

## E30 Smart Tool US Version | P/N: 81401263



*Pole shoes  
required for  
operation*

Featuring Variable Field Output (VFO) and Smart Part Present technology, the E30 magnetic gripper is ready to handle your complex automation tasks.

The VFO feature allows the user to adjust the magnetic strength of the E30 in order to pick material of varying thicknesses. The E30 magnetic gripper also has Smart Part Present ability to detect if you have picked up multiple or incorrect parts.

Pole shoes can be used with the E30 to pick parts with complex geometries. With VFO and part present the E30 can handle the toughest of destacking and bin picking applications.

### General Specifications<sup>1</sup>

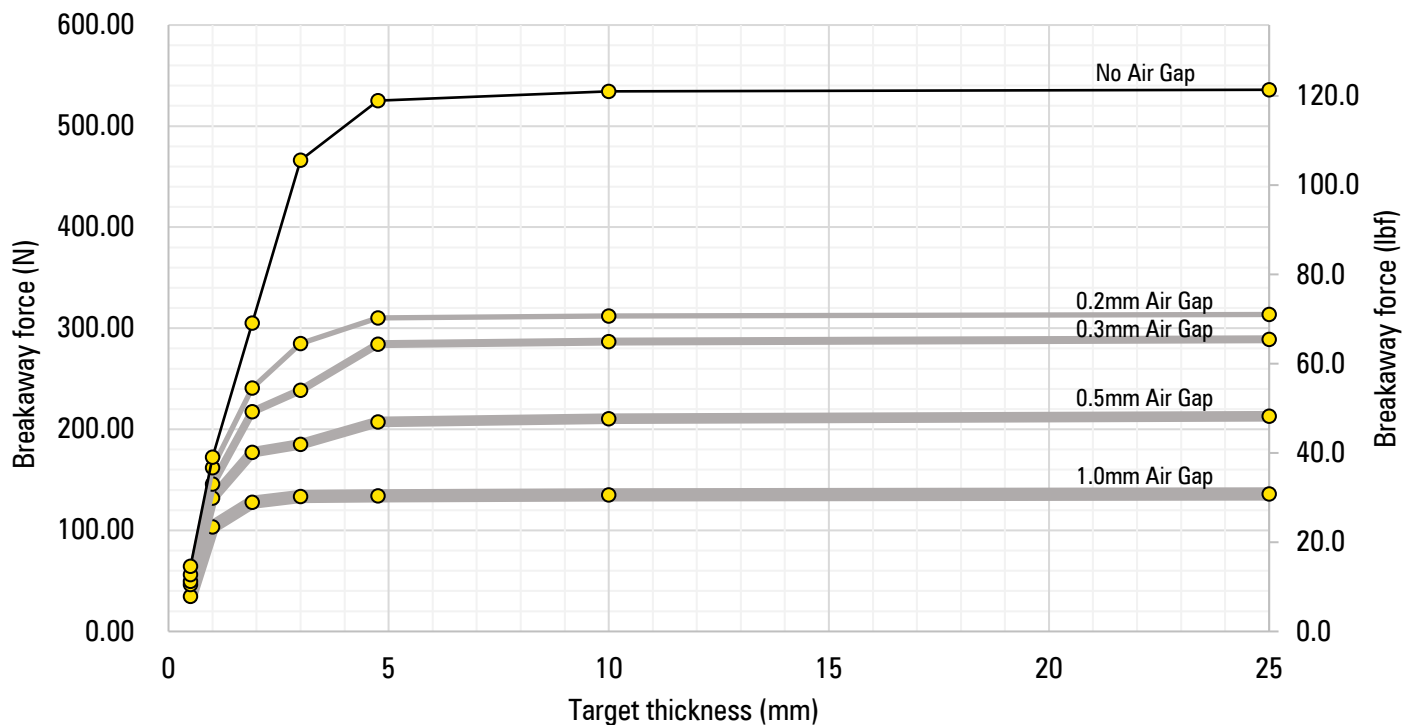
|                         |                                  |           |          |
|-------------------------|----------------------------------|-----------|----------|
| Maximum Breakaway Force | 552.3 N                          | 124.1 lbf | 56.3 kgf |
| Maximum Shear Force     | 176.6 N                          | 39.7 lbf  | 18 kgf   |
| Net Tool Weight         | 1.98 lbs                         |           | 0.9 kg   |
| Supply Voltage          | 24 V DC                          |           |          |
| Peak Current Draw       | 1A @ 24 V DC                     |           |          |
| Connector Type          | Male M12x1.0 – 5 Pin – A-coded   |           |          |
| Mounting Options        | TOP: Ø6-M8-Ø6 NAAMS pattern (x2) |           |          |

## Magnet Strength<sup>1</sup>

Table 1: Breakaway Strength with Different Sheet Thicknesses

| Target Thickness | mm     | 0.5   | 1     | 1.9   | 3     | 4.76  | 10    | 25    |
|------------------|--------|-------|-------|-------|-------|-------|-------|-------|
|                  | inches | 0.020 | 0.039 | 0.075 | 0.118 | 0.187 | 0.394 | 0.984 |
| Hold Force       | N      | 64.4  | 172.3 | 305.1 | 466.3 | 525.2 | 534.3 | 536.0 |
|                  | lbf    | 14.5  | 38.7  | 68.6  | 104.8 | 118.1 | 120.1 | 120.5 |

Figure 1: Breakaway Strength with Different Air Gaps



### <sup>1</sup> Footnotes:

- ▶ The forces listed in this document represent ideal maximums and may not accurately reflect the actual forces achievable in a customer's specific application due to variations in materials or process conditions.
- ▶ Review and understand the warnings section on page 3 before operating the tool.
- ▶ Breakaway forces were determined in laboratory environment on a 200mm x 200mm sheet of SAE1018 Steel with surface roughness of 63 microinches with standard pole shoes.
- ▶ Breakaway forces in general specifications and Table 1 were determined using standard pole shoes on clean, flat surfaces with no air gaps between the pole shoes and the target material. Any variation from this ideal scenario will decrease breakaway forces.

## Warnings

**Review and understand all warnings before operating the tool.**

**Contact and consult Magswitch engineering at +1(303) 468.0662 if you have any questions or concerns about your application or the tool's operation.**

- ▶ The breakaway and shear forces listed in this document are not safe lifting forces. Designers must account for the safety factor. Safe working loads must account for additional forces placed on the magnet and part when in motion or out of balance.
- ▶ The forces listed in this document represent ideal maximums and may not accurately reflect the actual forces achievable in a customer's specific application due to variations in materials or process conditions.
- ▶ The following conditions affect the tool's strength and impact the safe handling and transport of target materials:
  - Motion of the magnet (e.g. fast movements, emergency stops, and steep carrying angles)
  - Debris or contamination on the target surface
  - Air gaps between the magnet and target materials
  - Wear and damage to the tools pole shoes
  - Target material thickness (Reference *Table 1* on page 2 for reduced hold force on thinner material.)
  - Target material shape
  - Target material alloy
  - Pole shoe design
- ▶ To safely use the tool:
  - Always use pole shoes. If your pole shoes include dowel pins, always operate with dowel pins installed.
  - The COG of the material being lifted should be centered on the magnet to reduce pry.
  - Ensure all surfaces are clean and free of debris for maximum magnetic hold force. Any air gaps will reduce the magnet's hold force.
  - The north and south pole shoes of the magnet must make full contact with the target at time of actuation.
  - Do not expose the magnet to temperatures above 80°C (176°F). High temperatures will permanently degrade the magnet and may result in an unsafe condition.
  - Consult Magswitch engineering for custom pole shoes if working with irregular target surfaces
- ▶ To prolong the life of the tool:
  - Always use armor in bin picking operations.
  - Do not actuate the magnet off target. Actuation of the magnet off target will lead to increased wear on the magnet's internal actuation mechanisms.
- ▶ Always perform testing before deployment.

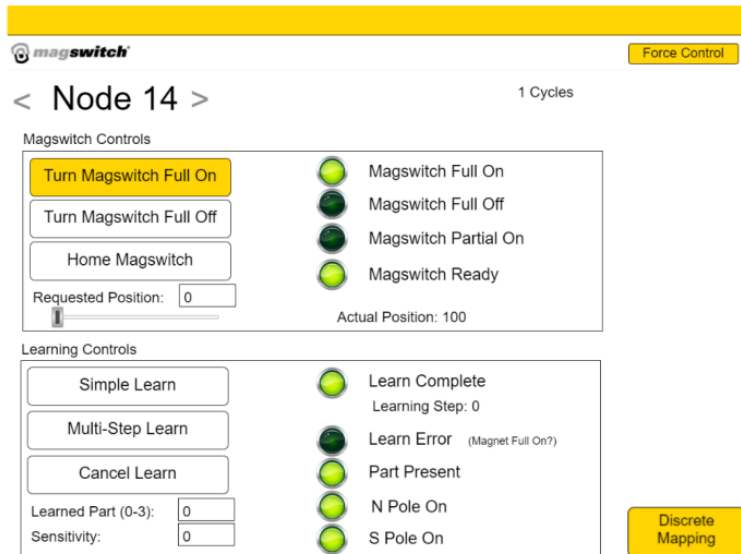
## Simple Learn: Part Present Setup

Simple Learn Setup works best for the following applications:

- ▶ The E-Series tool is rigidly fixtured and cannot be moved to the edges of a part (or the part cannot be shifted relative to the magnet).
- ▶ The E-Series tool and part are moved through a space in which there is external interference from the presence of large ferrous bodies (fixtures and machinery) or external magnetic fields.
- ▶ The part to pick has time-varying magnetic properties, i.e. one sheet is picked initially, and a second sheet is added beneath or nearby.

Any change to the magnetic field strength during a simple learn will affect the tool's part presence functionality. Consult Magswitch document 1101340 for additional calibration information if needed.

1. Make all connections for Vin, GND and CANopen (See connector pinout on page 5).
2. Turn the power supply on. The blue LED will be illuminated.
3. Place tool on the location of the part that needs to be calibrated.
4. Turn magnet "ON" fully (100% ON).
5. Select Simple Learn button.
6. Simple Learn is complete once the blue LED flashes 5 times slowly.
7. The interface will now illuminate Part Present, N Pole On, and S Pole On.



The screenshot shows the Magswitch control interface for Node 14. The interface is divided into two main sections: Magswitch Controls and Learning Controls. The Magswitch Controls section includes buttons for 'Turn Magswitch Full On', 'Turn Magswitch Full Off', and 'Home Magswitch'. It also displays 'Requested Position: 0' and 'Actual Position: 100'. The Learning Controls section includes buttons for 'Simple Learn', 'Multi-Step Learn', and 'Cancel Learn'. It also displays 'Learned Part (0-3): 0' and 'Sensitivity: 0'. On the right side, there are status indicators for 'Magswitch Full On', 'Magswitch Full Off', 'Magswitch Partial On', 'Magswitch Ready', 'Learn Complete', 'Learn Error (Magnet Full On?)', 'Part Present', 'N Pole On', and 'S Pole On'. A 'Discrete Mapping' button is located at the bottom right.

## Electrical Characteristics

### Recommended Operating Conditions

| Parameter                            | Min | Max | Unit |
|--------------------------------------|-----|-----|------|
| Supply voltage                       | 22  | 24  | V    |
| Operating free-air temperature range | -10 | 40  | C    |
| Storage free-air temperature range   | -25 | 80  | C    |
| Relative Humidity (non-condensing)   | 0   | 95  | %    |

### Electrical Characteristics

$V_{DD} = 24\text{ V}$  (unless otherwise noted)

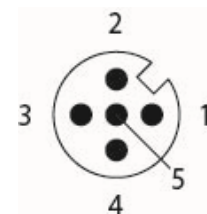
| Parameter          | Max  | Unit |
|--------------------|------|------|
| Current draw       | 0.94 | A    |
| Start-up time      | 3400 | ms   |
| Actuation on time  | 280  | ms   |
| Actuation off time | 280  | ms   |

## LED Color Codes

| Function/State                      | Blue LED State                          | Green LED State |
|-------------------------------------|-----------------------------------------|-----------------|
| No power to tool                    | OFF                                     | OFF             |
| Waiting to home magnet              | Blinking                                | Blinking        |
| Magnet actuated OFF                 | ON                                      | OFF             |
| Magnet actuated ON 100% (Fail-Safe) | ON                                      | ON              |
| Magnet partially actuated           | ON                                      | Blinking        |
| Standard calibration routine        | Blinks when calibration mode is entered | OFF             |

## Connector Pinout

| Pin | Function         | Logic                        |
|-----|------------------|------------------------------|
| 1   | Signal Shield    | -                            |
| 2   | Vin (V+)         | + 24 VDC                     |
| 3   | GND (V-)         | GND                          |
| 4   | CANopen bus high | TX/RX high line (D1) (CAN H) |
| 5   | CANopen bus low  | TX/RX low line (D0) (CAN L)  |



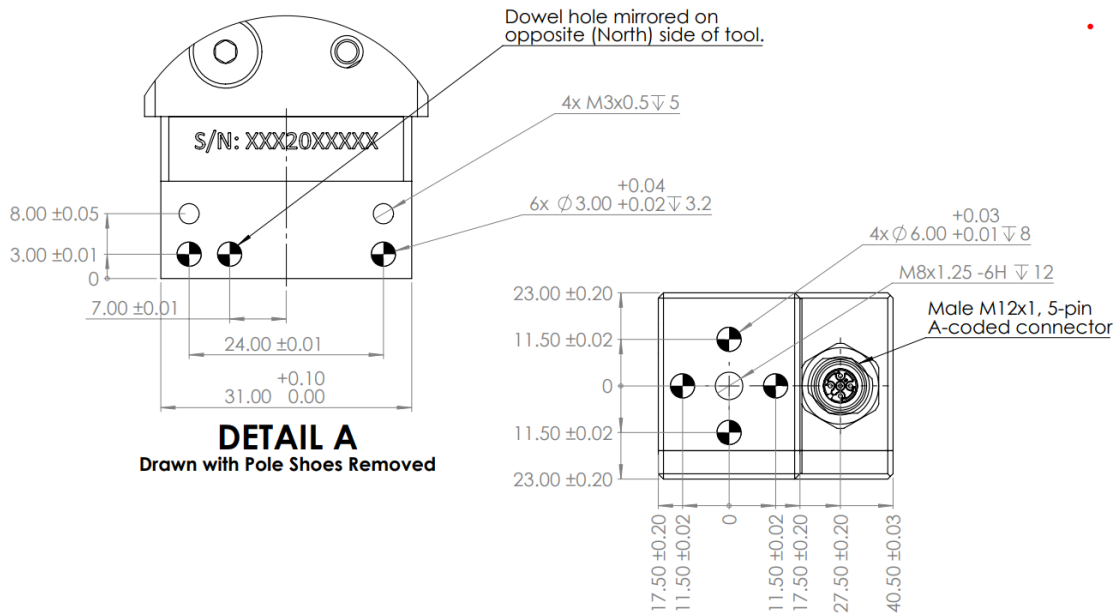
## Accessories Available

| Standard pole shoes                                        |                                                |
|------------------------------------------------------------|------------------------------------------------|
| E30 Standard Flat Pole Shoe Kit (Included)                 | 8800782                                        |
| E30 Standard Thin Optimized Pole Shoe Kit                  | 8800862                                        |
| E30 Standard Pin Clamp Pole Shoe Kit                       | 88001504                                       |
| Armor                                                      |                                                |
| E30 Armor Kit, Standard Bin Picking                        | 88001423                                       |
| Armor-ready pole shoes                                     |                                                |
| E30 Flat Pole Shoe Kit, Armor Ready                        | 88001424                                       |
| E30 Thin Optimized Pole Shoe Kit, Armor Ready              | 88001586                                       |
| E30 V-Cut 135deg Pole Shoe Kit, Armor Ready                | 88001426                                       |
| E30 V-Cut 155deg Pole Shoe Kit, Armor Ready                | 88001427                                       |
| Compliance                                                 |                                                |
| E50 Compliance Device Kit, Top Mounted<br>with E30 adapter | 88001628 (Compliance Kit)<br>3002637 (Adapter) |
| Mounting                                                   |                                                |
| E30 Standard Mount, BP ISO 31.5 / 50                       | 88001773                                       |
| Dual/Single E30 Adjustable Mount, BP ISO 31.5 / 50         | 88001790                                       |

## Pole Shoe Installation

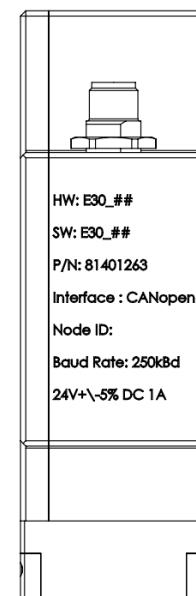
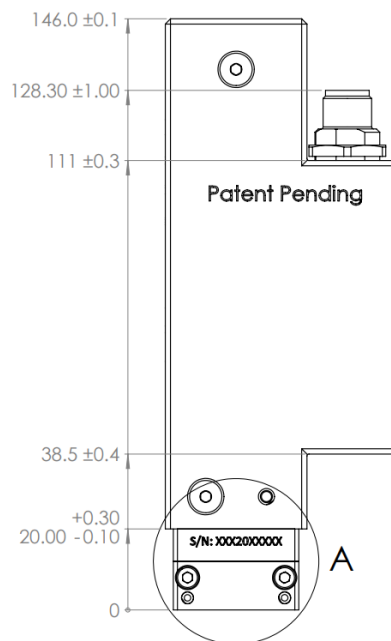
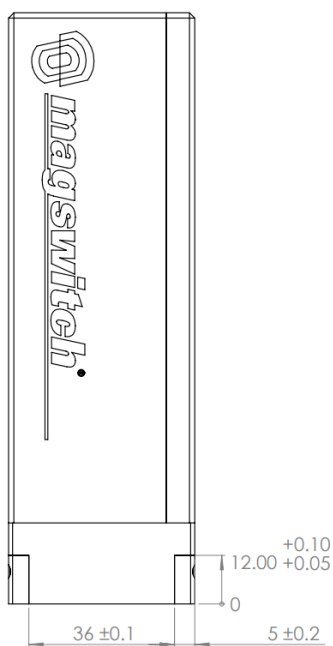
1. Remove any pole shoes currently installed on the sides of the tool.
2. Ensure dowel and fastener holes are clean. Confirm the side surfaces of the magnet housing are flat and smooth.
3. Align dowel pins with housing bores and apply light pressure to seat poles flush against housing.
4. Apply Loctite 222 to fastener threads and install 4x M3 socket head cap screws.
5. Torque all screws to 2.0Nm (17.7 in-lbf). There should be no visible gap between the pole shoes and the magnet housing.

## Tool Dimensions



**DETAIL A IS SHOWN WITHOUT POLE SHOES**

- POLE SHOES ARE REQUIRED FOR OPERATION
- IF YOUR POLE SHOES INCLUDE DOWEL PINS, ALWAYS OPERATE WITH DOWEL PINS INSTALLED



## Center of Mass

