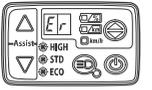
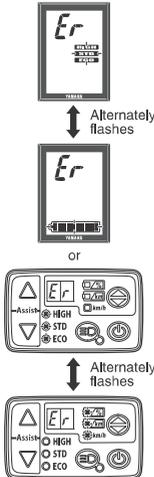


## Diagnosis function

### List of error codes and corresponding power assist operations.

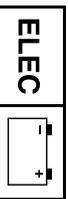
Display pattern	Fault device	Error codes	Fault details	Power assist behavior and error code record	*Restoration Max Level	Action	
 <p>or</p> 	Display unit	12	Stopped the communications to the display unit.	Power assist is normal. Error code does not record.	0	Replace the display unit assembly.	
		13	Communication data failure to display unit.				
 <p>↑ Alternately flashes ↓</p>  <p>or</p>  <p>↑ Alternately flashes ↓</p> 	Display unit	15	Display comes off from the holder.	Power assist will stop after determine the error. Error code does not record.	0	Replace the display unit assembly.	
	Encoder	16	Disconnected or red wire is short-circuited.	Power assist will immediately stop after determine the error. Error code will record.	1	<ol style="list-style-type: none"> <li>1. Check the encoder connector.</li> <li>2. Replace the encoder lead wire.</li> <li>3. Replace the motor assembly.</li> </ol>	
		17	Black wire is short-circuited.				
	Torque Sensor		20	Disconnected.	Power assist will stop after determine the error. Error code will record.	1	<ol style="list-style-type: none"> <li>1. Replace the encoder lead wire.</li> <li>2. Replace the torque sensor assembly.</li> </ol>
			21	Short-circuited.			
			22	Wiring failure between the torque sensor and the controller.			

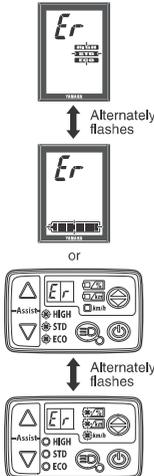


Display pattern	Fault device	Error codes	Fault details	Power assist behavior and error code record	*Restoration Max Level	Action		
 <p>Alternately flashes</p> <p>or</p> <p>Alternately flashes</p>	Torque Sensor	23	Abnormal voltage. (detected during running / with slight voltage rise)	Power assist will stop after determine the error. Error code will record.	2	<ol style="list-style-type: none"> <li>1. Perform the torque sensor reference voltage adjustment.</li> <li>2. Replace the torque sensor assembly.</li> </ol>		
		24	Abnormal voltage. (detected during running / with high constant voltage)					
		25	Abnormal voltage. (detected during running / others)					
		26	Abnormal voltage. (detected during running at low speeds)					
					27	Wiring failure between the coil and the circuit board. (wire chattering: nearly disconnected)	2	Replace the torque sensor assembly.  <ol style="list-style-type: none"> <li>1. Perform the torque sensor reference voltage adjustment.</li> <li>2. Replace the torque sensor assembly.</li> </ol>
					28	Wiring failure between the coil and the circuit board. (wire chattering: nearly disconnected)		
					29	Abnormal no-load voltage.		
					30	Abnormal voltage. (detected during running/with high constant voltage.)		
		31	Abnormal voltage. (detected during running/with slight voltage rise.)		2	Replace the torque sensor assembly.		



Display pattern	Fault device	Error codes	Fault details	Power assist behavior and error code record	*Restoration Max Level	Action
 <p>↑ Alternately flashes</p>  <p>or</p>  <p>↑ Alternately flashes</p> 	Crank sensor	32	Torque sensor or crank sensor failure.	Power assist will stop after determine the error. Error code will record.	1	<ol style="list-style-type: none"> <li>1. Replace the torque sensor.</li> <li>2. Replace the crank sensor.</li> <li>3. Replace the encoder lead wire.</li> <li>4. Replace the drive axle assembly.</li> </ol>
		33	Short-circuited or crank sensor failure.			<ol style="list-style-type: none"> <li>1. Replace the crank sensor.</li> <li>2. Replace the encoder lead wire.</li> <li>3. Replace the drive axle assembly.</li> </ol>
	Motor	40	3 lead wires are disconnected.	Power assist will immediately stop after determine the error. Error code will record.	1	<ol style="list-style-type: none"> <li>1. Replace the controller assembly.</li> <li>2. Replace the motor assembly.</li> </ol>
		41	Yellow lead wire is disconnected. (U phase)	Power assist will stop after determine the error. Error code will record.		Replace the controller assembly.
		42	Blue lead wire is disconnected. (V phase)			
		43	White lead wire is disconnected. (W phase)			

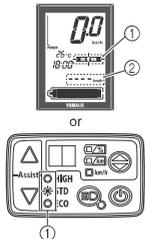


Display pattern	Fault device	Error codes	Fault details	Power assist behavior and error code record	*Restoration Max Level	Action		
 <p>Alternately flashes</p> <p>or</p> <p>Alternately flashes</p>	Motor or Controller	50	Abnormal voltage of the sensor for U phase current while the motor is not operating.	Power assist will immediately stop after determine the error. Error code will record.	1	Replace the controller assembly.		
		51	Abnormal voltage of the sensor for V phase current while the motor is not operating.					
		52	Abnormal voltage of the sensor for W phase current while the motor is not operating.					
				53	Over current is applied to the U phase of the motor.	Power assist will stop after determine the error. Error code will record.	2	1. Replace the controller assembly. 2. Replace the motor assembly.
				54	Over current is applied to the V phase of the motor.			
				55	Over current is applied to the W phase of the motor.			
				56	Abnormal DC current	Power assist will immediately stop after determine the error. Error code will record.	1	
				60	Not within the 12V output range	Power assist will immediately stop after determine the error. Error code will record.	1	Replace the controller assembly.
				70	External memory data error	Power assist will immediately stop after determine the error. Error code will record.	1	Replace the controller assembly.
		71	Failure in data reading					



Display pattern	Fault device	Error codes	Fault details	Power assist behavior and error code record	*Restoration Max Level	Action
 <p>↑ Alternately flashes</p>  <p>or</p>  <p>↑ Alternately flashes</p> 	Motor or Controller	80	Detected circuit board temperature is too low. ( $-20^{\circ}\text{C}$ )	Power assist will stop after determine the error. Error code will record.	2	Replace the controller assembly.
		81	Detected circuit board temperature is too high. ( $125^{\circ}\text{C}$ ) (including DC circuit)			
		82	Sensor on the board is nearly detached.			
	Others	89	Detected circuit board temperature is too high. ( $90^{\circ}\text{C}$ )	Power assist is normal. Error code will record.	0	<ol style="list-style-type: none"> <li>1. Check the environment of usage.</li> <li>2. Replace the controller assembly.</li> </ol>



Display pattern	Fault device	Error codes	Fault details	Power assist behavior and error code record	*Restoration Max Level	Action
 <p>Assist mode lamps ① are displayed with a slow flashes. Function displays ② are displayed with "----".</p>	Speed Sensor	—	The vehicle speed has not gone out though the motor is rotating.	Power assist becomes weak. Error code does not record.	0	<ol style="list-style-type: none"> <li>1. Check the speed sensor lead connector.</li> <li>2. Check the gap between the pick up and the magnet sensor spoke type. (See "Speed sensor" for the specified gap.)</li> <li>3. Replace the speed sensor set.</li> </ol>
		—	Abnormal width of the pulse (detected during running)			
All segments or LED turned off	Battery	90	Detected battery voltage is too high.(45V)	Power assist will stop after determine the error. (Also display unit will turn off) Error code will record.	1	Replace the battery.
All segments or LED turned off. When you turn on the main switch, all segments or LED will turn on during 4 seconds, then automatically turn off.		91	Can't receive data from battery correctly.	Power assist will immediately stop after determine the error. (Also display unit will turn off) Error code will record.		<ol style="list-style-type: none"> <li>1. Check the battery communication connector.</li> <li>2. Replace the plug DC.</li> <li>3. Replace the controller assembly.</li> <li>4. Replace the battery.</li> </ol>

\*Restoration Max Level:

Level	
0	If the system detects this error, the power assist mode will be down or turns to off. But when the system is restored to normal, the power assist mode will return to normal and the error indicator will be unshown immediately.
1	If the system detects this error prescribed number of times, the power assist mode turns to off and the error indicator is displayed on the display unit. But they can return to normal, if the system will not detect any errors when the power is cycled.
2	If the system detects this error prescribed number of times, the power assist mode turns to off, and the error indicator is displayed on the display unit. They can not return to normal, even if the power is cycled.

