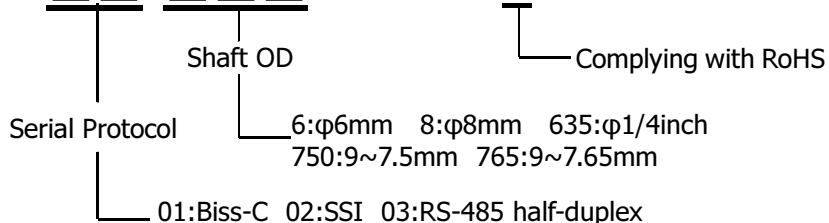


Battery Backup Multi-turn Absolute Encoder**NEMICON****Hollow shaft type Model : 37HA-MB****■ Features**

- 39-bits resolution: 16-bits battery backup multi-turn & 23-bits optical single-turn
- Built-in communication protocol (option): BiSS C mode, SSI mode & RS-485 half-duplex
- Overall encoder outer diameter $\varnothing 37$ mm and typical mounting height 28 mm
- Supporting standard hollow taper shaft, short hollow taper shaft and $\frac{1}{4}$ inch, 6mm and 8mm diameter of the hollow blind shaft options.

**■ Model****37HA-MB□□-□□□-000-00E****■ Specification**

1. Basic specification

| General | | |
|---------------------------------------|--|--------------------------------|
| Outside diameter | 37mm | At housing |
| Height | 27.6mm | From Motor Mounting Surface |
| Bearing | With Bearing | |
| Shaft | Hollow shaft: $\varnothing 1/4, \varnothing 6, \varnothing 8$ | |
| | Taper shaft: $\varnothing 9-\varnothing 7.5$ mm; 1:10 $\varnothing 9-\varnothing 7.65$ mm; 1:10 | |
| Measuring Methods | Optical transparent / Absolute | |
| Electrical | | |
| Single-turn Resolution | 23bits (8,388,607 counts) | |
| Multi-turn Resolution | 16bits (65,535 counts) | |
| Main Supply Voltage | +5.0V $\pm 10\%$ | |
| Main Supply Current | Typical 115mA | Without load, Ta=+25°C |
| External Battery Voltage | Typical +3.6V Max +4.5V | |
| External Battery Current | Typical 95uA | Ta=+25°C, No shaft rotation |
| Electrically Permissible Speed | $\leq 6,000$ min ⁻¹ | |
| Electrically Permissible Acceleration | Normal mode: $\leq 8.0 \times 10^4$ rad/s ² | |
| | Battery mode: $\leq 4.0 \times 10^4$ rad/s ² | |
| Data Interface | BiSS-C, SSI, RS-485 half-duplex | |

- Note: 1. Normal mode: Encoder operates on encoder main power supply.
 2. Battery mode: Encoder operates in "OFF" State, while multi-turn data is tracked by battery circuitry.

| Mechanical | | |
|---|---|--|
| System Accuracy | Typical ± 80 Arc-sec | With electrical correction, $T_a = +25^\circ\text{C}$ |
| Mechanical Permissible Speed | $\leq 6,000\text{min}^{-1}$ | |
| Mechanical Permissible Acceleration | $\leq 8.0 \times 10^4 \text{ rad/s}^2$ | |
| Moment of inertia | $\leq 1.0 \times 10^{-6} \text{ kgm}^2$ | |
| Shaft Radial Play | $\leq \pm 0.05 \text{ mm}$ | |
| Shaft Axial Play | $\leq \pm 0.1 \text{ mm}$ | |
| Starting torque | $\leq 9.8 \times 10^{-3} \text{ N.m}$ $T_{amb} = 25^\circ\text{C}$ | |
| Environmental | | |
| Operating Temperature Range | $-20 \sim +105^\circ\text{C}$ | |
| Storage Temperature Range | $-20 \sim +105^\circ\text{C}$ | |
| Vibration | $\leq 98\text{m/s}^2$ 10 to 2000Hz | Per IEC 60068-2-6 |
| Shock | $\leq 1960\text{m/s}^2$ 6ms; Half Sine | Per IEC 60068-2-27 |
| Protection | IP40 | |
| Weight | 0.047kg ($\pm 10\%$) | |
| Relative Air Humidity (Non-Condensing) | RH 90 % | $T_a = +40^\circ\text{C}$ |
| Others | | |
| Counting Direction | Increase with Counter Clockwise (CCW) shaft rotation, view from coupling end (Figure 1) | |
| External Battery Recommendation | 3.60V/ 2,000mAh Lithium battery | |
| External Battery Alarm | Typical 3.10V $\pm 0.1\text{V}$ | |
| System Down Error | Typical 2.90V $\pm 0.25\text{V}$ | |
| Multi-turn value by Counter Clear | 0 | |
| Internal Memory | EEPROM | |
| Usable Memory Area | 5Kbit | |
| Initialization Time | 500ms | |

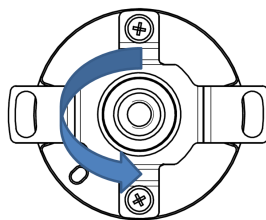


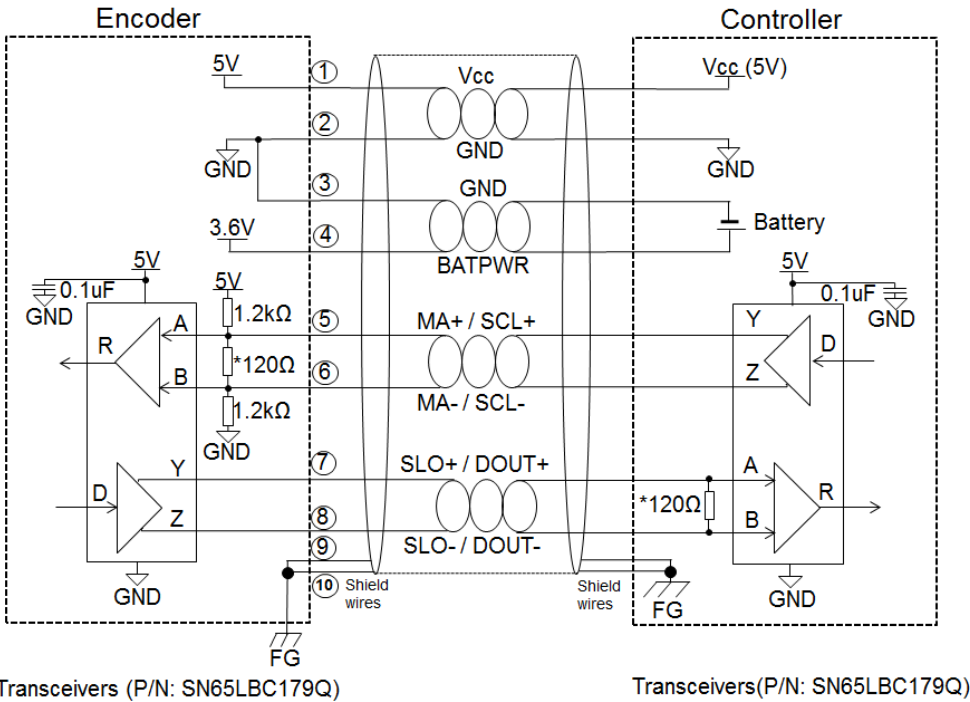
Figure 1

Note: Exposure to absolute maximum rating conditions for extended periods may affect reliability.

Interface Diagram

The following are examples of the circuit diagram of full-duplex and half-duplex transceiver.

Full-duplex transceiver (BiSS C mode / SSI mode protocol):

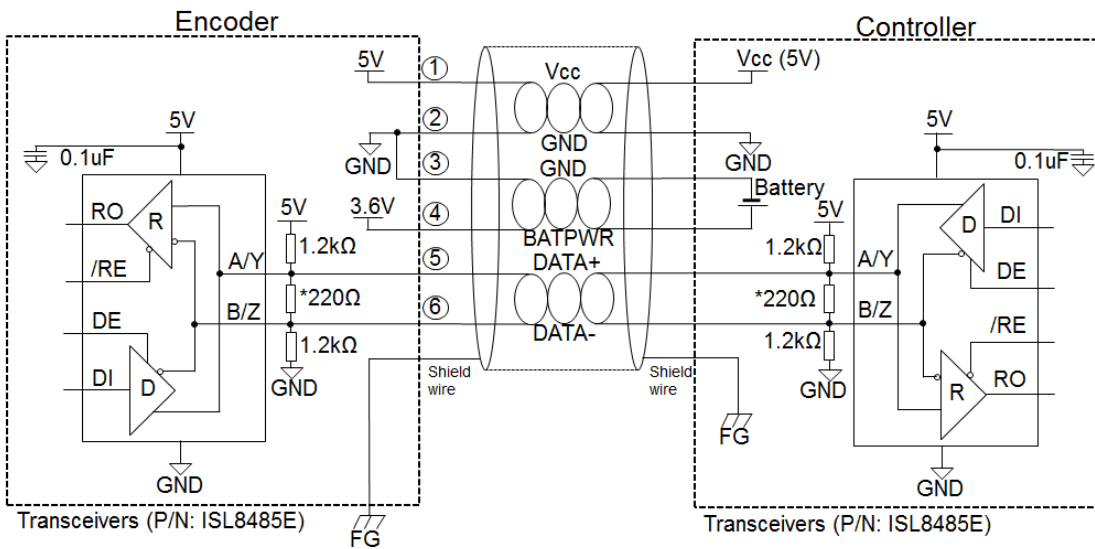


Transceivers (P/N: SN65LBC179Q)

Transceivers(P/N: SN65LBC179Q)

Figure 2: Circuit diagram of full-duplex transceiver

Half-duplex transceiver (RS-485 half-duplex protocol):



Transceivers (P/N: ISL8485E)

Transceivers (P/N: ISL8485E)

Figure 3: Circuit diagram of half-duplex transceiver

Note:

- 1) Termination resistor, *120ohm and *220ohm are recommended but may depends on the characteristic impedance of cable used.
- 2) Recommended to connect encoder chassis and cable shield to frame ground (FG) in application for enhanced noise immunity in harst operating condition.

■ Connector Output Assignment

| Pin | BiSS-C mode protocol (Output: 10 pins connector) | SSI mode protocol (Output: 10 pins connector) | RS-485 half-duplex protocol (Output: 7 pins connector) |
|-----|---|--|---|
| 1 | VCC, Encoder Supply | VCC, Encoder Supply | VCC, Encoder Supply |
| 2 | GND, Ground | GND, Ground | GND, Ground |
| 3 | GND (External Battery) | GND (External Battery) | GND (External Battery) |
| 4 | BATPWR (External Battery) | BATPWR (External Battery) | BATPWR (External Battery) |
| 5 | MA+ | SCL+ | DATA+ |
| 6 | MA- | SCL- | DATA- |
| 7 | SLO+ | DOUT+ | Cable Shield, Connect to Chassis |
| 8 | SLO- | DOUT- | N/A |
| 9 | Cable Shield, Connect to Chassis | Cable Shield, Connect to Chassis | N/A |
| 10 | Cable Shield, Connect to Chassis | Cable Shield, Connect to Chassis | N/A |

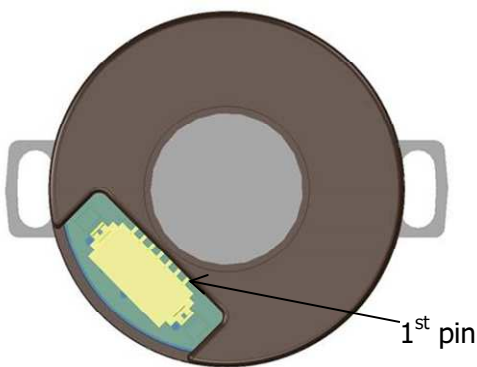


Figure 4: 7pins Connector Pin Assignment

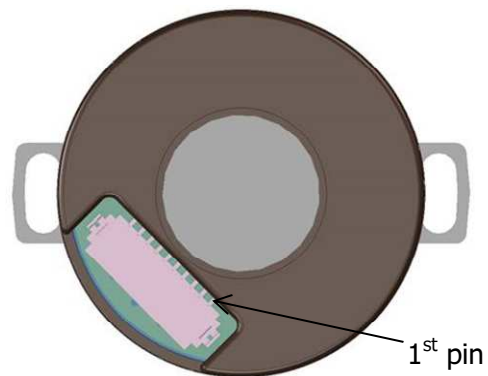


Figure 5: 10pins Connector Pin

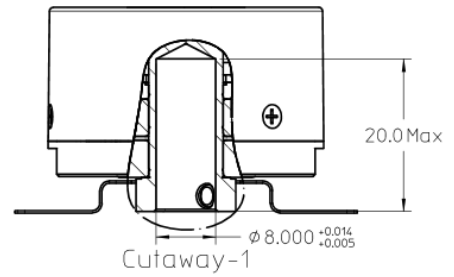
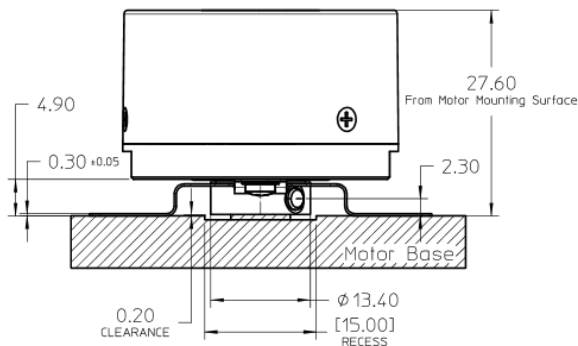
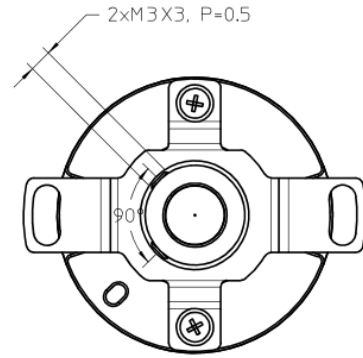
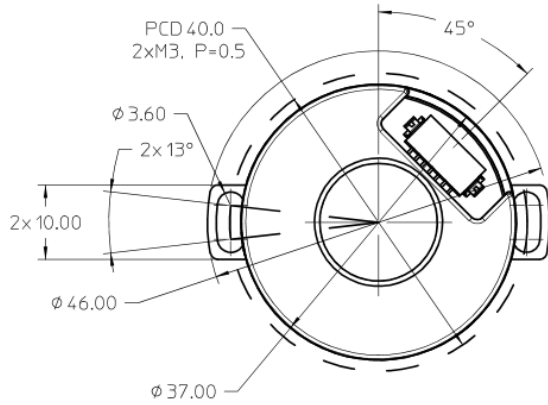
*Recommended mating connector:

Hirose Part No : DF13-7S-1.25C for 7pins connector and DF13-10S-1.25C for 10 pins connector
(CL No.536-0006-8)

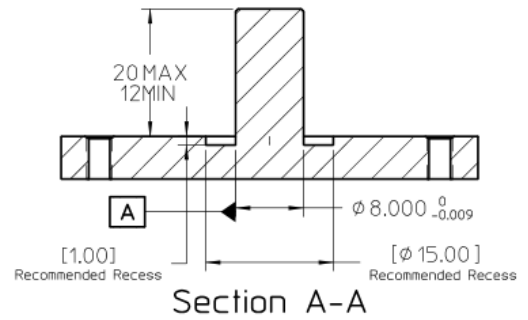
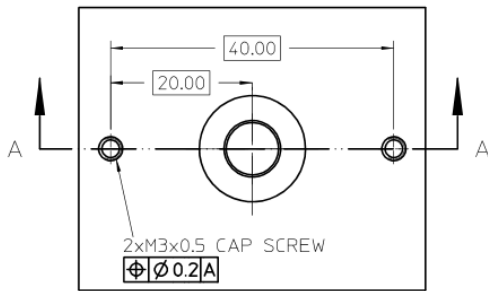
Hirose (Terminal Pin for Wire 26~30AWG): DF13-2630SCF (CL No.536-0300-5)

Mechanical Drawing

Hollow Blind Shaft Option (Φ8mm)



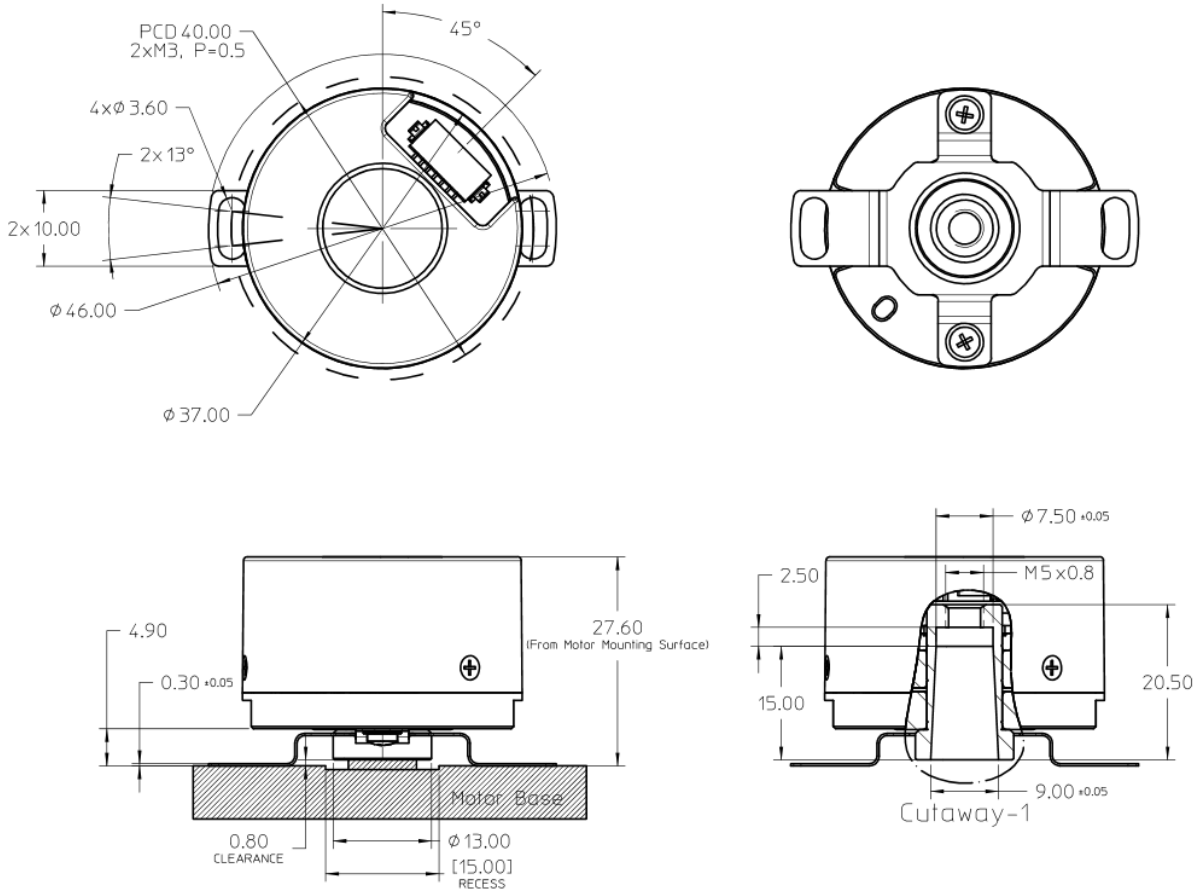
Recommended Shaft and Mounting Requirement



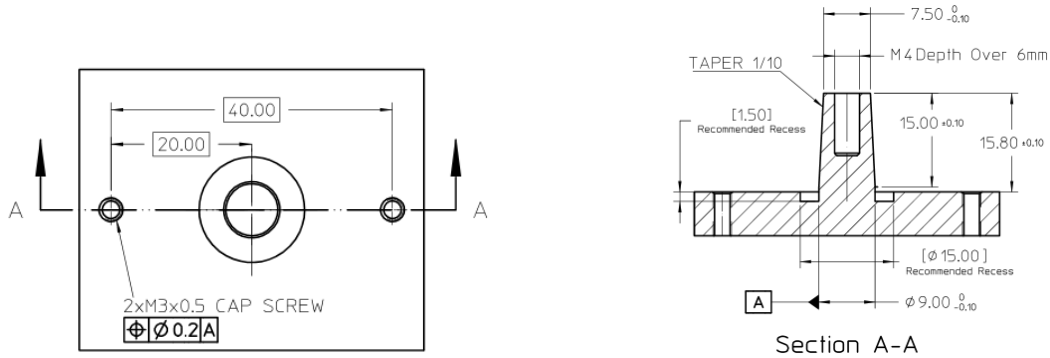
Note:

1. Dimensions are in millimeters.
2. 3rd Angle Projection.
3. Unless otherwise specified, all tolerances are within ±0.5 mm.
4. Recommended to have a recess on motor mounting surface to prevent encoder shaft interference with motor base.

Standard Hollow Taper Shaft Option (Φ9-Φ7.5mm; 1:10)



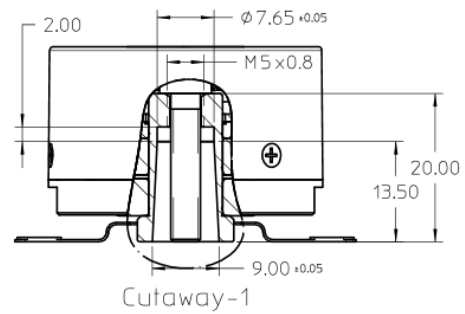
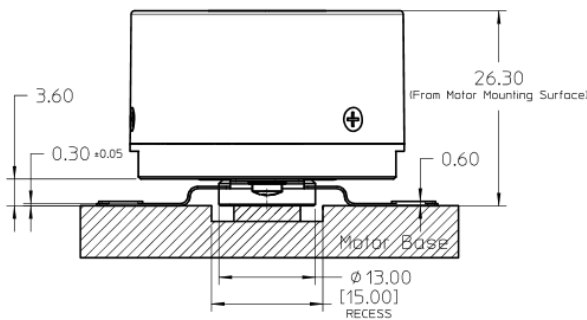
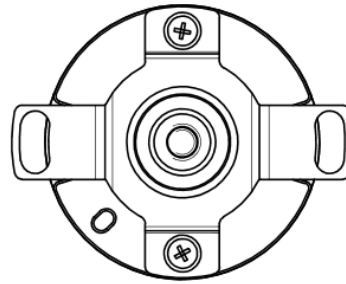
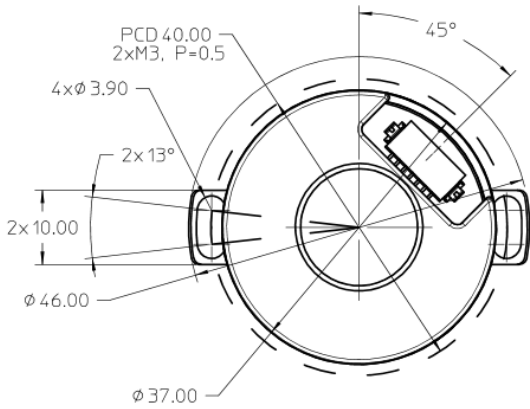
Recommended Shaft and Mounting Requirement



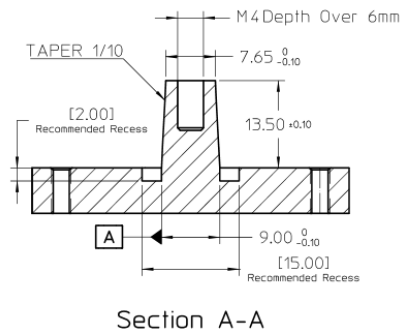
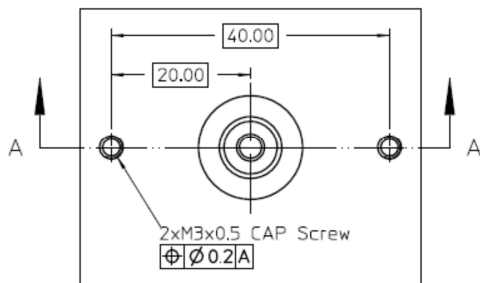
Note:

1. Dimensions are in millimeters.
2. 3rd Angle Projection.
3. Unless otherwise specified, all tolerances are within ± 0.5 mm.
4. Recommended to have a recess on motor mounting surface to prevent encoder shaft interference with motor base.

Short Hollow Taper Shaft Option ($\Phi 9-\Phi 7.65\text{mm}$; 1:10)



Recommended Shaft and Mounting Requirement



Note:

1. Dimensions are in millimeters.
2. 3rd Angle Projection.
3. Unless otherwise specified, all tolerances are within ± 0.5 mm.
4. Recommended to have a recess on motor mounting surface to prevent encoder shaft interference with motor base.

Applications

- Robotics
- Factory automation
- CNC machine tool

NOTE

Broadcom Limited encoders are not recommended for use in safety critical applications. E.g. ABS braking systems, power steering, life support systems and critical care medical equipment. Please contact sales representative if more clarification is needed.