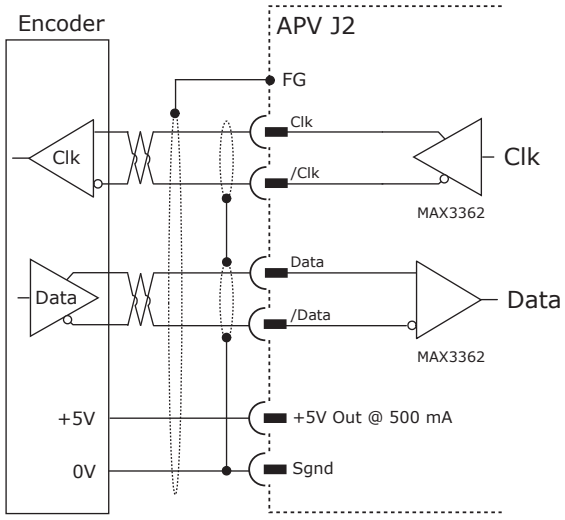
Signal	J2 Pins
Enc A	43
Enc /A	44
Enc B	45
Enc /B	46
Enc X	47
Enc /X	48
+5V	57,58

J2 Sgnd Pins
3,4,18,19,20,21,22,23,24, 31,32,33,34,42,49,50,59,60

SSI ABSOLUTE ENCODER

The SSI (Synchronous Serial Interface) is an interface used to connect an absolute position encoder to a motion controller or control system. The R43 drive provides a train of clock signals in differential format to the encoder which initiates the transmission of the position data on the subsequent clock pulses. The number of encoder data bits and counts per motor revolution are programmable.

The hardware bus consists of two signals: SCLK and SDATA. The SCLK signal is only active during transfers. Data is clocked in on the falling edge of the clock signal.



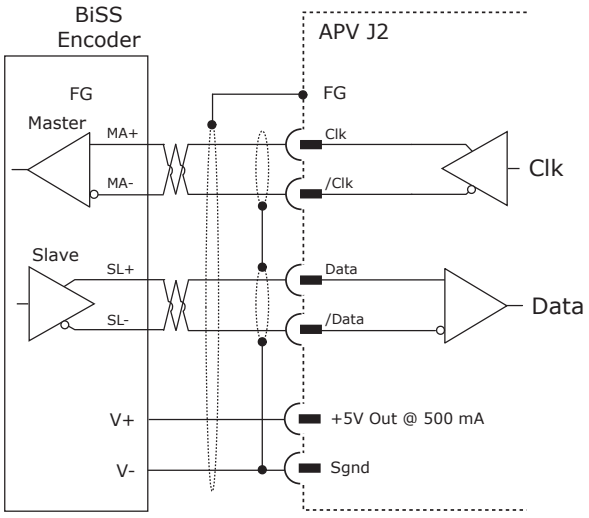
SSI,BiSS SIGNALS

SSI	BiSS	J2 Pins
Clk	MA+	47
/Clk	MA-	48
Data	SL+	43
/Data	SL-	44
+5V		57,58

BiSS ABSOLUTE ENCODER

BiSS is an Open Source digital interface for sensors and actuators. BiSS refers to principles of well known industrial standards for Serial Synchronous Interfaces like SSI, AS-Interface® and Interbus® with additional options.

- Serial Synchronous Data Communication
- Cyclic at high speed
- 2 unidirectional lines Clock and Data
  - Line delay compensation for high speed data transfer
  - Request for data generation at slaves
  - Safety capable: CRC, Errors, Warnings
  - Bus capability incl. actuators
- Bidirectional
  - BiSS B-protocol: Mode choice at each cycle start
  - BiSS C-protocol: Continuous mode

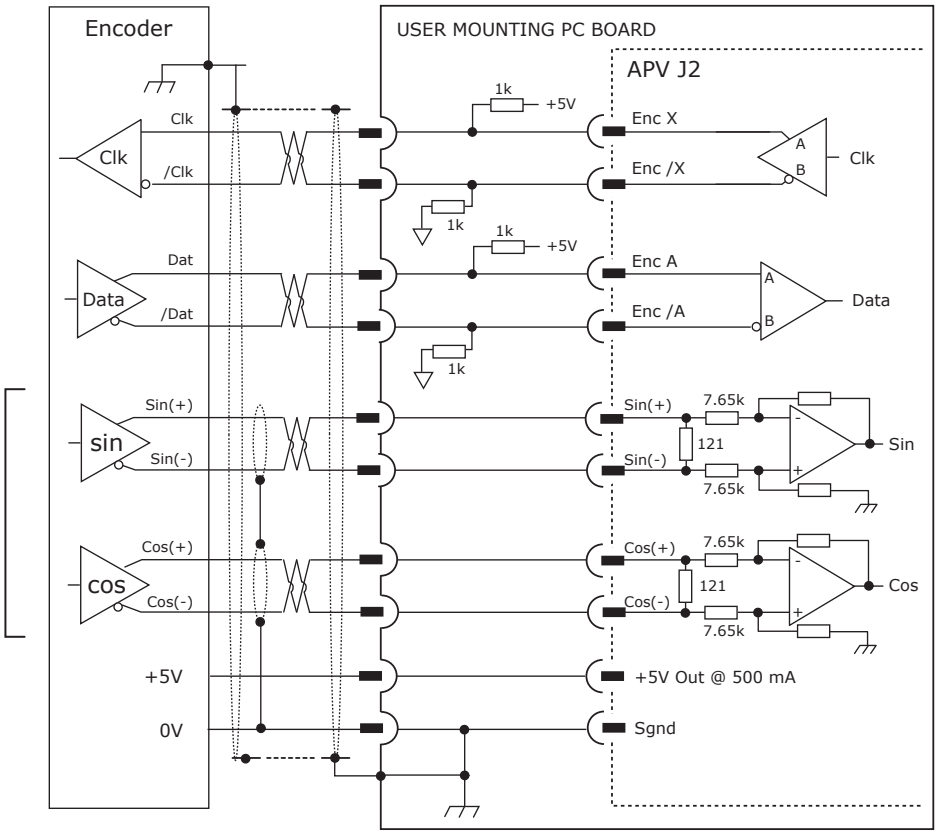


Note: Single (outer) shields should be connected at the drive end. Inner shields are optional for digital encoders and should only be connected to Signal Ground on the drive.

ENCODER 1 (PRIMARY FEEDBACK)

ENDAT ABSOLUTE ENCODER

The EnDat interface is a Heidenhain interface that is similar to SSI in the use of clock and data signals, but which also supports analog Sin/Cos channels from the same encoder. The number of position data bits is programmable as is the use of Sin/Cos channels. Use of Sin/Cos incremental signals is optional in the EnDat specification.



ENDAT SIGNALS

Signal	J2 Pins
Clk	47
/Clk	48
Data	43
/Data	44
Sin(+) *	36
Sin(-) *	35
Cos(+) *	38
Cos(-) *	37
+5V	57,58

* Sin/Cos optional with EnDat 2.2 or any 1 Mbit or faster Endat
Sin/Cos required if EnDat 2.1 < 1 Mbit

J2 Sgnd Pins
3,4,18,19,20,21,22,23,24, 31,32,33,34,42,49,50,59,60

ABSOLUTE-A ENCODER

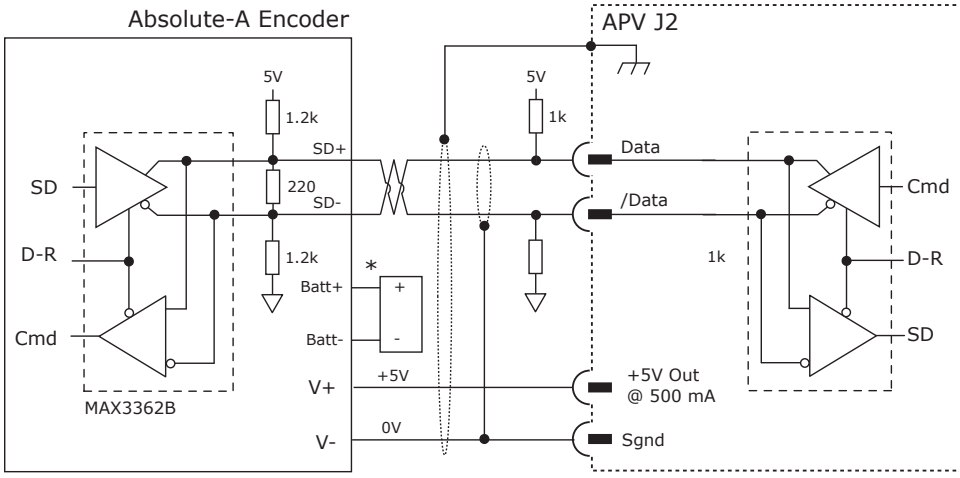
The Absolute A interface is a serial, half-duplex type that is electrically the same as RS-485.
Note the battery which must be connected. Without it, the encoder will produce a fault condition.

ABSOLUTE-A SIGNALS

Signal	J2 Pins
Data	43
/Data	44
+5V	57,58

- Absolute A
- Tamagawa Absolute A
- Panasonic Absolute A Format
- Sanyo Denki Absolute A

* Battery optional

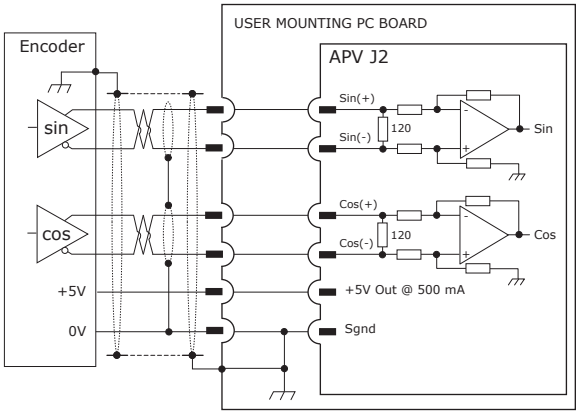


Note: Single (outer) shields should be connected at the drive end. The inner shield is optional for digital encoders and should only be connected to Signal Ground on the drive.

ANALOG ENCODER

SIN/COS ENCODERS

Sin/Cos sensors in linear brushless motors are produced from the magnetic field in the rod and provide commutation feedback as well as higher resolution position feedback by interpolating of the signals.
Incremental rotary encoders are also available with Sin/Cos outputs. Programmable interpolation enables the number of counts per revolution or linear movement to be programmable.

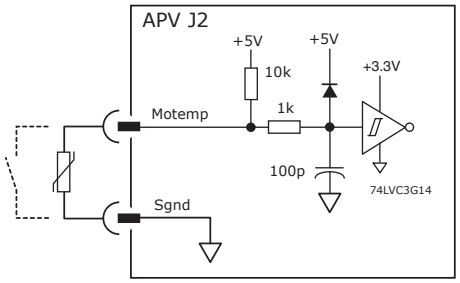


Input	J2 Pins
SIN(+)	36
SIN(-)	35
COS(+)	38
COS(-)	37
+5V	57,58

OTHER MOTOR CONNECTIONS

MOTOR TEMPERATURE SENSOR

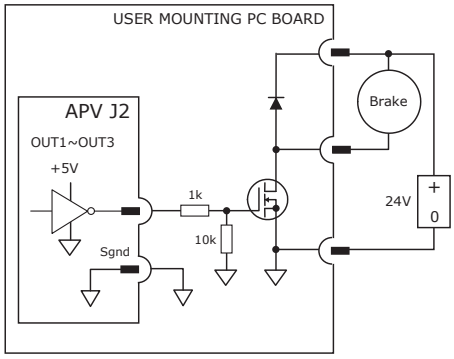
Any digital input is programmable for use with a motor overtemperature switch. Either a HI or LO input level is programmable to signal an over-temp condition.



Input	J2 Pins
Motemp IN5	9
Sgnd	3

MOTOR BRAKE

OUT1~OUT3 have +5V outputs that can control a MOSFET. When programmed for brake control with an active HI level, the output will turn on the MOSFET, releasing the brake and allowing the motor to move.

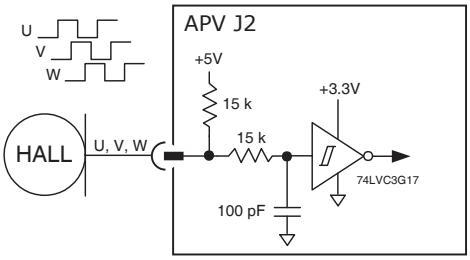


Output	J2 Pins
OUT1	13
OUT2	12
OUT3 *	15

* OUT3 is brake default

HALLS

Hall sensors in a brushless motor are produced from the magnetic field in the motor and provide commutation feedback without an encoder. When used with incremental encoders, they enable the motor to operate without a phase-finding cycle.



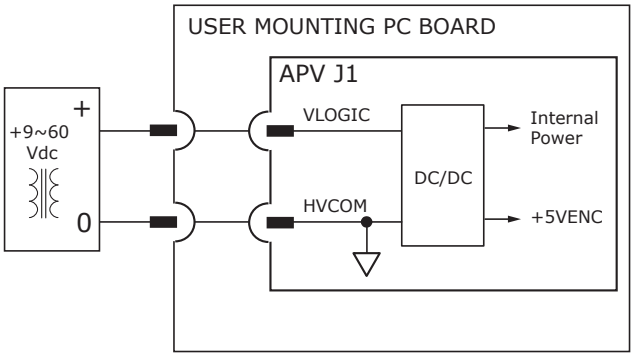
Input	J2 Pins
Hall U	39
Hall V	40
Hall W	41

J2 Sgnd Pins
3,4,18,19,20,21,22,23,24, 31,32,33,34,42,49,50,59,60

VLOGIC

DESCRIPTION

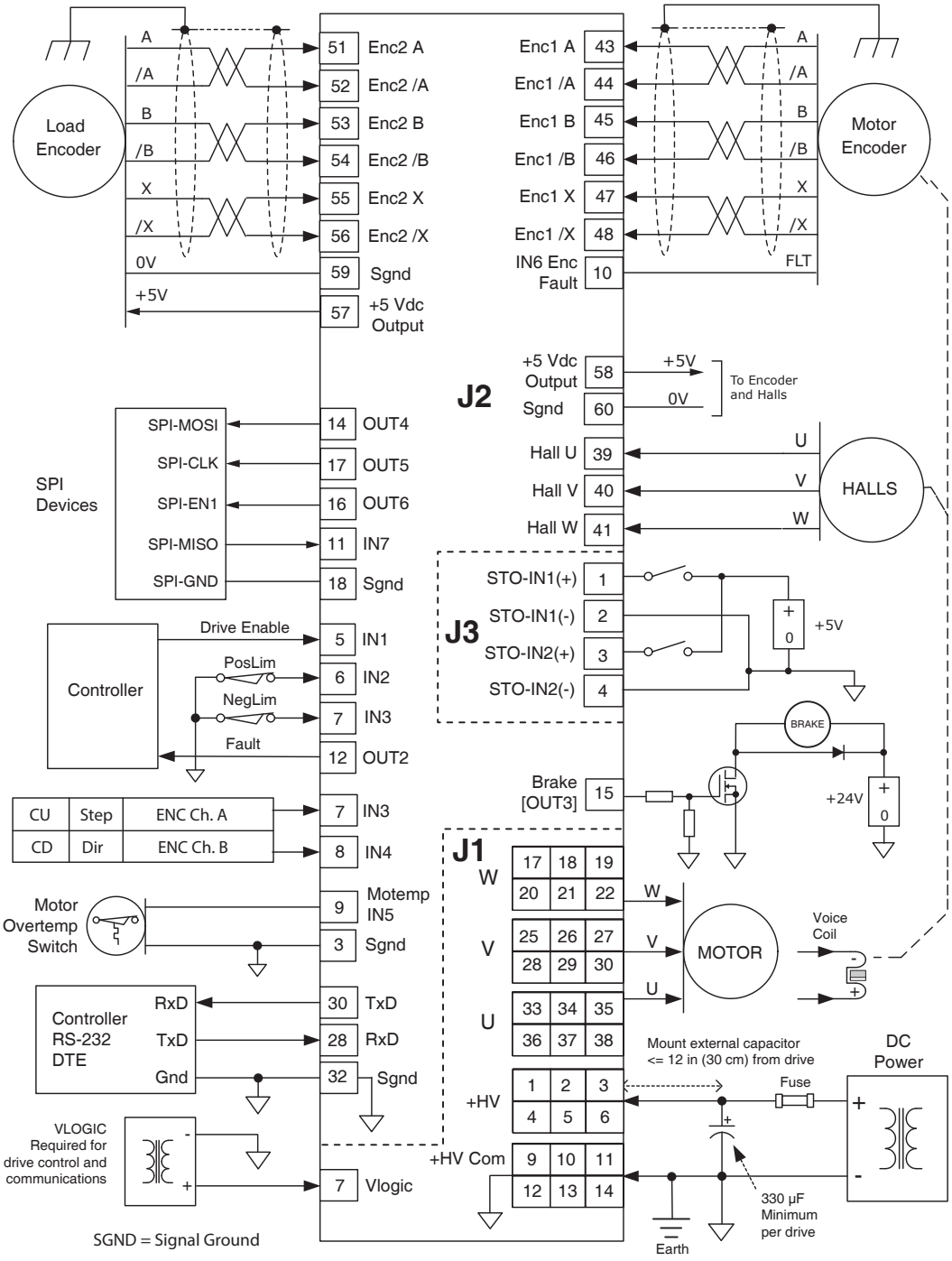
Powers the internal logic and control circuits in the drive.
When using the STO feature, it must be produced by power supplies with transformer isolation from the mains and PELV or SELV ratings and a maximum output voltage of 60 Vdc. If the motor can operate from voltages of 60 Vdc or less, the +HV and Vlogic can be driven from a single power supply.



Signal	J1 Pins
Vlogic	7
HVcom	9,10,11, 12,13,14

TYPICAL CONNECTIONS

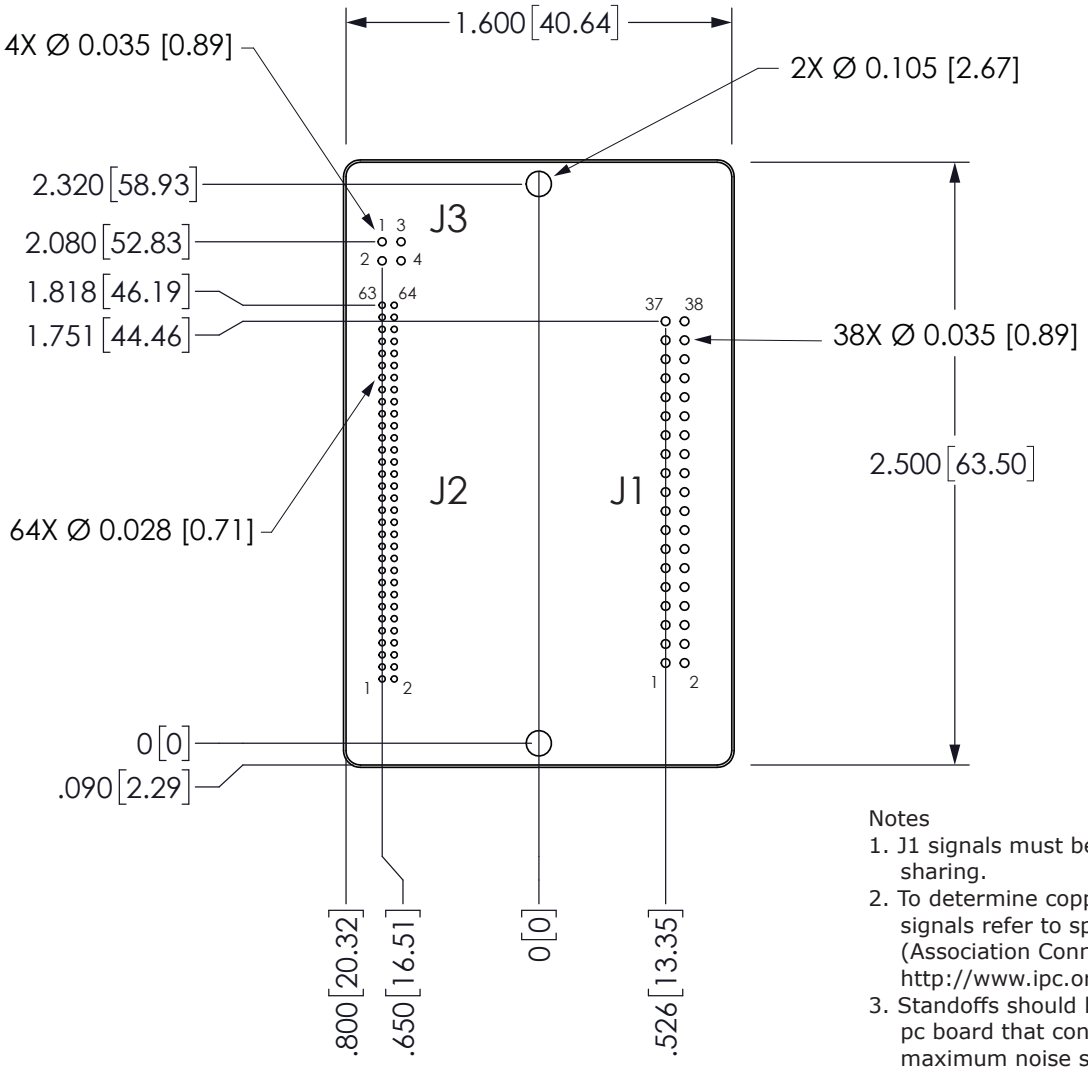
This graphic shows the functional connections between R43 connectors and various devices. User mounting board connections are not shown.



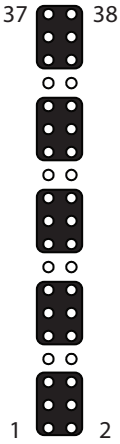
Notes
1. [IN1] is shown as Drive Enable and [IN2] and [IN7] are shown with some typical functions. [IN3] and [IN4] are shown as digital command inputs. [IN3] is shown twice. If SLI function is used, it will not be available for other functions. All inputs are programmable.
2. [OUT2] is shown as a Fault signal to the controller and [OUT3] is shown as control for a motor brake. All outputs are programmable.
3. Encoder connections are shown for incremental types, but absolute encoders are supported on both primary and load encoder inputs.

PC BOARD MOUNTING & DRILLING DIMENSIONS

Top view looking down on mounting PC board.



J1 Signal Grouping for current-sharing



Notes
1. J1 signals must be connected for current-sharing.
2. To determine copper width and thickness for J1 signals refer to specification IPC-2221. (Association Connecting Electronic Industries, http://www.ipc.org)
3. Standoffs should be connected to etches on pc board that connect to frame ground for maximum noise suppression and immunity. They also provide the PE (Protective Earth) connection between the heatplate and ground.

Dimensions are in inches [mm].

For Sockets on User PC Board:

Qty	Description	Mfgr	Part Number	Ref Des	Remarks
1	Socket Strip	Samtec	SQT-119-01-G-D	J1	0.0787 in (2.00 mm) pitch
1	Socket Strip	Samtec	SFMC-132-01-L-D	J2	0.050 in (1.27 mm) pitch
1	Socket Strip	Samtec	SQT-102-01-G-D	J3	0.0787 in (2.00 mm) pitch
2	Standoff	hex, 20.5 mm long, M2,5 mm thread			

For Soldering to User PC Board:

Qty	Description	Mfgr	Part Number	Ref Des	Remarks
1	For J1, refer to this document: http://suddendocs.samtec.com/processing/through-hole-printing.pdf				
1	Socket Strip	Samtec	CLP-132-02-L-D-BE-A-K-TR	J2	0.050 in (1.27 mm) pitch
1	Socket Strip	Samtec	CLT-102-2-G-D-BE	J3	0.0787 in (2.00 mm) pitch
2	Standoff	hex, 15 mm long, M 2.5 mm thread			

PC BOARD SIGNALS

J3 SAFETY

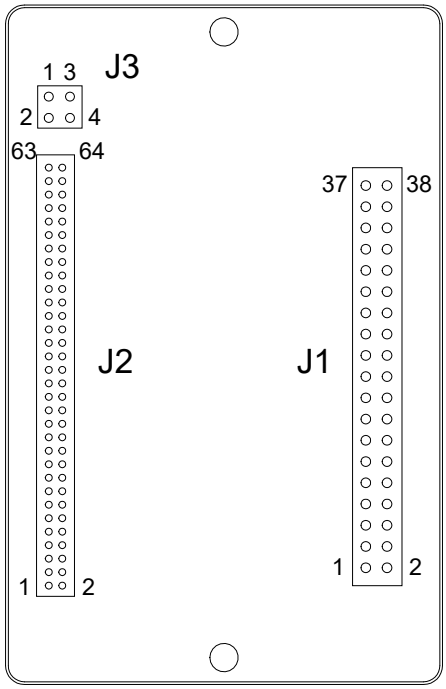
SIGNAL	PIN	PIN	SIGNAL
STO-IN1(+)	1	3	STO-IN2(+)
STO-IN1(-)	2	4	STO-IN2(-)

J2 FEEDBACK

Signal	P3 Pin		Signal
Reserved	63	64	Reserved
Reserved	61	62	Reserved
Sgnd	59	60	Sgnd
Enc +5V	57	58	Enc +5V
Enc2 X	55	56	Enc2 /X
Enc2 B	53	54	Enc2 /B
Enc2 A	51	52	Enc2 /A
Sgnd	49	50	Sgnd
Enc1 X	47	48	Enc1 /X
Enc1 B	45	46	Enc1 /B
Enc1 A	43	44	Enc1 /A
Hall W	41	42	Sgnd
Hall U	39	40	Hall V
Cos(-)	37	38	Cos(+)
Sin(-)	35	36	Sin(+)
Sgnd	33	34	Sgnd
Sgnd	31	32	Sgnd
CAN-H	29	30	Serial TxD
CAN-L	27	28	Serial RxD
CAN-Gnd	25	26	CAN-Gnd
Sgnd	23	24	Sgnd
Sgnd	21	22	Sgnd
Sgnd	19	20	Sgnd
SLI-CLK OUT5	17	18	Sgnd
Brake OUT3	15	16	OUT6 SLI-EN1
OUT1	13	14	OUT4 SLI-MOSI
SLI-MISO IN7	11	12	OUT2
IN5	9	10	IN6
IN3	7	8	IN4
Enable IN1	5	6	IN2
Sgnd	3	4	Sgnd
Refin(-)	1	2	Refin(+)

TOP VIEW

Viewed from above looking down on the connectors or PC board footprint to which the module is mounted



J1: HV & Motor
Dual row, 2 mm centers
38 position female header
SAMTEC SQT-119-01-G-D

J2: Feedback
Dual row, 0.050 inch centers
64 position female header
SAMTEC FLE-132-01-G-DV-K-TR

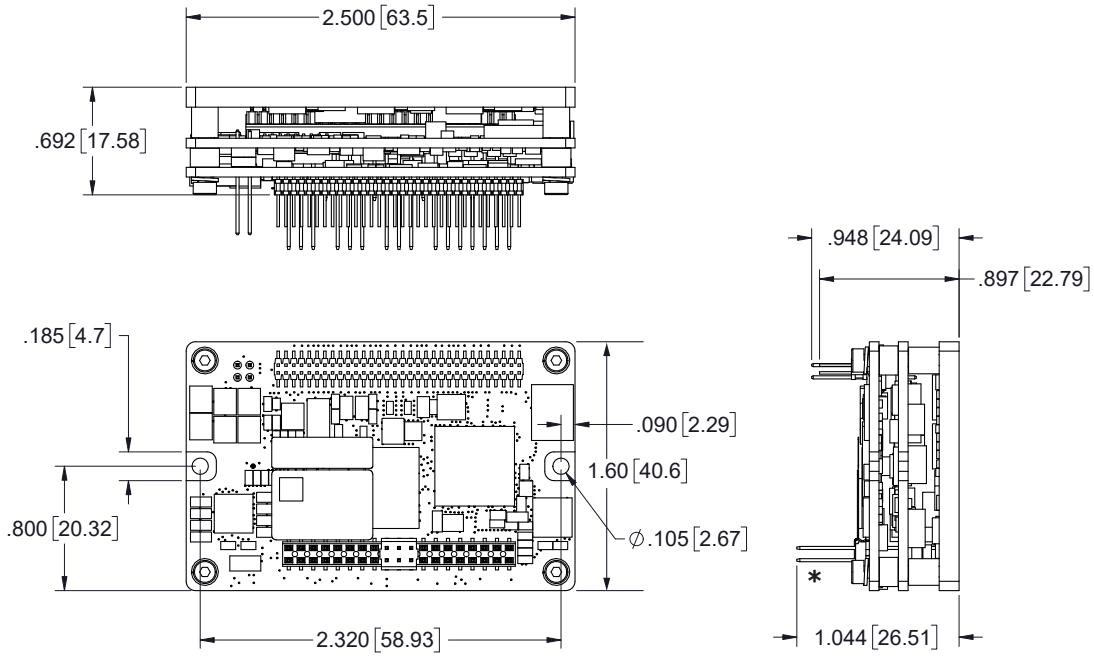
J3: Safety
Dual row, 2 mm centers
4 position female header
SAMTEC TLE-102-01-G-DV-TR

J1 POWER & MOTOR

Signal	J1 Pin		Signal
MOT U	37	38	MOT U
	35	36	
	33	34	
	31	32	
MOT V	29	30	MOT V
	27	28	
	25	26	
	23	24	
MOT W	21	22	MOT W
	19	20	
	17	18	
	15	16	
HVCOM	13	14	HVCOM
	11	12	
	9	10	
	7	8	VLOGIC
+HV	5	6	+HV
	3	4	
	1	2	

DIMENSIONS

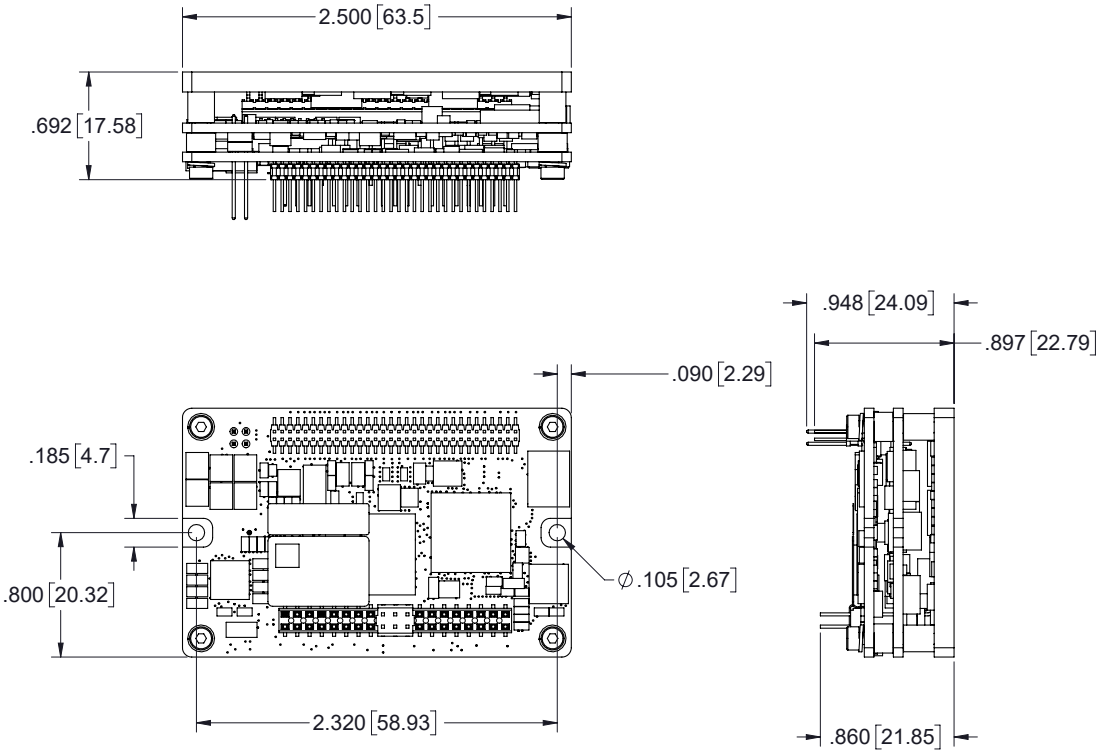
R43-090-50, R43-090-50-C



Dimensions are in inches [mm].

* These pins are longer for soldering to the user PC board.

R43-090-14, R43-090-30, R43-180-10, R43-180-20



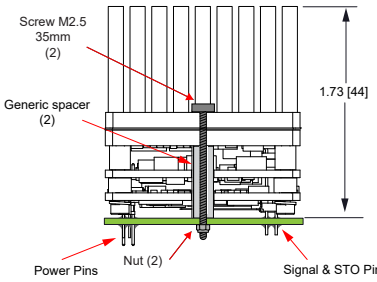
MOUNTING: SOLDERED INTO USER PC BOARD

R43-090-50, R43-090-50-C

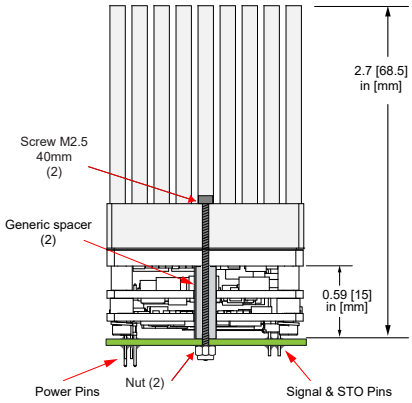
Kits are not available for this configuration. Here are the parts required:

Standoffs:	15 mm, diameter 4.5 mm, hollow, aluminum, RAF M0514-25, qty 2
Thermal pad:	Copley CC 6-83985-01, qty 1
Pins Heatsink:	Copley CC 21-126260-01, qty 1
Screws:	M2.5, Length dependent on assembly, qty 2
Nuts:	M2.5, Dependent on assembly, qty 2

Pins Heatsink



Tall Pins Heatsink

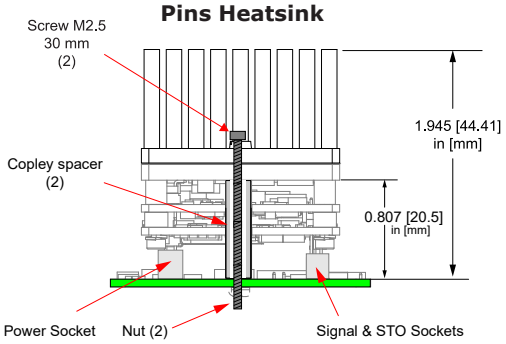


MOUNTING: SOCKETED INTO USER PC BOARD

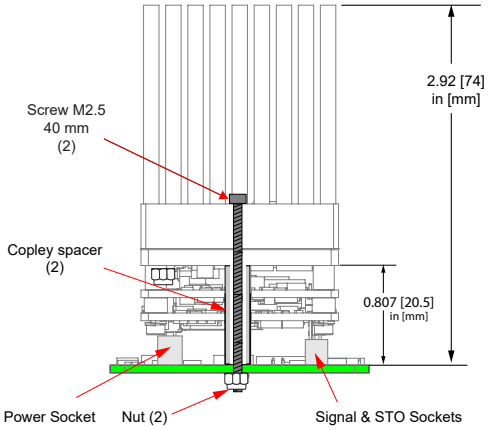
R43-090-14, R43-090-30, R43-180-10, R43-180-20

All connections shown socketed. With the pins heatsink the 30 mm screws are used. With the long pins heatsink the 40 mm screws are used.

Pins Heatsink



Tall Pins Heatsink



PINS HEATSINK KIT: R43-HK

Part	Part Number	Qty
Screw	M2.5-0.45 x 35 mm slotted cheese head	2
Nut	M2.5-0.45 DIN nylon lock nut	2
Thermal material	Copley	1
Spacer	Copley non-threaded spacer 20.5 mm,	2
Heatsink	Pins Heatsink, 1 inch tall	1

TALL PINS HEATSINK KIT: R43-TPK

Part	Part Number	Qty
Screw	M2.5-0.45 x 40 mm slotted cheese head	2
Nut	M2.5-0.45 DIN nylon lock nut	2
Thermal material	Copley	1
Spacer	Copley non-threaded spacer 20.5 mm,	2
Heatsink	Tall Pins Heatsink, 2 inch tall	1

CONNECTORS FOR SOCKETING

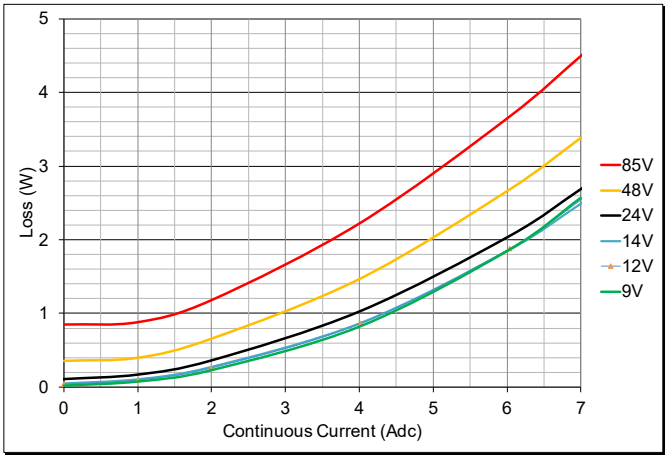
Part	Mfgr	Part Number	Qty
Signal Socket	Samtec	FLE-132-01-G-DV-K-TR	1
Power Socket	Samtec	SQT-119-01-G-D	1
STO Socket	Samtec	TLE-102-01-G-DV-TR	1

For the half-soldered configuration the dimensions, spacers, screws, and nuts are the same.

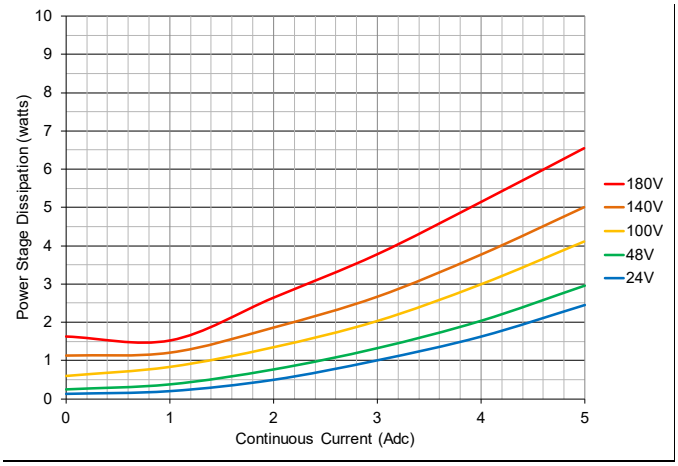
THERMALS: PWM OUTPUT DISSIPATIONS

These charts show power dissipation in the drive when the PWM outputs are driving a motor. The following page shows the dissipation in the Vlogic circuits that power the drives control circuits and external encoders. Adding the PWM dissipation to the Vlogic dissipation will yield the total dissipation in Watts for the drive. The dotted lines in the R43-090-30 chart show a dissipation of 9.5 W. at a continuous current of 13 Adc and +HV = 85 Vdc.

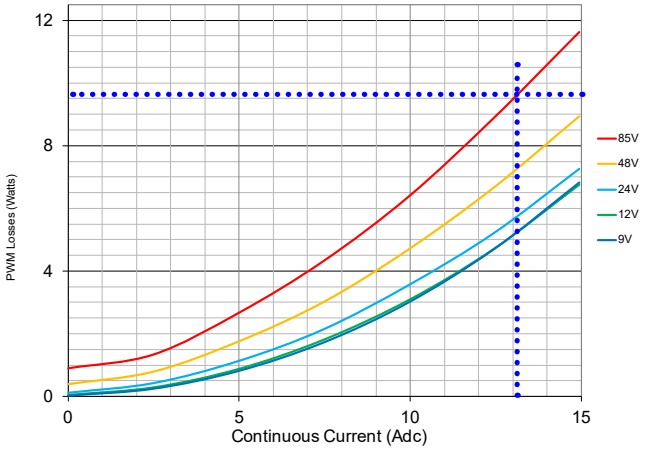
R43-090-14



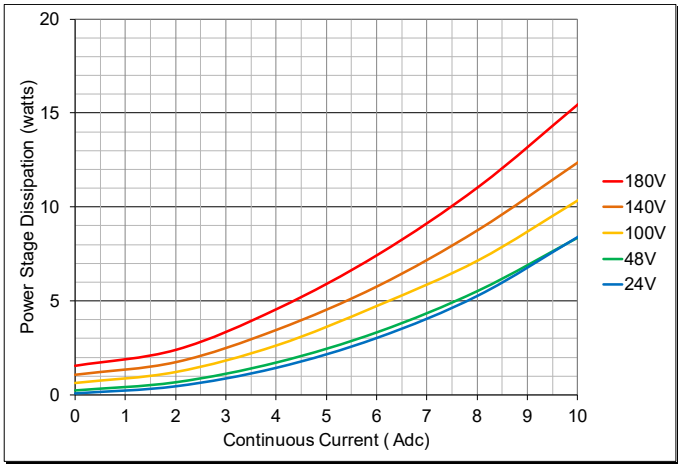
R43-180-10



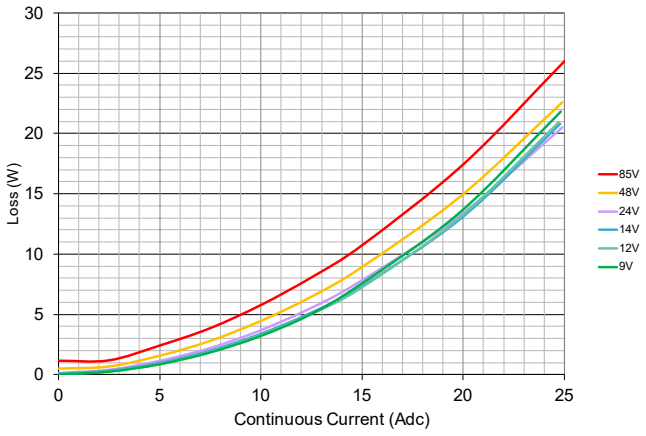
R43-090-30



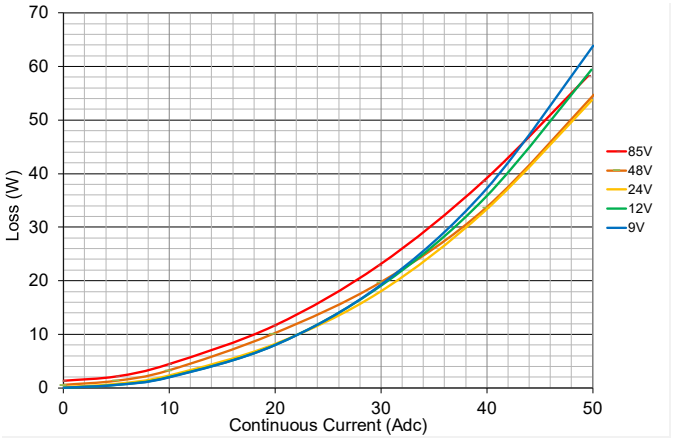
R43-180-20



R43-090-50

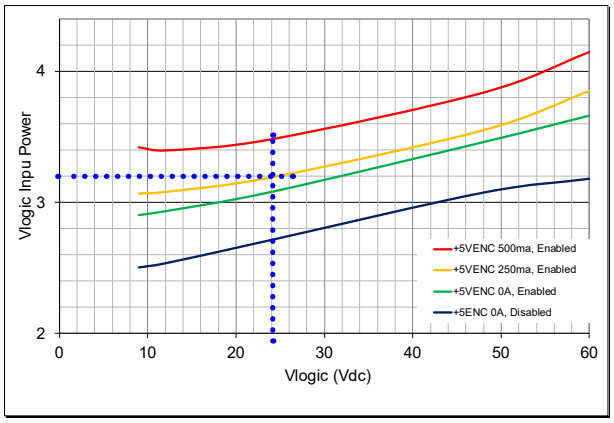


R43-090-50-C



THERMALS: VLOGIC & ENCODER +5V OUTPUT DISSIPATION

R43 All Models



These charts show power dissipation in the Vlogic circuits that power the drives control circuits and external encoders. Adding the PWM dissipation to the Vlogic dissipation will yield the total dissipation in Watts for the drive.

The dotted lines in the chart show a dissipation of 3.2 W. at Vlogic = 24 Vdc when the drive is in an Enabled state and outputting 250 mA for an encoder.

THERMAL RESISTANCE

Thermal resistance Rth is a measure of the way the drive resists the flow of heat produced internally to the environment. The lower the resistance the more freely the heat can be dissipated. Thermal resistance Rth is in units of degrees-Centigrade per Watt (C/W). Lowering Rth can be done with heatsinks that increase the area that is exposed to the environment and by moving air over the surfaces with fans. The flow of fan forced air is measured in Linear-Feet-per-Minute (LFM).

No Heatsink

LFM	0	100	200	300
Rth	8.5	6.5	5.5	4.0

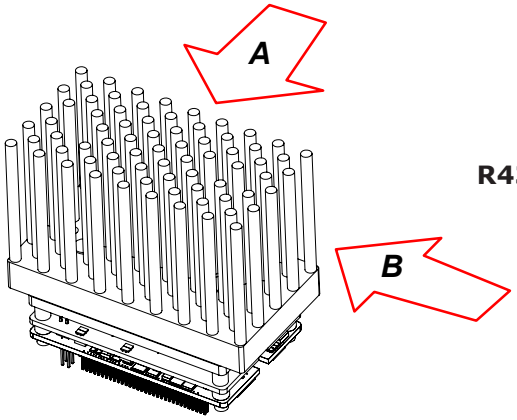
R43

Pins Heatsink A-Airflow

LFM	0	100	200	300
Rth	-	2.9	1.8	1.4

Pins Heatsink B-Airflow

LFM	0	100	200	300
Rth	-	4.2	2.6	1.9



R43 + R43-HK

Tall Pins Heatsink A-Airflow

LFM	0	100	200	300
Rth	-	1.3	0.9	0.7

Tall Pins Heatsink B-Airflow

LFM	0	100	200	300
Rth	-	2.2	1.4	1.1

Note: The Tall Pins Heatsink is not shown here.

THERMAL CALCULATIONS

THERMAL CALCULATIONS EXAMPLE: R43-090-30, +HV = 85 V, IOUT = 13 A, AMBIENT TEMP 32 °C

FIND THE COOLING MEANS REQUIRED WHEN DISSIPATION AND AMBIENT TEMP ARE KNOWN

Given: Tamb = 32 ºC (89.6 ºF), +HV dissipation = 9.5 W., Vlogic dissipation = 3.2 W
Tmax = 90 ºC (drive shut-down temperature)

Find: Thermal resistance Rth:
Delta-T = Tmax - Tamb = 90 - 32 = 58 ºC
Total dissipation = 9.5 + 3.2 = 12.7 W
Rth = Delta-T / dissipation = ºC / Watt = 58 / 12.7 = 4.57 ºC/W

From the tables above, there are three configuations that provide Rth less than 4.57 ºC/W:
No heat sink, forced air at 300 LFM
With short pins heat sink, forced air at A or B direction, 100 LFM or greater
With long pins heat sink, convection with forced air not required

FIND THE MAX AMBIENT TEMP WHEN DRIVE CONFIGURATION IS KNOWN

Given: R43-090-30 with pins heatsink, forced-air at 200 LFM, A direction, dissipation is 12.7 W
Rth = 1.8 ºC/W
Tmax = 90 ºC (drive shut-down temperature)

Find: Max ambient operating temperature
Delta-T = 12.7 W x 1.8 ºC/W = 22.9 ºC
Max Tamb = Tmax - Delta-T = 90 - 22.9 = 67.1 ºC
Max ambient operating temperature is 45 °C so it can operate up to this temperature

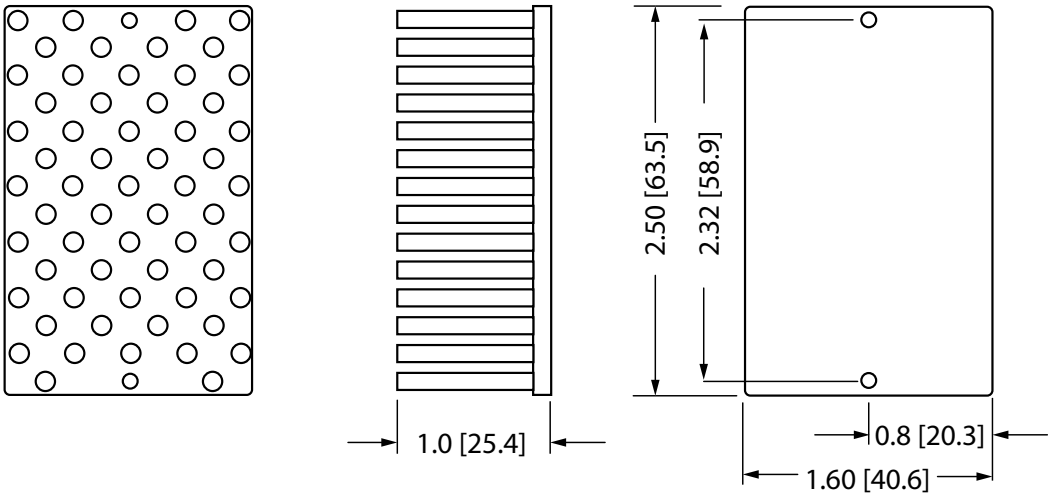
BEST PRACTICES FOR THERMAL MANAGEMENT

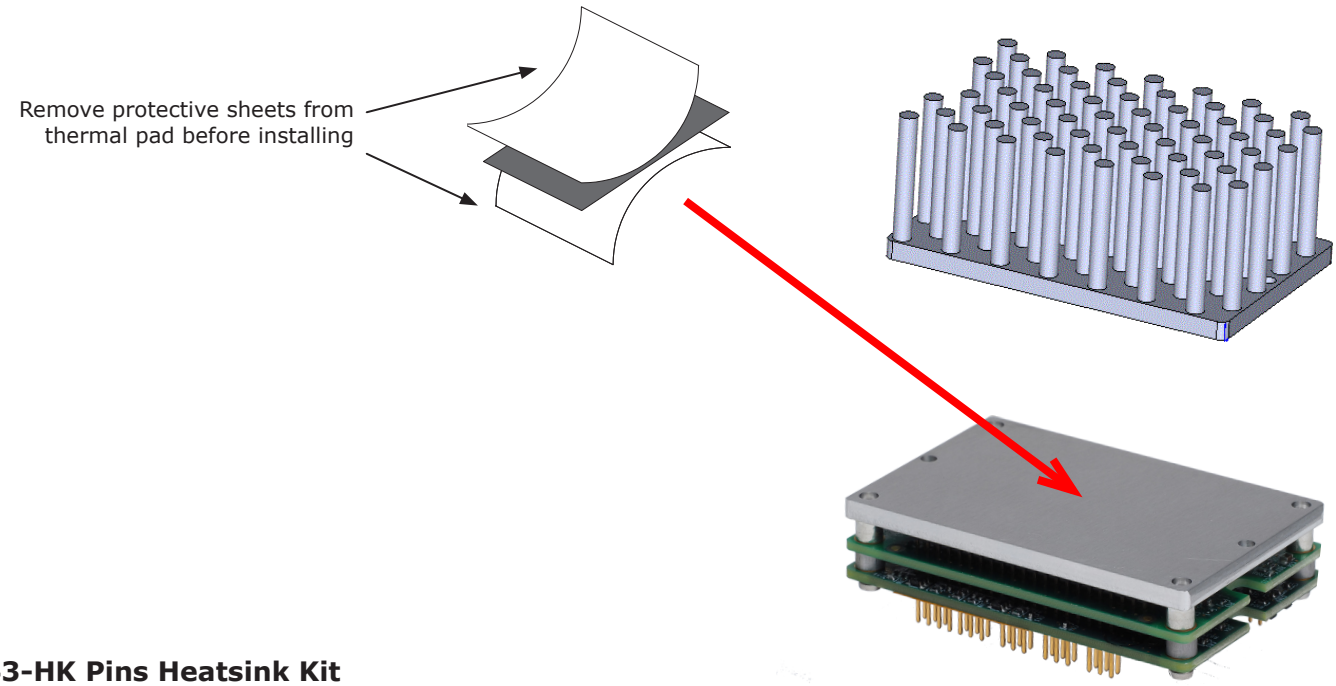
- All of the variables in an installation are usually not known.
- Calculations like those above are done with values that may be estimates, not exact values.
- Movement of air is very important. Even when enclosures have no openings, internal fans circulate the air to move heat from drives to the enclosure walls and to prevent hot-spotting.
- A heat sink cuts the R43 thermal resistance significantly with forced air.
  Overheating can shut down drive but over-cooling is not possible.
  Measurement of the drive temperature with CME is easy and is the best indicator of the need for a heatsink. It shows the combined effect of all the variables:
  Thermal dissipation, ambient temperature, cooling means, the environment, etc.

ORDERING CONFIGURATIONS

R43-HK HEATSINK KIT

The R43-HK kit contains a heatsink, thermal material, and hardware to mount it to the drive and PC board.





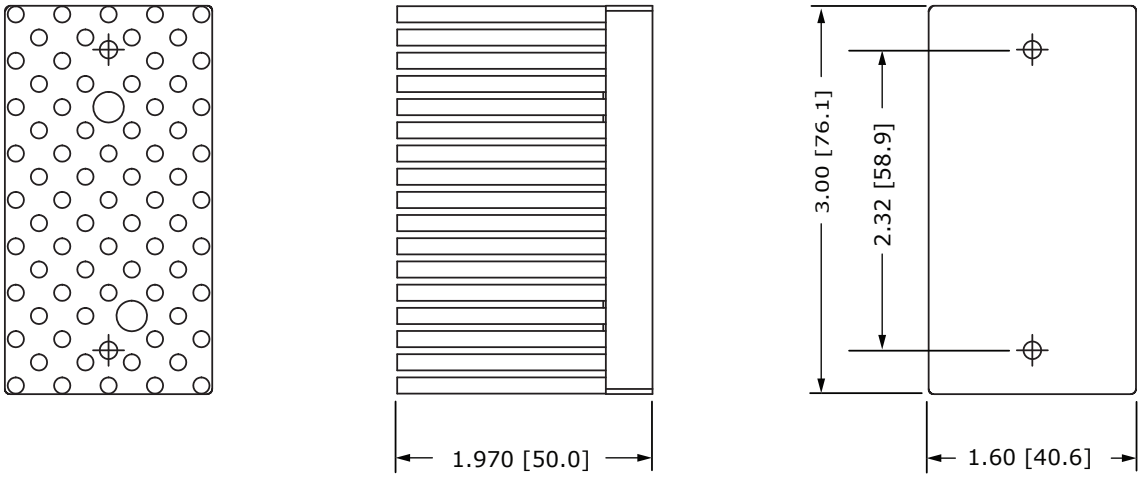
R43-HK Pins Heatsink Kit

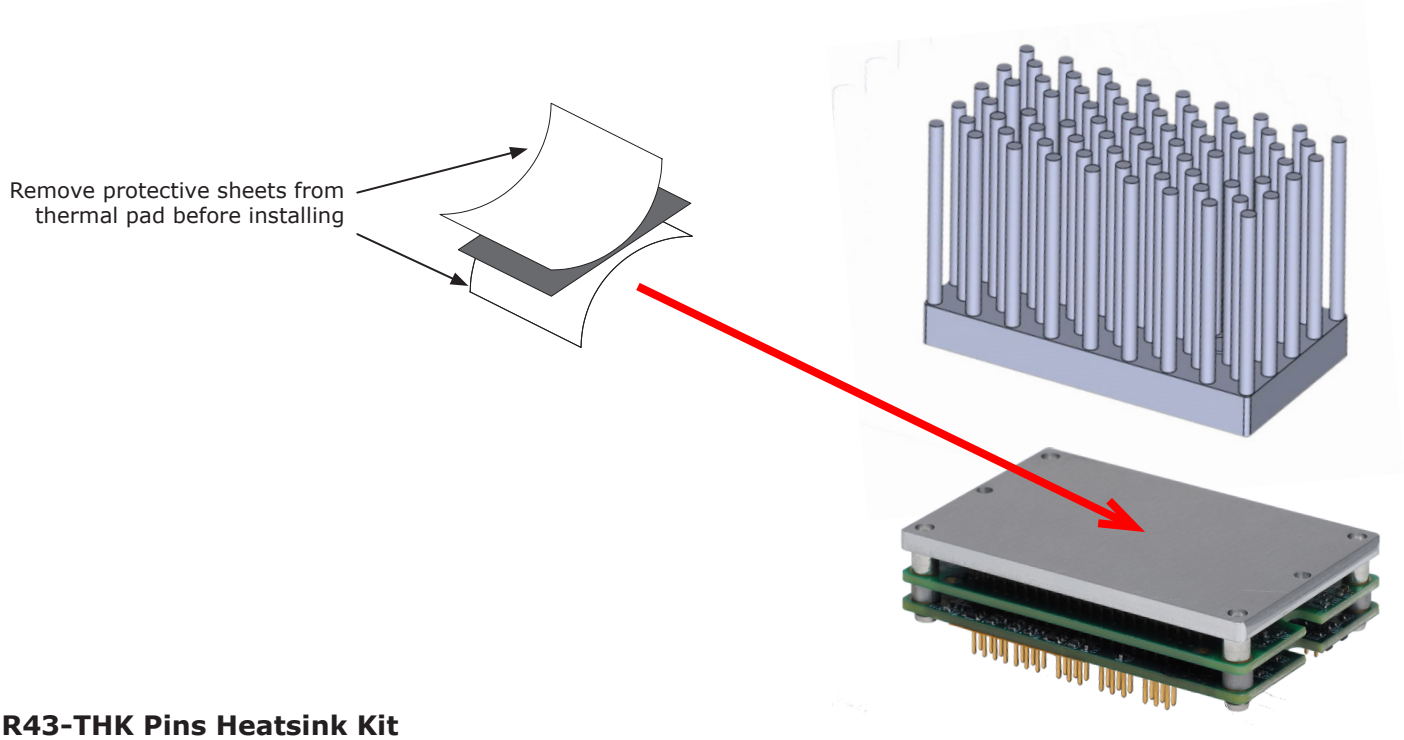
Qty	Description
1	Pins Heatsink, 1 inch tall
1	Thermal material
2	Copley non-threaded spacer, 20.5 mm
2	Screw, M2.5-0.45 x 30 mm slotted drive cheese head
2	Nut, M2.5x0.45 DIN Zinc Plated Nylon Insert Lock

ORDERING CONFIGURATIONS

R43-THK HEATSINK KIT

The R43-THK kit contains a heatsink, thermal material, and hardware to mount it to the drive and PC board.





R43-THK Pins Heatsink Kit

Qty	Description
1	Tall Pins Heatsink, 1.97 inch tall
1	Thermal material
2	Copley non-threaded spacer, 20.5 mm
2	Screw, M2.5-0.45 x 40 mm slotted drive cheese head
2	Nut, M2.5x0.45 DIN Zinc Plated Nylon Insert Lock

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ORDERING GUIDE

MICRO MODULES

R43-090-14	Accelnet Plus Micro Module R43 servo drive, 7/14 A, 90 Vdc
R43-090-30	Accelnet Plus Micro Module R43 servo drive, 15/30 A, 90 Vdc
R43-090-50	Accelnet Plus Micro Module R43 servo drive, 25/50 A, 90 Vdc
R43-090-50-C	Accelnet Plus Micro Module R43 servo drive 50/50 A, 90 Vdc
R43-180-10	Accelnet Plus Micro Module R43 servo drive, 5/10 A, 180 Vdc
R43-180-20	Accelnet Plus Micro Module R43 servo drive, 10/20 A, 180 Vdc

ACCESSORIES FOR MICRO MODULES

R43-HK	Heatsink kit (Pins heatsink, thermal pad, and hardware)
R43-THK	Heatsink kit (Tall Pins heatsink, thermal pad, and hardware)

16-127023 Document Revision History

Revision	Date	Remarks
00	May 6, 2020	First release