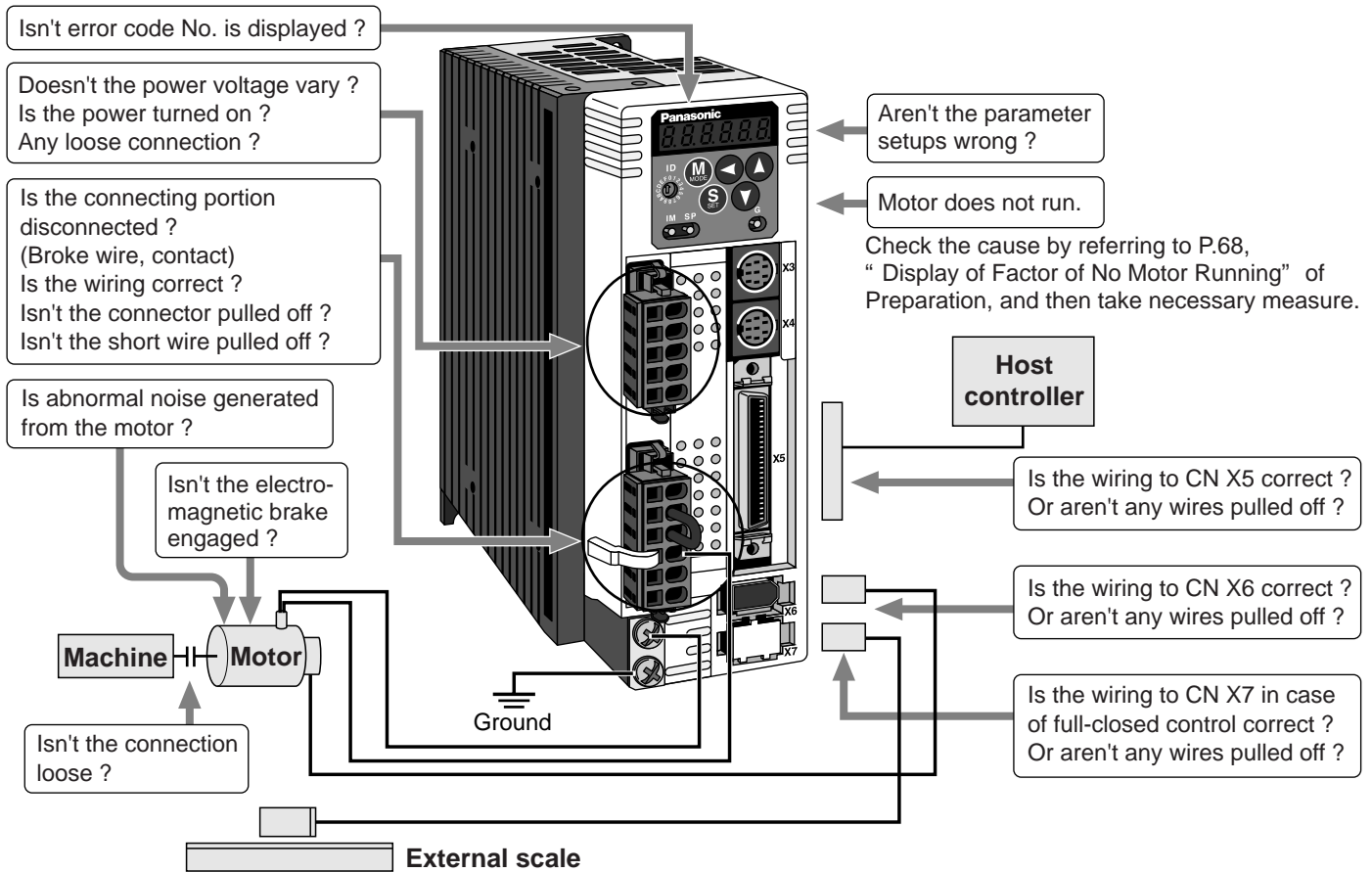


## [When in Trouble]

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# When in Trouble

## What to Check ?



## Protective Function (What is Error Code ?)

- Various protective functions are equipped in the driver. When these are triggered, the motor will stall due to error, according to P.43, "Timing Chart (When error occurs)" of Preparation, and the driver will turn the Servo-Alarm output (ALM) to off (open).
- Error status and their measures
  - During the error status, the error code No. will be displayed on the front panel LED, and you cannot turn Servo-ON.
  - You can clear the error status by turning on the alarm clear input (A-CLR) for 120ms or longer.
  - When overload protection is triggered, you can clear it by turning on the alarm clear signal (A-CLR) 10 sec or longer after the error occurs. You can clear the time characteristics by turning off the connection between L1C and L2C or r and t of the control power supply of the driver.
  - You can clear the above error by operating the front panel keys.  
(Refer to P.73, "Alarm Clear Mode" of Preparation.)
  - You can also clear the above error by operating the "PANATERM®".

### <Remarks>

- When the protective function with a prefix of "\*" in the protective function table is triggered, you cannot clear with alarm clear input (A-CLR). For resumption, shut off the power to remove the cause of the error and re-enter the power.
- Following errors will not be stored in the error history.
 

Control power supply under-voltage protection	(Error code No. 11)
Main power supply under-voltage protection	(Error code No. 13)
EEPROM parameter error protection	(Error code No. 36)
EEPROM check code error protection	(Error code No. 37)
Over-travel prohibition input protection	(Error code No. 38)
Motor self-recognition error protection	(Error code No. 95)

Protective Function (Detail of Error Code)

Protective function	Error code No.	Causes	Measures
Control power supply under-voltage protection	11	<p>Voltage between P and N of the converter portion of the control power supply has fallen below the specified value.</p> <ol style="list-style-type: none"> <li>1)Power supply voltage is low. Instantaneous power failure has occurred</li> <li>2)Lack of power capacity...Power supply voltage has fallen down due to inrush current at the main power-on.</li> <li>3)Failure of servo driver (failure of the circuit)</li> </ol>	<p>Measure the voltage between lines of connector (L1C and L2C) and terminal block (r and t).</p> <ol style="list-style-type: none"> <li>1)Increase the power capacity. Change the power supply.</li> <li>2)Increase the power capacity.</li> <li>3)Replace the driver with a new one.</li> </ol>
Over-voltage protection	12	<p>Voltage between P and N of the converter portion of the control power supply has exceeded the specified value</p> <ol style="list-style-type: none"> <li>1)Power supply voltage has exceeded the permissible input voltage. Voltage surge due to the phase-advancing capacitor or UPS (Uninterruptible Power Supply) have occurred.</li> <li>2)Disconnection of the regeneration discharge resistor</li> <li>3)External regeneration discharge resistor is not appropriate and could not absorb the regeneration energy.</li> <li>4)Failure of servo driver (failure of the circuit)</li> </ol>	<p>Measure the voltage between lines of connector (L1, L2 and L3).</p> <ol style="list-style-type: none"> <li>1)Enter correct voltage. Remove a phase-advancing capacitor.</li> <li>2)Measure the resistance of the external resistor connected between terminal P and B of the driver. Replace the external resistor if the value is <math>\infty</math>.</li> <li>3)Change to the one with specified resistance and wattage.</li> <li>4)Replace the driver with a new one.</li> </ol>
Main power supply under-voltage protection	13	<p>Instantaneous power failure has occurred between L1 and L3 for longer period than the preset time with Pr6D (Main power off detecting time) while Pr65 (LV trip selection at the main power-off) is set to 1. Or the voltage between P and N of the converter portion of the main power supply has fallen below the specified value during Servo-ON.</p> <ol style="list-style-type: none"> <li>1)Power supply voltage is low. Instantaneous power failure has occurred</li> <li>2)Instantaneous power failure has occurred.</li> <li>3)Lack of power capacity...Power supply voltage has fallen down due to inrush current at the main power-on.</li> <li>4)Phase lack...3-phase input driver has been operated with single phase input.</li> <li>5)Failure of servo driver (failure of the circuit)</li> </ol>	<p>Measure the voltage between lines of connector (L1, L2 and L3).</p> <ol style="list-style-type: none"> <li>1)Increase the power capacity. Change the power supply. Remove the causes of the shutdown of the magnetic contactor or the main power supply, then re-enter the power.</li> <li>2)Set up the longer time to Pr6D (Main power off detecting time). Set up each phase of the power correctly.</li> <li>3)Increase the power capacity. For the capacity, refer to P.32, "Driver and List of Applicable Peripheral Equipments" of Preparation.</li> <li>4)Connect each phase of the power supply (L1, L2 and L3) correctly. For single phase, 100V and 200V driver, use L1 and L3.</li> <li>5)Replace the driver with a new one.</li> </ol>
* Over-current protection	14	<p>Current through the converter portion has exceeded the specified value.</p> <ol style="list-style-type: none"> <li>1)Failure of servo driver (failure of the circuit, IGBT or other components)</li> <li>2)Short of the motor wire (U, V and W)</li> <li>3)Earth fault of the motor wire</li> <li>4)Burnout of the motor</li> <li>5)Poor contact of the motor wire.</li> <li>6)Melting of the relays for dynamic brake due to frequent Servo-ON/OFF operation</li> <li>7)The motor is not applicable to the driver.</li> <li>8)Timing of pulse input is same as or earlier than Servo-ON.</li> <li>9)Overheating of the dynamic brake circuit (F-frame only)</li> </ol>	<ol style="list-style-type: none"> <li>1)Turn to Servo-ON, while disconnecting the motor. If error occurs immediately, replace with a new driver.</li> <li>2)Check that the motor wire (U, V and W) is not shorted, and check the branched out wire out of the connector. Make a correct wiring connection.</li> <li>3)Measure the insulation resistance between motor wires, U, V and W and earth wire. In case of poor insulation, replace the motor.</li> <li>4)Check the balance of resistor between each motor line, and if unbalance is found, replace the motor.</li> <li>5)Check the loose connectors. If they are, or pulled out, fix them securely.</li> <li>6)Replace the driver. Prohibit the run/stop operation with Servo-ON/OFF.</li> <li>7)Check the name plate and capacity of the motor and driver, and replace with motor applicable to the driver.</li> <li>8)Enter the pulses 100ms or longer after Servo-ON.</li> <li>9)Discontinue the run/stop operation with Servo ON-OFF. Allow approx. 3 minutes pause when the dynamic brake is activated during high-speed running.</li> </ol>
* Over-heat protection	15	<p>Temperature of the heat sink or power device has been risen over the specified temperature.</p> <ol style="list-style-type: none"> <li>1)Ambient temperature has risen over the specified temperature.</li> <li>2)Over-load</li> </ol>	<ol style="list-style-type: none"> <li>1)Improve the ambient temperature and cooling condition.</li> <li>2)Increase the capacity of the driver and motor. Set up longer acceleration/deceleration time. Lower the load.</li> </ol>

# When in Trouble

Protective function	Error code No.	Causes	Measures
Over-load protection	16	<p>Torque command value has exceeded the over-load level set with Pr72 (Setup of over-load level) and resulted in overload protection according to the time characteristics (described later)</p> <ol style="list-style-type: none"> <li>1)Load was heavy and actual torque has exceeded the rated torque and kept running for a long time.</li> <li>2)Oscillation and hunching action due to poor adjustment. Motor vibration, abnormal noise. Inertia ratio (Pr20) setup error.</li> <li>3)Miswiring, disconnection of the motor.</li> <li>4)Machine has collided or the load has gotten heavy. Machine has been distorted.</li> <li>5)Electromagnetic brake has been kept engaged.</li> <li>6)While wiring multiple axes, miswiring has occurred by connecting the motor cable to other axis.</li> <li>7)Pr72 setup has been low.</li> </ol>	<p>Check that the torque (current) does not oscillates nor fluctuate up an down very much on the graphic screen of the PANATERM®. Check the over-load alarm display and load factor with the PANATERM®.</p> <ol style="list-style-type: none"> <li>1)Increase the capacity of the driver and motor. Set up longer acceleration/deceleration time. Lower the load.</li> <li>2)Make a re-adjustment.</li> <li>3)Make a wiring as per the wiring diagram. Replace the cables. Connect the black (W phase), white (V phase) and red (U phase) cables in sequence from the bottom at the CN X2 connector.</li> <li>4)Remove the cause of distortion. Lower the load.</li> <li>5)Measure the voltage between brake terminals. Release the brake</li> <li>6)Make a correct wiring by matching the correct motor and encoder wires.</li> <li>7)Set up Pr72 to 0. (Set up to max. value of 115% of the driver)</li> </ol>
* Over-regeneration load protection	18	<p>Regenerative energy has exceeded the capacity of regenerative resistor.</p> <ol style="list-style-type: none"> <li>1)Due to the regenerative energy during deceleration caused by a large load inertia, converter voltage has risen, and the voltage is risen further due to the lack of capacity of absorbing this energy of the regeneration discharge resistor.</li> <li>2)Regenerative energy has not been absorbed in the specified time due to a high motor rotational speed.</li> <li>3)Active limit of the external regenerative resistor has been limited to 10% duty.</li> </ol>	<p>Check the load factor of the regenerative resistor on the monitor screen of the PANATERM®. Do not use in the continuous regenerative brake application.</p> <ol style="list-style-type: none"> <li>1)Check the running pattern (velocity monitor). Check the load factor of the regenerative resistor and over-regeneration warning display. Increase the capacity of the driver and the motor, and loosen the deceleration time. Use the external regenerative resistor.</li> <li>2)Check the running pattern (speed monitor). Check the load factor of the regenerative resistor. Increase the capacity of the driver and the motor, and loosen the deceleration time. Lower the motor rotational speed. Use an external regenerative resistor.</li> <li>3)Set up Pr6C to 2.</li> </ol>
		<p><b>&lt;Remarks&gt;</b> Install an external protection such as thermal fuse without fail when you set up Pr6C to 2. Otherwise, regenerative resistor loses the protection and it may be heated up extremely and may burn out.</p>	
* Encoder communication error protection	21	<p>Communication between the encoder and the driver has been interrupted in certain times, and disconnection detecting function has been triggered.</p>	<ul style="list-style-type: none"> <li>• Make a wiring connection of the encoder as per the wiring diagram. Correct the miswiring of the connector pins. Note that the encoder cable to be connected to CN X6.</li> <li>• Secure the power supply for the encoder of DC5V±5% (4.75-5.25V)...pay an attention especially when the encoder cables are long.</li> <li>• Separate the encoder cable and the motor cable if they are bound together.</li> <li>• Connect the shield to FG...Refer to P.38, "Wiring to the Connector, CN X6" of Preparation.</li> </ul>
* Encoder communication data error protection	23	<p>Communication error has occurred in data from the encoder. Mainly data error due to noise. Encoder cables are connected, but communication data has some errors.</p>	
Position deviation excess protection	24	<p>Deviation pulses have exceeded the setup of Pr70 (Setup of position deviation excess).</p> <ol style="list-style-type: none"> <li>1)The motor movement has not followed the command.</li> <li>2)Setup value of Pr70 (Setup of position deviation excess) is small.</li> </ol>	<ol style="list-style-type: none"> <li>1)Check that the motor follows to the position command pulses. Check that the output toque has not saturated in torque monitor. Make a gain adjustment. Set up maximum value to Pr5E (Setup of 1st torque limit) and Pr5F (2nd torque limit setup). Make a encoder wiring as per the wiring diagram. Set up the longer acceleration/deceleration time. Lower the load and speed.</li> <li>2)Set up a larger value to Pr70, or set up 0 (invalid).</li> </ol>

Protective function	Error code No.	Causes	Measures
* Hybrid deviation excess error protection	25	Position of load by the external scale and position of the motor by the encoder slips larger than the setup pulses with Pr7B (Setup of hybrid deviation excess) at full-closed control.	<ul style="list-style-type: none"> <li>• Check the connection between the motor and the load.</li> <li>• Check the connection between the external scale and the driver.</li> <li>• Check that the variation of the motor position (encoder feedback value) and the load position (external scale feedback value) is the same sign when you move the load.</li> </ul> Check that the numerator and denominator of the external scale division (Pr78, 79 and 7A) and reversal of external scale direction (Pr7C) are correctly set.
Over-speed protection	26	The motor rotational speed has exceeded the setup value of Pr73 (Over-speed level setup)	<ul style="list-style-type: none"> <li>• Do not give an excessive speed command.</li> <li>• Check the command pulse input frequency and division/multiplication ratio.</li> <li>• Make a gain adjustment when an overshoot has occurred due to a poor gain adjustment.</li> <li>• Make a wiring connection of the encoder as per the wiring diagram.</li> <li>• Set up Pr73 to 0 (Set up to motor max. speed x 1.2.)</li> </ul>
Electronic gear error protection	27	Division and multiplication ratio which are set up with the 1st and the 2nd numerator/denominator of the electronic gear (Pr48 to 4B) are not appropriate.	<ul style="list-style-type: none"> <li>• Check the setup values of Pr48 to 4B.</li> <li>• Set up the division/multiplication ratio so that the command pulse frequency after division, multiplication may become less than 80Mpps at deviation counter input portion, and 3Mpps at command input portion.</li> </ul>
* External scale communication data error protection	28	Communication error has occurred in data from the encoder. Mainly data error due to noise. Encoder cables are connected, but communication data has some error.	<ul style="list-style-type: none"> <li>• Secure the power supply for the encoder of DC5±5% (4.75-5.25V)...pay attention especially when the encoder cables are long.</li> <li>• Separate the encoder cable and the motor cable if they are bound together.</li> <li>• Connect the shield to FG...refer to wiring diagram.</li> </ul>
Deviation counter overflow protection	29	Deviation counter value has exceeded 2 <sup>27</sup> (134217728).	<ul style="list-style-type: none"> <li>• Check that the motor runs as per the position command pulses.</li> <li>• Check that the output torque has not saturated in torque monitor.</li> <li>• Make a gain adjustment.</li> <li>• Set up maximum value to Pr5E (1st torque limit setup) and Pr5F (2nd torque limit setup).</li> <li>• Make a wiring connection of the encoder as per the wiring diagram.</li> </ul>
Software limit protection	34	The motor position has exceeded the range set with software limit. 1)Gain has not matched up. 2)Setup value of Pr26 (Software limit setup) is small.	Refer to P.258,"Software Limit Function" before using this. 1)Check the gain (balance of position loop gain and velocity loop gain) and the inertia ratio. 2)Setup a larger value to Pr26.
* External scale communication error protection	35	Communication between the external scale and the driver has been interrupted in certain times, and disconnection detecting function has been triggered.	<ul style="list-style-type: none"> <li>• Make a wiring connection of the external scale as per the wiring diagram.</li> <li>• Correct the miswiring of the connector pins.</li> </ul>
* EEPROM parameter error protection	36	Data in parameter storage area has been damaged when reading the data from EEPROM at power-on.	<ul style="list-style-type: none"> <li>• Set up all parameters again.</li> <li>• If the error persists, replace the driver (it may be a failure.) Return the product to the dealer or manufacturer.</li> </ul>
* EEPROM check code error protection	37	Data for writing confirmation to EEPROM has been damaged when reading the data from EEPROM at power-on.	Replace the driver. (it may be a failure). Return the product to a dealer or manufacturer.
Over-travel inhibit input protection	38	Connection of both CW and CCW over-travel inhibit input (CWL, Pin-8/CCW, Pin-9) to COM- have been opened, while Pr04 (Over-travel inhibit input setup) is 0. Or either one of the connection of CW or CCW over-travel inhibit input to COM- has been opened, while Pr04 is set to 2.	<ul style="list-style-type: none"> <li>• Check that there are not any errors in switches, wires or power supply which are connected to CW/CCW over-travel inhibit input. Check that the rising time of the control power supply (DC12-24V) is not slow.</li> </ul>

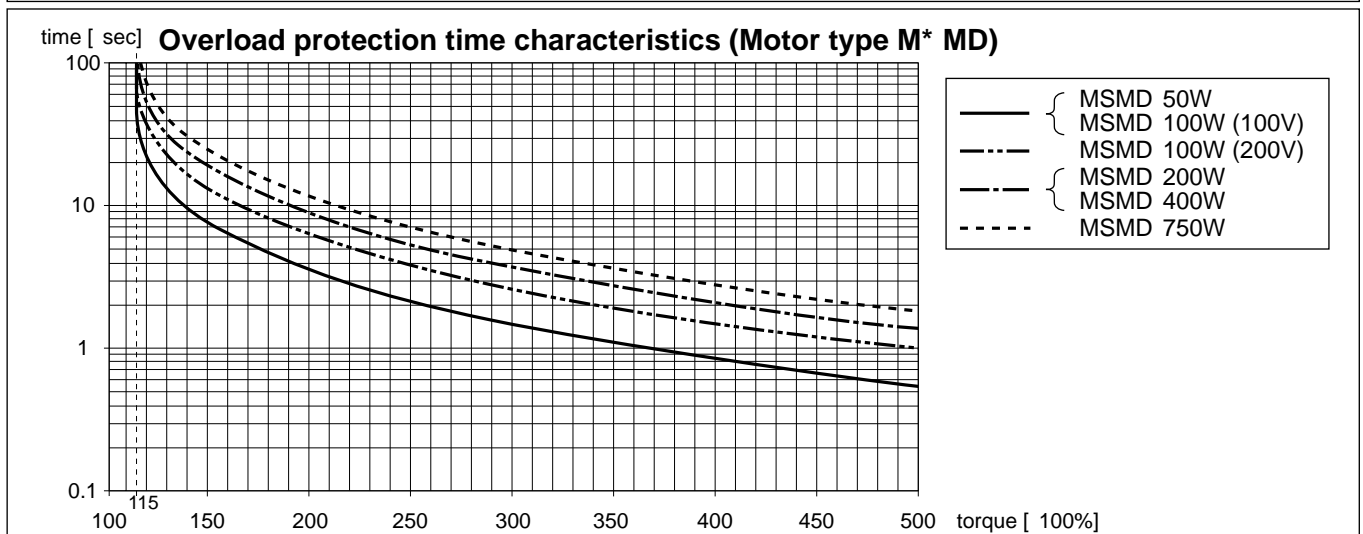
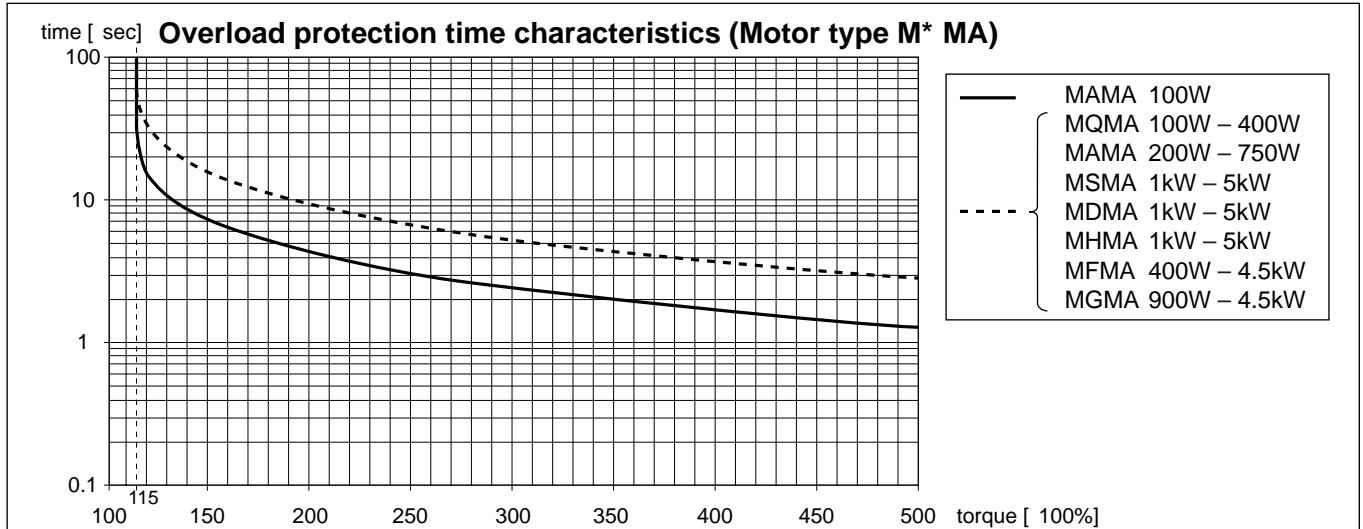
# When in Trouble

Protective function	Error code No.	Causes	Measures
<b>Analog input excess protection</b>	<b>39</b>	Higher voltage has been applied to the analog command input (SPR : CN X5, Pin-14) than the value that has been set by Pr71 (Analog input excess setup). This protective function is validated when SPR/TRQR/SPL is valid such cases as, 1)Velocity control when Pr02 (Control mode setup) is set to 1, 3 or 5 and Pr05 (Velocity setup internal/external switching) is set to 0 or 2, and when analog velocity command is selected and speed zero clamp is invalidated. (velocity command is not zero). 2)Torque control when Pr02 (Control mode setup) is set to 2 or 4 and Pr5B (Torque command selection) is set to 0. 3)Torque control when Pr02 (Control mode setup) is set to 2, 4 or 5 and Pr5B (Torque command selection) is set to 1, and speed zero clamp is invalidated (Velocity command is not zero.)	<ul style="list-style-type: none"> <li>• Set up Pr71 (Setup of analog input excess) correctly. Check the connecting condition of the connector, CN X5.</li> <li>• Set up a larger value to Pr57 (Filter setup of Velocity command).</li> <li>• Set up Pr71 to 0 and invalidate the protective function.</li> </ul>
<b>Absolute system down error protection</b>	<b>40</b>	Voltage of the built-in capacitor has fallen below the specified value because the power supply or battery for the 17-bit absolute encoder has been down.	After connecting the power supply for the battery, clear the absolute encoder. (Refer to P.271, "Setup (Initialization) of Absolute Encoder" of Supplement.) You cannot clear the alarm unless you clear the absolute encoder.
<b>* Absolute counter over error protection</b>	<b>41</b>	Multi-turn counter of the 17-bit absolute encoder has exceeded the specified value.	<ul style="list-style-type: none"> <li>• Set up an appropriate value to Pr0B (Absolute encoder setup) .</li> <li>• Limit the travel from the machine origin within 32767 revolutions.</li> </ul>
<b>Absolute over-speed error protection</b>	<b>42</b>	The motor speed has exceeded the specified value when only the supply from the battery has been supplied to 17-bit encoder during the power failure.	<ul style="list-style-type: none"> <li>• Check the supply voltage at the encoder side (5V±5%)</li> <li>• Check the connecting condition of the connector, CN X6.</li> <li>• You cannot clear the alarm unless you clear the absolute encoder.</li> </ul>
<b>* Absolute single turn counter error protection</b>	<b>44</b>	Single turn counter error of 17-bit absolute encoder has been detected. Single turn counter error of 2500[ P/r] , 5-wire serial encoder has been detected.	Replace the motor.
<b>* Absolute multi-turn counter error protection</b>	<b>45</b>	Multi turn counter error of 17-bit absolute encoder has been detected. Multi turn counter error of 2500[ P/r] , 5-wire serial encoder has been detected.	Replace the motor.
<b>Absolute status error protection</b>	<b>47</b>	17-bit absolute encoder has been running at faster speed than the specified value at power-on.	Arrange so as the motor does not run at power-on.
<b>* Encoder Z-phase error protection</b>	<b>48</b>	Missing pulse of Z-phase of 2500[ P/r] , 5-wire serial encoder has been detected	The encoder might be a failure. Replace the motor.
<b>* Encoder CS signal error protection</b>	<b>49</b>	CS signal logic error of 2500[ P/r] , 5-wire serial encoder has been detected	The encoder might be a failure. Replace the motor.

Protective function	Error code No.	Causes	Measures
* External scale status 0 error protection	50	Bit 0 of the external scale error code (ALMC) has been turned to 1. Check the specifications of the external scale.	Remove the causes of the error, then clear the external scale error from the front panel. And then, shut off the power to reset.
* External scale status 1 error protection	51	Bit 1 of the external scale error code (ALMC) has been turned to 1. Check the specifications of the external scale.	
* External scale status 2 error protection	52	Bit 2 of the external scale error code (ALMC) has been turned to 1. Check the specifications of the external scale.	
* External scale status 3 error protection	53	Bit 3 of the external scale error code (ALMC) has been turned to 1. Check the specifications of the external scale.	
* External scale status 4 error protection	54	Bit 4 of the external scale error code (ALMC) has been turned to 1. Check the specifications of the external scale.	
* External scale status 5 error protection	55	Bit 5 of the external scale error code (ALMC) has been turned to 1. Check the specifications of the external scale.	
CCWTL input excess protection	65	Higher voltage than $\pm 10V$ has been applied to the analog command input (CCWTL : CN X5, Pin-16) This protective function is validated when CCWTL is valid such cases as, 1) Torque control when Pr02 (Control mode setup) is 5, or Pr02 is 2 or 4 and when Pr5B (Torque command selection) is 1. 2) Position control, Velocity control and Full-closed control when Pr03 (Torque limit selection) is 0.	<ul style="list-style-type: none"> <li>• Check the connecting condition of connector, CN X5.</li> <li>• Set the CCWTL voltage within <math>\pm 10V</math>.</li> </ul>
CWTL input excess protection	66	Higher voltage than $\pm 10V$ has been applied to the analog command input (CWTL : CN X5, Pin-18) This protective function is validated when CWTL is valid such case as, 1) Position control, Velocity control and Full-closed control when Pr03 (Torque limit selection) is 0.	<ul style="list-style-type: none"> <li>• Check the connecting condition of connector, CN X5.</li> <li>• Set the CWTL voltage within <math>\pm 10V</math>.</li> </ul>
* Motor automatic recognition error protection	95	The motor and the driver has not been matched.	Replace the motor which matches to the driver.
* Other error	Other No.	Control circuit has malfunctioned due to excess noise or other causes. Some error has occurred inside of the driver while triggering self-diagnosis function of the driver.	<ul style="list-style-type: none"> <li>• Turn off the power once, then re-enter.</li> <li>• If error repeats, this might be a failure. Stop using the products, and replace the motor and the driver. Return the products to the dealer or manufacturer.</li> </ul>

# When in Trouble

## • Time characteristics of Err16 (Overload protection)



## • Software Limit Function

### 1) Outline

You can make an alarm stop of the motor with software limit protection (Error code No.34) when the motor travels exceeding the movable range which is set up with Pr26 (Set up of software limit) against the position command input range.

You can prevent the work from colliding to the machine end caused by motor oscillation.

### 2) Applicable range

This function works under the following conditions.

Conditions under which the software limit works	
<b>Control mode</b>	<ul style="list-style-type: none"> <li>• Either at position control mode or full-closed control mode</li> <li>Pr02 = 0 : Position control</li> <li>Pr02 = 3 : 1st control mode of Position control/Velocity control</li> <li>Pr02 = 4 : 1st control mode of Position control/torque control</li> <li>Pr02 = 6 : Full-closed control</li> </ul>
<b>Others</b>	(1) at Servo-ON (2) when Pr26 (Software limit setup) is other than 0. (3) After the last clearance of the position command input range (0 clearance), the movable range of the motor is within 2147483647 for both CCW and CW direction.  Once the motor gets out of the (3) condition, the software limit protection will be invalidated until the later mentioned "5) Condition under which the position command input range is cleared" is satisfied. The position command input range will be 0-cleared when the motor gets out of the conditions of (1) and (2).

### 3) Cautions

- This function is not a protection against the abnormal position command.
- When this software limit protection is activated, the motor decelerates and stops according to Pr68 (Sequence at alarm).

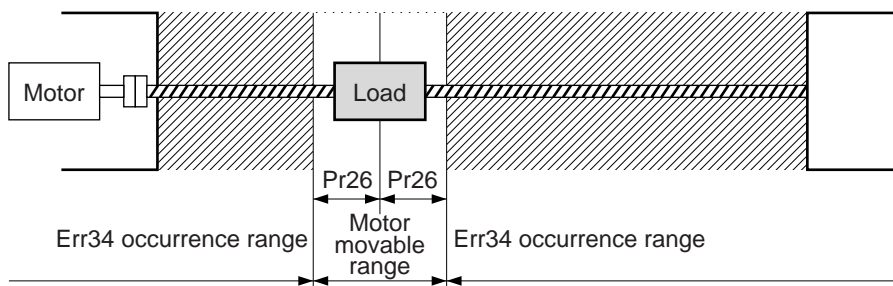
The work (load) may collide to the machine end and be damaged depending on the load during this deceleration, hence set up the range of Pr26 including the deceleration movement.

- This software limit protection will be invalidated during the trial run and frequency characteristics functioning of the PANATERM®.

### 4) Example of movement

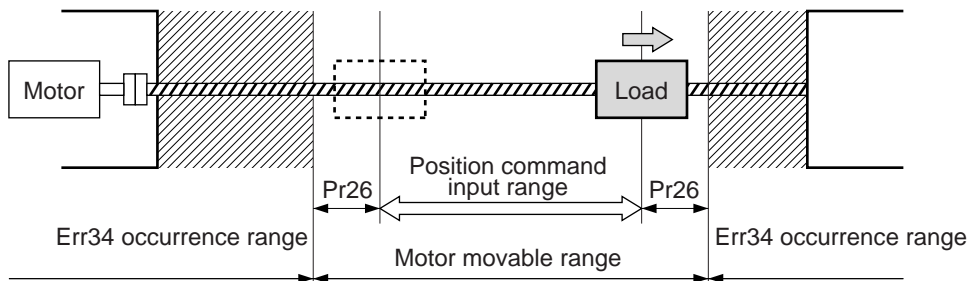
#### (1) When no position command is entered (Servo-ON status),

The motor movable range will be the travel range which is set at both sides of the motor with Pr26 since no position command is entered. When the load enters to the Err34 occurrence range (oblique line range), software limit protection will be activated.



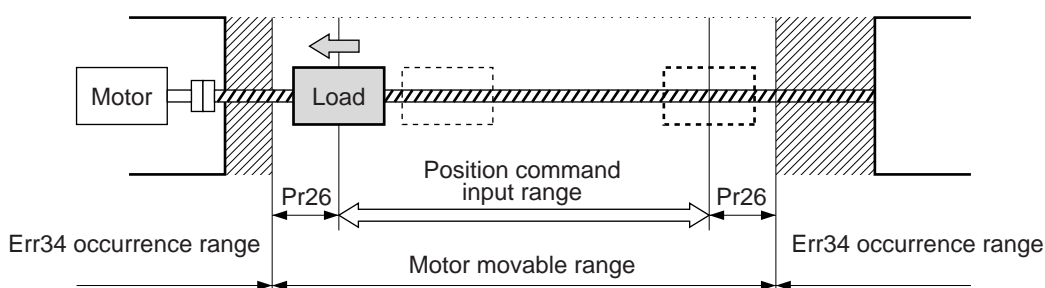
#### (2) When the load moves to the right (at Servo-ON),

When the position command to the right direction is entered, the motor movable range will be expanded by entered position command, and the movable range will be the position command input range + Pr26 setups in both sides.



#### (3) When the load moves to the left (at Servo-ON),

When the position command to the left direction, the motor movable range will be expanded further.



### 5) Condition under which the position command input range is cleared

The position command input range will be 0-cleared under the following conditions.

- when the power is turned on.
- while the position deviation is being cleared (Deviation counter clear is valid, Pr66 (Sequence at over-travel inhibition) is 2 and over-travel inhibition input is valid.)
- At the starting and the finishing of the normal auto-gain tuning.

# Troubleshooting

## Motor Does Not Run

When the motor does not run, refer to P.68, "Display of Factor of No-Motor Running" of Preparation as well.

Classification	Causes		Measures
Parameter	Setup of the control mode is not correct	Check that the present control mode is correct with monitor mode of the front panel.	1)Set up Pr02 (Setup of control mode) again. 2)Check that the input to control mode switching (C-MODE) of the CN X5 is correct, when Pr03 is set to 3-5.
	Selection of torque limit is not correct	Check that the external analog input (CWTL/CCWTL) is not used for the torque limit.	1)Set up Pr03 (Selection of torque limit) to 0 and apply -9 [ V ] to CWTL and +9 [ V ] to CCWTL when you use the external input. 2)Set up Pr03 (Selection of torque limit) to 1 and set up the max. value to Pr5E (Setup of 1st torque limit) when you use the parameter value.
	Setup of electronic gear is not correct. (Position/Full-closed)	Check that the motor moves by expected revolution against the command pulses.	1)Check the setups of Pr48-4B again. 2)Connect the electronic gear switching input (DIV) of CN X5 to COM-, or invalidate the division/multiplication switching by setting up the same value to Pr48 and Pr49.
Wiring	Servo-ON input of CN X5 (SRV-ON) is open.	Check that the input signal No.0 or No.03 does not show "-", with monitor mode of the front panel.	Check and make a wiring so as to connect the SRV-ON input to COM-.
	CW/CCW over-travel inhibit input of CN X5 (CWTL/CCWTL) is open.	Check that the input signal No.02 or No.03 does not show "A", with monitor mode of the front panel.	1)Check and make a wiring so as to connect both CWL and CCWL inputs to COM-.
	Command pulse input setup is incorrect. (Position/Full-closed)	Check that the input pulse counts and variation of command pulse sum does not slips, with monitor mode of the front panel.	2)Set up Pr04 (Setup of over-travel inhibit input) to 1 (invalid) and reset the power.
	Command pulse input inhibition (INH) of CN X5 is open. (Position/Full-closed)	Check that the input signal No.08 does not show "A", with monitor mode of the front panel.	1)Check that the command pulses are entered correctly to the direction selected with Pr40 (Selection of command pulse input). 2)Check that the command pulses are entered correctly in the format selected with Pr42 (Setup of command pulse input mode).
	Counter clear input (CL) of CN X5 is connected to COM-. (Position/Full-closed)	Check that the input signal No.0A does not show "A", with monitor mode of the front panel.	1)Check and make a wiring so as to connect the INH input to COM-. 2)Set up Pr43 (Invalidation of command pulse inhibition input) to 1 (invalid).
	Speed command is invalid (Velocity)	Check that the velocity command input method (external analog command/internal velocity command) is correct.	1)Check and make wiring so as to open the CL input 2)Set up Pr4E (Counter clear input mode) to 2 (invalid).
	Speed zero clamp input (ZEROSPD) of CN X5 is open. (Velocity/Torque)	Check that the input signal No.05 does not show "A", with monitor mode of the front panel.	1)Check the setups of Pr50-52 again by setting up Pr05 (Internal or external switching of speed setup) to 0, when you use the external analog command. 2)Set up Pr53-56 and Pr74-77 by setting up Pr05 (Internal or external switching of speed setup) to either one of 1, 2 or 3, when you use the internal speed command.
	Torque command is invalid (Torque)	Check that the torque command input method (SPR/TRQR input, CCWTL/TRQR input) is correct.	1)Check and make wiring so as to connect speed zero clamp input to COM-. 2)Set up Pr06 (Selection of ZEROSPD input) to 0 (invalid).
	Velocity control is invalid (Torque)	Check that the velocity limit input method (internal velocity, SPR/TRQR/SPL input) is correct.	1)Check that the input voltage is applied correctly by setting up Pr5B (Selection of torque command) to 0, when you use SPR/TRQR input. 2)Check that the input voltage is applied correctly by setting up Pr5B (Selection of torque command) to 1, when you use the CCWTL/CWTL input.
	Velocity control is invalid (Torque)	Check that the velocity limit input method (internal velocity, SPR/TRQR/SPL input) is correct.	1)Set up the desired value to Pr56 (Speed setup/4th speed) by setting up Pr5B (Selection of torque command) to 0, when you use the internal speed. 2)Check that the input voltage is applied correctly by setting up Pr5B Selection of torque command) to 1, when you use the SPR/TRQR/SPL input.
Installation	Main power is shut off.	Check that the output signal No.0 does not show "-", with monitor mode of the front panel.	Check the wiring/voltage of main power of the driver (L1, L2 and L3).
	The motor shaft drags, the motor does not run.	1)Check that you can turn the motor shaft, after turning off the power and separate it from the machine. 2)Check that you can turn the motor shaft while applying DC24V to the brake in case of the motor with electromagnetic brake.	If you cannot turn the motor shaft, consult with the dealer for repair.

## Unstable Rotation (Not Smooth)

## Motor Runs Slowly Even with Speed Zero at Velocity Control Mode

Classification	Causes	Measures
Parameter	Setup of the control mode is not correct.	If you set up Pr02 to 1(Velocity control mode) by mistake at position control mode, the motor runs slowly at servo-ON due to speed command offset. Change the setup of Pr02 to 0.
Adjustment	Gain adjustment is not proper.	Increase the setup of Pr11, 1st velocity loop gain. Enter torque filter of Pr14 and increase the setup of Pr11 again.
	Velocity and position command are not stable.	Check the motor movement with check pin of the front panel or the waveform graphic function of the PANATERM®. Review the wiring, connector contact failure and controller.
Wiring	Each input signal of CN X5 is chattering. 1) Servo-ON signal	1)Check the wiring and connection between Pin29 and 41 of the connector, CN X5 using the display function of I/O signal status. Correct the wiring and connection so that the Servo-ON signal can be turned on normally. Review the controller.
	2) CW/CCW torque limit input signal	2)Check the wiring and connection between Pin-18 and 17, 16 and 17 of the connector, CN X5 using tester or oscilloscope. Correct the wiring and connection so that CW/CCW torque limit input can be entered normally.
	3) Deviation counter input signal	3)Check the wiring and connection between Pin-30 and 41, 16 and 17 of the connector, CN X5 using display function of I/O signal status. Correct the wiring and connection so that the deviation counter input can be turned on normally. Review the controller.
	4) Speed zero clamp signal	4)Check the wiring and connection between Pin-26 and 41of the connector, CN X5 using Display function of I/O signal status. Correct the wiring and connection so that the speed zero clamp input can be entered normally. Review the controller.
	5) Command pulse inhibition input	5)Check the wiring and connection between Pin-33 and 41of the connector, CN X5 using display function of I/O signal status. Correct the wiring and connection so that the command pulse inhibition input can be entered normally. Review the controller.
	Noise is on the velocity command.	Use a shield cable for connecting cable to the connector, CN X5. Separate the power line and signal line (30cm or longer) in the separate duct.
	Slip of offset	Check the voltage between Pin-14 and 15 (speed command input) using a tester or an oscilloscope. Adjust the Pr52 value so that the motor stops.

# Troubleshooting

## Positioning Accuracy Is Poor

Classification	Causes	Measures
<b>System</b>	Position command is not correct.	Count the feedback pulses with a monitor function of the PANATERM® or feedback pulse monitor mode of the console while repeating the movement of the same distance. If the value does not return to the same value, review the controller. Make a noise measure to command pulse.
	Captures the positioning complete signal at the edge.	Monitor the deviation at positioning complete signal reception with a check pin (IM) or the waveform graphic function of the PANATERM®. Make the controller capture the signal not at the edge but with some time allowance.
	Shape or width of the command pulse is not per the specifications.	If the shape of the command pulse is broken or narrowed, review the pulse generating circuit. Make a noise measure.
	Noise is superposed on deviation counter clear input CL (CN X5, Pin-5).	Make a noise measure to external DC power supply and make no wiring of the unused signal lines.
<b>Adjustment</b>	Position loop gain is small.	Check the position deviation with the monitor function of the PANATERM® or at the monitor mode of the console. Increase the setup of Pr10 within the range where no oscillation occurs.
<b>Parameter</b>	Setup of the positioning complete range is large.	Lower the setup of Pr60 within the range where no chattering of complete signal occurs.
	Command pulse frequency have exceeded 500kpps or 2Mpps.	Lower the command pulse frequency. Change the division/multiplication ratio of 1st and 2nd numerator of command division/multiplication, Pr48 and Pr4B. Use a pulse line interface exclusive to line driver when pulse line interface is used.
	Setup of the division/multiplication is not correct.	Check if the repetition accuracy is same or not. If it does not change, use a larger capacity motor and driver.
	Velocity loop gain is proportion action at motor in stall.	<ul style="list-style-type: none"> <li>• Set up Pr12 and Pr1A of time constant of velocity loop integration to 999 or smaller.</li> <li>• Review the wiring and connection so that the connection between Pin-27 and 41 of the gain switching input connector, CN X5 becomes off while you set up Pr30 of 2nd gain setup, to 1.</li> </ul>
<b>Wiring</b>	Each input signal of CN X5 is chattering. 1) Servo-ON signal  2) Deviation counter clear input signal  3) CW/CCW torque limit input signal  4) Command pulse inhibition input	1) Check the wiring and connection between Pin29 and 41 of the connector, CN X5 using the display function of I/O signal status. Correct the wiring and connection so that the servo-On signal can be turned on normally. Review the controller. 2) Check the wiring and connection between Pin-30 and 41, 16 and 17 of the connector, CN X5 using display function of I/O signal status. Correct the wiring and connection so that the deviation counter clear input can be turned on normally. Review the controller. 3) Check the wiring and connection between Pin-18 and 17, 16 and 17 of the connector, CN X5 using tester or oscilloscope. Correct the wiring and connection so that CW/CCW torque limit input can be entered normally. 4) Check the wiring and connection between Pin-33 and 41 of the connector, CN X5 using display function of I/O signal status. Correct the wiring and connection so that the command pulse inhibition input can be entered normally. Review the controller.
<b>Installation</b>	Load inertia is large.	Check the overshoot at stopping with graphic function of the PANATERM®. If no improvement is obtained, increase the driver and motor capacity.

**Origin Point Slips**

Classification	Causes	Measures
<b>System</b>	Z-phase is not detected.	Check that the Z-phase matches to the center of proximity dog. Execute the homing matching to the controller correctly.
	Homing creep speed is fast	Lower the homing speed at origin proximity. Or widen the origin sensor.
<b>Wiring</b>	Chattering of proximity sensor (proximity dog sensor) output	Check the dog sensor input signal of the controller with oscilloscope. Review the wiring near to proximity dog and make a noise measure or reduce noise.
	Noise is on the encoder line.	Reduce noise (installation of noise filter or ferrite core), shield treatment of I/F cables, use of a twisted pair or separation of power and signal lines.
	No Z-phase signal output	Check the Z-phase signal with oscilloscope. Check that the Pin-13 of the connector, CN X5 is connected to the earth of the controller. Connect the earth of the controller because the open collector interface is not insulated. Replace the motor and driver. Request for repair.
	Miswiring of Z-phase output	Check the wiring to see only one side of the line driver is connected or not. Use a CZ output (open collector if the controller is not differential input).

**Abnormal Motor Noise or Vibration**

Classification	Causes	Measures
<b>Wiring</b>	Noise is on the speed command.	Measure the speed command inputs of Pin-14 and 15 of the connector, CN X5 with an oscilloscope. Reduce noise (installation of noise filter or ferrite core), shield treatment of I/F cables, use of a twisted pair, separation of power and signal lines.
<b>Adjustment</b>	Gain setup is large.	Lower the gain by setting up lower values to Pr11 and 19, of velocity loop gain and Pr10 and 18 of position loop gain.
<b>Installation</b>	Velocity detection filter is changed.	Enlarge the setup of Pr13 and 1B, velocity detection filter within the range where noise level is acceptable, or return to default value.
	Resonance of the machine and the motor.	Re-adjust Pr14 and 1C (Torque filter). Check if the machine resonance exists or not with frequency characteristics analyzing function of the PANATERM®. Set up the notch frequency to Pr1D or Pr28 if resonance exists.
	Motor bearing	Check the noise and vibration near the bearing of the motor while running the motor with no load. Replace the motor to check. Request for repair.
	Electro-magnetic sound, gear noise, rubbing noise at brake engagement, hub noise or rubbing noise of encoder	Check the noise of the motor while running the motor with no load. Replace the motor to check. Request for repair.

# Troubleshooting

## Overshoot/Undershoot

## Overheating of the Motor (Motor Burn-Out)

Classification	Causes	Measures
<b>Adjustment</b>	Gain adjustment is not proper.	Check with graphic function of PANATERM® or velocity monitor (SP) or torque monitor (IM). Make a correct gain adjustment. Refer to P.226 of Adjustment.
<b>Installation</b>	Load inertia is large.	Check with graphic function of PANATERM® or velocity monitor (SP) or torque monitor (IM). Make an appropriate adjustment. Increase the motor and driver capacity and lower the inertia ratio. Use a gear reducer.
	Looseness or slip of the machine	Review the mounting to the machine.
	Ambient temperature, environment	Lower the temperature with cooling fan if the ambient temperature exceeds the predications.
	Stall of cooling fan, dirt of fan ventilation duct	Check the cooling fans of the driver and the machine. Replace the driver fan or request for repair.
	Mismatching of the driver and the motor	Check the name plates of the driver and the motor. Select a correct combination of them referring to the instruction manual or catalogue.
	Failure of motor bearing	Check that the motor does not generate rumbling noise while turning it by hand after shutting off the power. Replace the motor and request for repair if the noise is heard.
	Electromagnetic brake is kept engaged (left un-released).	Check the voltage at brake terminals. Apply the power (DC24V) to release the brake.
	Motor failure (oil, water or others)	Avoid the installation place where the motor is subject to high temperature, humidity, oil, dust or iron particles.
	Motor has been turned by external force while dynamic brake has been engaged.	Check the running pattern, working condition and operating status, and inhibit the operation under the condition of the left.

## Motor Speed Does Not Reach to the Setup

## Motor Revolutions (Travel) Is Too Large or Small

Classification	Causes	Measures
<b>Parameter</b>	Velocity command input gain is not correct.	Check that the setup of Pr50, speed command input gain, is made so as to make the setup of 500 makes 3000 r/min.
<b>Adjustment</b>	Position loop gain is low.	Set up Pr10, position loop gain to approx. 100.
	Division/Multiplication is not proper.	Set up correct values to Pr48, 1st numerator of electronic gear, 4A, numerator multiplier of electronic gear and 4B, denominator of electronic gear. Refer to parameter setup at each mode.

## Parameter Returns to Previous Setup

Classification	Causes	Measures
<b>Parameter</b>	No writing to EEPROM has been carried out before turning off the power.	Refer to P.70, "How to Operate-EEPROM Writing" of Preparation.

## Display of "Communication port or driver cannot be detected" Appears on the Screen While Using the PANATERM®.

Classification	Causes	Measures
<b>Wiring</b>	Communication cable (for RS232C) is connected to the connector, CN X3.	Connect the communication cable (for RS232C) to connector, CN X4.