ESTIC

SERVO NUTRUNNER SYSTEM

First Stage Setup 3 ID 5 CH12

Mon.Func.	OFF	Seizing Section
Mon.StartANG	400	deg
Mon.ANG	360	deg
Mon.Fil.ANG	2	deg
Mon.UpperTRQ	5.5	N.m
Mon.LowerTRQ	0.5	N.m
Stall Time	1.5	sec

ESTIC

01L01

MODE SEL ▲ ▼ SET

POWER   ALM   NG OK

L1C
L2C
L1
L2
L3

CHARGE

AXIS CONTROL UNIT
Model ENRZ-AU40-10
Source 1P 200-230VAC 50/60Hz
Rated Input 2.0A/0.4kVA
Output 100W
Ser. No. 612460
ESTIC CORPORATION
OSAKA JAPAN   Made in Japan 2004

MOTOR

U
V
W

Create the future of craftmanship with us

The keywords are "Accurate", "Electric", and "Intelligent".

ESTIC provides solutions based on accumulated know-how
and technology for all kinds of joint issue.

DATA LOGGER SYSTEM

New Generation of Nutrunner System

User friendly HMI (Application Software)
Variety of tool application
Maintainability
Less downtime

SERVO NUTRUNNER SYSTEM

Offer a wide range of technology from easy hand tools to auto station with auto feeding system

SERVO HAND NUTRUNNER SYSTEM

FASTENING SYSTEM

New Generation of AC Handheld Nutrunner Handy 1000 series

Realize high accuracy Nutrunner fastening in a compact hand tool!!
Reduce reaction force by "Pulse Mode" substantially
(Refer to the catalogue in detail)

Special Features of the Servo Nutrunner System

As customer's applications become smaller and more difficult, fastening strategy become more complicated and diversfied. This is the Nutrunner that provides the soluion.

Tool Unit specification and selection

Tool unit model	Fastening capacity (Nm)	Suitable fastening range (Nm)	Max. speed (rpm)	Control unit model	Main power supply capacity (at the time of rated operation)
ENRZ-TU001-S	10	1 10	1224	ENRZ-AU40-10	0.4kVA
ENRZ-TU001-O					
ENRZ-TU003-S	30	3 30	468		
ENRZ-TU003-O					
ENRZ-TU008-S	80	8 80	714	ENRZ-AU40-20	1.2kVA
ENRZ-TU008-O					
ENRZ-TU013-S	130	13 130	500		
ENRZ-TU013-O					
ENRZ-TU020-S	200	20 200	291		
ENRZ-TU020-O					
ENRZ-TU040-S	400	40 400	148		
ENRZ-TU060-S	600	60 600	113	ENRZ-AU40-40	1.7kVA
ENRZ-TU080-S	800	80 800	83		

1) "S" at the end of the model name indicates a straight type and "O" indicates an offset type. Please select according to the work shape.
2) Tool units marked with   also are available as a bent type. For details, please contact the person in charge at our company.
3) For use near the maximum tightening capacity, please select a model with a maximum use torque at least 10% larger under consideration of the duty cycle etc.
4) As the maximum tightening torque of the bent type is 20% lower than that of the standard type, this should be taken into consideration at the time of selection.

Features

1 | Compact & Lightweight Design

- Our new high-performance compact controller is only one-third the size ofour conventional product.
- Incorporates a compact, high-speed servomotor for a more compact tool unit.

2 | High-Speed Digital Processing

- Incorporates a 32-bit CPU for increased internal processing speed.
- Sequence program capability: 20 steps x 31 programs
- High-speed serial communication reduces wiring requirements and achieves high-capacity data communication.
- Optimum motor control improves fastening accuracy.
- Field network correspondence

3 | Easier Maintenance

- In the event of a malfunction, units can be replaced in as little as two minutes (our observations).
- The adoption of quick wiring methods and the concentration of all wiring connections on the front panel enhance ease-of-maintenance.
- The fastening history and system alarm history are memorized, which improves condition monitoring during maintenance.
- Higher download and upload speeds
- Built-in step synthesis torque curve function

4 | Excellent User Interface

- High-speed data communication makes it possible to display fastening results and maintenance requirements.
- The management software is compatible with Windows OS (Japanese, English).
  ①Windows 98
  ②Windows 98 SP1
  ③Windows 98 Second Edition
  ④Windows Me
  ⑤Windows NT4 (SP3)
  ⑥Windows 2000
  ⑦Windows XP

5 | Numerous Fastening Methods Included as Standard.

- Accommodates various fastening methods including torque, angle torque monitor, and yield method.
- Monitoring functions, such as torque rate assessment and zone assessment, detect abnormal fastening.

Nutrunner System Diagram

Master Control System

The Master Control System, with its simple-to-configure sequence program,easily accommodates multi-axis fastening without the need for complicated ladder program. What's more, it accommodates up to 31 channels of I/O data
through a serial connection to the PLC, which conserves wiring, reduces labor,and makes it possible to easily incorporate fastening history data into the PLCs.

Standard System

A simple I/O system structure can be created by using 1 axis/1 control system. In addition, a master link connecting up to 31 axes makes possible central control of channel switching and data processing.

PI/O

MASTER CONTROL UNIT
(ENRZ-MU40*)

PI/O

<PLC>

SI/O
RS-232C

Host network

FIELDBUS

FIELDBUS
I/F UNIT
(ENRZ-BU40*)

Power supply
DC24V

14

19

20   15

15

8

AXIS CONTROL UNIT
(ENRZ-AU40)   21

AXIS CONTROL UNIT
(ENRZ-AU40)

12

7   9

10   10

11

Control power supply
AC 200 V to 230 V
Single phase, 50/60 Hz

Drive power supply
AC 200 V to 230 V,
Three phases, 50/60 Hz

1 2 3

4 5 6

Max.
31 stations

Centronics printer

18

1 2 3

13

Serial printer

16

Z40 management software
(ENRZ-PC40*)

TOOL UNIT
(ENRZ-TU***-*)

TOOL UNIT
(ENRZ-TU***-*)

PC: Z40 management software
(ENRZ-PC40*)

16

17

(ENRZ-DP40*)

AU40 Axis Control Unit

Provides high-quality, high-accuracy fastening by means of a single axis controller developed exclusively for the Nutrunner.

Fastening history (2000)
System alarm history (50)
I/O control
RS-232C port (for PC communications and serial printer)

MU40 Master Control Unit

Multi-axis program control accommodating up to 31 axes accommodates varied fastening control.
What's more, the serial connection to the PLC reduces wiring needs.

Fastening sequences (20 steps x 31 programs)
Serial link control (Mitsubishi, Omron, Sharp)
System alarm history (50)
RS-232C port (PC communications)
Centro port (ESC/P printer)

MU40A	Mitsubishi
MU40D	Omron
MU40F	Sharp

DP40 Display Unit

Fastening result values and the torque wave can be easily verified on-site. Moreover, settings and input values can also be confirmed.

Result display/setting value input unit
Display of torque wave and fastening history
Color LCD
Select between Japanese-language & English-language display.

DP40J	Japanese-language version
DP40E	English-language version

Cable and Accessories

No.	Name	Length	Model
1	AU40 torque transducer cable	5[m]	ENRZ-CVTN2-050
		10[m]	ENRZ-CVTN2-100
		15[m]	ENRZ-CVTN2-150
		20[m]	ENRZ-CVTN2-200
2	AU40 motor cable	5[m]	ENRZ-CVMN2-050
		10[m]	ENRZ-CVMN2-100
		15[m]	ENRZ-CVMN2-150
		20[m]	ENRZ-CVMN2-200
3	Encoder cable	5[m]	ENRZ-CVEN-050
		10[m]	ENRZ-CVEN-100
		15[m]	ENRZ-CVEN-150
		20[m]	ENRZ-CVEN-200
4	Torque transducer relay cable	3[m]	ENRZ-CVTN-030
		6[m]	ENRZ-CVTN-060
		10[m]	ENRZ-CVTN-100
5	Motor relay cable	3[m]	ENRZ-CVMP-030
		6[m]	ENRZ-CVMP-060
		10[m]	ENRZ-CVMP-100
6	Encoder relay cable	3[m]	ENRZ-CVEP-030
		6[m]	ENRZ-CVEP-060
		10[m]	ENRZ-CVEP-100

No.	Name	Length	Model
7	AU40 NET cable	0.2[m]	ENRZ-CVNK2A-002
		1[m]	ENRZ-CVNK2A-010
		2[m]	ENRZ-CVNK2A-020
8	MU40 NET cable	0.3[m]	ENRZ-CVNK2M-003
		1[m]	ENRZ-CVNK2M-010
		2[m]	ENRZ-CVNK2M-020
9	AU40 NET termination resistor connector		ENRZ-CVST2

No.	Name	Length	Model
10	AU control connector (*1)		ENRZ-CNAU
11	AU40 power supply cable (*2)	3[m]	ENRZ-CVDC2-030
12	Check connector cable	3[m]	ENRZ-CVCK-030
13	Serial printer cable	3[m]	ENRZ-CVSP-030
		5[m]	ENRZ-CVSP-050
		10[m]	ENRZ-CVSP-100

No.	Name	Length	Model
14	MU control connector (*3)		ENRZ-CNMU
15	DC power supply cable (*2)	3[m]	ENRZ-CVDC-030
16	Serial communication cable	1.5[m]	ENRZ-CVSR-015
		5[m]	ENRZ-CVSR-050
		10[m]	ENRZ-CVSR-100
17	Display cable	3[m]	ENRZ-CVDP-030
		5[m]	ENRZ-CVDP-050
		10[m]	ENRZ-CVDP-100
		20[m]	ENRZ-CVDP-200
18	Printer connection cable	2[m]	ENRZ-CVPR-020
		6[m]	ENRZ-CVPR-060
19	PLC connection cable (*4)	3[m]	ENRZ-CVPL-030

No.	Name	Length	Model
20	BU connection cable	0.2[m]	ENRZ-CVBM-002
		1[m]	ENRZ-CVBM-010
		2[m]	ENRZ-CVBM-020

No.	Name	Length	Model
21	AU40 battery (*5)		ENRZ-BATT

*1: The connector is not a controller accessory.
   The connector is not wired to a cable.
*2: This is a controller accessory.
*3: The connector is an accessory of the controller.
   The connector is not wired to a cable.
*4: The connector on the PLC side is not an accessory.
*5: The battery is not an accessory.
   It is required for construction of a standard system.

PC40 Management Software

Windows-compatible management software allows for simple parameter setup and maintenance.

Result display/setting value input software
Display of torque wave and fastening history
Compatible with various operating systems (Win 98, ME, 2000, XP)
Select between Japanese-language &English-language display.
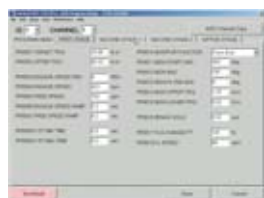
PC40J   Japanese-language version
PD40E   English-language version

BU40   Fieldbus I/F Unit   --Option--

Communicate and control through links to global networks.
Compatible with various wire-saving communications methods.

Fieldbus compatible
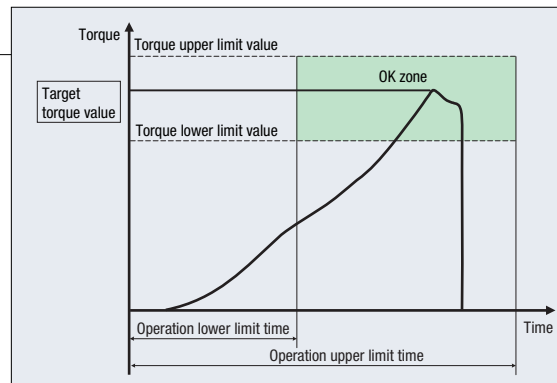DeviceNet / Profibus-DP

BU40D   DeviceNet
BU40P   Profibus-DP

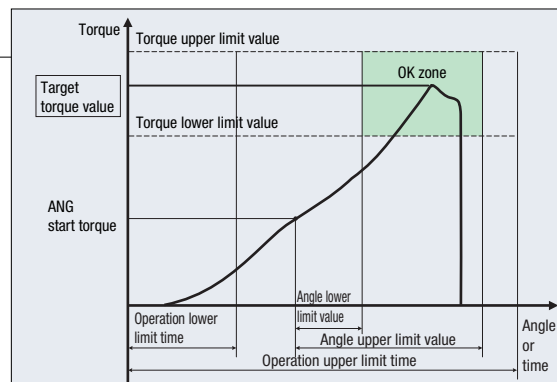# Six Fastening Strategy are available

Tightening system

1 | Torque Method

This fastening method is used widely, fastening is stopped when the fastening target torque set in advance has been reached, judgment is made if the peak torque is within the range of the set upper and lower limit or not, and OK or NG is put out with this method. With this system, total judgment is performed including upper and lower limit for the fastening time in addition to upper and lower limit for the torque.
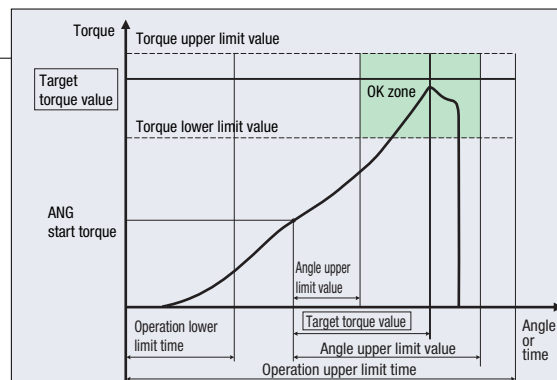
Torque

Torque upper limit value

OK zone

Target torque value

Torque lower limit value

Operation lower limit time

Time

Operation upper limit time

2 | Torque Method Angle Monitor

Basically, fastening is performed according to the torque method, and judgment is made with setting an upper and a lower limit for the angle in addition to an upper and a lower limit for the torque.

Torque

Torque upper limit value

OK zone

Target torque value

Torque lower limit value

ANG start torque

Angle lower limit value

Operation lower limit time

Angle upper limit value

Angle or time

Operation upper limit time

3 | Torque or Angle Method

Basically, this control method is similar to the torque method angle monitor, but the stop control condition for the target is effective for the target torque and the target angle, and the output axis is stopped when one of the target values is reached.

Torque

Torque upper limit value

Target torque value

OK zone

Torque lower limit value

ANG start torque

Angle upper limit value

Operation lower limit time

Target torque value

Angle or time

Angle upper limit value

Operation upper limit time

4 | Angle Method

With this fastening method, fastening is performed from an angle measuring start torque until an optionally set fastening target angle has been reached, fastening is stopped, judgment is made if angle and torque value are within the range between the set upper and lower limit, and OK or NG (for each value) is put out with this method.

Torque

Torque upper limit value

OK zone

Torque lower limit value

ANG start torque

Angle upper limit value

Operation lower limit time

Target torque value

Angle or time

Angle upper limit value

Operation upper limit time
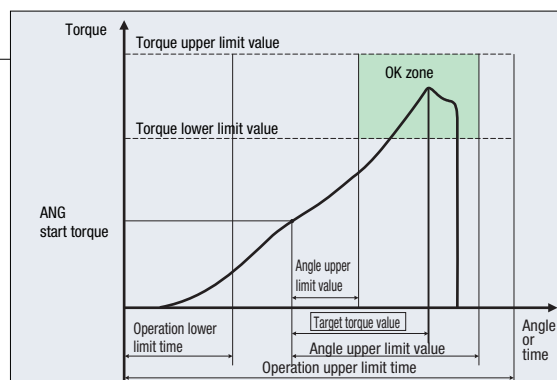
5 | Virtual Angle Method

This fastening method uses the fact that the relation between torque rise rate (torque rate) and bolt axial force rise rate is proportional when there are no unstable elements for friction and seating status, and it performs angle control on the basis of the torque rise rate.
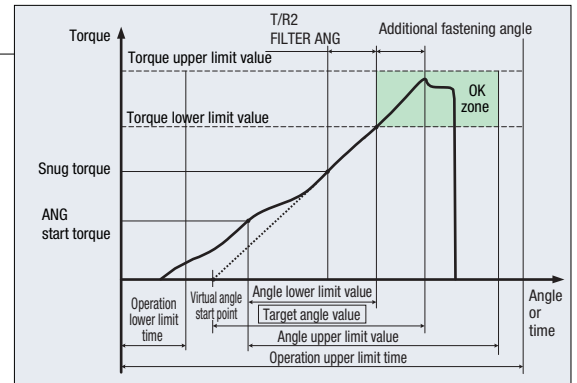
6 | Yield Method

This clamping method van obtain the maximum clamping force of a bolt. The bolt yield point is obtained from the torque rise rate (torque rate), additional fastening is performed from that point for a set angle, and fastening is completed in the initial plastic zone with this method.
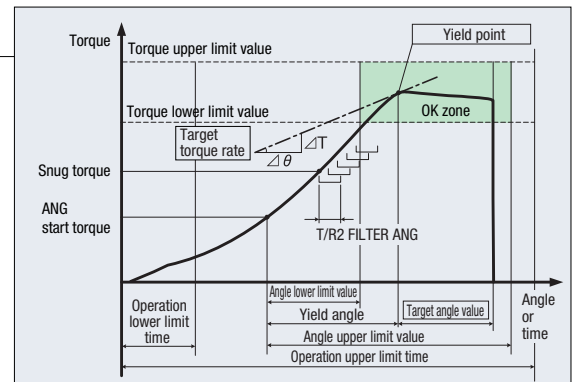
Fastening Theory

With bolt fastening, a fastening force is generated between the parts by application of fastening torque. With T as the fastening torque and N as the fastening force (axial force) generated between the parts, the relation becomes as shown below when the part and the fastened object are within the elastic limit.

As K changes according to the connection state with thread and bolt seat surface, there is considerable scatter even for bolts and tapping even with manufacture under the same conditions.

As shown in the figure on the left, when fastening to the target torque T with the torque method, the axial force of the bolt shows the scatter N1 because of the difference in the torque coefficient, even when the torque is constant. However, with the angle method fastening for the constant angle ø1 from the snag point, the scatter of the axial force becomes N2, which is smaller than with the torque method. When the fastening angle is made ø2 and fastening is performed to within the elastic range of the bolt, the scatter of the axial force becomes N3, which is still smaller. Accordingly, for execution of fastening without loosening, it is necessary to select the fastening method according to the fastening conditions for the object to be fastened and the conditions at the time of product design.

$T = KdN$ T = Torque(Nom) N = Axial force(N) K = Torque coefficient d = Nominal bolt diameter(m)

8
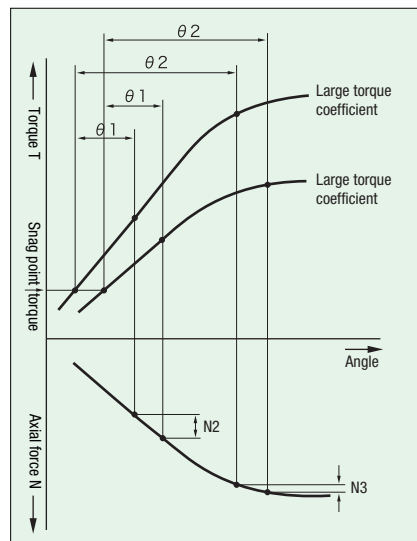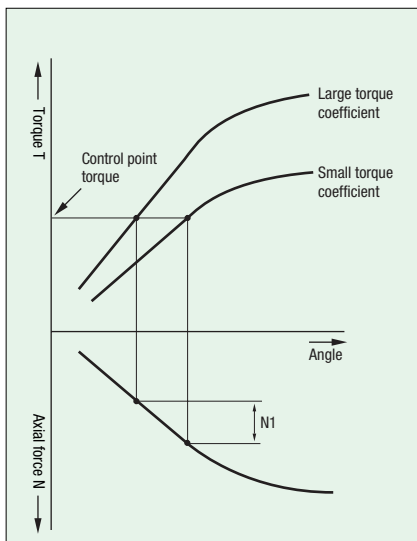
Caution Items at Time of Use

Allowable Spindle Load

The load acting onto the shaft part of the tool unit other than the fastening torque (reaction force) must be designed within the following.

Unit: N (kgf)

Model	Thrust/Radial load
ENRZ-TU001-S	98 10
ENRZ-TU001-O	98 10
ENRZ-TU003-S	98 10
ENRZ-TU003-O	98 10
ENRZ-TU008-S	196 20
ENRZ-TU008-O	147 15
ENRZ-TU013-S	196 20
ENRZ-TU013-O	147 15
ENRZ-TU020-S	294 30
ENRZ-TU020-O	147 15
ENRZ-TU040-S	294 30
ENRZ-TU060-S	294 30
ENRZ-TU080-S	294 30

(Thrust load and radial load are the same.)

Radial load (P) position   Thrust load direction
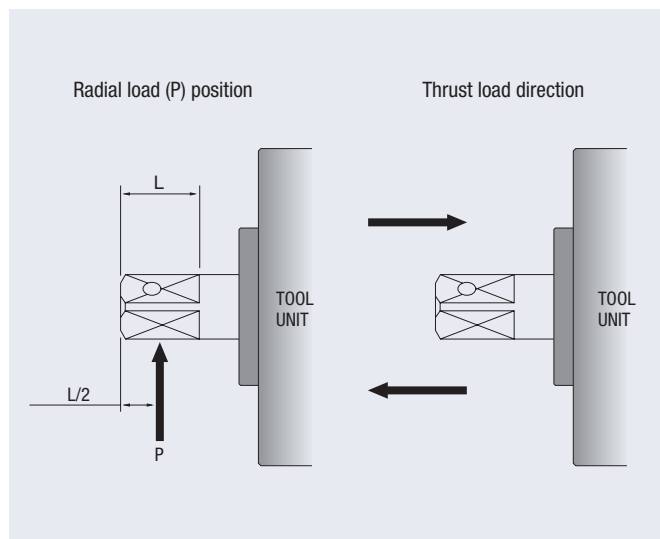
Installation of the Tool Unit

1) As this Nutrunner system is a mechanism for detection of the reaction force from the rotation torque of the output shaft to the unit body, care should be taken that the tool unit body has no mechanical contact.

Tool unit mounting bracket
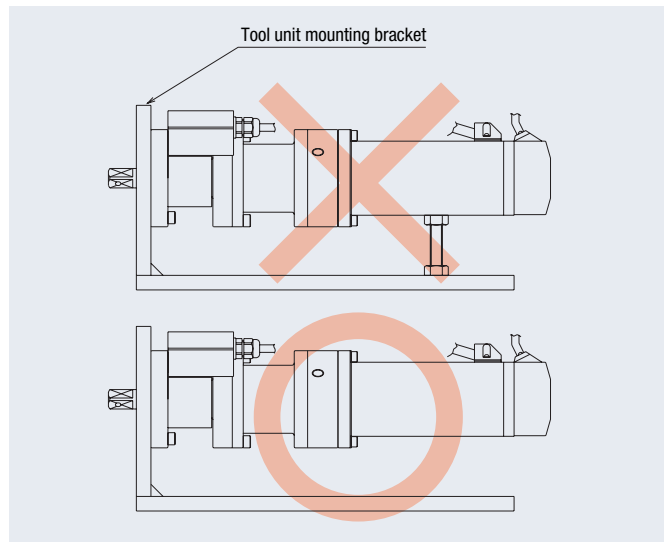
2) When the tool unit mounting bracket or the jig of the work to be fastened etc. moves because of the torque reaction force generated at the time of fastening, this causes scatter of the fastening accuracy. When the center deviation is large, an excessive force acts onto the shaft, and as this can cause shaft breakage, special care is required in regard to insufficient strength of the mounting bracket etc. and in regard to center deviation.

3) When the pitch between shafts is small in case of a multi-shaft installation, take care to prevent interference between tool units. (Normal torque measuring is not possible.)

4) When dry bushings etc. are used for bearings downstream from the Nutrunner output shaft, torque is lost by the dry bushing and it is to be feared that there will be a difference between the Nutrunner display value and the actual fastening torque. Use of dry bushings should be avoided as far as possible.

5) When the shaft pitch is narrow because of use of multiple spindles and gears etc. are inserted after the Nutrunner output shaft to correspond to the narrow space between shafts, the Nutrunner display value and the actual fastening torque may differ because of the influence of gear efficiency, pulsations, etc. Use of constant speed joints is recommended when the shaft pitch is to be reduced.
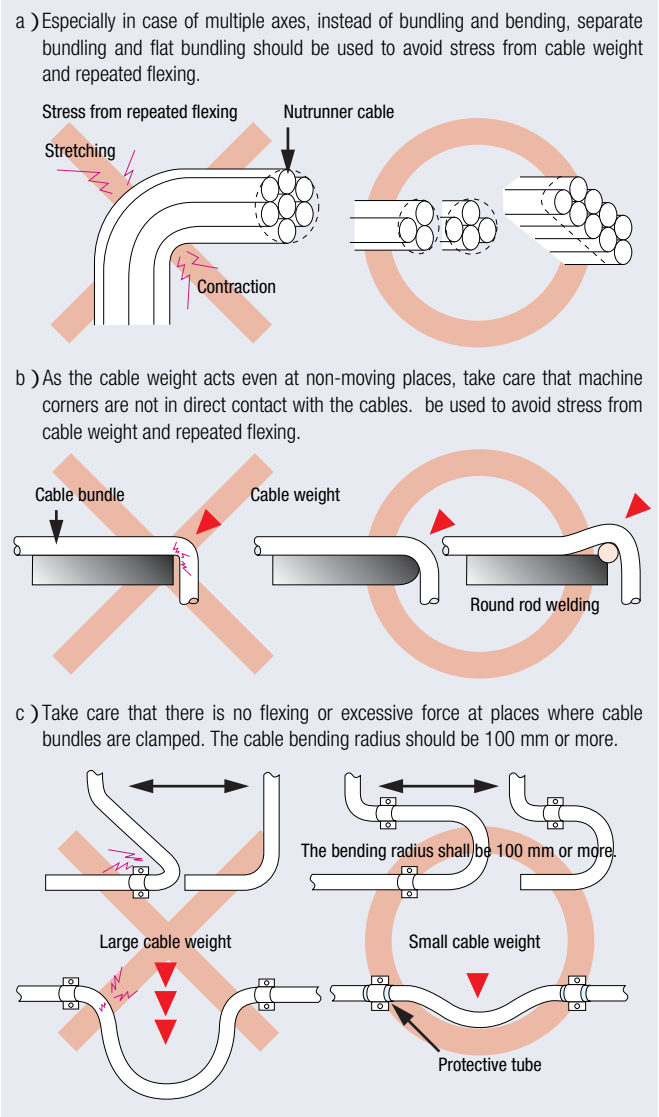
Installation of Control Unit

1) Always connect the protective ground terminal of the control unit and the protective ground terminal of the control panel to prevent electric shock. Use one-point class 3 grounding (100 Ω or lower).

2) Do not use the same power supply for control I/O control and electromagnetic contactors etc. This can cause erroneous operation and system errors because of noise.

3) Leave a fee space of 100 mm or more above the top and below the bottom of the control unit and do not inhibit air circulation.

4) Install a heat exchanger or a panel cooler for uniform temperature in the control panel.

5) Under consideration of heat dissipation and maintainability it is recommended to install with a space of at least 10 mm between units.

Installation of the Control Unit
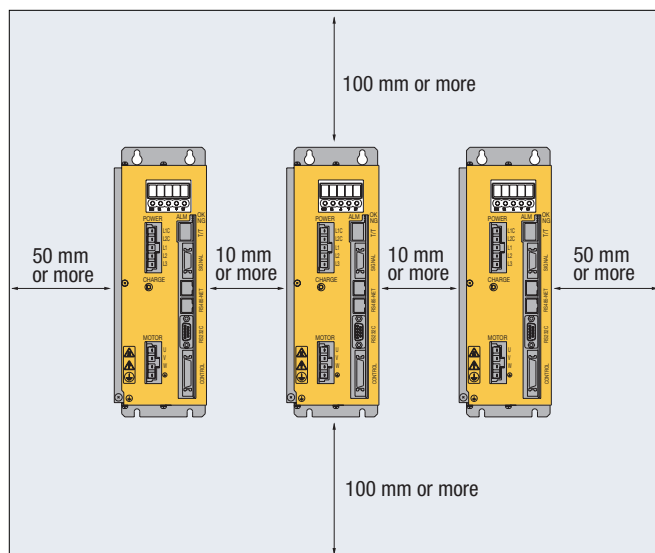
Cable Management

1) Wiring in a flexible tube or wiring on a cable conveyor is recommended for the Nutrunner moving parts.
   To prevent wire breaks, pay attention to the following points for routing of cable bundles.

a Especially in case of multiple axes, instead of bundling and bending, separate bundling and flat bundling should be used to avoid stress from cable weight and repeated flexing.

b As the cable weight acts even at non-moving places, take care that machine corners are not in direct contact with the cables. be used to avoid stress from cable weight and repeated flexing.

c Take care that there is no flexing or excessive force at places where cable bundles are clamped. The cable bending radius should be 100 mm or more.

2) The wiring method for transducer, encoder, and motor cables should be so that no forces act onto the connector part.

3) When Nutrunner cables are laid within the same flexible conduit (in case of multiple units etc.), the distance should be kept as short as possible and laying in the same flexible conduit with power cables should be avoided.

4) Basically it is recommended to wire transducer and encoder cables separate from motor cables.
   (Distance between cables: 30 cm or more)

Master/Axis Control Unit and Field Bus Interface Unit

System outline

Axis Control Unit Specifications

Model	ENRZ-AU40-10	ENRZ-AU40-20	ENRZ-AU40-40
Applicable motor	100W	200W	400W
Control power supply voltage	Single phase AC 200 to 230 V ± 10%, 50/60 Hz		
Main power supply voltage	Single phase AC 200 to 230 V ± 10%, 50/60 Hz	Three phases AC 200 to 230 V ± 10%, 50/60 Hz	
Main power supply capacity	0.4KVA	1.2KVA	1.7KVA
Use environment	No corrosive gases, dust, metal powder, oil mist, or explosive gases.		
Ambient temperature	0 to 55 C (no condensation)		
Ambient humidity	35% to 90% RH (no condensation)		
Noise tolerance	Power supply line: No abnormalities with 1500 Vp-p, 1 μS rectangular wave (noise simulator)		
Mass	2.5kg	3.2kg	3.4kg
Display part	5 character x 1 line, 7 segment LED display part, function keys (5 keys), display lamps (OK/ALM/NG)		
Max. programs/steps	31ch		
NET max. connected stations	31 stations (including the own station)		
Control input	12 points, DC 24 V (intake current: 6 mA/point), photo-coupler isolation		
Control output	22 points, photo-coupler open collector output (max. 50 mA/point at the time of DC 24 V output)		
Communication functions	RS-232C x 1 port (9600 bps to 115.2 kbps, variable)		
Memory backup function	System parameters, fastening parameters, system error history, fastening history (flash ROM), calendar function (battery backup)		
Self-diagnosis function	Memory, torque transducer, encoder, amplifier, tool, ID collation, various communication set values, zero point voltage		

Master Control Unit Specifications

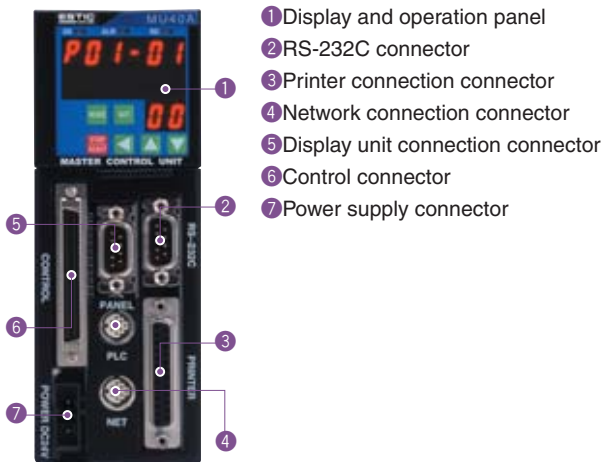| Model	ENRZ-MU40A	ENRZ-MU40D	ENRZ-MU40F
Applicable manufacturer	MELSEC Series made by Mitsubishi Electric	SYSMAC CS1 Series made by Omron	JW30 Series made by Sharp
Power supply	DC24V± 10		
Power supply capacity	10 W/shaft		
Use environment	No corrosive gases, dust, metal powder, oil mist, or explosive gases.		
Ambient temperature	0 45C°		
Ambient humidity	90% RH or lower (no condensation)		
Noise tolerance	Power supply line: No abnormalities with 1500 Vp-p, 1 μS rectangular wave (noise simulator)		
Mass	1.4kg		
Display part	6 characters x 2 lines, 2 characters x 1 line, 7 segment LED		
Max. programs/steps	31 programs/20 steps each		
NETNET max. connected stations	31 stations (including the own station)		
Control input	21 points photo-coupler isolation (DC 24 V intake current: 10 mA/point)		
Control output	38 points, photo-coupler open collector output (max. 50 mA/point at the time of DC 24 V output)		
Communication functions	RS-232C connector (for PLC) x 1, RS-232C connector (for PC) x 1, printer connector (conforming to Centronics) x 1		
Memory backup function	Sequence program (flash ROM) System parameters, system error history (EEP-ROM backup)		
Self-diagnosis function	Memory, local station trouble, local station response, PLC communication, program yes/no		

Field Bus Interface Unit

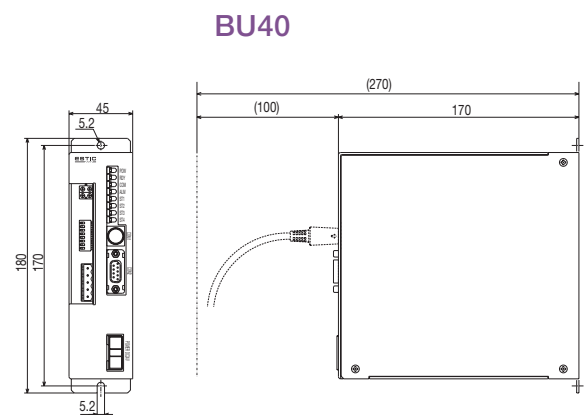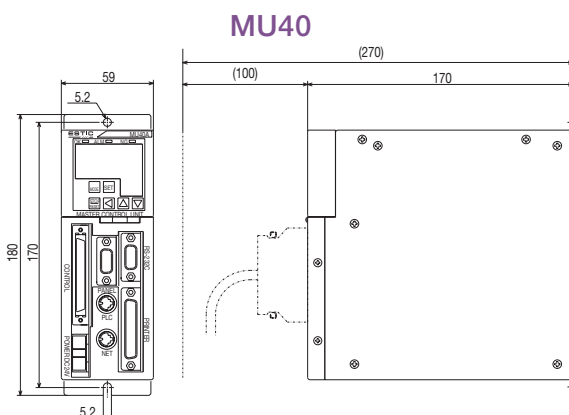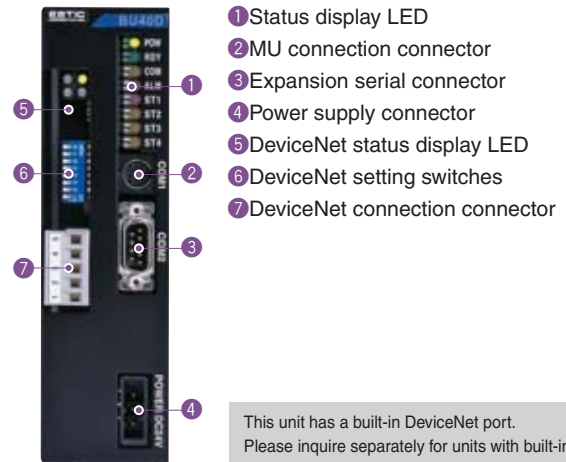| Model	ENRZ-BU40-D	ENRZ-BU40-P
Built-in port	AnyBus-S, DeviceNet (made by HMS)	AnyBus-S, Profibus-DP (made by HMS)
Power supply	DC24V± 10	
Power supply capacity	6 W/shaft	
Use environment	No corrosive gases, dust, metal powder, oil mist, or explosive gases.	
Ambient temperature	0 45C°	
Ambient humidity	90% RH or lower (no condensation)	
External I/O support	RS-232C connector x 1	
	DeviceNet connector (for PLC) x 1	Profibus-DP connector (for PLC) x 1
Mass	1.2kg	

External Dimension and Description

Axis Control Unit

❶ Display and operation panel　❹ Network connection connector　❼ Motor connection connector
❷ T/T connection connector　❺ RS-232C connector　❽ Power supply connector
❸ Encoder connection connector　❻ Control connector

AU40　100W

AU40　200W，400W

Master Control Unit

❶ Display and operation panel
❷ RS-232C connector
❸ Printer connection connector
❹ Network connection connector
❺ Display unit connection connector
❻ Control connector
❼ Power supply connector

Field Bus Interface Unit

❶ Status display LED
❷ MU connection connector
❸ Expansion serial connector
❹ Power supply connector
❺ DeviceNet status display LED
❻ DeviceNet setting switches
❼ DeviceNet connection connector

This unit has a built-in DeviceNet port.
Please inquire separately for units with built-in Profibus.

MU40

BU40

A variety of tool Selection for your application

Encoder part

Motor part

Straight type

Bent type

Shaft part

Torque transducer part

Reduction gear part
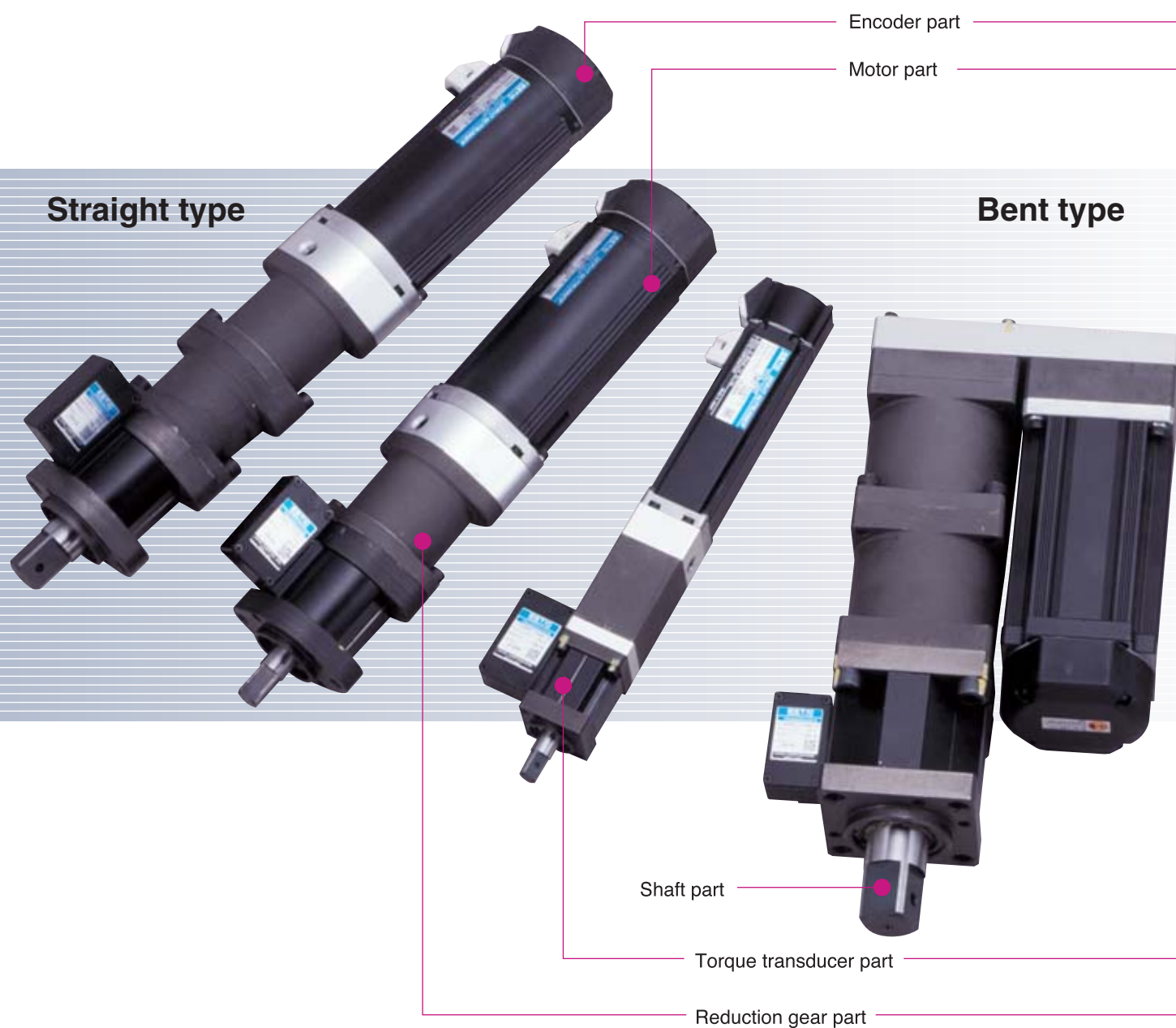
Special Features

▶ **Realize high speed (max. 15,000 rpm) by means of a newly developed servo motor.**

▶ **The wide range from 1 N⋅m to 800 N⋅m is covered by 8 tool units.**

▶ **Use of high-quality torque transducer with tool ID and built-in preamplifier.**

▶ **Bent type, angle head type, etc. for correspondence to various applications.**

Offset type

Offset gear part
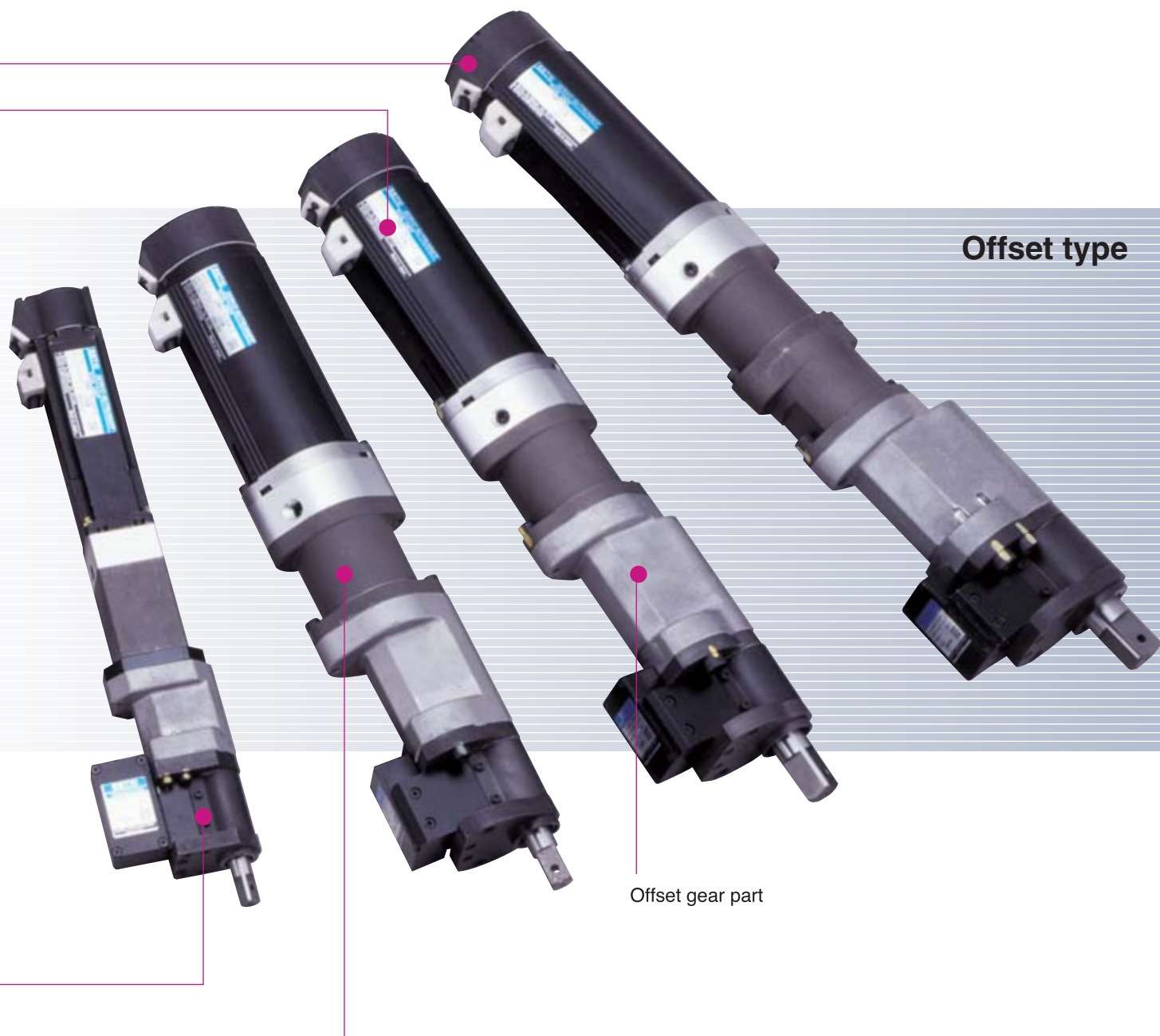
Tool Unit Specifications

Model	ENRZ-TU001-*	ENRZ-TU003-*	ENRZ-TU008-*	ENRZ-TU013-*	ENRZ-TU020-*	ENRZ-TU040-S	ENRZ-TU060-S	ENRZ-TU080-S
Max. output torque (Nom)	10	30	80	130	200	400	600	800
Max. speed (rpm)	1224	468	714	500	291	148	113	83
Motor output (W)	100		200				400	
Torque converter specifications	Type with built-in distortion gauge torque converter amplifier							
Torque display resolution (Nom)	0.01	0.02	0.1	0.2	0.2	0.5	0.5	1
Angle detector specifications	Optical encoder line drive output A, B, Z phase							
Angle display resolution (deg)	0.1							
Dynamic torque fastening accuracy	$3\sigma/\bar{X}$=2% or lower							
Weight (kg)	1.9 2.3	1.9 2.3	4.2 4.7	4.2 5.2	5.5 6.5	6.3	12	12

Note 1: Please contact the person in charge at our company for the bent type specifications.
Note 2: The weight indication in brackets is for the offset type.
Note 3: Parts marked * depend on S (straight type) or O (offset type).

Tool Unit

Straight type ENRZ-TU001-S / ENRZ-TU003-S / ENRZ-TU060-S / ENRZ-TU080-S
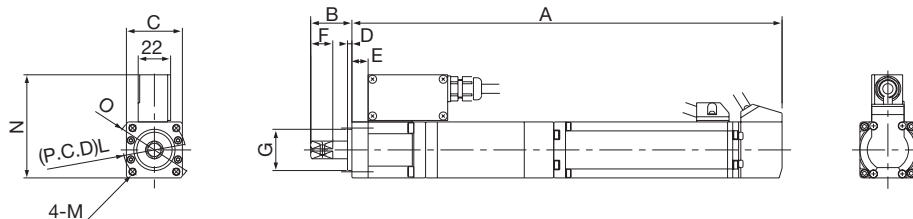
Straight type ENRZ-TU008-S / ENRZ-TU013-S / ENRZ-TU020-S / ENRZ-TU040-S
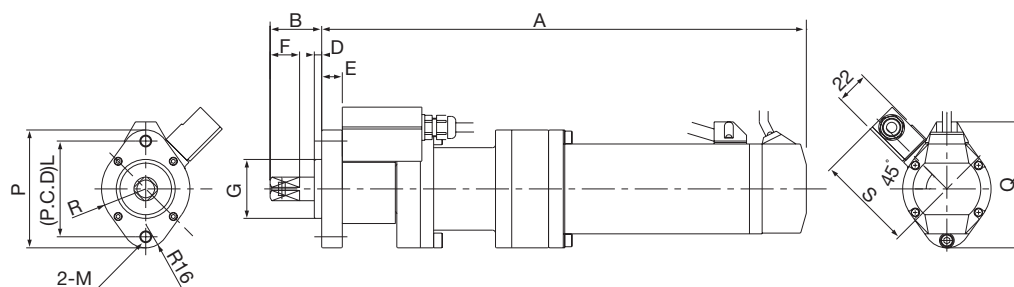
Offset type ENRZ-TU001-O / ENRZ-TU003-O
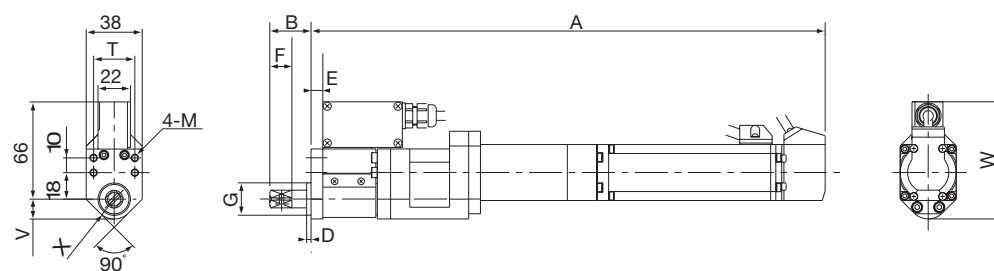
Dimension Table

Tool unit model	A	B	C	D	E	F	G	H	I	J	K
ENRZ-TU001-S	286	28	□38	3	11	15	ø28g7	8	ø12h7	3	□ 9.5
ENRZ-TU001-O	343	28	─	3	8	15	ø22g7	8	ø12h7	3	□ 9.5
ENRZ-TU003-S	292	28	□38	3	11	15	ø28g7	8	ø12h7	3	□ 9.5
ENRZ-TU003-O	349	28	─	3	8	15	ø22g7	8	ø12h7	3	□ 9.5
ENRZ-TU008-S	329	35	─	5	14	20	ø40g7	8	ø16h7	4.5	□12.7
ENRZ-TU008-O	399	35	─	5	10	20	ø28g7	8	ø16h7	4.5	□12.7
ENRZ-TU013-S	329	40	─	6	14	25	ø46g7	9	ø20h7	4.5	□15.9
ENRZ-TU013-O	412	40	─	5	10	25	ø32g7	9	ø20h7	4.5	□15.9
ENRZ-TU020-S	384	40	─	6	14	25	ø46g7	9	ø25h7	4.5	□19
ENRZ-TU020-O	468	40	─	5	10	25	ø40g7	9	ø24h7	4.5	□19
ENRZ-TU040-S	398	55	─	7	15	30	ø60g7	14.5	ø30h7	6.3	□25.4
ENRZ-TU060-S	455	55	□80	7	15	30	ø55g7	14.5	ø32h7	6.3	□25.4
ENRZ-TU080-S	455	55	□80	7	15	30	ø60g7	14.5	ø40h7	6.3	□31.8

Offset type ENRZ-TU008-O / ENRZ-TU013-O / ENRZ-TU020-O
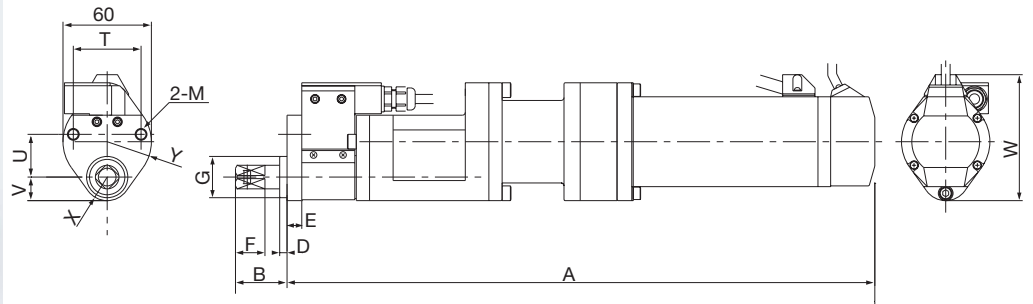
Bent type
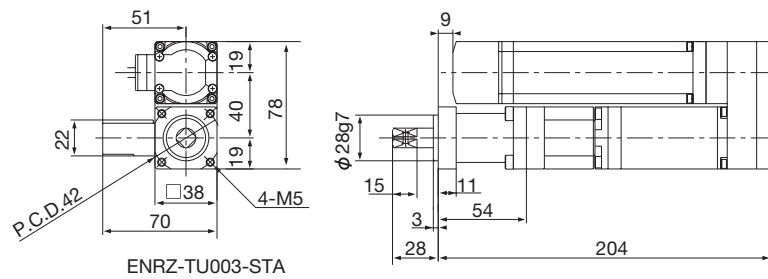
ENRZ-TU003-STA
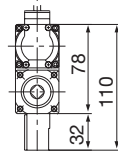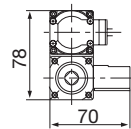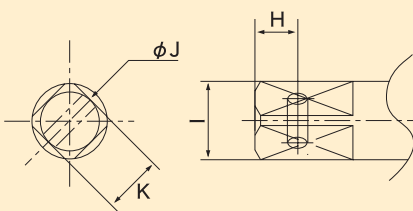
ENRZ-TU003-STB   ENRZ-TU003-STC

Square Drive

Please contact the person in charge at our company for the dimensions of the bent type.

Unit: mm

L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
42	M 5	70	ø52	—	—	—	—	—	—	—	—	—	—
—	M 5	—	—	—	—	—	—	28	—	13.5	79.5	R13.5	—
42	M 5	70	ø52	—	—	—	—	—	—	—	—	—	—
—	M 5	—	—	—	—	—	—	28	—	13.5	79.5	R13.5	—
65	M 8	—	—	80	85.5	R30	65.5	—	—	—	—	—	—
—	M 8	—	—	—	—	—	—	46	29	16	85.5	R16	R30
65	M10	—	—	80	85.5	R30	65.5	—	—	—	—	—	—
—	M10	—	—	—	—	—	—	44	32	19	91.5	R19	R30
65	M10	—	—	80	85.5	R30	65.5	—	—	—	—	—	—
—	M10	—	—	—	—	—	—	44	36.5	23	100	R23	R30
84	M12	—	—	100	—	R33	71	—	—	—	—	—	—
88	M12	113	ø110	—	—	—	—	—	—	—	—	—	—
88	M12	113	ø110	—	—	—	—	—	—	—	—	—	—

Socket Assembly & Socket Adapter

Socket Assembly

Specification

| Model	Applicable tool unit	Adapter insertion angle
TNA1-SA02-30	ENRZ-TU001-* ENRZ-TU003-*	□ 9.5
TNA1-SA05-35	ENRZ-TU008-*	□ 12.7
TNA1-SA20-45C	ENRZ-TU013-*	□ 15.9
TNA1-SA20-45Z	ENRZ-TU020-*	□ 15.9
TNA1-SA40-70	ENRZ-TU040-S ENRZ-TU060-S	□ 25.4
TNA1-SA80-80	ENRZ-TU080-S	□ 31.8

* Indicates parts common for S (straight type) and O (offset type).

Installation Reference
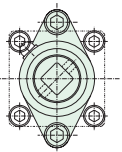
10 to 20 Nom
At the time of straight use
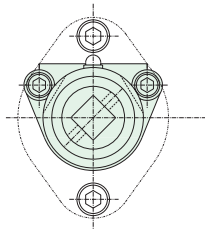
80 Nom
At the time of straight use
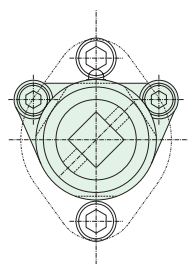
130 Nom
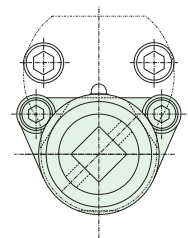At the time of straight use
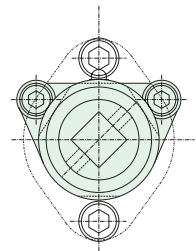
200 Nom
At the time of straight use
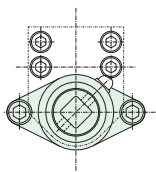
10 to 20 Nom
At the time of offset use
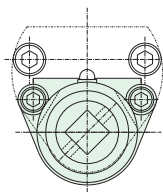
10 to 20 Nom
At the time of offset use
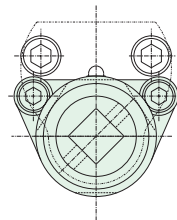
80 Nom
At the time of offset use

130 Nom
At the time of offset use

(*1) Design the tool installation bolts so that the mounting plate side has spot facing to prevent interference with the socket assembly mounting flange.
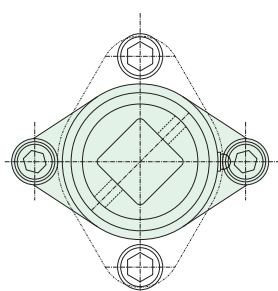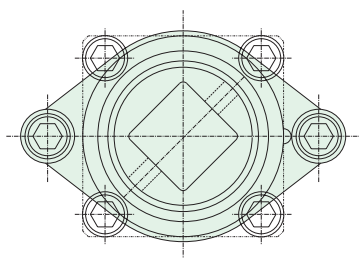
Socket Adapter

Specification

Model	Socket assembly side - Socket side
TNA1-AD01-01	□ 9.5 — □ 9.5
TNA1-AD05-01	□ 12.7 — □ 12.7
TNA1-AD05-02	□ 12.7 — □ 9.5
TNA1-AD20-01	□ 15.9 — □ 15.9
TNA1-AD20-02	□ 15.9 — □ 12.7
TNA1-AD20-03	□ 15.9 — □ 19
TNA1-AD40-01	□ 25.4 — □ 25.4
TNA1-AD40-02	□ 25.4 — □ 19
TNA1-AD80-01	□ 31.8 — □ 31.8
TNA1-AD80-02	□ 31.8 — □ 25.4
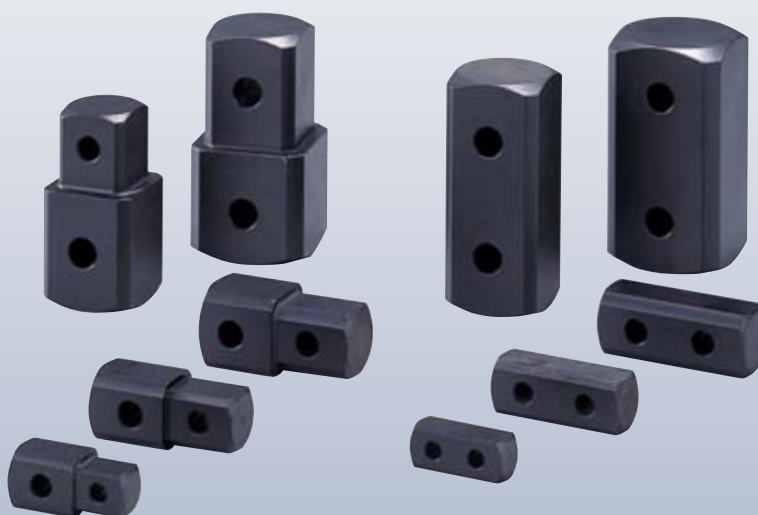
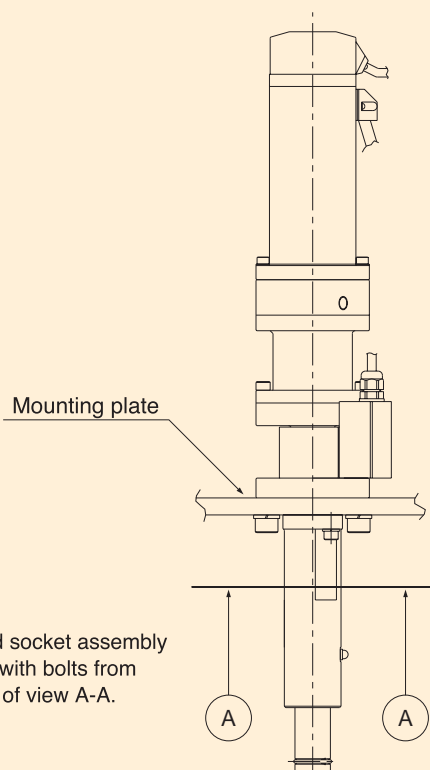## Installation Guide

400 Nom
At the time of straight use

600 to 800 Nom
At the time of straight use (**1)

Mounting plate

Tool unit and socket assembly
are secured with bolts from
the direction of view A-A.

A   A

Socket Assembly & Socket Adapter

Socket Assembly External Dimensions

X: Initial installation load (N)
Y: Stroke end load (N)
Z: Spring rate (N/mm)

TNA1-SA05-35
TNA1-SA20-45C
TNA1-SA20-45Z

TNA1-SA02-30

TNA1-SA40-70
TNA1-SA80-80
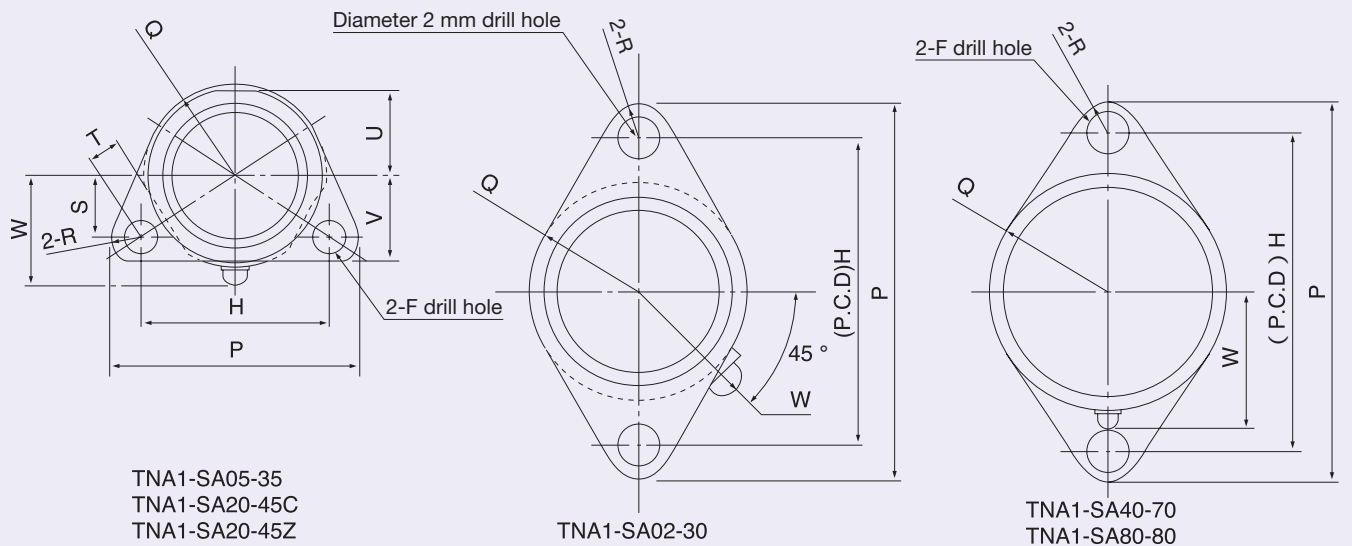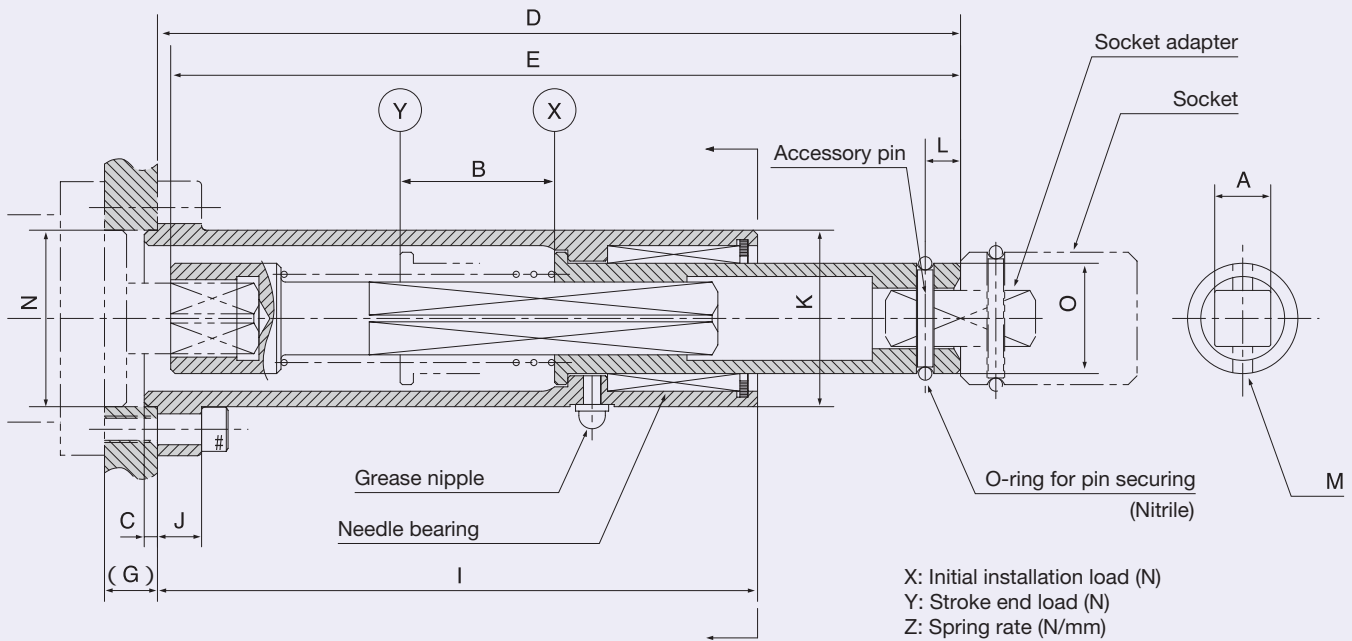
Socket Assembly Dimension Table

Model	A	B	C	D	E	F	G	H	I	J	K	L	M
TNA1-SA02-30	□ 9.5	30	3	155	153	φ 6.5	(12)	45	109	8	φ30	5.5	φ4.0
TNA1-SA05-35	□12.7	35	3	182	179	φ 7	(12)	43	136	10	φ40	8	φ4.5
TNA1-SA20-45C	□15.9	45	3	212	209	φ 9	(12)	50	153	12	φ48	9	φ6.0
TNA1-SA20-45Z	□15.9	45	3	212	209	φ 9	(12)	50	153	12	φ48	9	φ6.0
TNA1-SA40-70	□25.4	70	3	309	300	φ11	(16)	84	219	15	φ62	15	φ7.5
TNA1-SA80-80	□31.8	80	5	340	331	φ14	(16)	108	230	16	φ76	16.5	φ7.5

Socket Adapter External Dimensions

TNA1-AD**-03
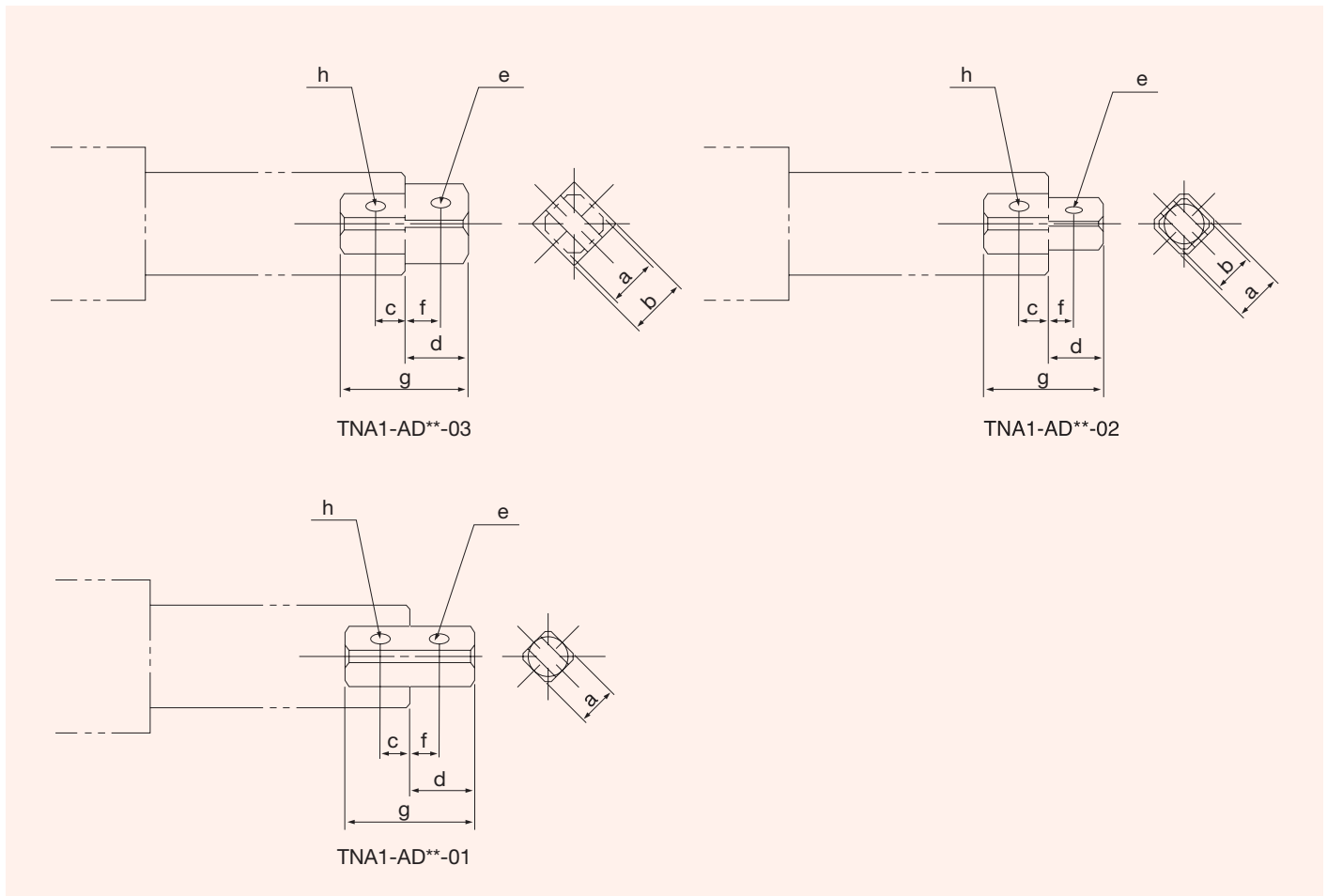
TNA1-AD**-02

TNA1-AD**-01

Socket Adapter Dimension Table

Unit: mm

Model	a	b	c	d	e	f	g	h	Mass (g)
TNA1-AD01-01	□ 9.5	—	5.5	12	φ4	5.5	24	φ4	15
TNA1-AD05-01	□12.7	—	8	17	φ5	8	34	φ5	37
TNA1-AD05-02	□12.7	□ 9.5	8	12	φ4	5.5	29	φ5	26
TNA1-AD20-01	□15.9	—	9	20	φ6	9	40	φ6	66
TNA1-AD20-02	□15.9	□12.7	9	17	φ5	8	37	φ6	51
TNA1-AD20-03	□15.9	□19	9	20	φ6.5	11	40	φ6	82
TNA1-AD40-01	□25.4	—	15	30	φ7.5	15	60	φ7.5	272
TNA1-AD40-02	□25.4	□19	15	20	φ6	11	50	φ7.5	186
TNA1-AD80-01	□31.8	—	16.5	30	φ7.5	16.5	60	φ7.5	434
TNA1-AD80-02	□31.8	□25.4	16.5	30	φ7.5	15	60	φ7.5	354

Unit: mm

N	O	P	Q	R	S	T	U	V	W	X	Y	Z	Accessory pin	O-ring for pin securing	Mass (kg)
φ28g7	φ18g7	55	R15	R 5	—	—	—	—	19.5	13.5	23.2	0.323	φ3×16	P16	0.5
φ40g7	φ25g7	55	R21	R 6	13	7	21	21.5	25	14.2	25.5	0.323	φ4×20	P22	1.0
φ46g7	φ32g7	65	R24	R 7.5	16	8.5	22.5	22.5	29	18.1	34.5	0.362	φ5×25	P29	1.3
φ46g7	φ32g7	65	R24	R 7.5	16	8.5	22.5	22.5	29	18.1	34.5	0.362	φ5×25	P29	1.3
φ60g7	φ45g7	100	R31	R 8	—	—	—	—	36	27.5	43.6	0.225	φ6×40	P42	3.6
φ80g7	φ55g7	128	R42	R10	—	—	—	—	43	47.0	77.4	0.362	φ6×50	P52	9.6

Management Software & Display Unit

Special software for operation from your computer!
Provide a various maintenance functions.

Main menu

AU fastening setting screen

Features

1 | Start-up

- Nutrunner system station No. setting
- Setting data upload
- Setting data download

2 | Master Control Unit

- System settings
- Print output item selection for fastening result data
- PLC device allocation
- Tightening sequence program settings

3 | Axis Control Unit

- MAS station data communication settings
- Program head settings
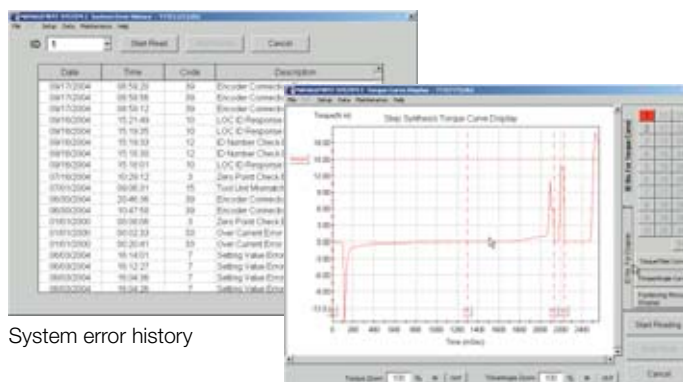- Fastening parameter setting

4 | Master Control Unit Data

- Fastening result data monitor at the time of fastening sequence program execution
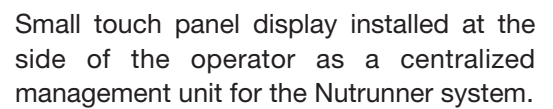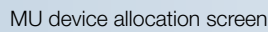

Tightening result monitor

5 | Data

- Axis Control Unit fastening result history data for the last 2000 cases
- Master Control Unit system error history for max. 50 cases
- Axis Control Unit system error history for max. 50 cases
- Torque Curve display

System error history

Torque curve

MU device allocation screen

Small touch panel display installed at the side of the operator as a centralized management unit for the Nutrunner system.

6 Maintenance

- Maintenance log information
- AU input monitor
- AU output monitor
- MU input monitor
- MU output monitor
- Voltage monitor
- CAL monitor
- Angle monitor
- Torque monitor

CAL monitor

7 Test Operation

- Sequence program start screen (only display unit)

8 Bypass (Spindle Cut)

- Bypass (Spindle Cut) setup screen from Master Control Unit to Axis Control Unit

Fastening Result Monitor

Maintenance Menu

Fastening Set Value Copy

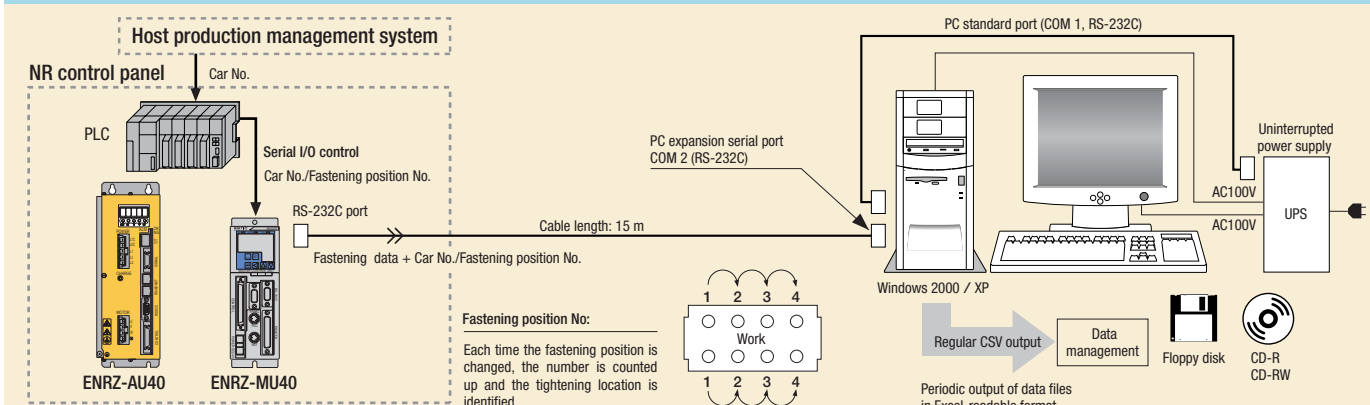First Stage Settings

Torque Monitor
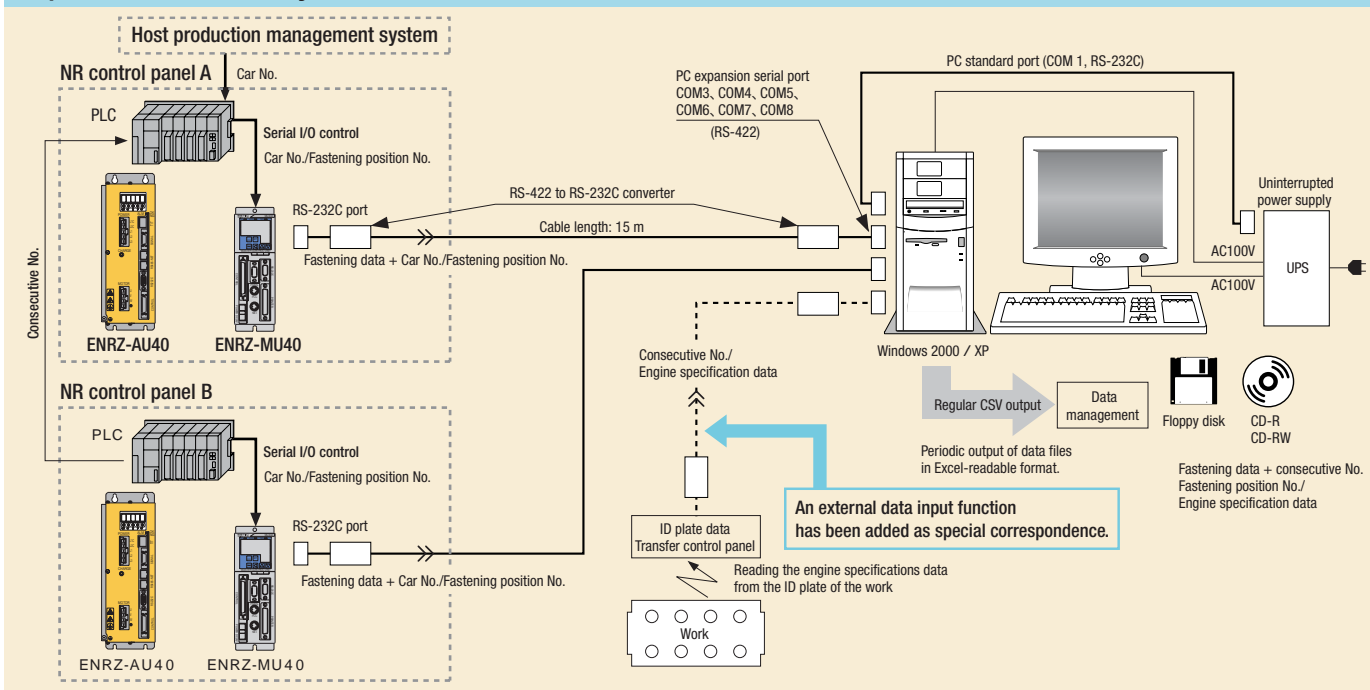

Operation Monitor

22

Data Logger System

The Data Logger System is to save fastening result data output from ENRZ system to an ODBC conformance database.

Sample system configuration

Standard MU system

Host production management system

NR control panel | Car No.

PLC

Serial I/O control
Car No./Fastening position No.

ENRZ-AU40   ENRZ-MU40

RS-232C port

Fastening data + Car No./Fastening position No.

Cable length: 15 m

Fastening position No:
Each time the fastening position is changed, the number is counted up and the tightening location is identified.

PC standard port (COM 1, RS-232C)

PC expansion serial port COM 2 (RS-232C)

Windows 2000   XP

Regular CSV output → Data management

Periodic output of data files in Excel-readable format.

Uninterrupted power supply

AC100V
AC100V

UPS

Floppy disk   CD-R CD-RW

1 2 3 4   Work   1 2 3 4

Special order MU system

Host production management system

NR control panel A | Car No.

PLC

Serial I/O control
Car No./Fastening position No.

ENRZ-AU40   ENRZ-MU40

RS-232C port

Fastening data + Car No./Fastening position No.

RS-422 to RS-232C converter

Cable length: 15 m

Consecutive No.

NR control panel B

PLC

Serial I/O control
Car No./Fastening position No.

RS-232C port

Fastening data + Car No./Fastening position No.

ENRZ-AU40   ENRZ-MU40

Consecutive No./
Engine specification data

ID plate data
Transfer control panel

Reading the engine specifications data from the ID plate of the work

Work

An external data input function has been added as special correspondence.

PC standard port (COM 1, RS-232C)

PC expansion serial port
COM3 COM4 COM5
COM6 COM7 COM8
(RS-422)

Windows 2000   XP

Regular CSV output → Data management

Periodic output of data files in Excel-readable format.

Fastening data + consecutive No.
Fastening position No./
Engine specification data

Uninterrupted power supply

AC100V
AC100V

UPS

Floppy disk   CD-R CD-RW

Operation environment specifications

Item	Specifications
Compatible OS	Windows NT (Ver. 4.0, SP6 or higher), Windows 2000, SP2/Windows XP, SP1/Windows XP, SP2
Compatible personal computer	DOS/V PC (NEC PC9821 series is not compatible)
Memory	Main memory usable by OS and data logger system: 256 MB or more
Hard disk capacity	System: 1 GB or more, fastening data: 5 GB or more recommended
CPU performance	Celeron or Pentium III, 500 MHz or more
Display	XGA or better, 16 bit color or better
Disk drive	CD-ROM drive
Communication port	An RS-232C port supported by Windows is required. AU/MU/IF50 can be connected to COM 1 to 10 (however, an expansion serial board is required for use of COM 3 to 10). In case of an UPS connection port, COM 1 or a USB port is required, and in case of PLC communication, COM 2 is required.
Recommended expansion serial board	Intelligent serial board (operation has been confirmed for Rocket Port made by the Comtrol company)
Parallel port	DSUB 25 pin AT compatible printer port x 1 or USB port x 1
Mouse	Compatible with Windows NT Ver. 4.0 or Windows 2000 or Windows XP
Compatible connection equipment	ENRZ-AU30 or AU40/MU30 or MU40 x max. 8 sets PLC: Mitsubishi Electric MELSEC-A series x 1 set, Sharp JW-20, JW30 series x 1 set

Features

1 | Compatible with the ENRZ series

The fastening data from each unit can be collected and saved.

2 | One PC monitors maximum of 8 fastening system

When an expansion serial card is installed in the PC, the data from max. 8 equipment units (fastening systems) can be collected.

3 | Unique Idetification Number from PLC

By serial communication with the PLC, the car body management No. can be acquired from the PLC and can be saved related to the fastening data.

4 | Data storage in a database

The received data are registered in a database as they are. As commercial database software conforming to ODBC is used, data maintenance and retrieval functions have been improved.

5 | Uninterruptiable Power Supply (UPS)

The software can be shut down safely by connection of an uninterruptible power supply as a countermeasure against power drops and power failures.

6 | Expandability

The saved data can be searched for NG and CSV file output is possible.
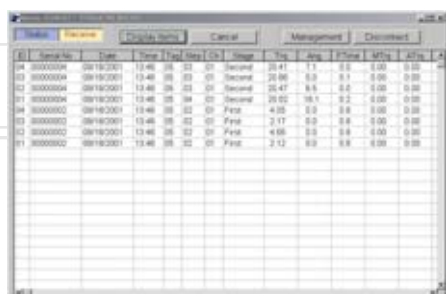
Work No. division setting

Regular CSV output setting

Fastening result monitor

Statistics monitor data setting
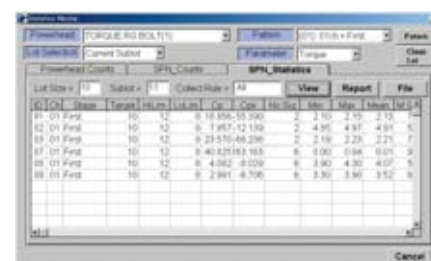
Main menu screen

Statistics calculation monitor screen

*   Settings and screens displayed in color are options.

24
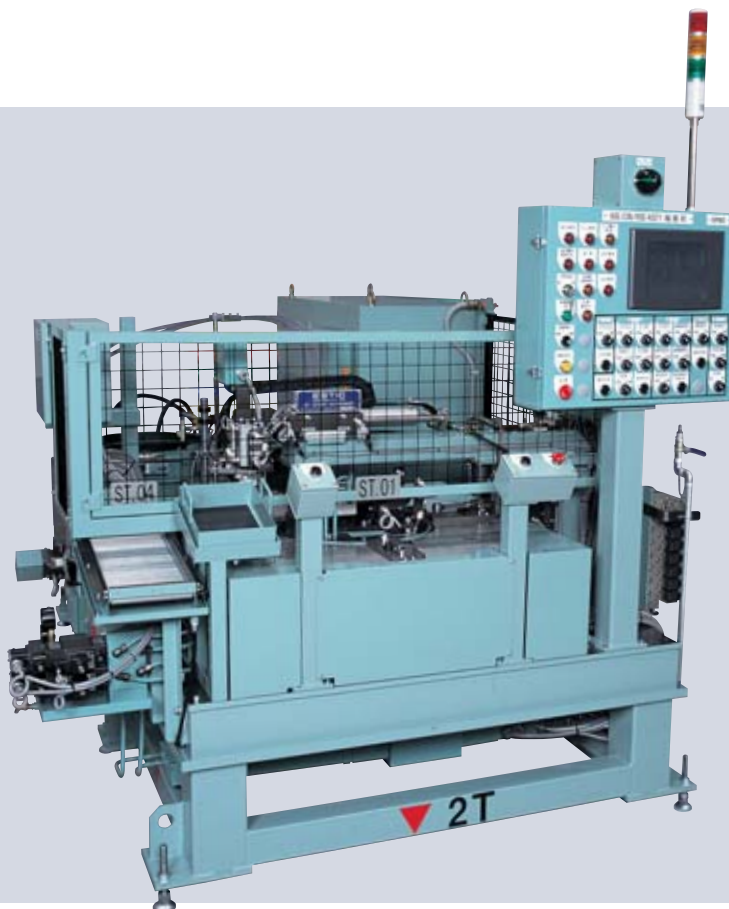
Application Example

An example for use of the Servo Nutrunner System.

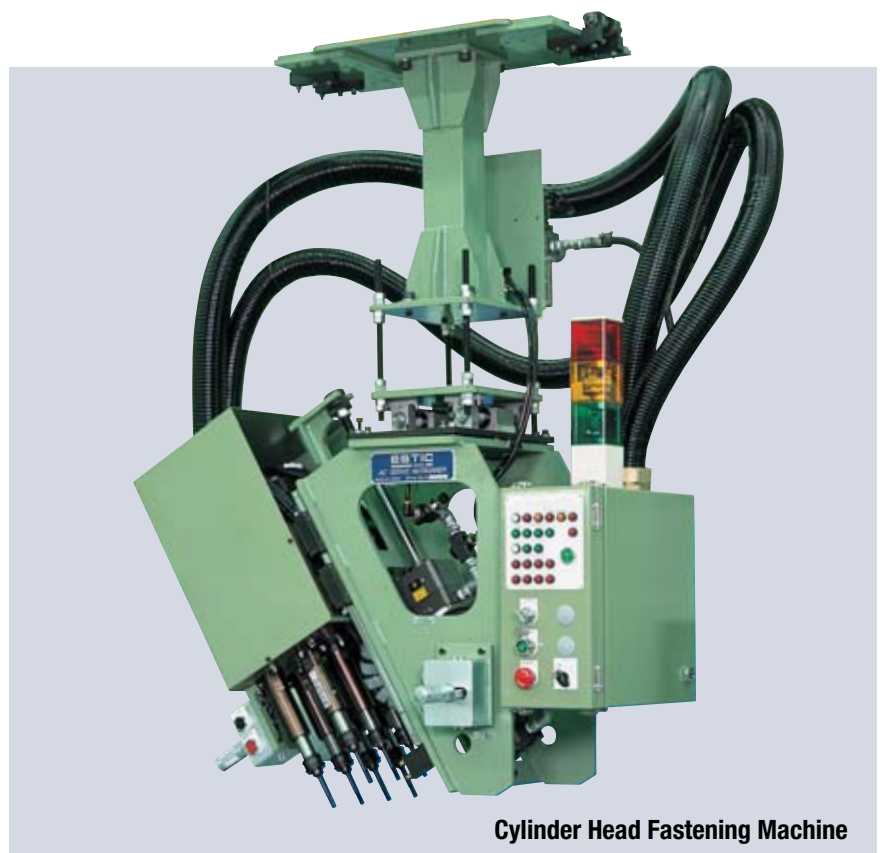**Side Cover Fastening Machine with Auto Feeding System**
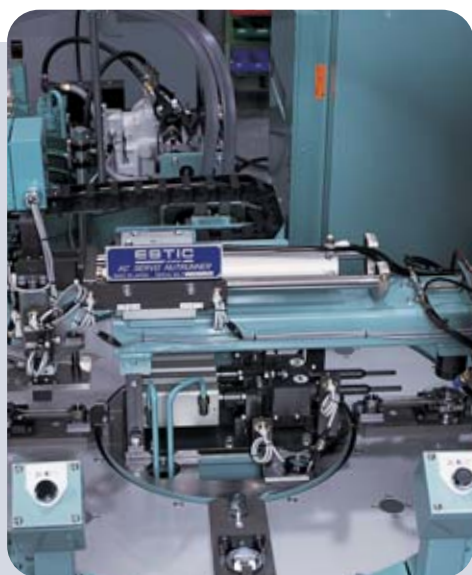
Connecting Rod Assembly Machine

Side Cover Fastening Machine

Cylinder Head Fastening Machine

ESTIC

ESTIC CORPORATION

URL http://www.estic.co.jp

The contents of this catalog are as of February 2008.