

PEDIII (PEDIII-h) CONTROLLER



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INTRODUCTION

Launched in the end of 1998, PEDIII & FEDIII generation three controllers have already obtained position and reputation of the best system for critical screw tightening control, with thousands of systems actually in operation throughout the world.

The state-of-the-art multiple feedback control technology of PEDIII & FEDIII guarantees reliable and efficient job of screw tightening control, regardless of joint characteristics and frictional differences, for any type of screw and for any type of work.

Many of control parameters and functions can be customized by use of Customizer software, to best suit any specific requirements or applications, without any hardware modification.

Model PEDIII and model PEDIII-h (equipped with High Speed control board) controllers, are both primarily designed for manual assembly applications and also for robotics applications requiring simple screw tightening control only.

For more versatile control of screw tightening and reversing, sister model FEDIII and FEDIII-h (equipped with High Speed control board) are available.

Model PEDIII (PEDIII-h) controller performs best when connected and used with any of model A family or S & M family drivers with memory on board, although previous version H series driver without the memory can also be connected and used together with.

MAIN FEATURES

- 1) **STATE-OF-THE-ART MULTIPLE FEEDBACK CONTROL**
Technart's state-of-the-art multiple feed back control technology makes best use of 32 bits RISC processor for real-time monitoring and control of screw tightening torque and process.
- 2) **RELIABLE CONTROL OF TIGHTENING TORQUE AND PROCESS**
PEDIII (PEDIII-h) monitors and controls motor current, motor voltage and motor rpm, to control screw tightening torque and process. It guarantees reliable repeatability of torque applied to screws, regardless of joint characteristics and frictional differences in actual applications.
- 3) **COMMUNICATION WITH DRIVER**
PEDIII (PEDIII-h), when powered on, automatically recognizes the connected driver and its individual mechanical characteristics. A particular matching of a controller and a driver does not need to be maintained.
- 4) **MEMORY FOR DRIVER TORQUE FAMILY DATA**
PEDIII (PEDIII-h) can contain three different data of driver torque family. When, for instance, PEDIII (PEDIII-h) contains torque family data of 3600/8500/12K, any of 3600, 8500 or 12K family driver can be connected and used with it right away, without any manipulation.
- 5) **DIGITAL TORQUE SETTING**
Set a tightening torque digitally, and all the rest are taken care by PEDIII (PEDIII-h) automatically, for best control of screw tightening at the torque for most applications.
- 6) **SELF-DIAGNOSTICS AND OVERHEAT PROTECTION**
PEDIII (PEDIII-h) protects herself from any damage caused by overheat due to repeated high load operations in too short an interval.
- 7) **COMPREHENSIVE ERROR MESSAGES**
Every part inside the system and every stages of screw tightening process are under comprehensive monitoring.
- 8) **TWO STANDARD INTERFACES**
Two interfaces are available in standard : a 24-pin photo-coupler interface and a serial RS-232C modular jack, for control and monitoring of the system from external PLC or PC.

9) CUSTOMIZING OF FUNCTIONS AND PARAMETERS

Many of functions and parameters can be customized, to best suit your specific applications, via RS-232C interface from Technart Customizer software running on your PC.

10) HIGH SPEED TIGHTENING CONTROL

Model PEDIII-h carries High Speed control board (standard specification for export) and provides high speed screw tightening, effective for most applications.

MODEL NUMBER CONFIGURATION

PEDIII-h AC220V 3600/8500/12K

POWER SUPPLY VOLTAGE RATING
AC100V, 110V, 115V, 220V, 230V or 240V

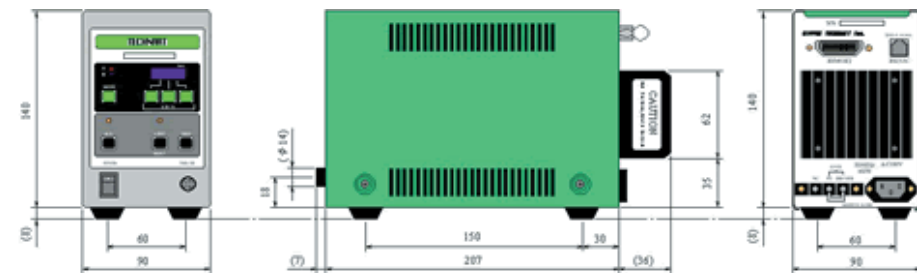
THREE TORQUE FAMILY NUMBER
PEDIII (PEDIII-h) can contain three different data of driver torque family.

CONTROLLER MODEL

PEDIII = without high speed board
 PEDIII-h = with high speed board (standard for export)
 PEDIII-h-d = with high speed board & dual torque setting facility
 PEDIII-h-z = with high speed board & torque-up signal

SPECIFICATION OUTLINE

- CONTROL PROCESSOR : 32-bit single chip RISC processor
- POWER SUPPLY RATING : AC100V, 110V, 115V, 220V, 230V or 240V
- FREQUENCY : 50/60 Hz
- POWER CONSUMPTION : 160 W
- INSULATION RESISTANCE : 10 Mega Ohm or more at 500V Mega
(between AC plug and controller frame)
- WITHSTANDING VOLTAGE : 1 second at AC1200V
(between AC plug and controller frame)
- POWER SUPPLY TO DRIVER : DC35V (rectified from AC35V)
- TORQUE RANGE : in accordance with torque family data
(see table below)
- FUSE : 1 Amp.
- AMBIENT TEMPERATURE : 0 to 50 deg. C
- AMBIENT HUMIDITY : 30 to 80 % RH (no condensation)
- WEIGHT : 3.2 kg
- OUTER DIMENSIONS : see below
- WARRANTY : 12 (twelve) months after delivery



TORQUE FAMILY NUMBER TABLE

TORQUE FAMILY NUMBER	1 2 0 0	2 2 0 0	3 6 0 0	8 5 0 0	1 2 K	1 5 K	2 0 K
TORQUE RANGE (kgf.cm)	0.3 - 1.2	0.6 - 2.2	1.0 - 3.6	2.0 - 8.5	3.0 - 12.0	4.0 - 15.0	5.0 - 20.0
SETTING TORQUE STEP (kgf.cm)	0.01	0.01	0.01	0.01	0.1	0.1	0.1

ACCURACY & REPEATABILITY

Accuracy and repeatability of driver's output torque powered by PEDIII (PEDIII-h) controller depends on the torque family of the driver as shown in the table below :

TORQUE FAMILY	ACCURACY	REPEATABILITY	
		AT MAX. TORQUE	AT MIN. TORQUE
1200	2 %	2.0 %	3.6 %
2200		7.5 %	7.5 %
3600		5.0 %	7.8 %
8500		7.5 %	9.0 %
12K		5.0 %	6.0 %
15K		8.0 %	10.0 %
20K		12.0 %	12.0 %

Definition of accuracy and repeatability adopted in the shipping test is as follows :

In the **ACCURACY** test, the controller is set to middle value of the setting torque range of the driver being tested. In case of the 8500 family driver, the setting torque value used for the test is 5.0 kgf.cm. The ACCURACY (unit : %) is then obtained from dividing average torque value of 50 times readings by setting torque value. It has to be within +/- 2 (two) percent to pass the test.

In the **REPEATABILITY** test, torque measurement is repeated 50 times for each setting torque of maximum, middle and minimum of the torque range of the driver being tested. In case of the 8500 family driver, tested torque settings are 8.5 kgf.cm, 5.0 kgf.cm and 2.0 kgf.cm.

The REPEATABILITY is then obtained from 3 x SIGMA (three sigma) divided by average torque value of 50 times readings (sigma : standard deviation).

When the repeatability turns out to be 10 percent, it means that the output torque goes within +/- 10 percent at the probability of more than 99.7 percent.

The **Technart method torque measurement** is used in the shipping test of ACCURACY and REPEATABILITY, as described below :

- 1) A square block (work-piece) with screw hole, made from stainless steel, is placed onto the socket of the torque meter.
- 2) A thin plastic sheet is placed between the square block and the socket of torque meter to eliminate any movement of the square block during measurement and also for the purpose of easy removal of the square block after usage.
- 3) The size of screw used in measurement is :
 M2 x 8 (Torx T6) for 0.5 to 2.4 kgf.cm
 M2.5 x 8 (Torx T8) for 2.5 to 3.9 kgf.cm
 M3 x 8 (Torx T10) for 4.0 to 10.9 kgf.cm
 M4 x 10 (Torx T20) for 11.0 to 20.9 kgf.cm
- 4) Ambient temperature for shipping test is 20 to 25 deg C.
- 5) Controller is turned on more than 30 minutes before measurement.
- 6) The same screw is used for 10 times measurements only. After 10 times measurements, it is exchanged with a new screw. It means that the 50 times measurements need 5 virgin screws.
- 7) A flat washer is used (simulation of hard joint).
- 8) After each measurement (each tightening), the tightened screw is reversed for next measurement.
 Also after each measurement (each tightening), the driver bit is taken out from screw and rotated by hand or by controller every time. The purpose of this manipulation is to change mechanical position of gear etc. inside the driver.

RPM SPEED OF DRIVER BIT

PEDIII (PEDIII-h) controller's multiple feedback technology monitors and controls motor current, motor voltage and motor rpm, in real-time, to control screw tightening process and torque, as outlined below :

- 1) Start signal is sent to the controller.
- 2) Voltage is applied to driver motor, and the motor starts rotating.
- 3) The motor rpm is monitored by encoder. If rpm is slow, higher voltage is applied. If rpm is fast, lower voltage is applied.
- 4) Screw seating is detected by monitoring of motor current.
- 5) After detection of screw seating, motor current is increased more and more, up to target current (=target torque).
- 6) After reaching target current (=target torque), the target current is held for 0.1 second (default) for stabilization of the torque.

During the whole process of screw tightening as above, the motor current to the driver motor is completely monitored and controlled. The motor current is equal to torque, and it can be said that the output torque is completely controlled, during the whole process of screw tightening, but except for one moment. That is the moment (instance) of screw seating, that is, the moment when the head of the screw being driven down hits the surface of work-piece and becomes seated.

When the head of the screw being driven down hits the surface of work-piece and becomes seated, the motor rotation, suddenly halted, causes impulsive force (= spike). How large the spike will be is determined by 1) total size of the mass comprised of motor, gear, shaft and bit, 2) rotation speed of motor and 3) joint characteristics.

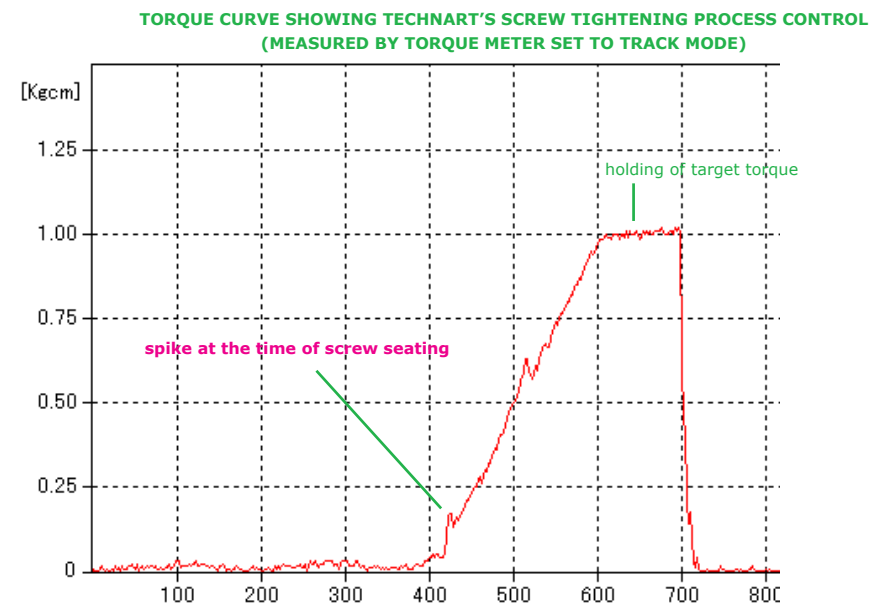
The factor 1) and 2) are known and are incorporated into control parameters, but the factor 3) is unknown as it is different in application by application.

In general, the harder the joint is, the larger the spike is.

The softer the joint is, the smaller the spike is.

The faster the rpm is, the larger the spike is.

The slower the rpm is, the smaller the spike is.



In the measurement of driver's output torque, by use of torque meter set to peak mode, the reading takes the height of the spike if it is higher than the holding torque (= target torque). The spike itself is, impulsive force of an instant, and it has little energy to rotate screw further after its seating, but the reading of the torque meter shows its peak height if it is higher than the holding torque.

The rpm speed of driver bit is one of parameters that can be customized (via Customizer software) within the range of the upper limit and the lower limit.

The upper limit represents the rpm speed any faster rpm than which may cause the spike higher than the target torque in peak height reading by the torque meter set to peak mode, when the joint characteristics is of the hardest conditions, as simulated by a flat washer only existing between screw head and stainless steel block placed into the socket of the torque meter.

In 12K, 15K and 20K family driver, part of the upper limit is determined by the output capacity limit of its motor and gear.

The upper limit and lower limit rpm set for each of torque family drivers is as shown in the graph below. In the graph, the x-axis shows setting torque, while the y-axis shows the rpm of the driver bit.

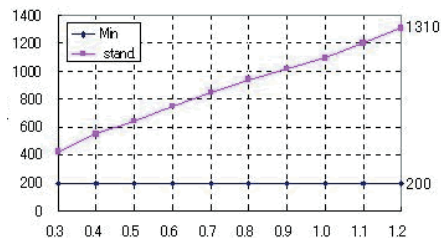
In the graph, HSO stands for High Speed, which is available when the driver is connected and used with PEDIII-h or FEDIII-h controller equipped with high speed control board (standard for export).

The High Speed control is effective for 3600 family or larger torque family driver only. It won't work for 1200 and 2200 family drivers.

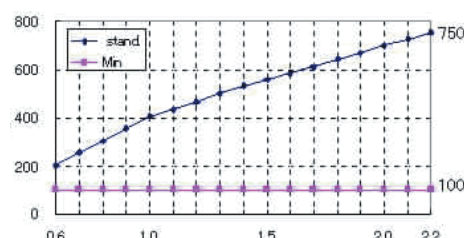
In the High Speed operation, detecting of screw seating is adjusted more sensitive and the brake is put on the motor upon detection of screw seating, to eliminate the risk of overtightening by the spike caused by inertia.

It has to be remembered that the rpm speed is always under the torque-sensitive control. When any load is detected, the rpm speed is adjusted accordingly in real-time. Shown in the graph below is the rpm speed when the driver motor is free from any load caused by friction between screw and screw hole etc..

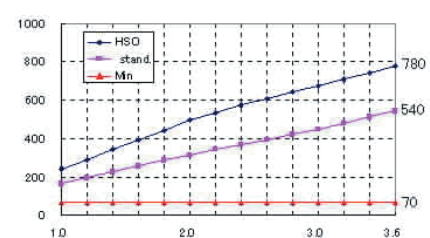
1200 family driver



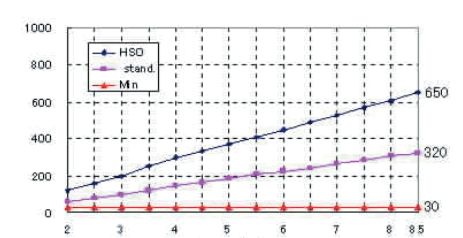
2200 family driver



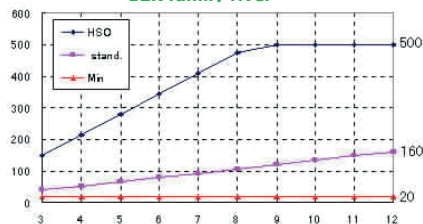
3600 family driver



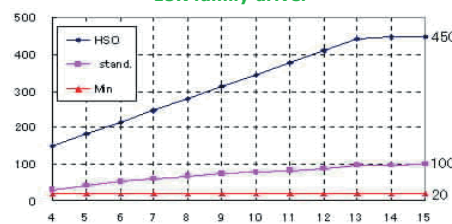
8500 family driver



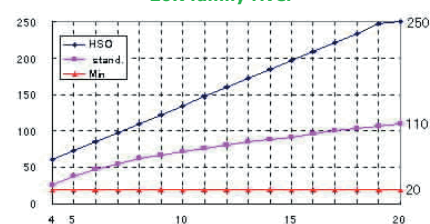
12K family driver



15K family driver



20K family driver



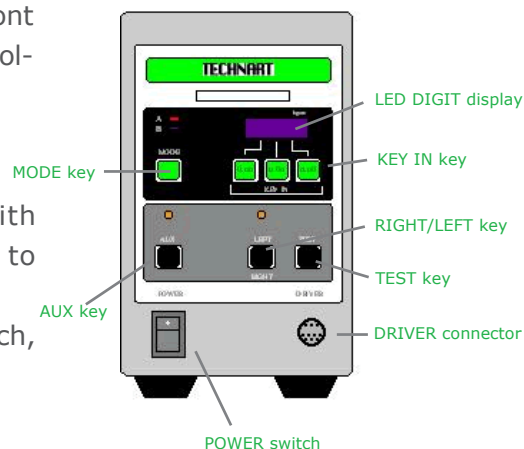
FRONT PANEL FACILITY

Illustrated on the right is the front panel of PEDIII (PEDIII-h) controller.

POWER switch

Press upper side (marked with white dot) of POWER switch, to turn on the controller.

Press lower side of POWER switch, to turn it off.



DRIVER connector

To the DRIVER connector, connect the connector of driver connection cable the other side of which is connected to the driver.

AUX key

In default specification, the LED of AUX key is usually off and the PEDIII (PEDIII-h) controller is in manual operation mode. Driver activation is by switch lever of model S & M family driver or by TEST key in the PEDIII (PEDIII-h) front panel.

When the controller is set to AUTO START mode via Customizer software, the LED of AUX key turns on and the connected driver motor keeps running once powered on.

RIGHT/LEFT key

This is to select direction of driver bit rotation to be applied for screw tightening. RIGHT is for clockwise rotation for screw tightening. LEFT is for counterclockwise rotation for screw tightening. When RIGHT is selected, the LED is off. When LEFT is selected, the LED is on.

TEST key

Press TEST key to activate the connected driver.

Keep pressing it until torque is up and screw tightening is completed. If released off before completion of screw tightening, an error message number E12 or E13 (interruption of operation) is displayed in the LED digit display of the PEDIII (PEDIII-h) front panel.

MODE key

This is for selection of A mode or B mode.

A mode and B mode can contain different set of control parameters each other. In default specification, A mode and B mode contain same default control parameters, and selection of A mode or B mode does not make any difference.

Different set of control parameters can be stored in A mode and in B mode, via Customizer software.

KEY IN key

Press KEY IN key to input tightening torque value digitally.

Each digit is independent. Digit display blinks when the input figure is out of effective torque range of the connected driver.

SCREW TIGHTENING MANUAL OPERATION

- 1) Connect PEDIII (PEDIII-h) controller with a driver by driver connection cable.
- 2) Turn on power supply by pressing POWER switch on the controller front panel.
First user code and then setting torque value is displayed in the LED 3-digit display on the controller front panel.
- 3) Make sure that the LED of AUX key is off. When the LED is off,

the controller is in manual operation mode, and the connected driver can be activated from switch lever of model S & M family driver, or from the TEST key on the controller front panel.

When the LED is on, the controller is in AUTO START mode and the connected driver's motor keeps running once powered on.

- 4) Make sure that the correct direction (RIGHT/LEFT) is selected for rotating direction for screw tightening.
When model S & M family driver is connected to the controller, also make sure that the FWD is selected in FWD/REV toggle switch located on the driver body.
- 5) Press the switch lever to start screw tightening, when model S & M family driver is used.
Press the TEST key on the controller front panel, when other type of driver is used.
Hold the switch lever or the TEST key pressed down firmly until torque-up and completion of screw tightening.
If released off before the completion of screw tightening, an error message number E12 or E13 will be displayed in the LED digit display on the controller front panel.

SCREW REVERSING MANUAL OPERATION

PEDIII (PEDIII-h) controller itself does not have screw reversing mode. When, however, connected and used with model S & M family driver designed for handheld operation purpose, screw reversing operation becomes available on hand, by selecting REV of FWD/REV toggle switch on the driver body.

- 1) Select REV of FWD/REV toggle switch on the driver body of S & M family driver.
- 2) Start screw reversing, by pressing down switch lever of the driver.

Driver motor keeps rotating during the switch lever is pressed on, and stops when released off.

- 3) An error message number E32 (time-over for reversing) will be displayed in the LED digit display on the controller front panel, when the screw could not be reversed.

GENERAL NOTE ON MANUAL SETTING

- 1) When PEDIII (PEDIII-h) is in manual operation mode, the LED of AUX key on its front panel is off, and the controller can be manipulated manually.
When PEDIII (PEDIII-h) is in AUTO START mode, the LED of AUX key is on, and the driver motor keeps running once powered on.
- 2) By RIGHT/LEFT key, the direction (clockwise or counterclockwise) can be selected, of the driver motor rotation to be applied to screw tightening. Clockwise rotation is more popular and the LED is off when the RIGHT is selected.
- 3) Tightening torque setting is by KEY IN keys. The figure goes up by pressing it. Each digit is independent each other. The figure shown in LED digit display blinks when the value goes out of effective torque range of the connected driver.
- 4) MODE key is for selection of A mode or B mode.
A mode and B mode can contain different set of control parameters each other, such as different rpm speed, different holding time etc. via Customizer software.
In default specification, A mode and B mode contain same set of control parameters, and selection of A mode or B mode does not make any difference.
- 5) Default operation mode of PEDIII (PEDIII-h) is manual.
It can, however, be controlled remotely from your PLC etc., via 24-pin photo-coupler interface or RS-232C serial interface, both

equipped in standard. During the remote control, all keys on the controller front panel except power switch are invalidated. When model S and M family driver is connected, its switch lever is also invalidated.

- 6) The rpm speed of the driver bit will be displayed in LED digit display when AUX key is pressed during driver motor rotation. The displayed rpm is approximate.

OVERHEAT PROTECTION

PEDIII (PEDIII-h) controller is protected by the following two arrangements, against possible damage due to the overheat caused by repeated operations at too short an interval.

MONITORING OF TEMPERATURE BY THERMOSTAT SENSOR

A thermostat sensor inside the controller monitors the inside temperature. When overheat is detected, the controller stops operation, displays an error message number E51 and outputs an ALARM signal. During the error, do not operate the driver anymore. The controller recovers from the error automatically after the inside temperature goes down below the upper limit temperature. Typically, it will take about 3 (three) minutes for the recovery, at ambient temperature of 25 deg. C.

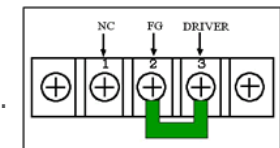
RESTRICTION OF REPEATED OPERATIONS AT TOO SHORT AN INTERVAL

When screw tightening operation has been repeated at too short an interval of more than 10 (ten) times within 10 (ten) seconds, the controller stops operation, displays an error message number E52 and outputs an ALARM signal. This is precaution against sudden overheat that may not be detected by the thermostat sensor. During the error, operation is prohibited. The controller recovers from the error automatically after one minute and will accept START signal again.

GROUNDING SYSTEM

PEDIII (PEDIII-h) controller adopts the advanced grounding system, applicable for most critical ESD sensitive environments. In the grounding system, the controller frame grounding line is configured independent and separated internally from the grounding line of the connected driver.

A connection terminal block for grounding is located at the back of the controller, as shown below :



- Pin No. 1 - NC is not used.
- Pin No. 2 - FG is for controller frame grounding.
- Pin No. 3 - DRIVER is for driver bit grounding.

Pin No. 2 is connected with Pin No. 3, by a short bar, in default specification. Take it off when the controller frame grounding shall be independent and separated from the driver grounding.

A combination of PEDIII (PEDIII-h) controller and model AG, SG or MG family driver equipped with continuous bit grounding mechanism, will provide the best solution for most critical ESD sensitive environments.

ERROR MESSAGE

PEDIII (PEDIII-h) controller issues an ERROR MESSAGE when the operation has not been completed successfully.

When an error takes place :

- 1) An ERROR MESSAGE NUMBER is displayed in the LED digit display of the controller.
- 2) An ALARM signal is output via the 24-pin photo-coupler interface located at the back of the controller.
- 3) A negative answer-back with ERROR MESSAGE NUMBER information is output via RS-232C interface located at the back of the controller.

Meaning of each ERROR MESSAGE NUMBER is as below :

ERROR RELATED TO SCREW TIGHTENING (automatic recovery)

E11 out of effective torque range

The tightening torque is out of the effective torque range of the connected driver.

E12 interruption of screw tightening before screw seating

The screw tightening was interrupted before screw seating detection.

E13 interruption of screw tightening after screw seating

The screw tightening was interrupted after screw seating, before torque-up and completion of screw tightening.

E14 screw seating at speed without torque control

Screw seating was detected while at high speed without torque control (High Speed For Auto M/C)

E15 screw head damage

The driver motor rotated during holding of target torque.

E21 too fast screw seating

Screw seating was detected before T1 min. setting.

E22 overtime for screw seating

No screw seating was detected before T1 max. setting.

E23 too fast torque-up after screw seating

Torque-up was detected after screw seating, before T2 min. setting.

E24 overtime for torque-up after screw seating

No torque-up was detected after screw seating, before T2 max. setting.

E25 too fast completion

Tightening was completed before T3 min. setting.

E26 overtime for completion

Tightening was not completed before T3 max. setting.

E27 little rotation before screw seating

Screw seating was detected before rotation of less than A1 min. setting.

E28 over rotation before screw seating

No screw seating was detected before rotation of A1 max. setting.

ERROR RELATED TO OPERATIONAL CONDITIONS (automatic recovery)

E51 too high temperature (overheat)

Too high temperature was detected inside the controller. It is automatically recovered once the temperature is down.

E52 operations at too short an interval

Screw tightening was repeated at too short an interval of more than 10 times within 10 seconds. It is automatically recovered one minute later.

REMARK on E51 & E52 :

When PEDIII (PEDIII-h) is in AUTO mode, the controller stays in NOT READY before above error is recovered. Any START signal

won't be accepted before the recovery from the error.

ERROR RELATED TO DRIVER & CONTROLLER FRONT PANEL

E61 motor lock

No feedback signal is received from motor encoder at all after driver motor activation.

E62 no torque family data for driver

Torque family data was not found corresponding to the connected driver.

E63 no driver

No driver is connected to the controller.

E65 front panel data error

Writing of front panel data into EEPROM was failed.

REMARK on E61 :

If E61 was issued in spite that the screw should be driven with little torque before screw seating, most feasibly the driver may be defective.

REMARK on E62 & E63 :

If E62 or E63 was issued, first check the model of the connected driver and also the connection itself if properly connected.

If the connected driver is right and is connected properly, turn the controller off and turn it powered on again.

REMARK on E65 :

If E65 was issued, first check the rating of power supply to the controller. If correct, turn the controller off and turn it powered on again.

ERROR RELATED TO FATAL HARDWARE MALFUNCTION

E71 controller hardware error

Error was found in backup data in the controller.

E72 driver hardware error

Error was found in backup data in the driver.

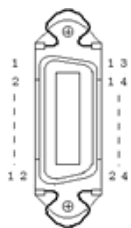
REMARK on E71 & E72 :

If E71 or E72 was issued, it is related to fatal hardware malfunction either in the controller or in the connected driver.

Contact the authorized distributor in your area.

24-PIN PHOTO-COUPLER INTERFACE

PEDIII (PEDIII-h) controller is, in standard, equipped with a 24-pin photo-coupler interface, located at the back of the controller. Your external PLC can control the operation via the interface.



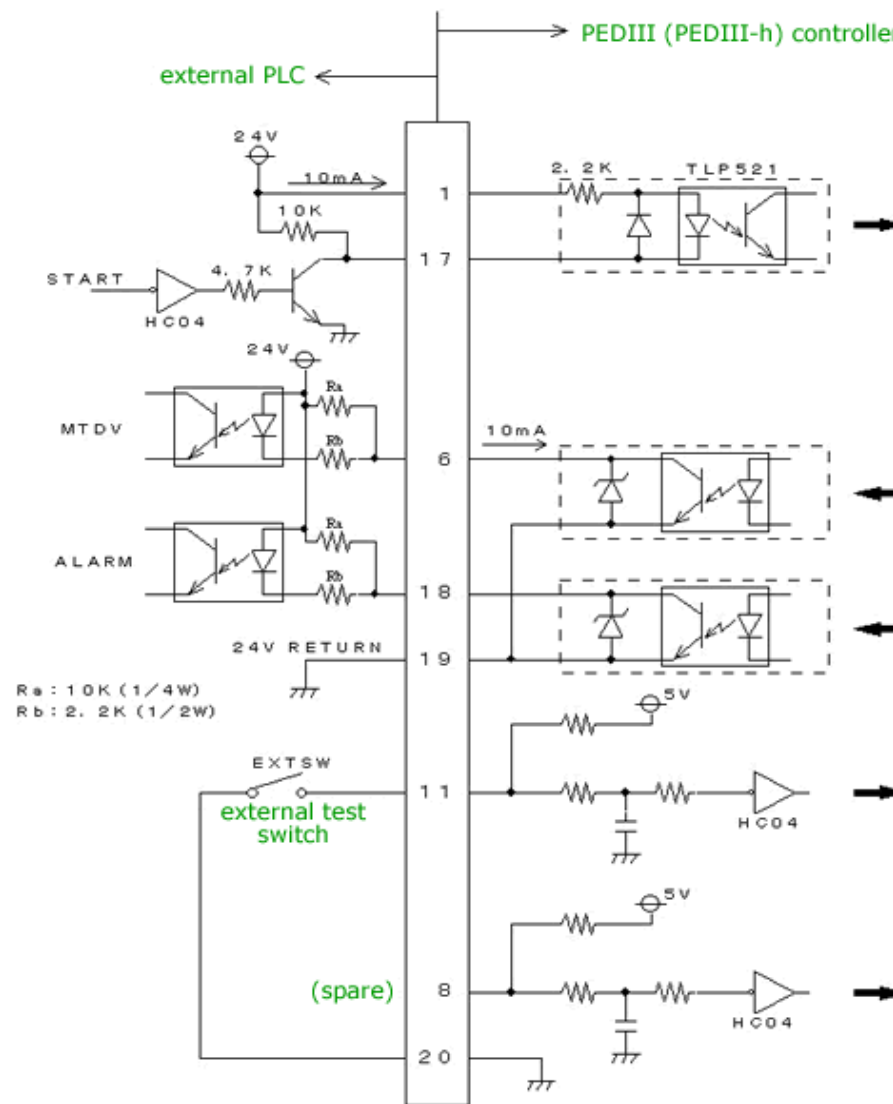
controller side connector :
DDK 57FE-40240-20S or equivalent
connection cable side connector :
DDK 54-30240 or equivalent

The interface configuration is different depending on the model :

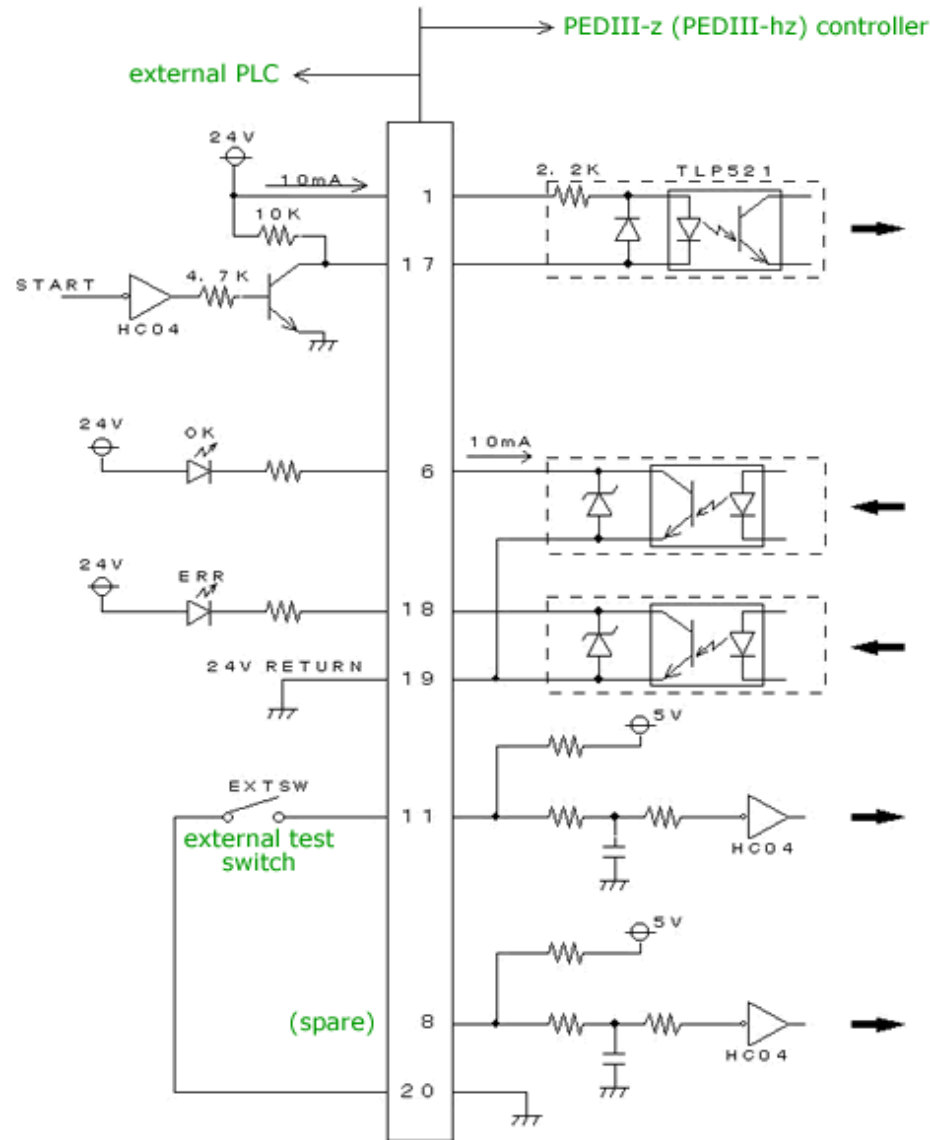
- 1) PEDIII & PEDIII-h standard model
- 2) PEDIII-z & PEDIII-h-z with OK output for connection to external buzzer etc.
- 3) PEDIII-d & PEDIII-h-d with dual torque setting facility

For the interface configuration, see the diagram on the right and on the next page :

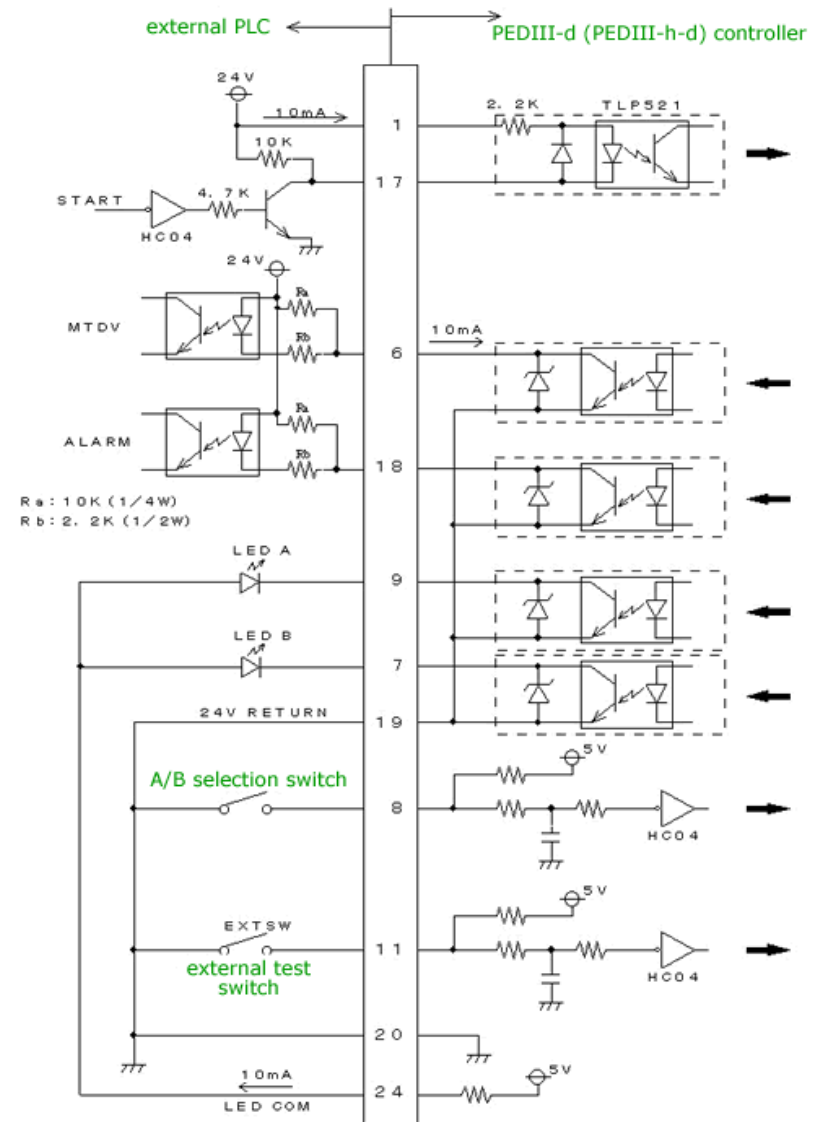
PEDIII & PEDIII-h INTERFACE DIAGRAM



PEDIII-z & PEDIII-h-z INTERFACE DIAGRAM



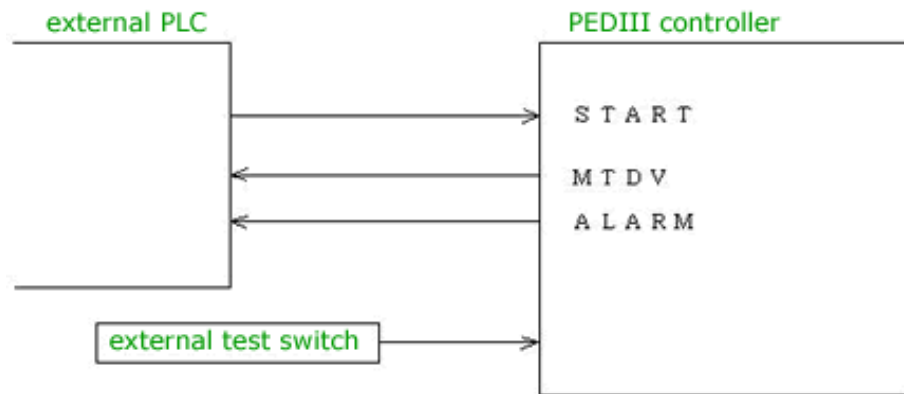
PEDIII-d & PEDIII-h-d INTERFACE DIAGRAM



REMOTE CONTROL VIA 24-PIN PHOTO-COUPLER INTERFACE

Your external PLC can control the operation via the 24-pin photo-coupler interface located at the back of PEDIII (PEDIII-h) controller.

The outline of control signals for remote control of PEDIII (PEDIII-h) is as illustrated below :



The **START** signal from your external PLC activates the operation of PEDIII (PEDIII-h) controller.

The chattering of 10 (ten) milliseconds shall be applied.

The **MTDV** signal is turned on during the driver motor is in operation.

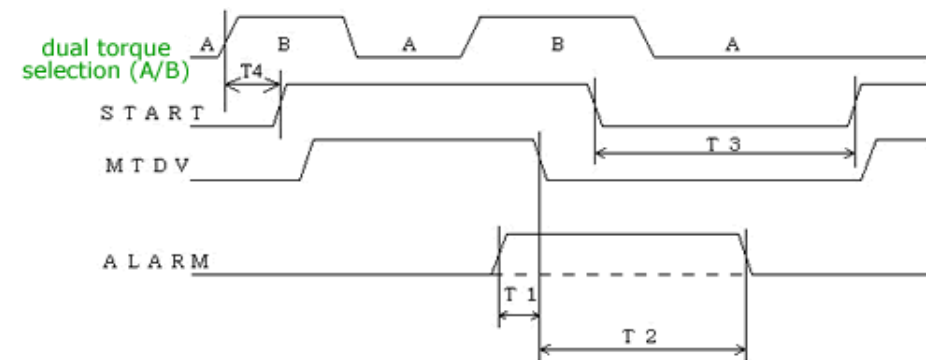
The **ALARM** signal is turned on when any error took place during operation.

The **external test switch** (connected to foot switch etc.) can also activate the operation of PEDIII (PEDIII-h) controller.

REMARK on model PEDIII-z & PEDIII-h-z :

In model PEDIII-z and PEDIII-h-z with OK/NOT OK signal, the MTDV signal is replaced by OK (torque-up) signal, and also the ALARM signal is replaced by NOT OK (error) signal, for connection to external buzzer, pilot lamp etc..

The timing for remote control signal is as shown in the chart below :



T1 : minimum 1 milliseconds

T2 : typically 300 milliseconds

T3 : minimum 10 milliseconds

T4 : minimum 10 milliseconds

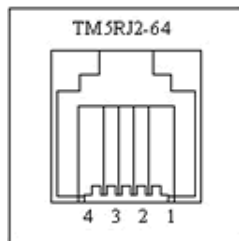
NOTE :

The START signal can be sent to PEDIII (PEDIII-h) even during the ALARM signal is still on, but the minimum 1 (one) second of cycle time waiting is recommended to prevent possible over-heat.

RS-232C INTERFACE

PEDIII (PEDIII-h) controller is, in standard, equipped with a 4-pin modular jack connector as RS-232C serial interface, located at the back of the controller. The RS-232C serial interface may be used for :

- 1) communication with Customizer software for customizing of control parameters and functions
- 2) remote control and monitoring of controller operation

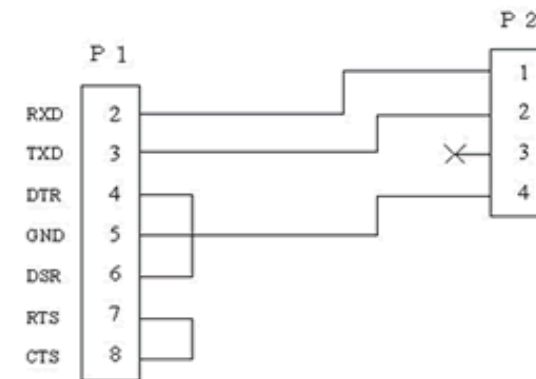
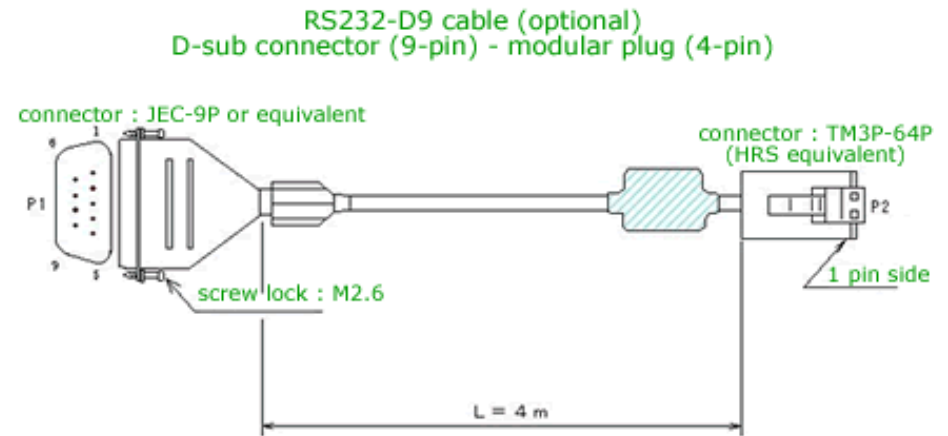


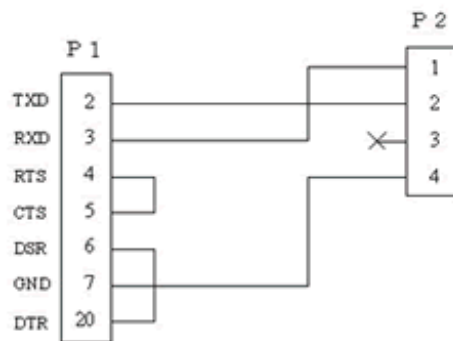
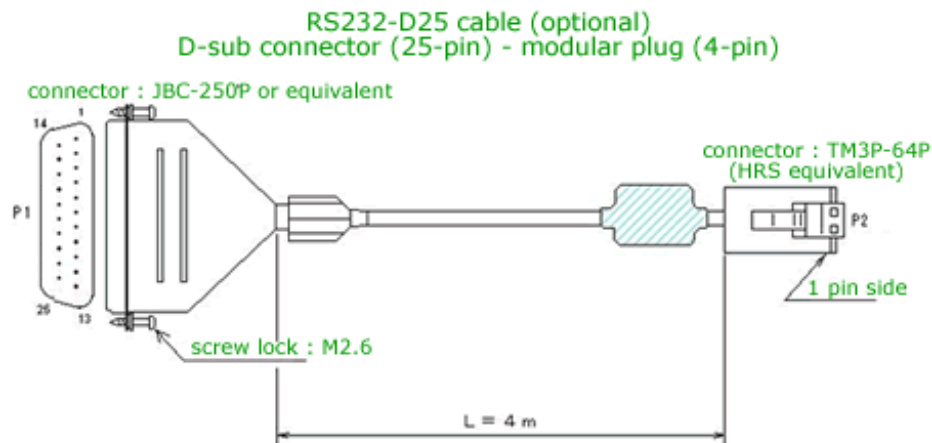
controller side connector : TM5RJ2-64
 cable side connector : TM3P-64P or equivalent

PIN NO.	SIGNAL	DIRECTION	REMARK
1	TX0	OUT	OUTPUT DATA
2	RX0	IN	INPUT DATA
3	NC		NOT USED
4	GND		GROUNDING

The RS-232C connection cable for connection between PEDIII (PEDIII-h) controller and your PC etc. is optional.

Two types of connection cables are available : order ref. RS232-D9 (with 9-pin D-cub connector) and ref. RS232-D25 (with 25-pin D-sub connector), as shown on the right and on the next page :





RS-232C COMMUNICATION

PEDIII (PEDIII-h) controller can be controlled and monitored remotely via RS-232C serial interface.

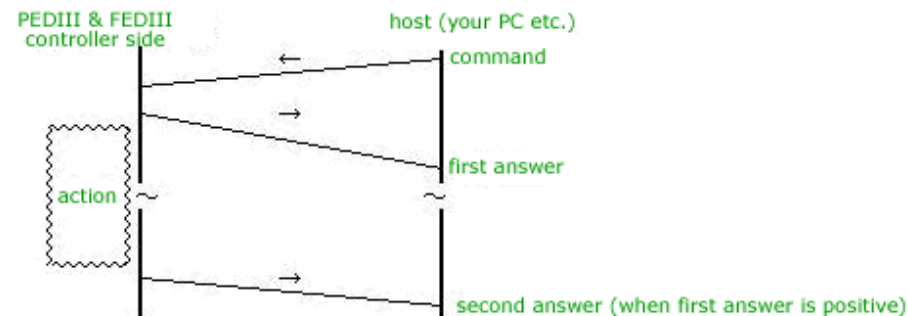
COMMUNICATION PROTOCOL

Baud Rate : 9600 bps
Stop Bit : 1 (one) bit
Byte Size : 8 (eight) bits
Parity Check : none

COMMUNICATION OUTLINE

The communication between HOST (your PC etc.) and PEDIII (PEDIII-h) controller takes the course of :

- 1) The HOST sends a command to PEDIII (PEDIII-h).
- 2) PEDIII (PEDIII-h) returns the first answer-back confirming receipt of the command.
- 3) PEDIII (PEDIII-h) returns the second answer-back confirming completion of the command (when the first answer-back is positive).



COMMAND STRUCTURE

A command signal to PEDIII (PEDIII-h) takes the structure of :

STX + "CMD" + "LEN" + "parameter" + ETX + BCC

STX and **"parameter"** : ASCII code
(exclusive OR is **BCC**)

CMD : one byte command

LEN : 2 (two) bytes number of characters
between **STX** and **ETX**

example : STX + "Q" + "LEN" + ETX + BCC
(02) (51) (30, 33) (04) (52)

answer back (positive) : ACK + "code" + EOT + BCC
answer back (negative) : NAK + "code" + EOT + BCC

"code" : 3 bytes (exclusive OR is **BCC**)

COMMAND TO PEDIII (PEDIII-h)

B compulsory stop

STX + "B" + "LEN" + ETX + BCC

First answer-back only is returned.

example : compulsory stop = "B03"

D data setting

STX + "D" + "LEN" + "xxx" + ETX + BCC

"xxx" = tightening torque value

example : set 0.98 kg = "D06098"

G start operation at existing data setting

STX + "G" + "LEN" + ETX + BCC

example : start operation at current setting = "G03"

M change mode

STX + "M" + "LEN" + "xx" + ETX + BCC

"Nx" = A/B mode : 0 = A, 1 = B

"xN" = LEFT/RIGHT : 0 = RIGHT, 1 = LEFT

example : change to B mode = "M051-"

change to RIGHT = "M05-1"

change to A mode and to LEFT = "M0500"

NOTE : "-" can be any value.

Q query

STX + "Q" + "LEN" + ETX + BCC

First answer-back only is returned.

example : query = "Q03"

FIRST ANSWER-BACK FROM PEDIII (PEDIII-h)

ACK positive

The command was received and will be executed.

ACK + CMD + "0" + "0" + EOT + BCC

NAK negative

during operation : NAK + CMD + "0" + "1" + EOT + BCC

incorrect format : NAK + CMD + "0" + "A" + EOT + BCC

invalid parameter :

NAK + CMD + "0" + "B" + EOT + BCC

SECOND ANSWER-BACK FROM PEDIII (PEDIII-h)

ACK positive

The command was completed successfully.

ACK + CMD + "0" + "9" + EOT + BCC

NAK negative

The command was not completed successfully (error).

NAK + CMD + N1 + N2 + EOT + BCC

NOTE : N1 & N2 = error message number in ASCII code

(N1 = upper digit, N2 = lower digit)

CONTROL PARAMETERS & FUNCTIONS

Control parameters and functions of PEDIII (PEDIII-h) controller are, in default specifications, optimized to cover most of screw tightening applications. Should different setting of parameters and functions be required to suit your specific applications, use Customizer software to customize those parameters and functions.

Default setting and adjustable range or alternative function for each parameter or function is as listed below :

PARAMETER	DEFAULT	ADJUSTABLE RANGE
Output Torque Adjust (OTA)	0 %	+/- 6 %
holding time of target torque	100 mSec.	0 to 200 mSec.
rpm decrease	0 rpm	see PAGE -5
screw binding release	off	on/off
waiting time Tw for screw binding release	50 mSec.	20 - 999 mSec.
torque H for screw binding release	30 %	10 to 90 %
time Tr for screw binding release	60 mSec.	0 to 999 mSec.
slow start	off	on/off
LED function	on when error	on when OK on when OK and blink when error on when error not used
LED brightness	light	light/dark
LED duration of time for ON/blink	1.0 Sec.	0.1 to 99.9 Sec.
auto off of error message number display	on	on/off
duration of time for on of error message	1.5 sec.	0.01 to 9.99 Sec.
auto off of OK display	on	on/off
duration of time for on of OK display	0.6 Sec.	0.01 to 9.99 Sec.
no activation after error	0.00 Sec.	0.00 to 9.99 Sec.
no activation after OK	0.00 Sec.	0.01 to 9.99 Sec.
start mode when powered on	retrieve last setting	AUTO mode MANU mode retrieve last setting
switch lever trigger	on	on/off
error when screw rotated during holding	360 deg.	30 to 1,440 deg.
T1 time min. (start to screw seating)	0.00 Sec.	0.00 to 60.00 Sec.
T1 time max. (start to screw seating)	0.00 Sec.	0.00 to 60.00 Sec.
T2 time min. (screw seating to end)	0.00 Sec.	0.00 to 60.00 Sec.
T2 time max. (screw seating to end)	0.00 Sec.	0.00 to 60.00 Sec.
T3 time min. (start to end)	0.00 Sec.	0.00 to 60.00 Sec.
T3 time max. (start to end)	0.00 Sec.	0.00 to 60.00 Sec.
A1 angle min. (start to screw seating)	0 deg.	15 to 9,990 deg.
A1 angle max. (start to screw seating)	0 deg.	15 to 9,990 deg.
RS-232C timer	20 Sec.	0 to 120 Sec.

STANDARD SUPPLY SCOPE

When a PEDIII (PEDIII-h) controller is ordered, the standard supply scope is as listed below unless otherwise ordered. They are contained and delivered in a carton box of W 30 x D 15 x H 19 cm. :

- 1 pc of controller of ordered model
- 1 pc of power supply connection cable

A driver to be used with the controller shall be ordered separately. Any connection cable for remote control is not included in the shipment.

Specification and operational instruction in English (this document) is not included in the shipment.

Request a copy of the latest edition document to the authorized distributor in your area you are purchasing Technart controller from, and a PDF document or its printout copy will be provided upon request.

Technart Customzier software is not included in the shipment. Request a copy to the authorized distributor in your area you are purchasing Technart controller from, and a latest version software will be provided upon request.

GENERAL INSTRUCTIONS

- 1) Apply to the controller stable power supply of within +/- 10% from the rating.
- 2) Avoid repeated screw tightening operations in too short an interval. If screw tightening at maximum torque of the driver is repeated in short an interval of less than 5 (five) seconds, the driver may be damaged due to the overheat of its motor. Stop operation when noticed the overheat of the driver motor.
- 3) Do not operate the controller outdoors, as it is neither water-proof or dustproof.
- 4) Higher torque of the driver's torque range provides faster rpm and also better repeatability of output torque. Choose the best torque family driver accordingly, to obtain the best performance.
- 5) The setting torque value displayed in the LED digit display of the controller is for setting purpose only. It is not the reading of actual measurement of the driver's output torque. When the most critical torque setting is required, measure the actual output torque of the driver by calibrated torque meter and adjust the torque setting on the controller accordingly.
- 6) The controller won't require and is not designed for, any calibration.
- 7) A particular matching of a controller and a driver needs not to be maintained, when model A family or model S & M family driver with memory on board is used.
- 8) Do not disassemble the controller by yourself. Contact the authorized distributor in your area when repair is required.

ABOUT THIS DOCUMENT

This document is a part of ALL ABOUT TECHNART - the complete technical information in English on Technart Electric Torque Driver System.

ALL ABOUT TECHNART is prepared by KYOSO CO., LTD. in Japan, for global export marketing and distribution of the products, on behalf of and with full support by the manufacturer, NIPPON TECHNART, INC. in Japan.

For any further information on the products, either technical or commercial, please contact the authorized distributor in your area, or contact us directly :

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