

**2019 MICHIGAN SKILLS USA CHAMPIONSHIPS  
TASK AND MATERIALS LIST**

SKILL OR LEADERSHIP AREA: INDUSTRIAL MOTOR CONTROL

**CONTEST LOCATION:**

DeVos Place  
303 Monroe Ave NW  
Grand Rapids, MI 49503  
616.742.6500  
<http://devosplace.org/>

**RESUME:**

Each student must submit a one-page printed resume before the contest start at the contest site (present to contest coordinator, not judges). The resume is no longer submitted online. This is the only time that resumes can be turned in. Failure to do so will result in a 10 point penalty.

**TASKS TO BE PERFORMED:**

1. Answer questions to written test regarding SkillsUSA knowledge.
2. Students must supply their own tools.  
**\*\* DO NOT BORROW FROM OTHERS!**

**SCOPE OF PROJECT:**

1. Mount electrical equipment (excluding electrical motors) and electrical conductors according to NFPA70.
2. Bend and mount conduit and junction boxes as per the drawing.
3. Provide the control wiring and schematics as per the written description.
4. Written test
5. Oral assessment
6. Provide resume (written)

**STUDENTS MUST SUPPLY:**

- Hammer
- Conduit reamer
- Screwdrivers (Regular and Phillips) and screw tips
- Needle nose pliers
- Wire strippers
- Pump pliers
- Electrical tape
- Crimp tool
- Diagonal wire cutters
- Electrical side cutting pliers
- Tool pouch and belt
- 6' rule or tape measure
- Knife
- Safety glasses with side shields or goggles
- ½" EMT conduit hand bender (thin wall)
- Pocket level
- Hack saw frame & blade with extra blade
- 2018 National Electrical Code book (no handbook)

- Supplies for drawing a ladder diagram
- Calculator
- Multimeter
- Wire number for wire labeling
- Resume – 1 page
- Six foot extension cord with 3 conductors, 14 or 12 AWG

**DRESS CODE:**

- Leather work boots or shoes (No athletics)
- Appropriate work attire
- Approved hard hat
- Safety glasses with side shields

**Note:**

- Intent of contest is to use manual hand tools
- Judges reserve the right to deny use of any tools not on list
- Conduit box kickers are not allowed
- Each student will be scored on a clean and safe workspace.

The 2019 Industrial Motor Controls Competition will include a reversing control circuit with numerous interlocks, EMT bending, interview with contestant- provided 1 page resume' and written test with 2014 National Electrical Code book. Students are responsible for bringing all tools listed on National Website including wire marker booklet.

Revised 12/19/18

Skills USA  
Industrial Motor Control Competition  
Parts list

1- 3 pole motor starter with memory contact, overload block, and auxiliary contact block containing one NO and one NC contact. 120 volt coil. Din rail mountable

Contactor – **sc-eo2**

Overload Block = **tk-eo2**

Auxiliary Contact Block (2 n.o./ 2 n.c. contacts) **sz-a22/t**

1- Reversing starters, 120-volt coil, with N.C. interlock contacts and N.O. memory contacts. Din rail mountable.

Contactor – **sc-eo2** Need two of these

Overload Block = **tk-eo2**

Auxiliary Contact Block (2 n.o./ 2 n.c. contacts) **sz-a22/t**

Mechanical Interlock = **SZ-RM**

Line side jumpers = **SZ-ERW1A**

Load side jumpers = **SZ-ERW1D**

1-Selector Switch (on-off-on) 22 or 30 mm 2 N.O. contacts. **GCX3320-22**

2- Limit switches, NO and NC contacts ½ threaded hub and offset nipple installed.  
**ABP2H41Z11**

2- Timers and bases, din rail mount, (Ice Cubes) on-delay, 120 volt operation. N.O. -C-  
N.C. contacts x2 **MS4SM-AP-ADC** and **TP411X**

2- Ice cube relay 120 volt coil, N.O – C – N.C. contacts x2 **QL2N1-A120** and **SQL08D**

2- Pilot Lights 22 or 30 mm 120 volt operation **ECX1051-120**

1- Push to test pilot light 22 or 30 mm **GCX3202-120**

1-push button enclosure three hole, 22 or 30 mm with offset nipple installed **SA107-40SL**

1-push button enclosure two hole, 22 or 30 mm with offset nipple installed **SA105-40SL**

25 wire terminals din rail mount. **KN-T12GRY**

2 Din rail mounted fuse holder. **KN-F10L110AC-10** with **5x20mm, 5amp fuses (multiple fuses)**

4 Grounding terminal block. **KN-G12SP-10**

1- 6' cordset, 120 volt with ½" connector.

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Screws #10 by 1"

Assortment of crimp connectors: spade, ring, and fork.

#16 TFFN Red, Black, Green, White

1- 4" square deep electrical box with ½ ko

5 – ½" offset nipples with locknuts

1-10' piece ½" EMT conduit

4- ½" EMT connectors

2- 1/2" EMT couplings

3- 1/2" minis

4- 2 – Red Momentary Pushbuttons with normally open and normally closed contact blocks

5- 2- Green Momentary Pushbuttons with normally open and normally closed contact blocks

All part numbers are from [www.automationdirect.com](http://www.automationdirect.com)

Equivalent parts are acceptable.

## Industrial Motor Controls Scoring Rubric

Industrial Motor Controls Scoring Sheet													
	Exceeds industry standards and quality.			Meets industry standards and quality			Acceptable performance			Unacceptable performance			
Safety	100		80	70		60	50		40	30		0	Score
	Works at a deliberate pace, aware of others around them and their safety, follows all safety requirements.			Follows safety requirements is unaware of others in the area.			Follows most safety requirements, has an occasional lapse in safe working procedures.			Unsafe working practices, is a danger to self or others in the immediate area.			
Ladder diagram	100		80	70		60	50		40	30		0	Score
	Diagram is correct, all symbols drawn correctly, lines are straight and connected at both ends, all lettering is neat with correct spelling.			Diagram may exhibit one of the following faults. Generally correct but not accurate, poor penmanship/symbol representation, lines not straight and at right angles, some words spelled incorrectly.			Diagram may exhibit two or three of the following faults. Generally correct but not accurate, poor penmanship/symbol representation, lines not straight and at right angles, some words spelled incorrectly.			Diagram is illegible, circuit will not work, symbols drawn incorrectly. Contestant shows no grasp of ladder diagram procedures.			
Wiring application	100		80	70		60	50		40	30		0	Score
	Proper size conductors, proper color code, all connections tight. Proper connection to components, contestant understands the circuit and component operation.			One of the following conditions present; conductors may not be correct size or color, more than two wires per terminal, wire nuts improperly utilized. Contestant requires guidance to connect component.			Two or three of the following conditions; conductors may not be correct size or color, more than two wires per terminal, wire nuts improperly utilized. Contestant requires guidance to connect component.			Several of the following conditions; conductors may not be correct size or color, more than two wires per terminal, wire nuts improperly utilized. Contestant requires guidance to connect component.			
Workmanship	100		80	70		60	50		40	30		0	Score
	Components mounted level, secure and in proper location, wires neat and orderly with proper bends, wires secured and wrapped, all			One of the following conditions; components mounted level, secure and in proper location, wires neat and orderly with proper bends, wires secured and			Two or three of the following conditions; components mounted level, secure and in proper location, wires neat and orderly with proper bends, wires secured and			Multiple errors exist; components mounted level, secure and in proper location, wires neat and orderly with proper bends, wires secured and			

	terminations numbered and orderly.			wrapped, all terminations numbered and orderly.			wrapped, all terminations numbered and orderly.			wrapped, all terminations numbered and orderly.			
NEC/written test	100		80	70		60	50		40	30		0	Score
	Entire project meets code compliance, no violations/wrong answers.			One code violation/two wrong answers.			Two or three code violations/3-4 wrong answers.			Multiple code violations/more than 4 wrong answers.			
Correct operation	100		80	70		60	50		40	30		0	Score
	Project works correctly the first time. Or if not operational, component issues not the fault of the contestant will not deduct from score.			Project does not work correctly on the first power up, student troubleshoots the problem with no assistance.			Project requires two attempts to correct the problem, assistance may be utilized.			Contestant is unable to correct the problem, has no working knowledge of the circuit.			
Raceway	100		80	70		60	50		40	30		0	Score
	All raceways correct length to within 1/8 <sup>th</sup> inch, bends are to the correct angle, bends are at the correct placement in the raceway. No kinks or damage to the raceway.			Raceway may contain one of the following; correct length to within 1/8 <sup>th</sup> inch, bends are to the correct angle, bends are at the correct placement in the raceway. No kinks or damage to the raceway.			Raceway may contain two or three of the following; correct length to within 1/8 <sup>th</sup> inch, bends are to the correct angle, bends are at the correct placement in the raceway. No kinks or damage to the raceway.			Raceway may contain several of the following; correct length to within 1/8 <sup>th</sup> inch, bends are to the correct angle, bends are at the correct placement in the raceway. No kinks or damage to the raceway.			
Project presentation	100		80	70		60	50		40	30		0	Score
	Contestant is able to correctly describe how the project will work. Speaks directly and concisely to the judge, makes eye contact and answers questions effectively.			Contestant does not correctly describe the circuit or does not demonstrate the project with good eye contact and confident speech			Contestant neither correctly demonstrates the circuit or presentation of the project			Contestant is unaware of all surroundings.			
Resume	100		80	70		60	50		40	30		0	Score
	Purpose and format of the resume is strong and clear.			Purpose and format is present but could be stronger. Some Resume shows an			Purpose and format is less clear, and weak parts remain. Format is confusing.			Purpose and format is not clear. Format is hard to see.			

	Resume is professional in appearance, tone, and style. Proper writing mechanics present.			appropriate appearance. Some inconsistencies remain. Writer follows most writing guidelines.			Major sections are missing. Resume shows a less professional appearance, multiple errors.			Major sections are missing information. Numerous errors, document is unreadable			
Interview	100		80	70		60	50		40	30		0	Score
	No infraction to the following: Contestant introduced themselves with a firm handshake and eye contact, maintained posture, and grooming, has mature answers to all questions, has knowledge of position applied.			One to two infractions of the following: Contestant introduced themselves with a firm handshake and eye contact, maintained posture, and grooming, has mature answers to all questions, has knowledge of position applied.			Three to four infractions of : Contestant introduced themselves with a firm handshake and eye contact, maintained posture, and grooming, has mature answers to all questions, has knowledge of position applied.			Multiple infractions of: Contestant introduced themselves with a firm handshake and eye contact, maintained posture, and grooming, has mature answers to all questions, has knowledge of position applied.			
	100		80	70		60	50		40	30		0	Score
Total Score													

