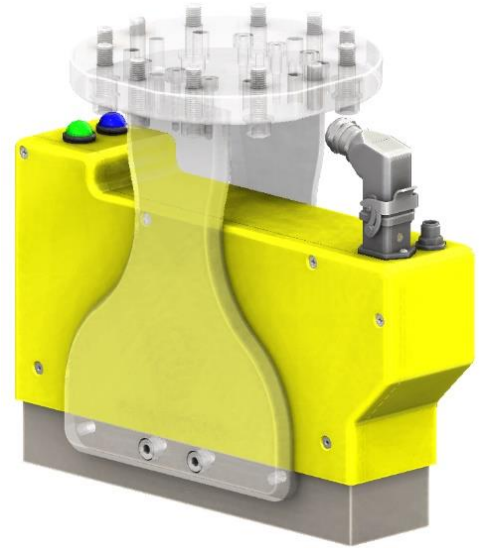


## ELAY 50x5 EU Smart Tool | P/N: 81501320

Featuring Variable Field Output (VFO) technology, this automation-ready magnetic gripper can be controlled using CANopen protocols to de-stack and pick single or multiple sheets. Adjustability of magnetic strength between 0 and 100% allows use of this mega magnet on both thin and thick sheets of varying sizes and material type. CANopen communication allows integration of multiple tools on the same CANopen bus, controlled simultaneously.

NOTE: Base tool does not ship with 8800924 EOAT bracket (transparent at right)



### Specifications

<b>Maximum Breakaway Force</b> <sup>1,2</sup>	2537 lb	1151 kg
<b>Maximum Shear Force</b> <sup>1,2</sup>	508 lb	230 kg
<b>Nominal Supply Voltage</b>	24 V DC	
<b>Peak Power Draw</b>	5.5 A @ 24 V DC	
<b>Net Weight</b>	33.95 lb	15.4 kg
<b>Connector Type</b>	Power: Female Heavy Duty - 4-Pin Data: Male M12x1.0 – 5 Pin – A-coded	
<b>Mounting Options</b>	SIDE: Ø8-M8-M8-Ø8 pattern (x2)	

<b>Material Thickness</b> - mm (in)	1.9 (0.075)	2.7 (0.106)	6.35 (0.250)	8 (0.315)	10 (0.394)	19.05 (0.750)
<b>Maximum Force</b> <sup>1,2,5</sup> - kg (lbs)	176 (388)	333 (734)	860 (1896)	864 (1906)	1090 (2404)	1151 (2537)

<b>De-stack Settings</b> <sup>3</sup>	Minimum Thickness for De-stack mm (in)	1 (0.039)	2 (0.079)	3 (0.118)	4 (0.157)	5 (0.197)	6 (0.236)
	Partial Actuation	22%	27%	33%	38%	40%	44%

$$SWL \text{ (Safe Working Load)} = \frac{\text{Maximum Force}^5}{\text{Safety Factor} (\geq 3)}$$

<sup>1</sup> Determined in laboratory environment on SAE1018 Steel with surface roughness 63 micro inches with optimized pole shoes. Many factors contribute to the actual breakaway force and safe working load in each application. Consult a Magswitch Applications Engineer and test the Magswitch in each application before deployment.

<sup>2</sup> All data applies to unit with standard combination V/flat pole shoes installed.

<sup>3</sup> Determined with SAE1018 Steel L=200mm W=600mm.

<sup>4</sup> Values may vary by +/- 5%.

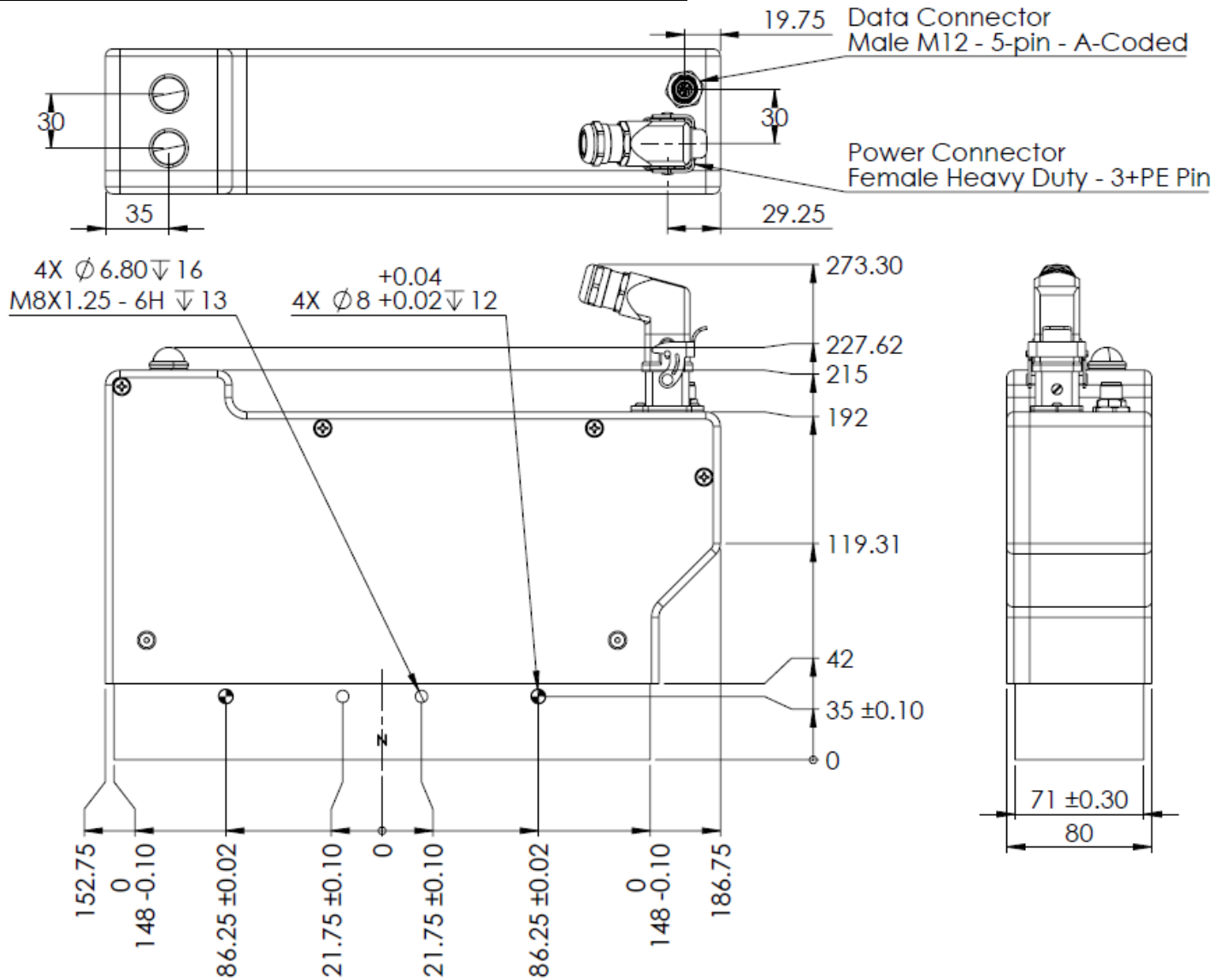
<sup>5</sup> Maximum forces listed above are not safe lifting forces. Designer must take into account safety factor when specifying tool. Magswitch recommends SWL = 3:1 for most lifting applications.

**Pole shoes required for operation**

**Standard Kits Available:**

88001109	ELAY50x5 Standard Pole Shoe Kit
8800924	Standard EOAT Bracket
88001126	Heavy Duty Plug, 105° angle, ELAY50x5 EU compatible

**WARNING!**  
Do Not Operate Unless In Contact With  
Ferrous Target!



Pole Shoes Sold Separately

## General Electrical Characteristics

Parameter	Value
Input Voltage Range	24 ± 5% V DC
Rated Current Draw (Peak)	5.5 A DC @ 24 V DC
Rated Current Draw (Continuous)	0.65 A DC @ 24 V DC
Connector Style	Power: Female Heavy Duty – 3 + PE Pin (88001126 kit 105° angled male plug, 6-12mm cable gland included) Data: Male M12 – 5-Pin – A-Coded (female M12 plug / cable NOT included)

## Ambient Conditions

Parameter	Range
Ambient Temperature (Operation)	-10 to +40 Degrees Celsius
Ambient Temperature (Storage)	-25 to +80 Degrees Celsius
Relative Humidity (non-condensing)	0 to 95%

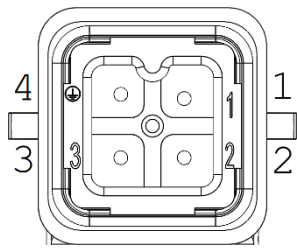
## LED Color Codes

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 Blinks when steps 1-4 are confirmed	OFF/ON depending on magnet state
Auto-calibration routine	Blinks on entry and exit/confirmation	OFF/ON depending on magnet state

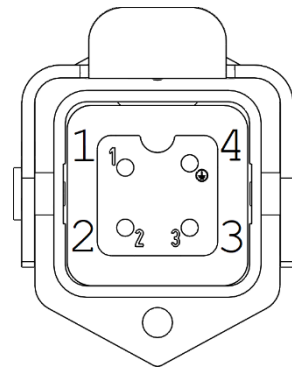
## Connector Pinout(s)

### Heavy Duty/Industrial Aerial Connector ("HAN 3A" style, 3-Pin + protective earth)

Pin #	Function	Logic
1	Vin (V+)	+ 24 VDC
2	Vin (V+) (internally connected to pin 1)	+ 24 VDC
3	GND (V-)	GND
4	Protective Earth / Shield	-



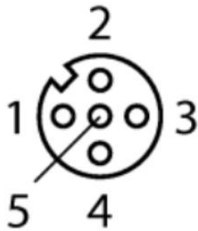
Cable Side: Pin Assignment, 4-pin, Male Connector (pin-side) View



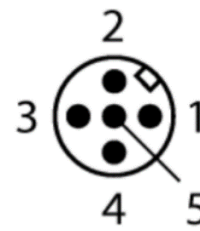
Tool side: Pin Assignment, 4-pin, Female Connector (socket-side) View

### Data Connector (M12 5-Pin)

Pin #	Function	Logic
1	Signal Shield	-
2	(Internally Disconnected)	-
3	GND	GND
4	CANopen bus high	TX/RX high line (D1) (CAN H)
5	CANopen bus low	TX/RX low line (D0) (CAN L)



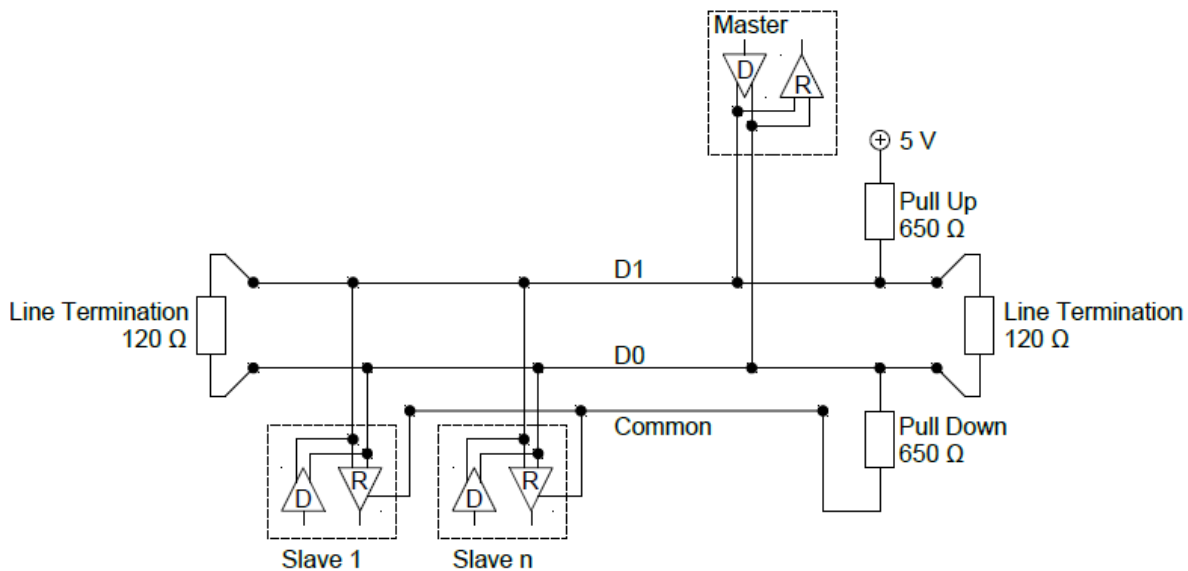
Cable Side: Pin Assignment M12, 5-pin, A-coded, Female Connector (socket-side) View



Tool side: Pin Assignment M12, 5-pin, A-coded, Male Connector (pin-side) View

## CANopen Configuration Information

CAN Baud Rate	250 kBaud, configurable
Default CAN Node ID	127 <sub>d</sub> = 7F <sub>h</sub> , configurable
Device Terminating Resistor	120 Ω <b>NOT</b> enabled
Master Device Termination	Master device must have line polarization/termination OR: Apply 450-650 Ω pull-up to +5V on high line (D1) (CAN_H) Apply 450-650 Ω pull-down to GND on low line (D0) (CAN_L)



### Changing CANopen NodeID

- Check object 2009<sub>h</sub> for current CANopen NodeID.
  - Default NodeID = 14<sub>d</sub> = E<sub>h</sub>
- Write desired NodeID value to 2009<sub>h</sub>.
  - Software Version 11 & above: Acceptable NodeID value range = 1<sub>d</sub>-23<sub>d</sub> (Defaults to 14 if node ID is out of range)
  - Software Version 10 & below: Acceptable NodeID value range = 1<sub>d</sub>-127<sub>d</sub>
- To save, write to object 1010<sub>h</sub> sub-index 0A<sub>h</sub> the value 1702257011<sub>d</sub> (65766173<sub>h</sub>).
- Wait until object 1010<sub>h</sub> sub-index 0A<sub>h</sub> is equal to 1.
- Disconnect and reconnect power.
- The device NodeID will now be changed.

### Changing CANopen Baud Rate

Please consult integration/assembly manual 1101334 for instructions on changing the CANopen baud rate. Available baud rates are 10, 20, 50, 125, 250, 500, and 1000 kBaud.

**CANopen I/O Service Data Objects (SDO's) and Functionality**

Type	Object (hex)	Sub Index (hex)	Short Name	Description
Inputs	2400	01	Move Enable	1 = home magnet 2 = move to position set in 2400:02 <b>0 = reset trigger after each move</b>
	2400	02	Set Position	Position 0-100% (increments of 1)
	2400	03	Calibration Trigger	Standard Calibration: 1 = trigger (must be reset to 0 after each trigger in standard calibration) Auto Calibration: 1 = start (with Calibration Mode already set to 1) 999 = exit & don't save <b>0 = reset trigger after setting 1 or 999</b>
	2400	04	Calibration Select	Select calibration storage options 0-3 (4 possible calibrations)
	2400	05	Sensitivity	default = 0 more sensitive = -x less sensitive = x typical x values = 5, 10, 20
	2400	06	Calibration Mode	0 = standard calibration procedure (good for bin picking, etc) 1 = auto calibrate
	Outputs	2500	01	Magnet Position
2500		02	Magnet State	0 = OFF 1 = Partial ON 2 = Magnet ON 100% (Fail-Safe)
2500		03	Calibration State	0 = no South Pole, no North Pole, and no part present in range 4 = North, South, part present all within Range
2500		04	In Calibration	0 = not in Calibration 1 = In Standard Calibration 2 = In Auto Calibration
2500		05	Calibration Step	0 = not in calibration 1 = waiting for best circuit 2 = waiting for worst circuit 3 = waiting for South Pole 4 = waiting for North pole
2500		06	Cycle Count	Number of times the tool has been turned on to full power
2500		07	Home Status	0 = not properly homed 1 = Properly homed
2500		08	Move Status	0 = not complete 1 = Last set move complete
2500		09	Serial Number	Magswitch Tool Serial Number
2500		0A	Magnet Software Version	Magswitch Software Version
2500		0B	Tool Type	30 for E30, 50 for E50, 505 for ELAY50x5
2005			CANopen Baud Rate	84 <sub>h</sub> = 132 <sub>d</sub> = 125 kBaud by default. Consult configuration manual 1101334 before changing
2009			CANopen Node ID	Refer to Pg. 5: Step 2a and 2b for more details on NodeID range E <sub>h</sub> = 14 <sub>d</sub> by default

## 2-Step Calibration Procedure

See setup manual 1101334 for more E-series detail.

### Step 1

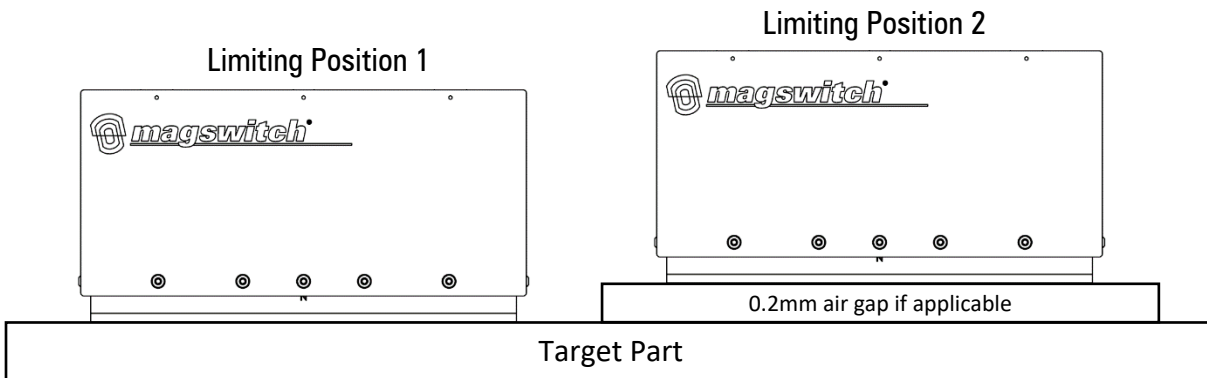
Limiting Position 1 for Calibration Match Signal

### Step 2

Limiting Position 2 for Calibration Match Signal

Object **CalState (2500:03<sub>h</sub>)** will return 4 when the contact quality between both poles and the part lie within the zone created by bounding Limiting Position 1, Limiting Position 2, and North and South Pole calibration signals.

**NOTE:** North and South pole calibration steps 3 and 4 typical of the E30 and E50 tools are removed from the ELAY calibration procedures. This is because the north and south poles of an ELAY tool are elongated, and in most customer applications it is difficult to position the long edge of the magnet near the edge of the part without also impacting the calibration of the opposite pole.



The following flowchart shows the proper CANopen signaling required to enter and set calibrations 0-4. Note that all “output” objects can be polled at any time to determine the current state of the calibration process.

It is critical that the magnet be fully actuated ( $\text{setPosition} / \text{OutPos} = 100$ ) at each calibration step to guarantee proper field values are stored. **The tool will not allow you to confirm calibration steps 1 and 2 unless the magnet is ON and the green light is lit.**

The supplementary document 1101340 can be provided by Magswitch if additional information regarding calibration procedure is needed.

## Auto-Calibration Procedure

Actuate tool OFF and enter auto-calibration mode by setting object  $2400:04 = 1_d$  and then writing  $2400:03 = 1_d$ . Position the tool on the desired part. Once the tool is actuated ON and the green light is lit, the tool records magnetic field strengths in the current configuration and stores them as allowable Part Present boundaries. Add or adjust parts and fixtures to widen the allowable range of field strengths. By writing  $2400:03 = 0_d$ , auto-calibration parameters are saved and standard operation resumes. Tool should NOT be actuated OFF until auto-calibration is exited and saved otherwise calibration values will be skewed. Tool should not be actuated off-target or calibration range will exceed practical usage and part present functionality will be inaccurate.

## E-Series Operational Flowchart

