

# Trade Profile

## Instrumentation and Control Technician



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# **RED SEAL**

# **TRADE PROFILE**

## **INSTRUMENTATION AND CONTROL**

## **TECHNICIAN**



# STRUCTURE OF THE TRADE PROFILE

This profile has two sections that provide a snapshot of the trade's description, and all trade activities as they are organized in the Red Seal Occupational Standard:

**Description of the Instrumentation and Control Technician trade:** an overview of the trade's duties, work environment, job requirements, similar occupations and career progression

**Task Matrix:** a chart which outlines graphically the major work activities, tasks and sub-tasks of this trade

**Major Work Activity (MWA):** the largest division within the standard that is comprised of a distinct set of trade activities

**Task:** distinct actions that describe the activities within a major work activity

**Sub-task:** distinct actions that describe the activities within a task

A complete version of the occupational standard, which provides additional detail for the trade activities, skills and knowledge can be found at [www.red-seal.ca](http://www.red-seal.ca).

# DESCRIPTION OF THE INSTRUMENTATION AND CONTROL TECHNICIAN TRADE

“Instrumentation and Control Technician” is this trade’s official Red Seal occupational title approved by the CCDA. This standard covers tasks performed by instrumentation and control technicians whose occupational title has been identified by some provinces and territories of Canada under the following names:

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
Instrumentation and Control Technician	■	■	■	■		■	■	■	■				
Instrument Technician											■		
Industrial Instrument Technician													■
Industrial Instrument Mechanic										■		■	

Instrumentation and control technicians are knowledgeable in measurement and automation of process control systems. Examples of industries that use process control systems are oil and gas refineries, power generation plants, pulp and paper mills, and manufacturing facilities.

Instrumentation and control technicians install and service a variety of systems including safety and security, energy delivery (hydraulic, pneumatic and electrical), communication, and process control systems. They also install and service measuring and indicating instruments to monitor process control variables, monitor the operation of equipment and measure the characteristics of the material within a process. Instrumentation and control technicians work with final control elements such as valves, actuators and positioners to manipulate the process medium. They install and terminate electrical, pneumatic and fluid connections. They may also work on network and signal transmission systems such as fibre-optic and wireless.

Along with the calibration, repair, adjustment and replacement of components, instrumentation and control technicians inspect and test the operation of instruments and systems to diagnose faults and verify repairs. They establish and optimize process control strategies, and configure related systems such as Programmable Logic Controllers (PLC), Distributed Control Systems (DCS), Human Machine Interfaces (HMI) and Supervisory Control and Data Acquisition (SCADA) systems. Instrumentation and control technicians maintain backups, documentation and software revisions as part of maintaining these computer-based control systems. Scheduled maintenance and the commissioning of systems are also important aspects of the work. Instrumentation and control technicians consult technical documentation, drawings, schematics and manuals. They may assist engineering in plant design, modification and hazard analysis, and work with plant operators to optimize plant controls.

Instrumentation and control technicians use hand and power tools, electronic test equipment and material handling equipment. They work on a range of instruments including primary control elements, transmitters, analyzers, sensors, detectors, signal conditioners, recorders, controllers and final control elements. These instruments measure and control variables such as pressure, flow, temperature, level, motion, force and chemical composition.

Instrumentation and control technicians work in various industrial sectors such as pulp and paper/fibre processing; food and beverage processing; pharmaceuticals processing; nuclear, thermal and hydropower generation; landfill/cogeneration; mining; petrochemical; pipeline; oil and gas; military; steel; water and wastewater treatment; medical instrumentation; manufacturing; and industrial/commercial instrument servicing.

When performing their duties, instrumentation and control technicians must comply with federal, jurisdictional, industrial and site-specific standards, codes and regulations. They install and commission new instrumentation systems according to these requirements. They contribute to keeping processes operating and equipment maintained within these set standards, codes and regulations. Keeping up-to-date with advances in technology in industry and in the trade is essential.

Instrumentation and control technicians may work in a variety of hazardous environments where they could be exposed to confined spaces, heights, noise, dust, cold and heat. There may also be risks working with chemicals, gases, electricity, radiation, laser equipment and substances under pressure. Instrumentation and control technicians are trained to identify hazards and work safely in these environments.

Key attributes for people entering this trade are manual dexterity, attention to detail, strong problem solving skills, ability to troubleshoot problems, communication skills, technological aptitude, and mathematical and scientific aptitude.

This standard recognizes similarities or overlaps with other tradespersons and professionals such as process operators, steamfitters/pipefitters, boilermakers, industrial mechanics (millwrights), electricians, information technology technicians and engineers.

With experience, instrumentation and control technicians may act as mentors and trainers to apprentices in the trade. They may also move into supervisory, design, advanced control, training, sales and other related positions.

# INSTRUMENTATION AND CONTROL TECHNICIAN

## TASK MATRIX

### A – Performs common occupational skills

9%

<b>Task A-1</b> <b>Performs safety-related functions</b> <b>30%</b>	<b>A-1.01 Maintains safe work environment</b>	<b>A-1.02 Uses personal protective equipment (PPE) and safety equipment</b>	<b>A-1.03 Performs de-energizing, lock-out and tag-out procedures</b>
<b>Task A-2</b> <b>Uses tools and equipment</b> <b>34%</b>	<b>A-2.01 Uses calibration, configuration and test equipment</b>	<b>A-2.02 Uses hand and power tools</b>	<b>A-2.03 Uses access equipment</b>
	<b>A-2.04 Uses rigging, hoisting and lifting equipment</b>		
<b>Task A-3</b> <b>Organizes work</b> <b>24%</b>	<b>A-3.01 Uses documentation</b>	<b>A-3.02 Interprets drawings and schematics</b>	<b>A-3.03 Plans tasks</b>
<b>Task A-4</b> <b>Uses communication and mentoring techniques</b> <b>12%</b>	<b>A-4.01 Uses communication techniques</b>	<b>A-4.02 Uses mentoring techniques</b>	

## B – Installs and services process measuring and indicating devices

**24%**

<b>Task B-5</b> Installs and services pressure, temperature, level and flow devices <b>30%</b>	B-5.01 Installs pressure, temperature, level and flow devices	B-5.02 Maintains pressure, temperature, level and flow devices	B-5.03 Diagnoses pressure, temperature, level and flow devices
	B-5.04 Repairs pressure, temperature, level and flow devices		
<b>Task B-6</b> Installs and services signal transducers <b>14%</b>	B-6.01 Performs installation and configuration of signal transducers	B-6.02 Diagnoses signal transducers	B-6.03 Performs maintenance and repairs on signal transducers
<b>Task B-7</b> Installs and services motion, speed, position and vibration devices <b>12%</b>	B-7.01 Installs motion, speed, position and vibration devices	B-7.02 Maintains motion, speed, position and vibration devices	B-7.03 Diagnoses motion, speed, position and vibration devices
	B-7.04 Repairs motion, speed, position and vibration devices		
<b>Task B-8</b> Installs and services mass, density and consistency devices <b>14%</b>	B-8.01 Installs mass, density and consistency devices	B-8.02 Maintains mass, density and consistency devices	B-8.03 Diagnoses mass, density and consistency devices
	B-8.04 Repairs mass, density and consistency devices		
<b>Task B-9</b> Installs and services process analyzers <b>17%</b>	B-9.01 Installs process analyzers	B-9.02 Maintains process analyzers	B-9.03 Diagnoses process analyzers
	B-9.04 Repairs process analyzers		

**Task B-10**  
**Installs and services multiple variable computing devices**  
**13%**

**B-10.01 Installs multiple variable computing devices**

**B-10.02 Maintains multiple variable computing devices**

**B-10.03 Diagnoses multiple variable computing devices**

**B-10.04 Repairs multiple variable computing devices**

## **C – Installs and services safety and security systems and devices**

**9%**

**Task C-11**  
**Installs and services safety systems and devices**  
**55%**

**C-11.01 Installs safety systems and devices**

**C-11.02 Maintains safety systems and devices**

**C-11.03 Diagnoses safety systems and devices**

**C-11.04 Repairs safety systems and devices**

**Task C-12**  
**Installs and services facility security systems**  
**(NOT COMMON CORE)**

**C-12.01 Installs facility security systems**  
**(NOT COMMON CORE)**

**C-12.02 Maintains facility security systems**  
**(NOT COMMON CORE)**

**C-12.03 Diagnoses facility security systems**  
**(NOT COMMON CORE)**

**C-12.04 Repairs facility security systems**  
**(NOT COMMON CORE)**

**Task C-13**  
**Installs and services safety instrumented systems (SIS)**  
**45%**

**C-13.01 Installs SIS**

**C-13.02 Configures SIS**

**C-13.03 Maintains SIS**

**C-13.04 Diagnoses SIS**

**C-13.05 Repairs SIS**



## D – Installs and services hydraulic, pneumatic and electrical systems

**11%**

<p><b>Task D-14</b> Installs and services control devices for hydraulic systems <b>19%</b></p>	<p><b>D-14.01</b> Installs control devices for hydraulic systems</p>	<p><b>D-14.02</b> Diagnoses control devices for hydraulic systems</p>	<p><b>D-14.03</b> Performs maintenance and repairs on control devices for hydraulic systems</p>
<p><b>Task D-15</b> Installs and services pneumatic equipment <b>40%</b></p>	<p><b>D-15.01</b> Installs pneumatic equipment</p>	<p><b>D-15.02</b> Diagnoses pneumatic equipment</p>	<p><b>D-15.03</b> Performs maintenance and repairs on pneumatic equipment</p>
<p><b>Task D-16</b> Installs and services electrical and electronic equipment <b>41%</b></p>	<p><b>D-16.01</b> Installs electrical and electronic equipment</p>	<p><b>D-16.02</b> Diagnoses electrical and electronic equipment</p>	<p><b>D-16.03</b> Performs maintenance and repairs for electrical and electronic equipment</p>

# E – Installs, configures and services final control elements

**20%**

<b>Task E-17</b> Installs and services valves <b>25%</b>	E-17.01 Installs valves	E-17.02 Maintains valves	E-17.03 Diagnoses valves
	E-17.04 Repairs valves		
<b>Task E-18</b> Installs and services actuators <b>27%</b>	E-18.01 Installs actuators	E-18.02 Maintains actuators	E-18.03 Diagnoses actuators
	E-18.04 Repairs actuators		
<b>Task E-19</b> Installs and services positioners <b>32%</b>	E-19.01 Installs positioners	E-19.02 Maintains positioners	E-19.03 Diagnoses positioners
	E-19.04 Repairs positioners		
<b>Task E-20</b> Configures and services variable speed drives (VSD) <b>16%</b>	E-20.01 Configures VSD	E-20.02 Maintains VSD	E-20.03 Diagnoses VSD
	E-20.04 Repairs VSD		

## F – Installs and services communication systems and devices

9%

<b>Task F-21</b> Installs and services control network systems <b>42%</b>	<b>F-21.01</b> Performs installation and configuration on control network systems	<b>F-21.02</b> Diagnoses control network systems	<b>F-21.03</b> Performs maintenance and repairs on control network systems
<b>Task F-22</b> Installs and services signal converters <b>33%</b>	<b>F-22.01</b> Performs installation and configuration of signal converters	<b>F-22.02</b> Diagnoses signal converters	<b>F-22.03</b> Performs maintenance and repairs on signal converters
<b>Task F-23</b> Installs and services gateways, bridges and media converters <b>25%</b>	<b>F-23.01</b> Performs installation and configuration of gateways, bridges and media converters	<b>F-23.02</b> Diagnoses gateways, bridges and media converters	<b>F-23.03</b> Performs maintenance and repairs on gateways, bridges and media converters

## G – Installs and services control systems and process control

17%

<b>Task G-24</b> Establishes and optimizes process control strategies <b>22%</b>	<b>G-24.01</b> Determines process control strategy	<b>G-24.02</b> Optimizes process control	
<b>Task G-25</b> Installs and services stand-alone controllers (SAC) <b>12%</b>	<b>G-25.01</b> Installs SAC	<b>G-25.02</b> Configures SAC	<b>G-25.03</b> Performs maintenance, diagnostics and repairs on SAC
<b>Task G-26</b> Installs and services programmable logic controllers (PLC) <b>23%</b>	<b>G-26.01</b> Installs PLC	<b>G-26.02</b> Configures PLC	<b>G-26.03</b> Performs maintenance, diagnostics and repairs on PLC
<b>Task G-27</b> Installs and services distributed control systems (DCS) <b>19%</b>	<b>G-27.01</b> Installs DCS	<b>G-27.02</b> Configures DCS	<b>G-27.03</b> Performs maintenance, diagnostics and repairs on DCS

**Task G-28**  
**Installs and services human machine interface (HMI)**  
**14%**

**G-28.01 Installs HMI**

**G-28.02 Configures HMI**

**G-28.03 Performs maintenance, diagnostics and repairs on HMI**

**Task G-29**  
**Installs and services supervisory control and data acquisition (SCADA) systems**  
**10%**

**G-29.01 Installs SCADA systems**

**G-29.02 Configures SCADA systems**

**G-29.03 Performs maintenance, diagnostics and repairs on SCADA systems**