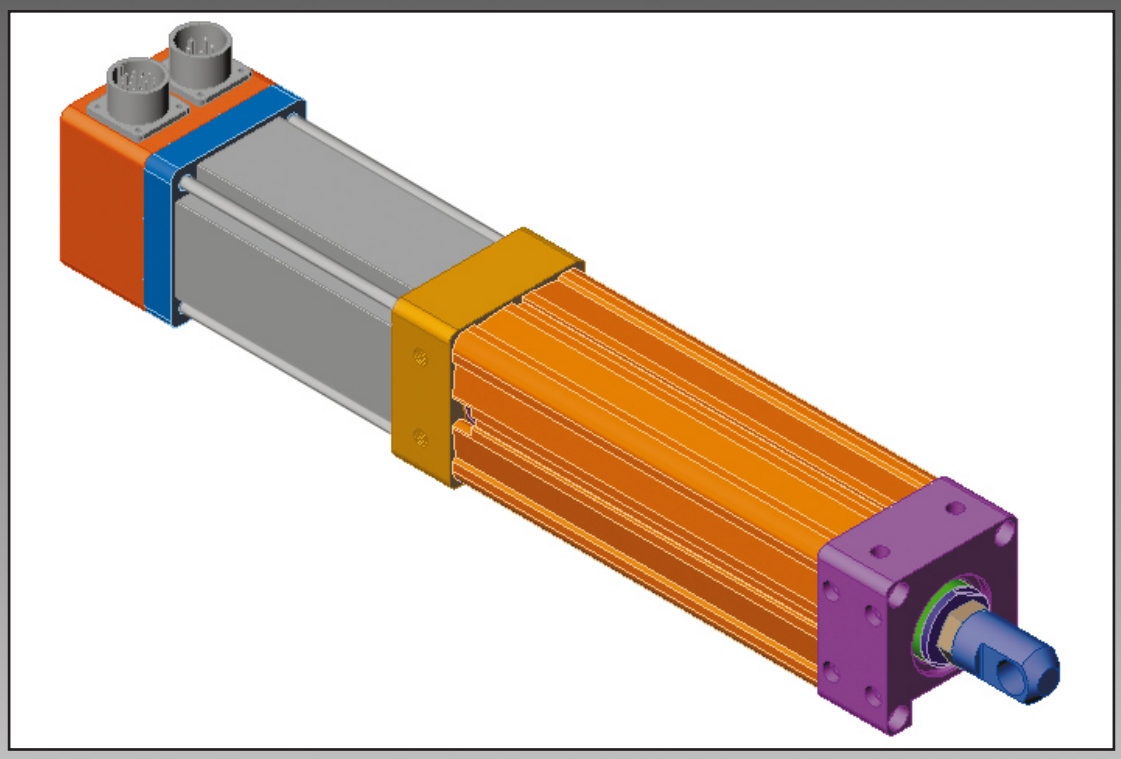
Axidyne® ELECTRIC LINEAR MOTION PRODUCTS

Welding Actuator HT23 + HT12 with Nachi Feedback #2705-0003, 2706-0003, 2706-0004

User Manual



TOL-O-MATIC, INC
Excellence in Motion®

Patent Pending

3620-4006_01

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HEALTH AND SAFETY REGULATIONS

Read completely through the applicable sections of the manual before the equipment/unit is unpacked, installed or operated. Pay careful attention to all of the dangers, warnings, cautions and notes stated in the manual.

Serious injury to persons or damage to the equipment may result if the information in the manual is not followed.

Items that are specifically marked DANGER!, WARNING!, CAUTION!, or NOTE! are arranged in a hierarchical system and have the following meaning:

DANGER! Indicates a very hazardous situation which, if not avoided, could result in death or serious injury. This signal word is limited to the most extreme situations.

WARNING! Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION! Indicates a potentially hazardous situation which, if not avoided, this situation may result in property damage or minor to moderate injury.

NOTE! Information that requires special attention is stated here.

Warning for Hot Surfaces

WARNING! Normal operating temperature of weld actuator can reach 175 Degrees F (80 Degrees C).

Modifications to the Equipment

WARNING! The manufacturer takes no responsibility whatsoever if the equipment is modified of it the equipment is used in any way not intended at the time of delivery. Unauthorized modifications or changes to the equipment are strictly forbidden.

Requirement regarding Personnel

NOTE! All personnel must be completely informed regarding all safety regulations and the function of the equipment.

Packing, Transport and Unpacking

NOTE! Anchor and secure actuator in such a way as to prevent damage during transport. Also make sure the actuator is clean and dry and protected from moisture.

Risk Area and Personnel

When installed in a weld gun, pinch points are generated capable of severe damaging forces. The risk area surrounding the weld actuator must either be enclosed or clearly marked including display signage in accordance with all applicable national and international legal requirements for welding actuators. The risk area must be protected by a safety system that stops the equipment if anyone enters the risk area. Personnel who enter the risk area must be authorized, trained and qualified for the different tasks inside the risk area.

Repair and Maintenance

All supply media must be shut OFF (electricity) before any work is begun on any equipment that is associated with the welding gun application.

1.1 Machine Identification

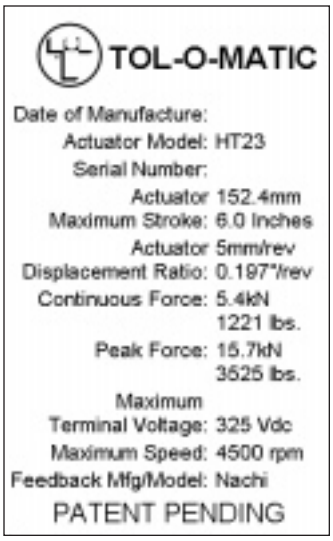


Figure 1.1: Actuator identification label

Do not remove the machine identification label and do not make it unreadable!

1.2 Manufacturer

Tol-O-Matic, Inc.
3800 County Road 116
Hamel, MN 55340, USA
763-478-8000 • Fax 763-478-8080
www.tolomatic.com

1.3 Material Composition

The weld actuator is made of conventional materials.

1.4 Intended Use

The HT weld actuator is a compact high force screw drive servo actuator for attachment to weld guns. The weld actuator controls the position of the weld gun tips and develops the required force for spot welding.

WARNING! Before installation and commissioning of the equipment, this manual and all accompanying manufacturer documents and manuals MUST be completely read by the concerned personnel. All warning texts must be given special attention.

1.5 Storage

Pay attention to the following when storing the weld actuator:

- Perform repairs, maintenance and inspections before storing the gun to ensure that the gun is in good working order.
- Make sure the gun is placed in a suitable storage position to prevent damage to the connectors and electronics .

2.1 General

The weld actuator is mounted to a weld gun by means of a fixed attachment. The weld actuator is used for applying force between the fixed electrode and the moving electrode.

> WARNING! The welding actuator stroke must be compatible with the weld gun tip opening

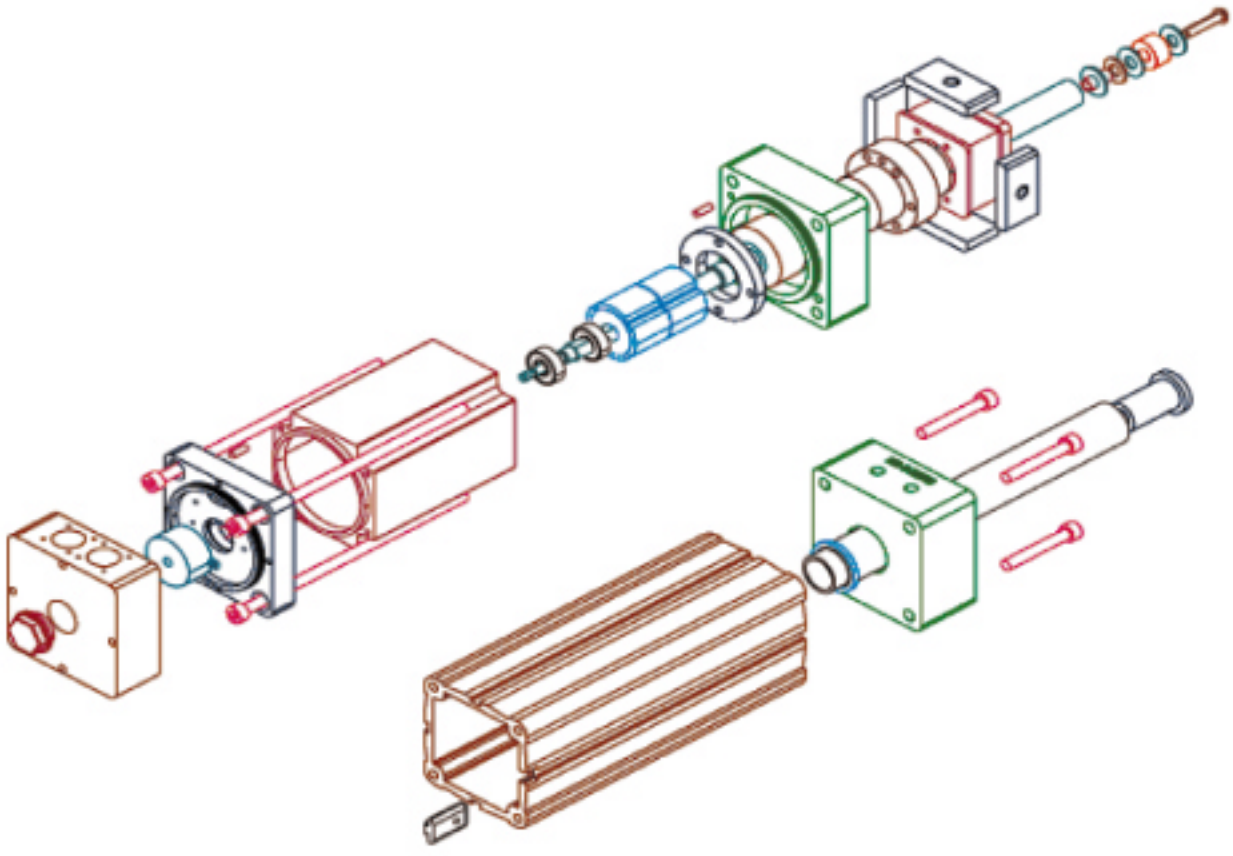


Figure 2.1: Exploded view of actuator

3 Basic Installation

3.1 Installing the Weld Actuator.

Please refer to your weld gun documentation for mechanical installation

3.2 Electrical Wiring

See the electrical circuit diagram that accompanied the weld gun at delivery.

4.1 General

Before commissioning the weld actuator, there are certain inspections and settings that must be carried out. Also after maintenance activities, the gun must be inspected before it is returned to service.

4.2 Inspection of Mechanical Travel Limits.

The mechanical travel limits of the actuator must be verified to ensure the actuator will not reach an internal hard limit during normal operation.

[**Step 1**] Turn the controller power off (see documentation for controls system for details).
[**Step 2**] With the actuator installed on a weld gun manually rotate the servo gear extending the rod until the weld gun tips are closed. Record the distance the rod is extended (d1).
[**Step 3**] Remove one rod tip and manually rotate the servo gear, extending the rod, until the actuator reaches its end of travel. Record the distance the rod is extended (d2).

The difference between the two measurements minus the gun deflection (d3) should be greater than 5 mm (d2 - d1 - d3 ≥ 5mm).

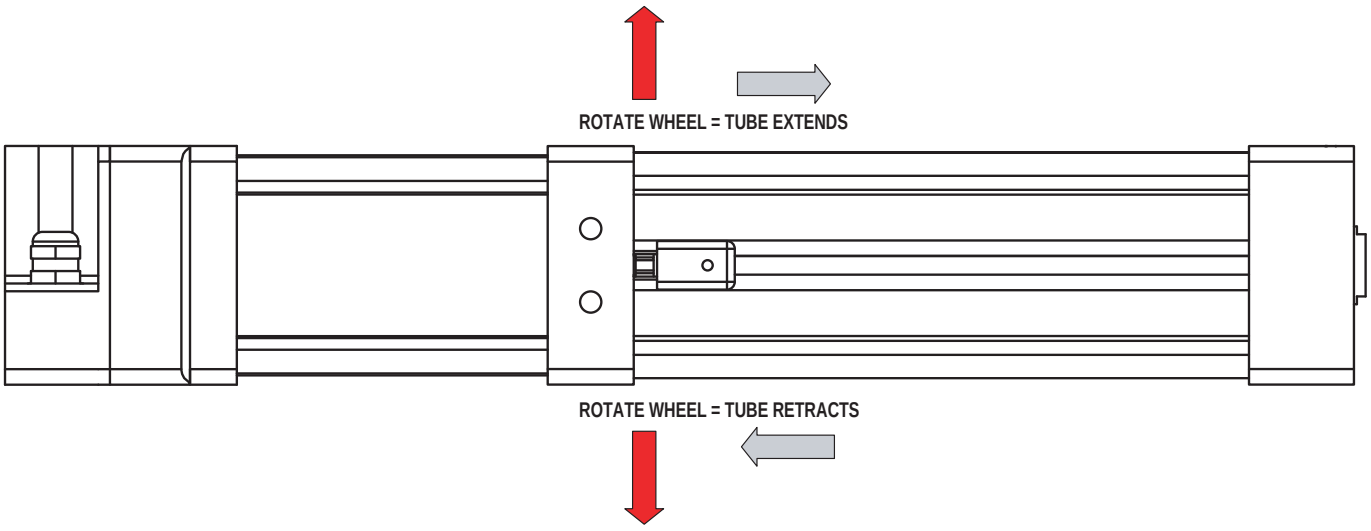


Figure 4.1: Manual operation of welding actuator

5 Repair and Maintenance

NOTE! Before starting any maintenance activities, make sure that the supply voltage is shut OFF.

- No lubrication is required during the service life of the weld actuator.

- Nachi encoders are positioned with respect to the motor windings. This alignment is critical for appropriate operation. It is recommended that the actuator be returned to Tol-O-Matic for encoder replacement or re-alignment should it become damaged or loose on the actuator shaft.

Disassembly of the weld actuator is not recommended. Weld Actuators should be returned to Tol-O-Matic for evaluation and repair.

Contact the weldgun manufacturer for instructions on how to return the weld actuator for evaluation.

WARNING! Never rotate the actuator via the Encoder connection. Doing so may result in the loss of phasing between the Pulsecoder and motor windings.

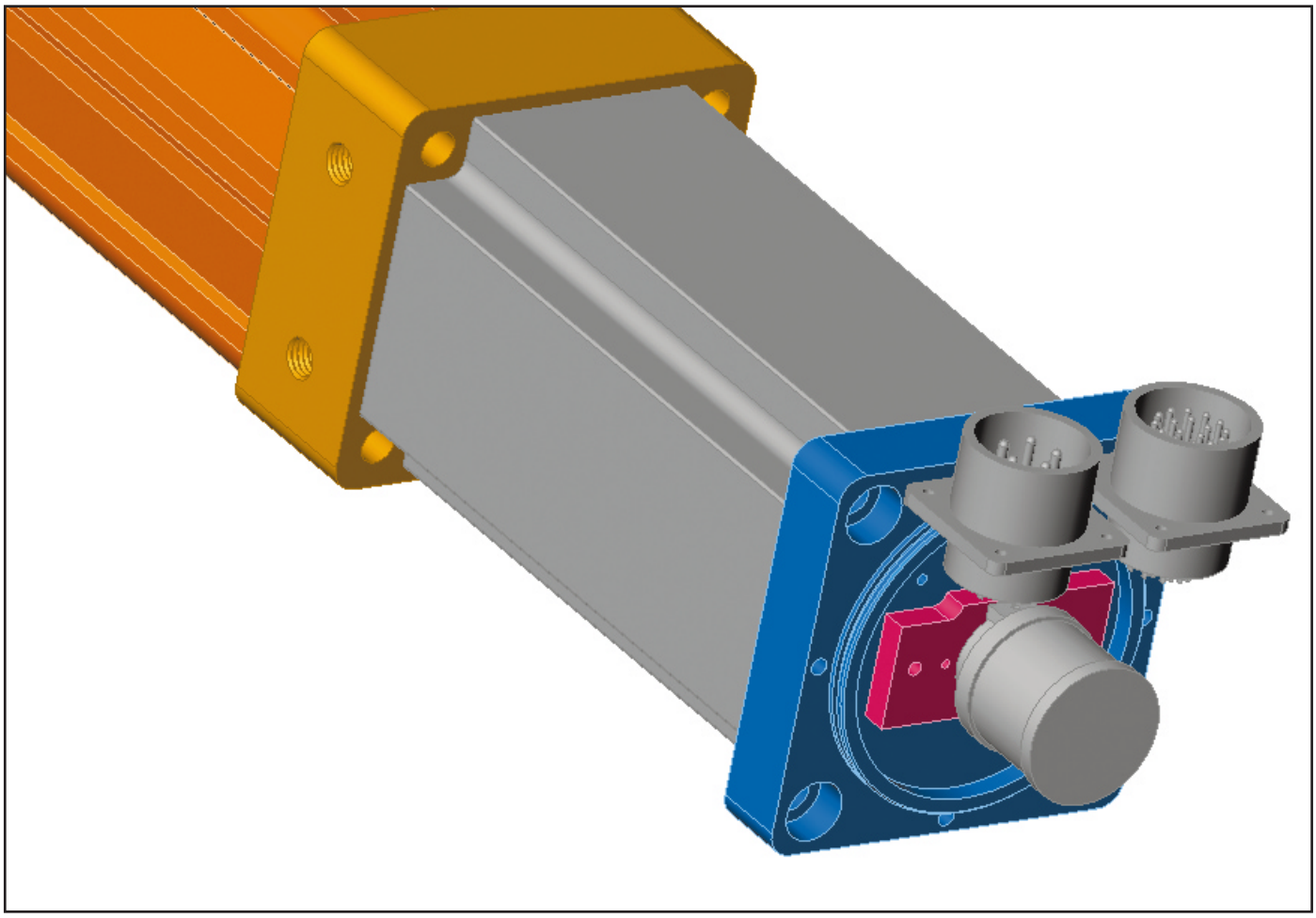


Figure 5.1: Nachi feedback on welding actuator, with rods and cover hidden to reveal internal components.

6 Appendix

6.1 Motor Specifications

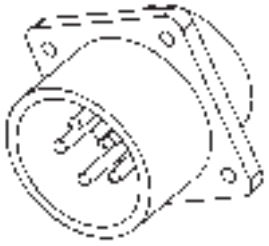
Motor Specifications	HT23	HT12
Continuous Stall Torque	5.0 Nm	3.4 Nm
Peak Stall Torque	24.9 Nm	16.9 Nm
Thermal Resistance	0.56 celsius/watt	0.58 celsius/watt
Stall Current	7.55 A RMS	6.13 A RMS
Peak Current	37.8 A RMS	30.7 A RMS
Number of Poles	4	4
Kt	0.69 Nm/amp per phase RMS	0.58 Nm/amp per phase RMS
Ke	0.396 V/rad/s L-L RMS	0.332 V/rad/s L-L RMS
Resistance @ 25 C	1.4 ohms L-L	2.0 ohms L-L
Stator Inductance	5.1 mH L-L	6.1 mH L-L
Maximum Bus Voltage	325 Vdc	325 Vdc
Rated Speed @ Maximum Voltage	4500 RPM	5400 RPM
Demagnetization Current	45 amps	39 amps

6.2 Thermal sensor specifications

The current thermal sensor will shut down the motor at 311 degrees F. However the motor should not perform a duty cycle that repeatedly generate motor temperatures above 175 degrees F, or premature bearing failure will result.

6.3 Connector pinout

MOTOR POWER CONNECTIONS



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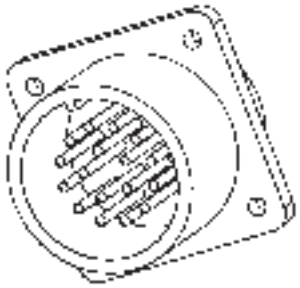
MOTOR CONNECTOR	MOTOR LEAD
A	BLACK
B	WHITE
C	RED
CENTER PIN	GREEN/YELLOW STRIP

Figure 6.1: Motor Power Connections

6.3 Connector pinout (cont.)

NACHI ENCODER CONNECTIONS



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CONNECTOR CONNECTION	ENCODER & THERMAL WIRE COLOR	SIGNAL TYPE
A	RED	A+
B	PINK	A-
C	GREEN	B+
D	BLUE	B-
E	LT. BLUE	RX (SER. DATA) +
F	PURPLE	RX (SER. DATA) -
G	BROWN	GND
H	WHITE	Vcc
J	GREY	GND (CASE)
K	YELLOW	Z + (INDEX)
L	ORANGE	Z - (INDEX)
M	LG YELLOW	THERM CONN
N	LG YELLOW	THERM CONN
P	N/C	N/C
R	DK GREEN	RESET
S	BLACK	GND
T	FLESH	Vb
EARTH GROUND	SILVER DRAIN	DRAIN

Figure 6.2: Feedback Connections

11/04 LC

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