The patented eFoundation (eF-785) is a single, rack-mountable unit that provides power control, power distribution, and safety interlock management for automated machinery.

Every automated machine needs to have a way to control its various hazardous and non-hazardous power supplies, and to distribute this power to devices in the machine. Most automated machines also must meet regulatory requirements for electromagnetic compatibility, electrical safety and machinery safety. These requirements dictate very specific control and filtering of machine power, as well as the control of the interlocks that protect machine users. The design and development effort required to do all this power control, distribution and safety interlock management is quite considerable, yet no competitive advantage is gained by doing it well. There is, however, a big penalty to pay for doing it poorly. In most applications, the eFoundation eliminates 80 to 90 percent of this design effort and risk, comes fully assembled and tested, and only costs a little more than the uninstalled pile of components it replaces. The eFoundation is the electrical foundation of your machine. Here are some more of its benefits:

POWER MANAGEMENT

- The eFoundation provides an organized way to distribute redundant, overcurrent-protected power to most devices in a machine—AC-powered devices such as large servo drives; 24 volt DC-powered devices such as sensors and solenoids; ControlPoint nodes; and DC-powered servo and stepper motor drives. Power requirements up to 4kVA can be accommodated with one eF-785.

- All power supplies derive their AC power from the eFoundation and route their DC outputs back to the eFoundation. These outputs are fully controlled and overcurrent protected; and can then be easily distributed throughout the machine. Built-in diagnostics along with audio/visual annunciators indicate system problems, making troubleshooting power-related issues easy.

SAFETY EVENTS

- Upon an E-stop, all ControlPoint motion axes can automatically be brought to a controlled stop prior to the required removal of power and release of safety interlocks. This preemptive stop prevents axes from crashing and damaging the machine due to the inopportune removal of power. This automatic function requires no software or software development.

- All necessary E-stop and safety interlock switches, including solenoid door locks, are connected through the eFoundation to seamlessly handle the connection and disconnection of power to hazardous devices within the machine (such as motor drives). This power control is accomplished using patented, redundant electro-mechanical control hardware with continuous fault monitoring. So, you don't have to worry about the regulatory requirements for hardware-only power control, fault-tolerance, redundancy and monitoring. Thus, with no design effort, you can greatly minimize the risk of failing regulatory compliance testing—failures that always occur late in the development cycle, when they are most expensive to fix.

SERVO-SPECIFIC FEATURES

- Regeneration loads are built-in for use by AC-powered servo drives. These necessary loads are normally a shock and thermal hazard. However, the eFoundation eliminates the effort required to guard these loads. Moreover, they are also fan cooled and protected against overloads.

- The eFoundation's power-disconnect function for DC-powered servo drives automatically provides dynamic braking for all associated motors. This ensures that motion stops quickly in the event of power loss.

HOST COMPUTER INTEGRATION

- Power can be removed from the machine's hazardous loads without interrupting power to the host CPU or other devices. This eliminates, in most cases, the cost of adding an uninterruptible power supply (UPS) to the machine. The eF-785 also senses the shutdown of the host and automatically initiates a controlled shutdown of the machine.

OVERALL DESIGN

- The eFoundation's unique design means that all of its components—contactors, breakers, fuses, transformers, filters, circuit boards, regeneration loads, fan, and connectors—fit within a 3.5 inch high, 19-inch rack-mountable enclosure. This is a savings of many cubic feet over most equivalent implementations. The integration of all these components also means that the number of parts that must be ordered and stocked is greatly reduced.

- The eFoundation's patented technology has allowed Teknic to create a product that costs only a few hundred dollars more than the raw, unassembled components it replaces. The eFoundation generally costs around $2,000 (and includes an integral ControlPoint NC-540 and 40 volt power supply for all ControlPoint systems). When the significantly lower manufacturing costs are factored in, the eFoundation saves a substantial amount of money in every machine.

COMPLIANCE IN A BOX™

The eF-785 is a power and safety management hub for use in OEM automated machinery. The "eF" designation stands for "electrical foundation", as the eF-785 consolidates nearly all of the required power management and distribution functions in an automated machine into one easy-to-integrate box.

WHAT IS THE MACHINERY DIRECTIVE? *(and why is it important outside of the EU?)*

All machinery with mechanical hazards that is to be sold to the European Union must meet the requirements of the CE Machinery Directive (Directive 98/37/EC). The CE Machinery Directive is similar to (and in most cases a superset of) the American National Standards Institute (ANSI) machine-specific standards for safety, (e.g. ANSI B11.19-1990 "Machine Tools, Safeguard-ing"). In the U.S., the Occupational Safety & Health Administration (OSHA) states: "OSHA encourages employers to abide by the more current industry consensus standards [such as the CE Machinery Directive] since those standards are more likely to be abreast of the state of the art than an applicable OSHA standard may be."

EN1050 RISK ASSESSMENT

For each risk in your machine you must perform a risk assessment according to the EN 1050 standard. You need to purchase a copy of the EN 1050 standard and follow it to do this. The result of this risk assessment will then define what level of safety control system is required as per EN-954-1 (levels B, 1, 2, 3 or 4) for each hazard. The ef-785 is applicable for levels B, 1, 2 and 3.

SPECIFICATIONS

ELECTRICAL		
	AC Power:	Single Phase w/ overload protection
	Front Panel Circuit Breaker:	20 Amps
	Selection:	115 / 230 Selector switch
	115 range:	100 - 126 Vrms, 50-60 Hz
	230 range:	198 - 240 Vrms, 50-60 Hz
	EMI Filtering:	Consistent with meeting EN61326

DIMENSIONS		
	Height, in (cm):	3.48 (8.8)
	Width, in (cm):	16.88 (42.9)
	Depth, in (cm):	18.19 (46.2)
	Weight, lbs (kg):	28.0 (12.7)

PART NUMBER

$$\text{EF-785-}[1][1][2][3]\text{-}[4][5][6]\text{-}[7]$$

Example: EF-785-AAQC-FFE-2-0-1

[1] POWER CONTROL OPTIONS:	DN:	DC powered servo or stepper drives/motors in Main Area only
	DD:	DC powered servo or stepper drives/motors in Main and Load areas
	AN:	AC and DC powered servo or stepper drives/motors in Main Area
	AD:	AC and DC powered servo or stepper drives/motors in Main Area, with DC powered servo or stepper drives/motors in Load area
	AA:	AC and DC powered servo or stepper drives/motors in Main and Load areas

[2] EMI FILTERING OPTIONS:	D:	Dual EMI filter; use with DC-only configurations
	Q:	Quad EMI filter, use with AC configurations

[3] CONTROLPOINT NETWORK HUB OPTIONS:	C:	CP network hub and 40VDC supply
	X:	Power and safety functions only

[4] POWER-OFF DELAY OPTIONS: (MAIN AREA)	N:	None. Power is turned off with no delay
	F:	Fast. Power is turned off 150 ms after E-Stop
	S:	Slow. Power is turned off 450 ms after E-Stop

[5] POWER-OFF DELAY OPTIONS: (LOAD AREA)	N:	None. Power is turned off with no delay
	F:	Fast. Power is turned off 150 ms after E-Stop
	S:	Slow. Power is turned off 450 ms after E-Stop
	X:	Not applicable (no load area)

[6] SUPPLEMENTARY OPTIONS:	B:	Host software shutdown disabled; E-Stop reset disabled
	C:	Host software shutdown enabled; E-Stop reset disabled
	D:	Host software shutdown disabled; E-Stop reset enabled
	E:	Host software shutdown enabled; E-Stop reset enabled

[7] FIRMWARE REVISION:	The unit's firmware revision. Typically appears in the form X-X-X. An example firmware revision might be "2-2-1" or "3-12-2" (without quotation marks). Talk to your Teknic OEM Applications Engineer to find out which firmware revision is recommended for your application.

Control PC

AC power
(to Host PC)

AC power
(to Host PC monitor)

AC Power
to other (hazardous) devices

24VDC
Power Supply
(2 max)

AC

DC

75VDC
Power Supply
(2 max)

AC

DC

Main Area
(2 circuits)

Load Area
(2 circuits)

DC Motor Drives (4 circuits total)

24VDC Devices (6 circuits total)

AC Power Source

JA Host Power

JB Host Power

SA

115V

J2

Hazardous
AC Out

J5

24VDC
Supply

P6

DC Servo
Supply

P7A **P7B**

Main DC Motor Pwr.
90VDC Max.

J8A **J8B**

Load DC Motor Pwr.
90VDC Max.

P9 A,B
24VDC
Ckt. 1

P10 A,B
24VDC
Ckt. 2

P11 A,B
24VDC
Ckt. 3

100-125/200-240
VAC ~ 20A, 50-60Hz

P2

P3

Main AC
Motor Power

J4

Load AC
Motor Power

F1, F2 Host Pwr. 8A Max

P12

Safety Harness

P13

Safety Control Ext.

P14

O/I

P18
40V

+ −

Net Out
⊕ RED

Net In
⊗ BLK

P15

USB

P16

J17

IEEE-1284 Host Port

AC Motor Drives

Main Area

Load Area

Interlocks or guardlocks

Interlocks or guardlocks

E-Stop

Power/Enable

Control PC