



Royal Canadian Mounted Police Gendarmerie royale du Canada

**RETURN BIDS TO:
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RCMP-GRC

Bid Receiving/Réception des sousmissions
Attention: Jordan McKenna
Mail Stop/Arrêt postal 15
73 Leikin Drive,
Ottawa, ON K1A 0R2

AMENDMENT - INVITATION TO TENDER

MODIFICATION - APPEL D'OFFRES

Tender to: Royal Canadian Mounted Police

We hereby offer to sell to Her Majesty the Queen in right of Canada, in accordance with the terms and conditions set out herein, referred to herein or attached hereto, the goods, services and construction listed herein and on any attached sheets at the price(s) set out therefore.

Soumission aux: Gendarmerie royale du Canada

Nous offrons par la présente de vendre à Sa Majesté la Reine du chef du Canada, aux conditions énoncées ou incluses par référence dans la présente et aux annexes ci-jointes, les biens, services et construction énumérés ici sur toute feuille ci-annexée, au(x) prix indiqué(s).

Comments - Commentaries

**Vendor/Firm Name and Address
Raison sociale et adresse du fournisseur/de l'entrepreneur
Facsimile No. - No de télécopieur:
Telephone No. - no de telephone:**

Title-Sujet: Construction d'une usine de traitement de l'eau - Norway House	
Solicitation No. - No. de l'invitation 201900293	Date 13 juin, 2018
Client Reference No. - No. De Référence du Client 201900293	Amend No.- No. du modif. 005
GETS Reference No. - No. de Référence de SEAG 201900293	
Solicitation Closes -L'invitation prend fin at - à 16 :00 HAE on - le 15, juin, 2018	
F.O.B. - F.A.B. Destination	
Address Enquiries to: - Adresser toutes questions à: jordan.mckenna@rcmp-grc.gc.ca	
Telephone No. - No de telephone 613.843.5518	Fax No. - N° de FAX:
Destination of Goods, Services, and Construction: Destinations des biens, services et construction:	
Delivery Required - Livraison exigée:	Delivery Offered - Livraison proposée
Name and title of person authorized to sign on behalf of Vendor/Firm Nom et titre de la personne autorisée à signer au nom du fournisseur/de l'entrepreneur	



Royal Canadian Mounted Police
Gendarmerie royale du Canada

La modification n° 4 de la demande de soumissions 201900293 vise à **apporter des modifications au document d'appel d'offres**

La modification n ° 5 est publiée afin de fournir les sections manquantes de l'addendum 3 précédemment publié

- 1) Veuillez voir les additions à l'addenda 3 ci-joint

TOUS LES AUTRES TERMES ET CONDITIONS DEMEURENT INCHANGÉES.

Part 1 ADDENDUM NO.3

1.1 General

- .1 This Addendum is issued prior to tender closing and shall become an integral part of the Tender, Specifications, Drawings and Contract Documents for this project.
- .2 In the event of conflicts between the various Contract Documents, the order of precedence shall be as stipulated in the General Conditions of the Contract, except that this Addendum shall take overall precedence.

Part 2 Clarifications and Additions

2.1 Revise:

Section 26 91 91

1.3 SYSTEM INTEGRATOR

- .1 Acceptable system integrators shall be Manco Controls, Celco Automation , Indus Automation, Hund Automation, Osorno, Delco Automation, or approved equal.

2.2 Add:

Section 46 07 13

1.2 LIST OF EQUIPMENT SUPPLIERS

- .4 Delco Water - A Division of Delco Automation Inc.

Contact: Kelly Franks, B.Sc.

3711 Thatcher Ave., Saskatoon, Saskatchewan S7R 1B8

Phone: (306) 244-6449 x 273

Email: kfranks@delco-water.com

2.3 Add:

Section 46 07 13

2.14 REDUCED PRESSURE BACKFLOW PREVENTERS

- .1 Backflow preventer shall conform to AWWA 511, CAN/CSA B64 SERIES, and other applicable standards.

- .2 Unit shall be bronze construction and serviceable in line.

- .3 Maximum operating pressure shall be 1.2 MPa (150 psi) and 60 oC (140 oF) operating temperature.

- .1 Acceptable Material: Wilkins Model 975XL Series, or approved equivalent

2.4 Remove Section 26 32 14 – Power Generation Diesel

2.5 Insert Attached Section 26 32 14 – Power Generation Diesel

2.6 “Graveled” areas to be filled with Manitoba Highways Type ‘A’ Base compacted to 100% SPD.

- 2.7** **“Rock” fill on slopes to be minimum 100 mm diameter locally sourced rock.**
- 2.8** **See Attached Request for Equal Delco Water**
- 2.9** **See Attached Mechanical Addendum No. 1**
- 2.10** **See Attached Electrical Addendum No. 2**

END OF SECTION

Part 1 ADDENDUM NO.1 - Mechanical

1.1 General

- .1 This Addendum is issued prior to tender closing and shall become an integral part of the Tender, Specifications, Drawings and Contract Documents for this project.
- .2 In the event of conflicts between the various Contract Documents, the order of precedence shall be as stipulated in the General Conditions of the Contract, except that this Addendum shall take overall precedence.

Part 2 Requests for Equals
Addendum

Section 22 42 02 Plumbing Fixtures
Equals

S-1 sink faucet Kohler K-800T70-5AKL
MS-1 service sink faucet Kohler K-8908

Section 23 34 23 Power Ventilators
Equals

Exhaust fans – Loren Cook

Section 23 33 00 Duct Work Accessories
Equals

Motorized dampers - Alumavent

Part 3 Changes

Changes

Section 22 47 00 Plumbing Equipment

1. Replace HWT-1 with the following:

- .1 Manufacturer: Rheem: EGSP20
- .2 Other acceptable manufacturers offering equivalent products.
 - .1 Substitutions: Refer to Section 01 62 00.
- .3 Type: Factory-assembled and wired, electric, vertical storage.
- .4 Performance:
 - .1 Storage capacity: 20 gal.
 - .2 Heating element size: 3.0 kW.
 - .3 Minimum recovery rate: 12 GPH 100 degrees C temperature rise.
 - .4 Maximum working pressure: 865 kPa

- .5 Electrical Characteristics:
 - .1 240 volts, Single phase, 60 Hz.
- .6 Tank: Welded steel pressure vessel, glass lined; thermally insulated with minimum 50 mm glass fibre encased in corrosion-resistant steel jacket; baked-on enamel finish.
- .7 Controls: Automatic immersion water thermostat; externally adjustable temperature range from 16 to 82 degrees C, flanged or screw-in nichrome elements, high temperature limit thermostat.
- .8 Controls: Ventilated control cabinet, factory-wired with solid state progressive sequencing step controller, fuses, magnetic contactors, control transformer, pilot lights indicating main power and heating steps, control circuit toggle switch, electronic low-water (probe-type) cut-off, high temperature limit thermostat, flush-mounted temperature and pressure gauges.
- .9 Heating Elements: Flange-mounted immersion elements; individual elements sheathed with Incoloy corrosion-resistant metal alloy, rated less than 480 W/sq cm.
- .10 CSA c191 compliant.

2. Replace LIFT PUMP with the following:

- .11 Manufacturer: Liberty FL50
- .12 Other acceptable manufacturers offering equivalent products.
 - .1 Substitutions: Refer to Section 01 62 00.
- .13 Type: Factory-assembled and wired, electric, vertical storage.
- .14 Performance:
 - .1 The pump(s) shall have a capacity of 70 GPM at a total dynamic head of 20 feet. Motor size shall be 1/2 horsepower, single phase, 60 hz, 115V.

3.2 Remove section 23 82 16 Air Coils – see electrical addendum for unit heater specification. Unit Heaters to be supplied and installed by electrical.

END OF SECTION



6-1375 Niakwa Road E; Winnipeg MB; R2J 3T3

Phone: 255-4842; Fax: 255-7679

E-mail: info@joreyelectric.com

Website: www.joreyelectric.com

NOTICE OF ADDENDUM

Project: Norway House Water Treatment Plant

Date: 8 June 2018

File: 17-053

Addendum No: Elec #2

Total # of pages: 1

The following changes are to be incorporated into the contract documents for this project. This addendum forms an integral part of the contract documents and the changes described herein are to be included in the tender price. No extra payment, following the close of tenders, will be allowed for the changes described herein.

ITEM	DETAILS
1)	Add metering between the attachment point and the 200A disconnect. Meter should be mounted on the outside of the water treatment plant, opposite the disconnect.
2)	The service entrance disconnect should have two 200A fuses.
3)	The hot water tank has changed to 3 kW. Provide a 2-pole 20A breaker in Panel A for the hot water tank.
4)	The sanitary pump has increased to ½ HP. Provide a 1-pole 20A breaker in Panel A for the sanitary pump. Confirm breaker size with nameplate information.
5)	Delete the baseboard heater in the storage room of the water treatment plant and add a 2 kW Unit Heater (UH-1).
6)	Provide programmable wall thermostats for all unit heaters in water treatment plant and pump house instead of built in stats.
7)	Connect two motorized dampers in the water treatment plant and two motorized dampers in the pump house. Provide one 120V, 15A circuit in Panel A and one 120V, 15A circuit in Panel B for the dampers.

Distribution:

Can-Tec Services Ltd. - Reid

Jorey Electric Ltd.

Per: Jodi Doerksen, P.Eng

Part 1 General

1.1 SECTION INCLUDES

- .1 Diesel engine driven generator sets

1.2 REFERENCES

- .1 American National Standards Institute (ANSI)/American Petroleum Institute (API)
 - .1 ANSI/API 650, Welded Steel Tanks for Oil Storage Tenth Edition; Addendum 1.
- .2 American National Standards Institute (ANSI)/National Electrical Manufacturers' Association (NEMA)
 - .1 ANSI/NEMA MG1, Motors and Generators.
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-3.6, Regular Sulphur Diesel Fuel.
- .4 International Organization for Standardization (ISO)
 - .1 ISO 3046-1-[2002], Reciprocating Internal Combustion Engines - Performance - Part 1: Declarations Of Power, Fuel And Lubricating Oil Consumptions, And Test Methods.
- .5 National Electrical Manufacturers Association (NEMA)
- .6 Underwriters' Laboratories of Canada (ULC)
 - .1 ULC-S601, Standard for Shop Fabricated Steel Aboveground Horizontal Tanks for Flammable and Combustible Liquids.
 - .2 CAN/ULC-S603, Standard for Steel Underground Tanks for Flammable and Combustible Liquids.

1.3 SYSTEM DESCRIPTION

- .1 Generating system consists of:
 - .1 Enclosures
 - .2 Diesel engine.
 - .3 Alternator.
 - .4 Alternator control panel.
 - .5 Battery charger and battery.
 - .6 Fuel supply system.
 - .7 Exhaust system.
 - .8 Steel mounting base.
 - .9 Synchronizing panel.
 - .10 Automatic load transfer equipment to:
 - .1 Monitor voltage on phases of normal power supply

- .2 Initiate cranking of standby generator unit on normal power failure or abnormal voltage on any one phase below pre-set adjustable limits for adjustable period of time.
 - .3 Transfer load from normal supply to standby unit when standby unit reaches rated frequency and voltage pre-set adjustable limits.
 - .4 Transfer load from standby unit to normal power supply when normal power restored, confirmed by sensing of voltage on phases above adjustable pre-set limit for adjustable time period.
 - .5 Shut down standby unit after running unloaded to cool down using adjustable time delay relay.
 - .6 Exercise the standby unit on a flexible user programmable schedule.
- .2 System designed to operate as standby power source.

1.4 **SHOP DRAWINGS**

- .1 Submit shop drawings in accordance with Section 01 - Submittal Procedures.
- .2 Include full physical, electrical, thermal, and finish details, with descriptions of operation and wiring diagrams:
 - .1 Engine: make and model, with performance curves.
 - .2 Alternator: make and model.
 - .3 Voltage regulator: make, model and type.
 - .4 Automatic transfer switch: make, model and type.
 - .5 Battery: make, type and capacity.
 - .6 Battery charger: make, type and model.
 - .7 Alternator control panel: make and type of meters and controls.
 - .8 Governor type and model.
 - .9 Cooling air requirements in m³ /s.
 - .10 British standard or DIN rating of engine.
 - .11 Flow diagrams for:
 - .1 Diesel fuel.
 - .2 Cooling air.
 - .12 Dimensioned drawing showing complete generating set mounted on steel base, including vibration isolators, exhaust system, drip trays, and total weight.
 - .13 Continuous full load output of set at 0.8PF lagging.
 - .14 Description of set operation including:
 - .1 Automatic starting and transfer to load and back to normal power, including time in seconds from start of cranking until unit reaches rated voltage and frequency.
 - .2 Manual starting.
 - .3 Automatic shut down and alarm on:
 - .1 Overcranking.
 - .2 Overspeed.
 - .3 High engine temp.

- .4 Low lube oil pressure.
- .5 Short circuit.
- .6 Alternator overvoltage.
- .7 Lube oil high temperature.
- .8 Over temperature on alternator.

1.5 CLOSEOUT SUBMITTALS

- .1 Provide operation and maintenance data for diesel generator for incorporation into manual specified in Section 01 - Closeout Submittals.
- .2 Include in Operation and Maintenance Manual instructions for particular unit supplied and not general description of units manufactured by supplier and:
 - .1 Operation and maintenance instructions for engine, alternator, control panel, automatic transfer switch, manual bypass switch, battery charger, battery, fuel system, engine room ventilation system, exhaust system and accessories, to permit effective operation, maintenance and repair.
 - .2 Technical data:
 - .1 Illustrated parts lists with parts catalogue numbers.
 - .2 Schematic diagram of electrical controls.
 - .3 Flow diagrams for:
 - .1 Fuel system.
 - .2 Lubricating oil.
 - .3 Cooling system.
 - .4 Certified copy of factory test results.
 - .5 Maintenance and overhaul instructions and schedules.
 - .6 Precise details for adjustment and setting of time delay relays or sensing controls which require on site adjustment.
 - .3 Include in Operation and Maintenance Manual completed copies of all commissioning materials and training materials.

1.6 WARRANTY

- .1 For Work of this Section, the 12 month warranty period prescribed in subsection GC32.1 of General Conditions "C" is extended to 60 months or 1500 operating hours, or whichever occurs first.

1.7 EXTRA MATERIALS

- .1 Provide maintenance materials in accordance with Section 01 - Closeout Submittals.
- .2 Include:
 - .1 2 fuel filter replacement elements.
 - .2 2 lube oil filter replacement elements.
 - .3 2 air cleaner filter elements.
 - .4 2 sets of fuses for control panel.
 - .5 Special tools for unit servicing.

Part 2 Products

2.1 PERFORMANCE

- .1 The GenSet system shall be Kohler, Cummins, ONAN, Caterpillar or accepted equal.
 - .1 Meet performance of Kohler 40REOZK4 with Decision Maker 3500 controller and KCS auto transfer switch with NEMA 1 enclosure.
 - .2 Power rating 32 kW at 0.8 pf operating at 120/240V, 1 phase.
 - .3 The generator set shall be capable of supplying 113.00 LRKVA for starting motor loads with a maximum instantaneous voltage dip of 35%, as measured by a digital RMS transient recorder in accordance with IEEE Standard 115.
 - .4 Transfer switch: automatic, open transition, solid neutral.
 - .5 Enclosure
 - .1 Winterized sound enclosure with critical grade silencer in enclosure interior.
 - .2 Max sound level 75 kVA @ 7 m.
 - .3 Sub base fuel tank with 24 hour capacity at full load.
 - .6 Coordinate or arrange and pay for concrete pad for genset.
 - .7 Appurtenances and accessories
 - .1 12 VDC or 24 VDC lead acid batteries c/w cables and mounting rack.
 - .2 10 A float / equalize battery charger.
 - .3 Safeguard breaker.
 - .4 Dry contact kits (ten status points, selectable).
 - .5 Low fuel level sensor (50%) and low low fuel level sensor (20%).

2.2 WINTERIZED SOUND ENCLOSURE

- .1 Enclosure shall be suitable for outdoor use to -40C and shall maintain an interior temperature above 10C in all outdoor conditions to CSA C282.
- .2 Exhaust silencer inside enclosure.
- .3 Door panels with lockable handles and hold opens. Door panels gasketed, tight fitting, secure and removable. Door panels, handles, locks, hold opens, and hinges shall be high quality.
- .4 Insulation shall be adhesive, foil backed, ruggedized and resistant to cutting and tearing.
- .5 Snow hoods with actuated dampers. Select and arrange dampers such that freeze thaw cycles due to natural weather or due to operation of the genset do not result in ice build-up liable to interfere with damper operation.
- .6 Normal power panelboard. Min rating 100A, 14 kAIC. Coordinate voltage and number of phases with supply. Minimum 4 spare circuits with 15A circuit breakers. Connect:
 - .1 Interior lighting. Lighting shall be suitable for low temperatures. Provide guards for light fixtures.
 - .2 Battery charger.
 - .3 Interior space heaters with thermostatic controls.

- .4 Block heater.
- .5 Battery blanket/heater.
- .6 Convenience receptacle.
- .7 The enclosure shall be sealed tight against weather moisture, vermin and insects.
- .8 All fill and drain ports shall be easily accessible for convenient filling or changing of fluids.

2.3 DIESEL ENGINE

- .1 Diesel engine: to ISO 3046-1.
 - .1 Engine: standard product of current manufacture, from company regularly engaged in production of such equipment.
 - .2 Turbo charged, synchronous speed 1800 r/min.
 - .3 Capacity:
 - .1 Rated continuous power in kW at rated speed, after adjustment for system losses in auxiliary equipment necessary for engine operation; to be calculated as follows: Rated continuous output = Generator kW divided by Generator efficiency at full load.
 - .1 Under following site conditions:
 - .1 Altitude: 225 m.
 - .2 Ambient temperature: 25 degrees C.
 - .3 Relative humidity: 95 %.
 - .4 Cooling System
 - .1 Liquid cooled: heavy duty industrial radiator mounted on generating set base with engine driven pusher type fan to direct air through radiator from engine side with ethylene glycol anti-freeze non-sludging above minus 46 degrees C.
 - .2 To maintain manufacturer's recommended engine temperature range at 10% continuous overload in ambient temperature of 40 degrees C.
 - .3 Block heater: thermostatically controlled lube oil or liquid coolant heater connected to line side of automatic transfer switch to allow engine to start in room ambient 0 degrees C.
 - .1 Switch and fuse in heater circuit, mounted in engine-alternator control cubicle and fed from line side of automatic transfer switch.
- .5 Fuel to CAN/CGSB-3.6.
 - .1 Type A fuel oil or Arctic Grade 1 or Arctic Grade 2 per manufacturer recommendations.
- .6 Fuel system: solid injection, mechanical fuel transfer pump with hand primer, fuel filters and air cleaner, fuel rack solenoid energized when engine running.
- .7 Governor:
 - .1 Steady state speed band of plus or minus 0.5%.
 - .2 Speed regulation no load to full load 5% maximum.

- .3 Electronic type, electric actuator, speed droop externally adjustable from isochronous to 5%, temperature compensated with steady state speed maintenance capability of plus or minus 0.25%.
- .4 Lubrication system:
 - .1 Pressure lubricated by engine driven pump.
 - .2 Lube oil filter: replaceable, full flow type, removable without disconnecting piping.
 - .3 Lube oil cooler.
 - .4 Engine sump drain valve.
 - .5 Oil level dip-stick.
- .5 Starting system:
 - .1 Positive shift, gear engaging starter 12 or 24V dc.
 - .2 Cranking limiter to provide 3 cranking periods of 10s duration, each separated by 5 s rest.
 - .3 Lead acid, 12 or 24V storage battery with sufficient capacity to crank engine for 1min at 0 degrees C without using more than 25% of ampere hour capacity.
 - .4 Battery charger : constant voltage, solid state, two stage from trickle charge at standby to boost charge after use. Regulation: plus or minus 1% output for plus or minus 10% input variation. Automatic boost for 6h every 30 days. Equipped with dc voltmeter, dc ammeter and on-off switch. Minimum charger capacity: 10 A.
- .6 Vibration isolated engine instrument panel with:
 - .1 Lube oil pressure gauge.
 - .2 Lube oil temperature gauge.
 - .3 Lube oil level gauge.
 - .4 Coolant temperature gauge.
 - .5 Coolant level gauge.
 - .6 Running time meter: non-tamper type.
- .7 Guards to protect personnel from hot and moving parts. Locate guards so that normal daily maintenance inspections can be undertaken without their removal.
- .8 Drip tray.

2.4 ALTERNATOR

- .1 Alternator: to ANSI/NEMA MG1.
- .2 Output at 40 degrees C ambient:
 - .1 100% full load continuously.
 - .2 110% full load for 1h.
 - .3 150% full load for 1 min.
- .3 Revolving field, brushless, single bearing.
- .4 Drip proof.

- .5 Amortisseur windings.
- .6 Synchronous type.
- .7 Exciter: permanent magnet.
- .8 NEMA class H insulation on windings.
- .9 Temperature sensors embedded in stator winding and connected to alternator control circuitry.
- .10 Voltage regulator: thyristor controlled rectifiers with phase controlled sensing circuit:
 - .1 Stability: 0.25% maximum voltage variation at any constant load from no load to full load.
 - .2 Regulation: 1.0% maximum voltage deviation between no-load steady state and full-load steady state.
 - .3 Transient: 10% maximum voltage dip on one-step application of 0.8PF full load.
 - .4 Transient: 12% maximum voltage rise on one-step removal of 0.8PF full load.
 - .5 Transient: 1 s maximum voltage recovery time with application or removal of 0.8PF full load.
- .11 Alternator: capable of sustaining 300% rated current for period not less than 10s permitting selective tripping of down line protective devices when short circuit occurs.

2.5 STEEL MOUNTING BASE

- .1 Complete generating set mounted on [structural] steel base of sufficient strength and rigidity to protect assembly from stress or strain during transportation, installation and under operating conditions on suitable level surface.
- .2 Assembly fitted with vibration isolators [and control console resiliently mounted].
 - .1 Spring type isolators with adjustable side snubbers and adjustable for levelling.
- .3 Sound insulation pads for installation between isolators and concrete base.

2.6 EXHAUST SYSTEM

- .1 Heavy duty horizontally mounted exhaust silencer with condensate drain, plug and flanged couplings.
- .2 Heavy duty flexible exhaust pipe with flanged couplings as required.
- .3 Fittings and accessories as required.
- .4 Expansion joints: stainless steel, corrugated, of suitable length, to absorb both vertical and horizontal expansion.

2.7 FUEL SYSTEM

- .1 Fuel storage tanks: to ANSI/API 650, ULC labelled.
 - .1 Above ground tank: to ULC-S601.
 - .2 Fuel storage tank with fill and vent lines to exterior of building, weatherproofing.
 - .3 Fuel level gauge and vent alarm.
 - .4 Drain and end plug.

- .5 Feed and return lines, with flexible terminations at engine.
- .6 Shut-off cock.
- .7 Renewable cartridge filter.
- .8 Fire valve.
- .9 Isolating valves on lines serving auxiliaries.
- .10 Low fuel level alarm for remote indication

2.8 COOLING AIR SYSTEM

- .1 Engine ventilating system:
 - .1 Cold air inlet damper assembly with modulating motor.
 - .2 Air discharge damper assembly with modulating motor.
 - .3 Weatherhoods.
 - .4 Modulating thermostat.
 - .5 Replaceable air intake filters.

2.9 CONTROL PANEL

- .1 Totally enclosed, mounting base isolated from diesel generator.
- .2 Instruments:
 - .1 Digital 100% solid state circuitry indicating type 2 % accuracy, rectangular face, flush panel mounting:
 - .1 Voltmeter: ac, scale 0 to full nominal value plus 30%.
 - .2 Ammeter: ac, scale 0 to full nominal value plus 30%.
 - .3 Frequency meter: scale 55 to 65Hz.
 - .2 Voltmeter selector switch, rotary, panel mounting, three position, labelled "Off, Line-Line, Line-Neutral".
 - .3 Ammeter selector switch, rotary, maintained contacts, panel mounting, designed to prevent opening of current circuits, Three position labelled "OFF- Line1-Line2".
- .3 Controls:
 - .1 Engine start button.
 - .2 Selector switch: Off-Auto-Manual - [Test full load test no load].
 - .3 Engine emergency stop button and provision for remote emergency stop button.
 - .1 Alternator output breaker:
 - .1 Circuit breaker, solid state sensing with:
 - .1 Frame containing breaker contacts, arc quenchers, manual mechanism, quick- make, quick-break, spring-loaded overcenter switching mechanism, mechanically trip free from handle, fixed type.
 - .2 Static sensor: current monitors detect overload, short-circuit and ground-fault currents, and send these signals through solid-state circuits to static sensor which acts to

- trip breaker. Adjustable for current values and time of tripping.
- .3 Flux-transfer shunt trip- magnetic tripping device actuated by signal from static sensor to open breaker contacts. Requires no external source of power.
- .2 Voltage control rheostat: mounted on inside of control panel.
- .3 Operating lights, panel mounted:
 - .1 "Normal power" pilot light.
 - .2 "Emergency power" pilot light.
 - .3 Green pilot lights for breaker on and red pilot lights for breaker off.
- .4 Solid state indicator lights for alarm with manually reset NO/NC contacts wired to terminal block for remote annunciation on:
 - .1 Low fuel level.
 - .2 Low low fuel level
 - .3 Low battery voltage.
 - .4 Ventilation failure.
 - .5 Low coolant temperature.
- .5 Solid state controller for automatic shutdown and alarms with manually reset NO/NC contacts wired to terminal block for remote annunciation on:
 - .1 Engine overcrank.
 - .2 Engine overspeed.
 - .3 Engine high temperature.
 - .4 Engine low lube oil pressure.
 - .5 Short circuit.
 - .6 AC over voltage.
- .6 Lamp test button.
- .7 Provision for remote monitoring.

2.10 AUTOMATIC TRANSFER SWITCH

- .1 Instrument transformers: to CAN3-C13.
- .2 Contactors: to ANSI/NEMA ICS2.
- .3 Contact type transfer equipment:
 - .1 Contact Type Transfer Equipment: to CSA C22.2 No.178.
 - .2 Two single phase contactors mounted on common frame, in double throw arrangement, mechanically and electrically interlocked.
 - .3 Main contacts: silver surfaced, protected by arc disruption means.
 - .4 Switch and relay contacts, coils, spring and control elements accessible for inspection and maintenance from front of panel without removal of switch panel or disconnection of drive linkages and power conductors.
 - .5 Auxiliary contact: silver plated, to initiate emergency generator start-up on failure of normal power.

- .6 Lever to operate switch manually when switch is isolated.
- .4 Controls
 - .1 Selector switch - four position "Test", "Auto", "Manual", "Engine start".
 - .1 Test position - Normal power failure simulated. Engine starts and transfer takes place. Return switch to "Auto" to stop engine.
 - .2 Auto position - Normal operation of transfer switch on failure of normal power; retransfers on return of normal voltage and shuts down engine.
 - .3 Manual position - Transfer switch may be operated by manual handle but transfer switch will not operate automatically and engine will not start.
 - .4 Engine start position - Engine starts but unit will not transfer unless normal power supply fails. Switch must be returned to "Auto" to stop engine.
 - .2 Control transformers: dry type with 120V secondary to isolate control circuits from:
 - .1 Normal power supply.
 - .2 Emergency power supply.
 - .3 Relays: continuous duty, industrial control type, with wiping action contacts rated 10 A minimum:
 - .1 Voltage sensing: solid state type, adjustable drop out and pick up, close differential, 2V minimum undervoltage and over voltage protection.
 - .2 Time delay: normal power to standby, adjustable solid state, 0 to 600s.
 - .3 Time delay on engine starting to override momentary power outages or dips, adjustable solid state, 0 to 600s..
 - .4 Time delay on retransfer from standby to normal power, adjustable 0 to 1800s.
 - .5 Time delay for engine cool-off to permit standby set to run unloaded after retransfer to normal power, adjustable solid state, 0 to 1800s.
 - .6 Time delay during transfer to stop transfer action in neutral position to prevent fast transfer, adjustable, 5s intervals to 180s.
 - .7 Frequency sensing, to prevent transfer from normal power supply until frequency of standby unit reaches preset adjustable values.
 - .4 Solid state electronic in-phase monitor.
- .5 Accessories
 - .1 Pilot lights to indicate power availability normal and standby, switch position, green for normal, red for standby.
 - .2 Plant exerciser: 168h timer to start standby unit once each week for selected interval. Timer adjustable 0-168h in 15 min intervals.
 - .3 Auxiliary relay to provide 10 N.O. and 10 N.C. contacts for remote alarms.

2.11 EQUIPMENT IDENTIFICATION

- .1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results – Electrical.

- .2 Control panel:
 - .1 For controls including selector switch and alternator breakers: size 4 nameplates.
 - .2 For meters, indicating lights, minor controls: size 2 nameplates.

2.12 FABRICATION

- .1 Shop assemble generating unit including:
 - .1 Base.
 - .2 Engine and radiator.
 - .3 Alternator.
 - .4 Control panel.
 - .5 Battery and charger.
 - .6 Automatic transfer equipment.

2.13 FINISHES

- .1 Supply 0.25L of touch up enamel.

2.14 SOURCE QUALITY CONTROL

- .1 Factory test generator set including engine, alternator, control panels, transfer switch and accessories. Test may be witnessed by Contract Administrator.
- .2 Provide notification six working days in advance of date of factory test.
- .3 Test procedure:
 - .1 Prepare blank forms and check sheet with spaces to record data. At top of first sheet record:
 - .1 Date.
 - .2 Generator set serial no.
 - .3 Engine, make, model, serial no.
 - .4 Alternator, make, model, serial no.
 - .5 Voltage regulator, make and model.
 - .6 Rating of generator set, kW, kV.A, V, A, r/min, Hz.
 - .2 Mark check sheet and record data on forms in duplicate as test proceeds.
- .4 Tests:
 - .1 With 100% rated load, operate set for 4 h, taking readings at 15 min intervals, and record the following:
 - .1 Time of reading.
 - .2 Running time.
 - .3 Ambient temp in degrees C.
 - .4 Lube oil pressure in kPa.
 - .5 Lube oil temp in degrees C.
 - .6 Engine coolant temp in degrees C.
 - .7 Exhaust stack temp in degrees C.

- .8 Alternator voltage.
- .9 Alternator current.
- .10 Power in kW.
- .11 Frequency in Hz.
- .12 Power Factor.
- .13 Battery charger current in A.
- .14 Battery voltage.
- .15 Alternator cooling air outlet temp.
- .2 After completion of run, demonstrate following shut down devices and alarms:
 - .1 Overcranking.
 - .2 Overspeed.
 - .3 High engine temp.
 - .4 Low lube oil pressure.
 - .5 Short circuit.
 - .6 Alternator overvoltage.
 - .7 Low battery voltage, or no battery charge.
 - .8 Manual remote emergency stop.
 - .9 High alternator temperature.
- .3 Next install continuous strip chart recorders to record frequency and voltage variations during load switching procedures. Each load change delayed until steady state conditions exist. Switching increments to include:
 - .1 No load to full load to no load.
 - .2 No load to 70% load to no load.
 - .3 No load to 20% load to no load.
 - .4 20% load to 40% load to no load.
 - .5 40% load to 60% load to no load.
 - .6 60% load to 80% load to no load.
- .5 Demonstrate:
 - .1 Automatic starting of set and automatic transfer of load on failure of normal power.
 - .2 Automatic shut down of engine on resumption of normal power.
 - .3 That battery charger reverts to high rate charge after cranking.
- .6 Demonstrate low oil pressure and high engine temperature shutdown devices operation without subjecting engine to these excesses.
- .7 Complete auto transfer switch equipment, including transfer mechanism, controls, relays and accessories factory assembled and tested.
 - .1 Tests:
 - .1 Operate equipment both mechanically and electrically to ensure proper performance.

- .2 Check selector switch, in modes of operation Test, Auto, Manual, Engine Start and record results.
- .3 Check voltage sensing and time delay relay settings.
- .4 Check:
 - .1 Automatic starting and transfer of load on failure of normal power.
 - .2 Retransfer of load when normal power supply resumed.
 - .3 Automatic shutdown.

Part 3 Execution

3.1 INSTALLATION

- .1 Locate generating unit and install as indicated.
- .2 Install fuel supply system as indicated.
- .3 Install ventilating air duct system as indicated.
- .4 Pipe muffler drains.
- .5 Complete wiring and interconnections as indicated.
- .6 Start generating set and test to ensure correct performance of components.

3.2 FIELD QUALITY CONTROL

- .1 Notify Contract Administrator 10 working days in advance of test date.
- .2 Provide fuel for testing and leave full tanks on acceptance.
- .3 Demonstrate:
 - .1 Unit start, transfer to load, retransfer to normal power, unit shut down, on "Automatic" control.
 - .2 Unit start and shut down on "Manual" control
 - .3 Unit start and transfer on "Test" control.
 - .4 Unit start on "Engine start" control.
 - .5 Operation of manual bypass switch.
 - .6 Operation of automatic alarms and shut down devices.
- .4 Run unit on load for minimum period of 4 hours to show load carrying ability, stability of voltage and frequency, and satisfactory performance of dampers in ventilating system to provide adequate engine cooling.
- .5 At end of test run, check battery voltage to demonstrate battery charger has returned battery to fully charged state.
- .6 Energize transfer equipment from normal power supply.
- .7 Set selector switch in "Test" position to ensure proper standby start, running, transfer, retransfer. Return selector switch to "Auto" position to ensure standby shuts down.
- .8 Set selector switch in "Manual" position and check to ensure proper performance.

- .9 Set selector switch in "Engine start" position and check to ensure proper performance. Return switch to "Auto" to stop engine.
- .10 Set selector switch in "Auto" position and open normal power supply disconnect. Standby should start, come up to rated voltage and frequency, and then load should transfer to standby. Allow to operate for 3 min, then close main power supply disconnect. Load should transfer back to normal power supply and standby should shutdown.
- .11 Perform load pick up tests as directed by Contract Administrator on site.

END OF SECTION

Ken Anderson

From: Franks, Kelly <kfranks@delco-water.com>
Sent: Thursday, June 07, 2018 3:15 PM
To: Ken Anderson
Cc: Flasch, Jessica; Marchinko, Scott
Subject: RE: Construction of Water Treatment Plant - Norway House
Attachments: 46-07-13_2.3_Cartridge Filters, Shelco MPA Pleated PP (2018-06-01).pdf; CLF10.pdf; Cartridge Filter Sizing.pdf; HC PE Cartridges.pdf

Hello Ken,

Thanks for your comments and feedback regarding our Norway House equal status submission.

In response to your comments:

1. DelcoWater will provide the **Fleck** control heads as specified. ✓
2. Our Shelco filter housing has 3 cartridge filters/vessel. A cost comparison is attached, however we used the Hurricane HC-40 filters as a comparison, rather than the HC-170, as the HC-40 seemed more appropriate based on design flows. The HC-170 would be a more expensive filter than the HC-40. Filter change out cost differences appear to be insignificant. See attached data sheets for our proposed cartridge filters and the Hurricane cartridge filters (note optimal flow rates). If DelcoWater is successful, we would stock these in Saskatoon or at Manco Controls in Winnipeg. ✓
3. Chlorine Analyzer. For 'reagentless' Chlorine Analyzers, we can provide the **Swan unit** as specified, or the **Hach CLF-10** (uses the same SC200 controller as the specified Hach turbidimeter. (see attached data sheet) ✓

We are hopeful this addresses your concerns.

Should you have any other questions, please let us know.

Regards,

Either one is acceptable.

Kelly Franks, B.Sc.

Business Development Manager

Delco Water - A Division of Delco Automation Inc.

3711 Thatcher Ave., Saskatoon, Saskatchewan S7R 1B8

P: (306) 244-6449 x 273 | F: (306) 665-7500 | C: (306) 370-8684 | E: kfranks@delco-water.com

SHOP DRAWING REVIEW	
<input checked="" type="checkbox"/>	REVIEWED
<input type="checkbox"/>	REVIEWED AS NOTED
<input type="checkbox"/>	REVISE AND RESUBMIT
<input type="checkbox"/>	NOT REVIEWED
REFER TO CONTRACT DOCUMENTS FOR INTERPRETATION	
BY: <u>Ken A.</u>	DATE: <u>June 7, 2018</u>



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DelcoWater Request for Approved Equal

Royal Canadian Mounted Police
Norway House RCMP Detachment Water Treatment Plant

SHOP DRAWING REVIEW

REVIEWED
 REVIEWED AS NOTED
 REVISE AND RESUBMIT
 NOT REVIEWED

REFER TO CONTRACT DOCUMENTS FOR INTERPRETATION

BY: Ken A. DATE: June 6, 2018



Send more information on the filtration products. I need full sheets on filter heads and cartridge canister and pleated cartridges. **Addressed.**

For filter valves:

I'm leaning towards rejection due to my experiences with filter valves becoming obsolete. I trust Fleck, Clack, Culligan to be around into the future for parts and replacement. And there are trained service techs easily available for manufacturer's I'm not sure I have the confidence in Canature. How can you inspire my confidence? I would prefer if you can use the specified filter heads.

Addressed.

For cartridge filters:

I understand your vessel will use multiple cartridges as opposed to one larger unit like HC-170. Can you provide more details on number of units, what is the cost of one of multiple cartridges versus a single HC-170? What is the readily availability of the cartridges for ordering locally? Cost per box?

Addressed.



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www.delco-water.com

June 1st, 2018

Jordan McKenna

RCMP
Mail StopéArrêt postal 15
73 chemin Leikin Drive,
Ottawa, ON K1A 0R2

Project Number: 4183980
Project Title: Construction of Water Treatment Plant – Norway House

Dear Jordan McKenna:

DelcoWater is a division of Delco Automation Inc. DelcoWater has operated as a water treatment solution and equipment provider since 1994. In this span of time, DelcoWater has established themselves as the western Canadian region's leading provider of membrane treatment technology. Delco Automation has the unique blend of skills in automation, water technology and security to deliver this project. Coupled with our branch office in Winnipeg operating as Manco Controls we can also provide local service and support.

Being based in the prairies, DelcoWater is exposed to the unique water treatment problems that are endemic to this region of the world. The water treatment problems that are commonly faced in western Canada can vary from high mineral purity water, suffering from high levels of color or dissolved organic contact, to extremely brackish water laden heavily with hardness minerals and metals. The design and equipment specifications provided within this package were compiled to best meet the intent of your tender specifications. The details of this package are flexible, and we will modify our equipment supply as necessary to meet your final design. It is DelcoWater's intent to provide the equipment as described in this package.

Sincerely,

Kelly Franks, B.Sc.
Business Development Manager
Delco Water - A Division of Delco Automation Inc.
3711 Thatcher Ave., Saskatoon, Saskatchewan S7R 1B8
P: (306) 244-6449 x 273 | F: (306) 665-7500 | C: (306) 370-8684 | E: kfranks@delco-water.com

Corporate Profile

Delco Automation Inc. (Parent Corporation)

Delco Automation is an engineering, system integration, manufacturing and field service company specializing in process control and information systems. Delco Automation serves clients in North America and worldwide in the agricultural, integrated security, power utility, water and wastewater, energy, natural resources, pipeline, petrochemical, forestry, food processing, and manufacturing industries.



As a key component to our success as a Systems Integrator we retain and train Engineers and Technicians with both an advanced knowledge of technologies, and expertise in the construction management process. We have installed the necessary business processes and insurance to assure that our customers projects are completed to their success with the least possible risk.



Independent from vendors and manufacturers, Delco integrates the most cost effective products for the distinct needs of our clients. Our standardized document and drawing control keeps the projects on track, and provides the information needed to insure client maintainability. Our team's commitment, drive, and advanced use of technology results in unrivalled productivity and quality.

Delco Automation is financially healthy, having the internal resources to grow and maintain technological development, while at the same time providing our clients with relatively low charge rates. This ensures that project execution, as well as continuing support and maintenance, will meet the expectations of the most demanding clients. We have managed ourselves conservatively and have retained sufficient earnings in the corporation to support our operations, growth, and technical leadership. We own our office and manufacturing headquarters in Saskatoon, SK. We bank at the Royal Bank of Canada in Saskatoon. Contact information is available on request.

Locations

Headquarters: Our engineering and manufacturing headquarters is centrally located in Saskatoon, Saskatchewan. Delco Automation's headquarters is a new, state-of-the-art work space designed to optimize work group productivity. It includes a 30 person customer training center and a secure redundant data center with daily on-site and weekly off-site backup of all of our project files and work-in-progress.

Satellite Offices: We currently have satellite offices in Calgary, Edmonton, Winnipeg and Ottawa. These offices have resources that range from service, sales, engineering and installation.

Organization

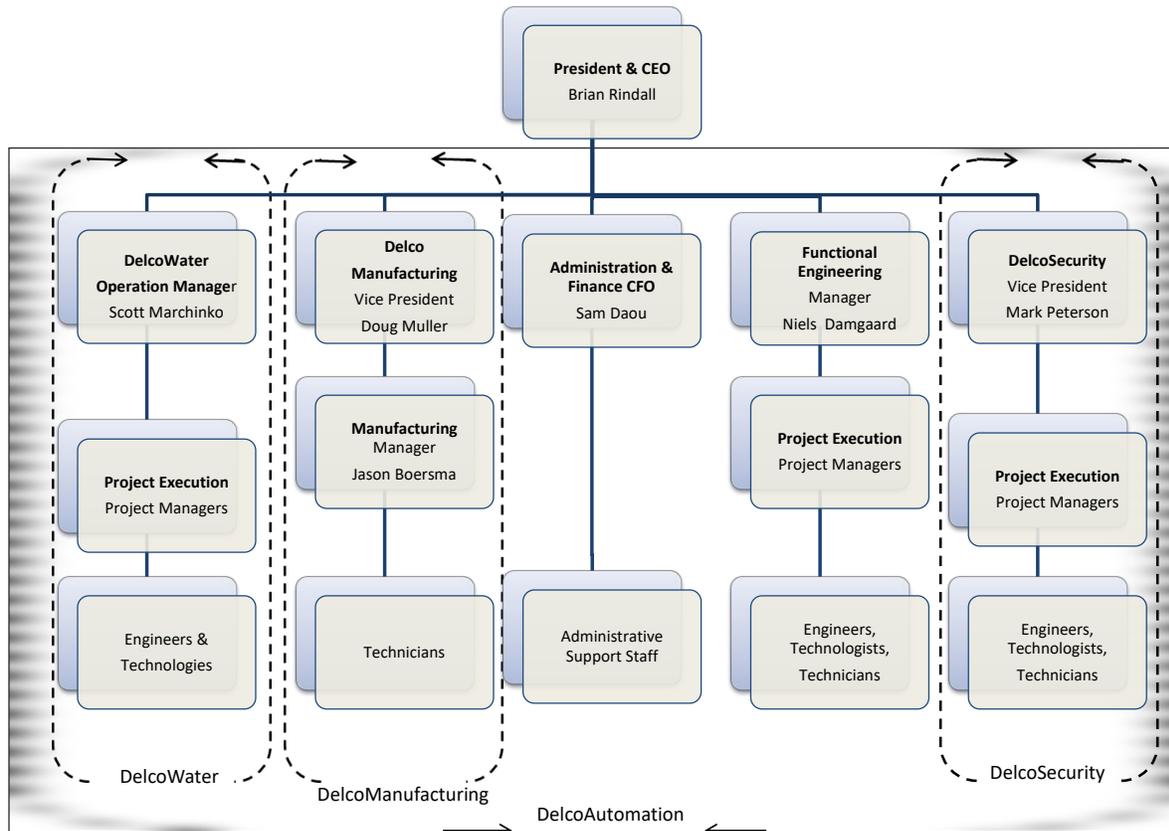
One of our major strengths is the qualification of our employees and our management team. We place a high priority on securing highly qualified personnel in essential positions throughout the

organization. These individuals are motivated by the ongoing challenge of continuing Delco Automation’s success and increasing our national market exposure.

Delco Automation Inc. is organized into functional groups that report directly to the company President. This structure enables rapid communication and responsiveness from all areas of the company. The executive management team meets weekly. The management team is committed to ensuring the success of all projects by providing the benefits of their collective experience and the expertise of their respective groups.

All Delco projects are designed based on company standards. In the event that a specific staff member is unavailable, our team approach and standardized methodologies will easily facilitate the integration of a replacement staff member. This ensures that project risks are mitigated.

The present organizational structure at Delco Automation is presented as follows.



Mission and Vision

Delco Automation has been adding value to our clients' operations for almost two decades. We are differentiated in the market because of our key corporate values and our culture. Our values embrace customer success by offering knowledgeable Engineers and Technologists who are practical in their approach to the economics and technical application of the total solutions we provide. Our leadership, business systems, and procedures are designed to ensure this culture is promoted and maintained.

VISION

"By passionately focusing on customer success we will make Delco Automation the first choice for industrial controls, automation, water treatment, life-safety and security systems."

MISSION STATEMENT

- We will exploit our engineering, systems and software know-how to deliver all the practical benefits of all Delco's offered products and services.
- We will aggressively remain in pursuit of the best ideas and technologies, while remaining focused on our Customers' price and delivery expectations.
- We will listen to our customers and respond with customized turn-key solutions that add value and are differentiated by innovative and simplified application.
- We will deliver flexible design/build solutions and exceptional service and support to make sure each and every customer is 100% satisfied.
- Accomplishing our mission means:
- Demonstrating professionalism, creativity, and fairness when dealing with all our customers, our suppliers, our community and us.
- Building enduring relationships and partnerships.
- Prizing intellectual capital by investing in our people to grow our knowledge base through continual learning and acquisition of new skills and technologies.
- Fostering a challenging work environment that creates new opportunities and rewards innovation, hard work and teamwork.
- Pursuing market segments with emphasis and geographic areas that can be supported locally over the long term and that meet our growth and profit targets.

Executive Management

Delco Automation Inc.'s management conducts monthly executive meetings to ensure that corporate strategies are being executed and are performing as planned. The Executive Members consist of senior-level Delco employees who are highly regarded as experts in their field. One of the main directives of the Delco Automation executive is to instill a culture of leadership within all of the employees at Delco.

Leadership has been the key to Delco Automation's success and creation of value-added benefits for our customers since our inception. At Delco Automation, leadership is the key to our culture, and we view Delco Automation managers as leaders in their areas of responsibility. Our managers are driven, energetic, global thinkers who constantly challenge the status quo to find better ways to do things.

The 4-D's of Delco Leadership
Drive - Demonstrate - Decide - Deliver

The personal **Drive** to welcome and embrace change - enthusiastically **Demonstrate** passion for our business that will energize others, **Decide** to insure the customer is always the first beneficiary, and the ability to consistently **Deliver**.



We are constantly reinforcing our high-speed culture with continuous improvement plans. The continuous improvement plans include driving high-performance work teams through specially tailored "Management by Objectives" programs. Our systems and our culture encourage long-term thinking and rewards continuous improvement. Our management methodology ensures that we look at our business the same way our shareholders do... from the perspective of creating value. To accomplish that, our culture focuses on turning managers into leaders and employees into owners.

The success of any project or company is dependent on management. The ability to make timely decisions, react to changing business environments and project challenges. We believe we have assembled a strong team of individuals that are specialist in their area. Our team has a relentless commitment to ensure client satisfaction, and corporate sustainability. Delco strives to continuously search for and retain highly energetic and innovative people to complement our organization.

The following are profiles of the executive members:

Brian Rindall, P. Mgr – President and CEO, co-founder: Prior to starting Delco, Brian worked as an electrical designer for a power utility and with a systems integration firm providing site services to a variety of companies in the power utility, pulp & paper, and cement plant sectors. Brian received the Raj Manek Entrepreneurial Award for Business Excellence as a graduate of the University of Saskatchewan's College of Commerce Business Administration program. He also received the "Stellar Student Award" at the Queen's University Executive Program for his top performance among 35 CEO's and Professional Managers across Canada who attended the program. Brian specializes in water treatment processes and the integration of membrane technologies.

Niels Damgaard – Engineering Manager: Niels manages Delco's Engineering Group which oversees the delivery of all technical work packages for Delco's portfolio of projects. The engineering group provides Delco's project deliverables: hardware and software design, IT, and technical publications services. Niels comes from a strong construction management background and is Project Management Institute (PMI) certified. He is a Microsoft Certified Developer, and is highly regarded in his field.

Doug Muller – Vice-President, co-founder: Doug is one of the founding members of Delco in 1994. Prior to starting Delco, Doug worked as a Journeyman Electrician with a local electrical contractor. Doug has been involved in the wiring of various industrial control panels at a multitude of sites. His experience in control panel fabrication, CSA Standards, and Safety Programs makes Doug an excellent resource to manage the Manufacturing and Safety side of the organization.

Project Management

Delco Automation understands what it takes to succeed and offers innovative program and project management services as part of automation performance solutions. Over the years, Delco Automation has developed a pool of experience in the consulting and Systems Integration industry and a sophisticated set of tools and methodologies based on that experience. We have invested extensively into the project management infrastructure required to accommodate the logistics of such a project.

As members of the Control Systems Integrator's Association (CSIA), we subscribe to the best practices in the North American automation industry. Further, we deploy the use of a standardized 13-stage Work Breakdown Structure (WBS). Our project managers are trained with the Project Management Institute (PMI) and utilize the Project Management Body of Knowledge (PMBOK) as guidelines for maintaining project controls.



At the core of our investment in project management is a business system we developed trade-named DelcoNucleus™. DelcoNucleus™ is a networked digital dashboard that visually displays (with color coding) the status of all project deliverables in our corporation. It is much like a graphical human machine interface in a control center, but for project events and deliverables. The system permits the PM to drill down into the

resources assigned for deliverables. It also visually annunciates key project milestones and checkpoints such that the Dept. Managers can drive the PM's and the required resources to the target dates.

All projects at Delco are documented and tracked with DelcoNucleus™. Microsoft Project output is used for distribution copies to customers. DelcoNucleus™ provides full project management integration across all Delco Automation projects including: accounting, time sheets, resource scheduling, project profit-loss, progress reports, document control and output of standard forms.

Projects are reviewed as a team corporately on a weekly basis under the control and guidance of the Engineering Manager and the Vice-Presidents. Variances and project hurdles are discussed and resolved weekly at these meetings. Individual project schedules are managed at the team level through independent weekly project coordination meetings. Project variances are discussed, and corrective action is applied.

Specific project management scheduling activities include:

1. Updating progress of each activity. This relates to effort consumed, and percentage complete. Changes from previous update are noted and documented.
2. Major changes in scope are identified and tracked.
3. Activities modified are tracked.
4. Baseline schedule is reviewed for schedule impacts.
5. Narrative Weekly and Monthly reports are generated. Included are as follows:
 - Work Completed during period. Deviations from previous report are noted.
 - Anticipated work to be completed prior to next reporting period.
 - Potential Problem areas are identified, including anticipated delays, and project schedule impacts.

- Recommended corrective action and impacts are noted. This includes impacts on sub-trades and vendors.
- Total hours consumed from project.
- Total hours remaining on project.

Weekly reports are for internal distribution to the department manager and project team. Monthly reports are prepared for the project owner/consultant. Weekly reports are available by request.

The following is the methodology used by Delco Automation during the life cycle of our systems integration projects – a 13-Stage process that ensures the quality of all project deliverables as per customer’s specifications. Our standard WBS is at the core of driving the project managers and resources to scheduled deliverables.

Quality Control

The philosophy used by Delco Automation in preparing this proposal, and in every aspect of any project, is fundamentally based on Delco Automation’s Quality Policy; “We relentlessly strive to be the best in every aspect of our business, by fostering a culture of trust, teamwork, responsibility, high expectations and open communications with employees, customers, and suppliers.”

Towards this end, Delco Automation understands what it takes to succeed and offers innovative program and project management services as part of our integrated performance solutions. Over the years, Delco Automation has developed a pool of experience in the consulting and Systems Integration industry and a sophisticated set of tools and methodologies based on that experience. As members of the Control Systems Integrator’s Association (CSIA), we subscribe to the best practices in the North American automation industry. We are also enrolled in CSIA’s formal CSI Certification program. This program is now recognized by Global Leaders in the industry such as Allen-Bradley (Rockwell), G.E., and Modicon. They are currently working towards mandatory CSI Certification in order to be eligible to partner with them in their Quality Programs.

Delco Automation’s manufacturing facility is certified as a CSA-approved manufacturer of electrical/electronic panel products. This ensures products are assembled to CSA’s standards. In addition, our manufacturing facility has developed a rigorous 50-pt. QA/QC inspection report to ensure superior and consistent product quality.

Before equipment is sent to site, a complete Factory Acceptance Test (FAT) will be performed at Delco Automation’s headquarters located in Saskatoon, SK. Once installation and commissioning of equipment onsite has been completed, a comprehensive Site Acceptance Test (SAT) will be performed; all functionalities of the software will be thoroughly tested. Before the FAT or SAT begins documentation for the testing will be submitted for review by all appropriate parties. The completed testing documentation will be included in the project O&M Manuals.

DelcoWater (Division of Delco Automation)

MUNICIPAL & INDUSTRIAL WATER TREATMENT & DISTRIBUTION

Pure, clean, and safe drinking water heads the list of fundamental needs for every individual, community, industry and country in the world. DelcoWater is here to help. We have successfully completed 100's of water & wastewater treatment automation and control projects. Our team of membrane treatment professionals offers a line of membrane treatment units with unrivalled intelligence. DelcoWater is pleased to have been involved in several projects in which the consulting firms have won technical innovation awards.



DelcoWater's water treatment automation systems tower above the competition. Infrastructure Managers, Consultants, and Contractors remain confident in selecting DelcoWater as their integrator of choice because they understand that we have depth in all processes related to the distribution and treatment of water. This includes experience with a variety of different raw water sources including surface and groundwater applications. Operations and Maintenance personnel prefer DelcoWater's control systems because of their ease-of-use and access to a data mine of quality and performance statistics. Our exposure to numerous process treatment circuits including coagulation, filtration, flocculation, clarification, membrane treatment and disinfection provides a strong knowledge base to apply to your next water treatment project.

Conventional & Biological Filtration



DelcoWater is experienced in integrating and controlling filter packages from the leading filter vendors across 100's of water treatment projects in the industrial and municipal environment. We have developed controls for, and have integrated, countless filtration systems including greensand, biological, and pressurized carbon filtration systems.

DelcoWater completed an innovative control and reporting system installation incorporating a 4-Stage Dual Media Gravity-fed filter circuit for a rapidly expanding community. This plant also features our best-in-class water quality reporting module suitable for the most stringent of authorities' trade named *AquaGuard*™.

Membrane Filtration (Reverse Osmosis, Nano-filtration, Ultra-filtration, & Microfiltration)



DelcoWater's membrane process expertise is driven by a team of professionals with over 60 years of combined experience in a wide range of applications. We have designed and integrated many membrane treatment units. DelcoWater offers a line of reverse osmosis (RO), nano-filtration (NF), ultra-filtration (UF), and micro-filtration (MF) membrane units for treatment of surface or well water applications. DelcoWater designs and integrates membrane treatment units combining different membrane modules when required, such as RO/NF and UF/RO/NF. Along with our extensive expertise in water treatment, DelcoWater has over 15 years of process automation and control experience. This has resulted in the release of our packaged control system with unrivalled intelligence for membrane treatment units, trade named *HYDRAMAX*™, which is the most sophisticated membrane treatment control system in the market.

The *HYDRAMAX*™ provides real-time analysis of health indicators specific to membrane systems and integrates our process control technologies. Benefits of this control system are extended membrane life, optimal chemical usage, automatic report generation, and consistent treated water quality. The analysis for each individual treatment stage allows for early detection of membrane scaling or fouling and therefore significant reduction in maintenance costs. The user-friendly control panel and easy to understand interface mean your operators will be up to speed quickly.

We continue to explore new frontiers in the water and wastewater industry. By constantly investigating and researching improved approaches for membrane systems, we remain at the leading edge of this exciting technology and your first choice for membrane water treatment units.

Water Distribution Systems

DelcoWater designs water distribution and transmission control systems to ensure your investment in piping and associated joints is maximized. Our expertise has resulted in an advanced control algorithm for pumping stations trade named *SoftSurge*™ that reduces water hammer shock in your transmission system. Our pump control stations are available in single, dual, triplex, and quad configurations and fabricated in our CSA panel products_facility with quality built-in.



Water transmission systems and associated pumping stations are often spread across miles of terrain. DelcoWater is a premier supplier of SCADA systems and can design reliable wireless communication backbones to ensure all of the source water stations are operating to performance specifications.

Wastewater Treatment & Sewage Distribution



DelcoWater is a single source expert in all aspects of automation and controls for the transport and treatment of municipal sewage and wastewater. We have years of experience in hardware and software design, manufacturing, installation, and servicing of a multitude of sewage lift stations, sewage distribution centers, and pollution control centers and associated reporting systems.



Pollution Control Centers



DelcoWater is proud to have been involved in designing and installing Pollution Control Center automation and control systems for 3 major municipal centers. We have acquired in-depth experience in all aspects of automating and controlling the treatment of wastewater including storage, digestion, primary, secondary, and tertiary clarification, UV and chlorination disinfection.

City of Saskatoon, H.M.Weir Pollution Control Center: Today, Biological Nutrient Removal (BNR) technology is more common place, but the City of Saskatoon was one of the first Canadian cities to implement BNR during the second major expansion of their Pollution Control Center. BNR reduces the levels of phosphorous, nitrogen, and dissolved organic matter in effluent discharge. The process provides for secondary treatment of the effluent without the use of chemicals. When the Consultants had to select a control systems integrator who could successfully tackle pioneering this technology - they chose DelcoWater.

City of Regina Wastewater Treatment Plant (WWTP): During the city's major expansion of their WWTP, DelcoWater provided HVAC/Emergency power upgrades, electrical control panel products, and instrument calibrations for the entire facility.

City of Prince Albert, J.W.Oliver Pollution Control Center: The City of Prince Albert embarked on a major upgrade to their pollution control center to achieve secondary treatment by implementing a Conventional Activated Sludge process. They selected DelcoWater as their integrator of choice to do the job.

Sewage Lift Stations

DelcoWater has designed, built, and installed numerous control and reporting systems for sewage lift applications. Our expertise also includes the design, configuration, and installation of wireless communications centers to support remote sites - SCADA systems that centrally gather process data from remote stations. Our CSA electrical panel products division has built 100's of single and duplex pumping stations for these applications.

The City of Regina storm sewer and wastewater distribution system is one of the largest in Saskatchewan. Products by DelcoWater are the primary control systems infrastructure for this system. You can find our systems operating reliably at Tor Hill, Maple Ridge, Boggy Creek, McArthur Blvd., Albert Park, SouthEast Sector, Westhill, Albert St., Broad St., Lewvan Dr., Arens Rd., Glencairn Rd., wastewater and storm water lift stations and Dieppe Drainage station.

Manufacturing

Delco offers extremely skilled technicians to furnish CSA electrical control panels for your next project. We provide the best practices in industry to deliver your electrical control panels to your site, pretested and shipped to ensure reliable operation upon arrival. We can manufacture the majority of your custom CSA electrical control panels —from DCS, PLC, RTU and Operator Consoles to Custom Motor Control and Power Products. We manufacture a full range of Class I and II products in a wide variety of NEMA ratings, utilizing the latest ISA, IEEE, EEMAC, CEC, IEC, JIC and ANSI standards. We have shipped 1000's of electrical and controls products to a diverse range of industries. We serve all major industries including oil & gas, water/wastewater, petrochemical, manufacturing, mining, food & beverage, security, forestry, pulp & paper, and agriculture.

Since 2005 Delco Manufacturing has taken responsibility for the manufacturing of our membrane treatment units.

Proximity of Service Facility and Personnel

Both DelcoWater and Delco Automation are centrally headquartered in Saskatoon, Sk. In addition, our sister company, Manco Controls is located in Winnipeg, Mb

The DelcoWater service department consists of six highly trained professionals, of which five are based out of Saskatoon, and one DelcoWater employee, based out of Manco Controls in Winnipeg. This group consists of one Electrical Engineer, one Civil Engineer, one Chemical Engineer, and three Instrumentation Technologists, one of which is a Level 4 certified operator.

DelcoWater also has a 24 hour emergency line, 1-800-244-6449, supported with over 12 Delco Automation staff. This provides us the ability to respond to emergencies within two hours, seven days a week. Our ability to remotely login over a secure internet connection and view the HMI, PLC and SCADA system allows us to trouble shoot, diagnose, make programming changes, and in the majority of cases, address the situation remotely.

In the event that remote trouble shooting does not address the issue, our field service team is equipped with six well maintained, late model company vehicles (trucks), which provides us the ability to be on site as required. Our fleet also has a tandem axle, enclosed cargo trailer, and a flat deck trailer for transport of larger items.

Many of the replacement parts and critical components for our Automation and Controls systems are stocked on our shelves in Winnipeg or Saskatoon, and if not, are likely readily available through our network of local wholesalers.

Process equipment such as chemical feed and instrumentation is stocked in Saskatoon. Our field service personnel and instrumentation technicians are equipped with tool kits that contain many of the necessary replacement and spare parts to help keep our instrumentation performing accurately.

DelcoWater – Partial Listing of Water Treatment Reference Plants

Project Name	Province	Process	No. of Trains	Capacity (USgpm)	Capacity (m ³ /day)
Village of Buffalo Narrows	SK	UF/NF	2	400	2,180
Cameco – Key Lake Potable WTP	SK	UF	2	250	1,363
Municipality of Killarney-Turtle Mountain	MB	MT/GSF	2	400	2,180
Town of Neepawa	MB	MT	2	800	4,360
Village of Togo	SK	MT	2	27	147
Yellow Grass	SK	MT	1	45	245
Whitehead / Elton – Alexander	MB	MT/MD	2	240	1,308
Golden Band Resources	SK	Coag/ MMF/MT/ AdvChem	2	70	382
Village of Borden	SK	MT	2	120	654
Town of Carlyle	SK	MT/MD	2	240	1,308
Town of Grenfell	SK	MT	2	330	1,799
Town of Niverville	MB	MT	2	285	1,553
Town of Spiritwood	SK	MT	2	250	1,363
Town of Kerrobert	SK	MT	2	254	1,384
Town of Whitewood	SK	GSF/MT/M D	2	240	1,308
Fisher River Cree Nation	MB	MT	2	300	1,635
Village of Cartwright	MB	MT	1	33	180
R.M. of Argyle - Baldur	MB	MT	1	33	180
Milner Ridge Correctional Centre	MB	MT	1	100	550
Village of Paradise Hill	SK	MT/MD	2	80	440

Process Key

MT = membrane treatment (RO/NF)
MD = Membrane degasifier
MMF = Multi-media filtration

GSF = Greensand filtration
AdvChem = Advanced chemical treatment
Coag = Coagulation

Reference Contacts

Village of Borden – Jim Buckingham – (306) 747-9071
Village of Paradise Hill – Bernard Ecker – (306) 344-7433
Town of Langenburg – Karlis VanCaseele – (306) 743-7621
Town of Grenfell – Mike Kardash – (306) 697-7763
Cameco Key Lake – Rob Vanstone – (306) 884-2100 ext 4620



3711 Thatcher Ave, Saskatoon, SK S7R 1B8
Tel: 306.244.6449 - Fax: 306.665.7500
www.delco-water.com

To Whom it May Concern,

The Town of Grenfell has had the privilege of working with Delco Automation since our 2010 water treatment plant upgrade. Delco provided Grenfell with distribution pump automation, raw water well controls, and a Reverse Osmosis Membrane Treatment Unit equipped with HMI. The HMI is equipped to control all functions throughout the entire treatment plant.

I have worked in the water treatment and public works field for 8 years, operating a conventional surface water treatment plant, a manganese greensand ground water treatment system, and now a highly automated Delco RO membrane system. I can assure you that Delco's energetic staff is courteous, pleasant to work with, and highly knowledgeable in all aspects of their service. They are available, and quick to respond with a solution to any issue that arises. Something that is very important to maintain normal, safe plant operation with zero down time.

Delco has provided Grenfell with high quality service, and has always promoted proper MTU operation through operator training. RO water treatment can be a costly process if membranes are not properly monitored to maximize membrane element life. Delco's methods have provided Grenfell with excellent results so far, surpassing projections made during plant design. Their service team is very experienced and confident in providing the best results for our plant.

Grenfell is extremely happy with Delco's service. Their Pressure Controlled Variable Frequency Drive automation system for our distribution pumps has saved us 41% in power consumption since our upgrade. This has been a very nice relief to our operating budget. Residents now enjoy clean taps, free of scale, and tasty RO water with a turn of their tap.

Michael Kardash
Water Treatment Supervisor
Town of Grenfell
(306) 697-7763

DelcoWater is seeking approved equal status as a supplier for the Norway House RCMP water treatment plant equipment, as well as approved equal status for the following items. From past experience, we have found these models to be very reliable and robust. In addition, we have a wealth of experience in commissioning and servicing these models, and Delco is able to offer project and price efficiencies.

1. RCMP Specification Section 40 05 51: Valves

2.4 Raw Water Pump Check Valves

Delco proposes the use of Georg Fischer Type 562 PVC spring check valves. ✓

2.5 Air Relief Valve

Delco proposes the use of Georg Fischer Type 591 PVC ventilating and bleed valve. ✓

2.6 Combination Air/Vacuum Release Valves

Delco to supply as per specification.

2.7 Stainless Steel Ball Valves (BAV)

Delco proposes the use of Pinnacle stainless steel ball valves. ✓

2.8 PVC Ball Valves (BAV)

Delco proposes the use of Georg Fischer Type 546 PVC ball valves. ✓

2.9 Sample Tap Ball Valves

Delco to supply as per specification.

2.10 Flow Control Valves (Hand Wheel Operated)

Delco proposes the use of Georg Fischer Type 514 PVC diaphragm valves. ✓

2.11 Pressure Relief Valves

Delco proposes the use of Georg Fischer Type 586 pressure retaining valves. ✓

2.12 Manual Operators

Delco to supply as per specification.

2. RCMP Specification Section 26 91 92: Instruments

2.2 Magnetic Flow Meter

Delco proposes the use of Siemens Sitrans F M MAG 5100W flow meters. ✓

2.3 Pressure Indicating Transmitters

Delco proposes installation of pressure indicators (Ashcroft 1008S series) and pressure transmitters (Ashcroft G2 series) together in place of all pressure indicating transmitters noted on the drawings and in the specifications. ✓

This arrangement is Delco's standard offering on all builds and is a more cost-effective alternative to the use of pressure indicating transmitters. In addition, Delco stocks spare Ashcroft pressure gauges and transmitters, if required.

2.4 Pressure Switches

Delco to supply as per specification.

2.5 Chlorine Analyzer/ORP Monitor

CLF10 - ok.

No. must be reagentless. There is no one to maintain the reagent vessels.

Delco proposes the use of the Hach ~~CL17~~ chlorine analyzer.

2.6 Turbidimeter

The Hach 1720E series turbidimeter and SC100 controller are obsolete; Delco proposes the use of Hach's TU5300 series turbidimeter and SC200 controller. ✓

3. RCMP Specification Section 46 07 13: Water Treatment Plant Equipment

2.2 Multimedia Filters

Delco proposes the use of Canature Water Group MTS 95 multi-media filters.

2.3 Cartridge Filtration

With Fleck Heads

Delco proposes the use of Nova Filtration Multi-Cartridge Filter Vessels with 1µ and 0.45µ absolute-rated Shelco MicroVantage MPA Series pleated polypropylene filter cartridges. ✓

2.4 Organic Colour Removal Filter – Ion Exchange

With Fleck Heads

Delco proposes the use of Canature Water Group MTS 95 colour removal filters.

2.5 UV Disinfection System

Delco to supply as per specification.

2.6 Chlorine Feed System

Delco proposes the use of Delco's standard dual pump chemical panel. ✓

2.7 Raw Water Intake Pipe and Screen

Delco to supply as per specification.

2.8 Raw Water Pumping System



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Delco to supply as per specification.

2.9 Hydro Pneumatic Tanks

Delco to supply as per specification.

2.10 Chlorine Contact Tanks

Delco to supply as per specification

2.11 Chlorine solution Holding Tank

Delco to supply as per specification.

2.12 Spill Pallets

Delco to supply as per specification.

4. RCMP Specification Section 26 91 91: Control Panels

1.3 System Integrator: Acceptable system integrators shall be Manco Controls, Celco Automation... ✓

Manco Controls is a 'sister' company, owned by Delco Automation. Please consider Delco Automation as an approved Systems Integrator.

Yes. Delco is an Acceptable systems integrator.



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 www.delco-water.com

Cartridge Housing Sizing

Project

Number 4183980
 Name Norway House RCMP WTP

Treated Water Requirement

Maximum Design Capacity (Spec'd) 1.00 L/s (15.85 USGPM)

Cartridge Filter Sizing

Materials 304 stainless steel
 Capacity 1.14 L/s (18 USGPM)
 Cartridge Flux Rate 3 gpm/10"L
 Cartridge Length 20"
 Number of Cartridges 3
 Canister Description 20" x 004 crtg 02_00" mnpt

Cartridge Filter (Shelco)

1µ Filters Pressure Drop @ 3 gpm/10"L <0.5 psi
 0.45µ Filters Pressure Drop @ 3 gpm/10"L <0.5 psi

Cartridge Filter Replacement Costs

QTY Req.

Hurricane HC/40-0.35 (each)	1 \$	202.43
Hurricane PP-HC-40-1 (each)	1 \$	315.40
Total	\$	517.82
Shelco MPA0.45-20S1S (each)	3 \$	89.04
Shelco MPA1-20S1S (each)	3 \$	78.80
Total	\$	503.53

The Harmsco Hurricane HUR-40 (rather than the HUR-170) filter housing & cartridges were used for comparison, as they are most suitable for the flow rates spec'd in the tender documents (as per Harmsco's product datasheets).

The Shelco cartridge filters can be purchased individually, or by the case (12 per case).

CLF10 sc & CLT10 sc FREE & TOTAL REAGENTLESS CHLORINE ANALYZERS

Applications

- Drinking Water
- Wastewater
- Power
- Industrial Water



SHOP DRAWING REVIEW

- REVIEWED
- REVIEWED AS NOTED
- REVISE AND RESUBMIT
- NOT REVIEWED

REFER TO CONTRACT DOCUMENTS FOR INTERPRETATION

BY: Ken A. DATE: June 7, 2018



Hach's answer to reagentless amperometric chlorine measurement.

From the leaders in disinfection monitoring, the right instrument for reagentless chlorine analysis.

Exclusive Self Diagnostics

The CLF10 sc and CLT10 sc analyzers leverage Hach's exclusive self diagnostics to alert users when the process has changed or the instrument needs servicing. Diagnostic features include the Cal Watch algorithm for warning of pH and chlorine calibration deviation and a non-contacting flow sensor for notification of insufficient sample flow.

Real-Time Process Control

The CLF10 sc and CLT10 sc analyzers allow for real-time control of disinfection processes by providing continuous readings that indicate when treatment conditions have changed.

No Reagent Replacement, No Waste Stream

Chlorine measurement with an amperometric analyzer such as the CLF10 sc or CLT10 sc does not require reagents, eliminating the need for routine reagent replacement and waste stream management.

Compatible with Hach's "Plug and Play" Digital Controllers

The CLF10 sc and CLT10 sc analyzers can be used with any Hach sc digital controller. Just plug in the analyzer and it's ready to use without software configuration.

EPA Compliant According to Method 334.0

The CL10 sc and CLT10 sc analyzers can be used for reporting chlorine residual measurements in accordance with EPA Method 334.0.



Be Right™

Specifications*

Chlorine Sensor

Measurement Range	0 to 10 ppm
Lower Limit of Detection (LOD)	30 ppb (0.03 ppm) or lower
Limit of Quantitation (LOQ)	90 ppb (0.09 ppm) or lower
Resolution	0.001 ppm (1 ppb)
Accuracy	Free Chlorine: ±3% of the reference test** (DPD) at constant pH less than 7.2 (±0.2 pH unit) ±10% of the reference test** (DPD) at stable pH less than 8.5 (±0.5 pH unit from the pH at calibration) Total Chlorine: ±10% of the reference test** (DPD) at stable pH less than 8.5 (±0.5 pH unit from the pH at calibration) ±20% of the reference test** (DPD) at stable pH greater than 8.5
Repeatability	30 ppb or 3%, whichever is greater
Response Time	Free Chlorine: 140 seconds or less for 90% change (T90) at a stable temperature and pH Total Chlorine: 100 seconds or less for 90% change (T90) at a stable temperature and pH
Sampling Time	Continuous
Interferences	Free Chlorine: Monochloramine, chlorine dioxide, ozone, and chalk deposits Total Chlorine: Chlorine dioxide, ozone, and chalk deposits
Pressure Limit	0.5 bar, no pressure impulses and/or vibrations
Sample Flow Rate	30 to 50 L/hour (7.9 to 13.2 gal/hour), Optimal is 40 L/hour (10.5 gal/hour)
Sample pH	4-9
Sample Temperature (compensated for fluctuations)	5 to 45°C (41 to 113°F)
Temperature Compensation	Internal temperature sensor
Storage Temperature	Sensor: 0 to 50°C (32 to 122°F) dry, without electrolyte Electrolyte: 15 to 25°C (59 to 77°F)
Power Requirements	12 Vdc, 30 mA maximum (supplied by controller)

Dimensions (sensor only)	195 mm (7.68 in.)/25 mm (0.98 in.) (length/diameter)
Cable Length	1 m (between gateways and sc-controller)
Cable Connection	5 pin, M12 connector
Measurement Method	Reagentless, electrochemical, three-electrode amperometric system
Calibration Methods	1-point or 2-point (zero and slope) calibration
Material	Corrosion-resistant materials, (stainless steel, PVC, silicon rubber and polycarbonate)
Warranty	1-year warranty on the electrode body, includes the electronics

Panel (including SS Panel, Gateway, Chlorine Sensor Flow Cell, pH Sensor Flow Cell)

Operating Temperature	0 to 45°C (32 to 113°F)
Storage Temperature (panel only)	-20 to 60°C (-4 to 149°F)
Power Requirements	12 Vdc ±10%, at 100 mA maximum (supplied by sc controller)
Mounting	Flat, vertical surface
Connections	Sample Line: 1/4-inch OD Drain Line (pH Flow Cell Outlet): 1/2-inch ID
Panel Dimensions	Length 482.6mm (19 in.) x Width 495.3mm (19.5 in.) x Depth 151.2mm (5.95 in.) (with panel-mounted components)
Weight	Approximately 5.5 kg (12 lbs) (panel and empty panel-mounted components only)
Controller Platform	sc controller models

Complete Analyzer (Panel + Sensor)

Waterproof Rating	Current rating for sc100/1000/200 controllers and gateway – IP65 (NEMA 4X)
Certification	CE / ETL, EMC
Shipping Weight	Approximately 9.1 kg (20 lbs)

*Subject to change without notice.

**Reference measurement must be conducted at the analyzer sampling point.

Principle of Operation

Amperometry is an electrochemical technique that measures the change in current resulting from chemical reactions taking place on the electrodes. The generated current is proportional to the analyte concentration. A typical amperometric sensor consists of two dissimilar electrodes—an anode and a cathode (i.e. silver/platinum or copper/gold, respectively).

Typically, the electrodes are covered with a membrane cap containing electrolyte, providing for better selectivity of the analysis. Additionally, a small constant electrical voltage is applied across the electrodes.

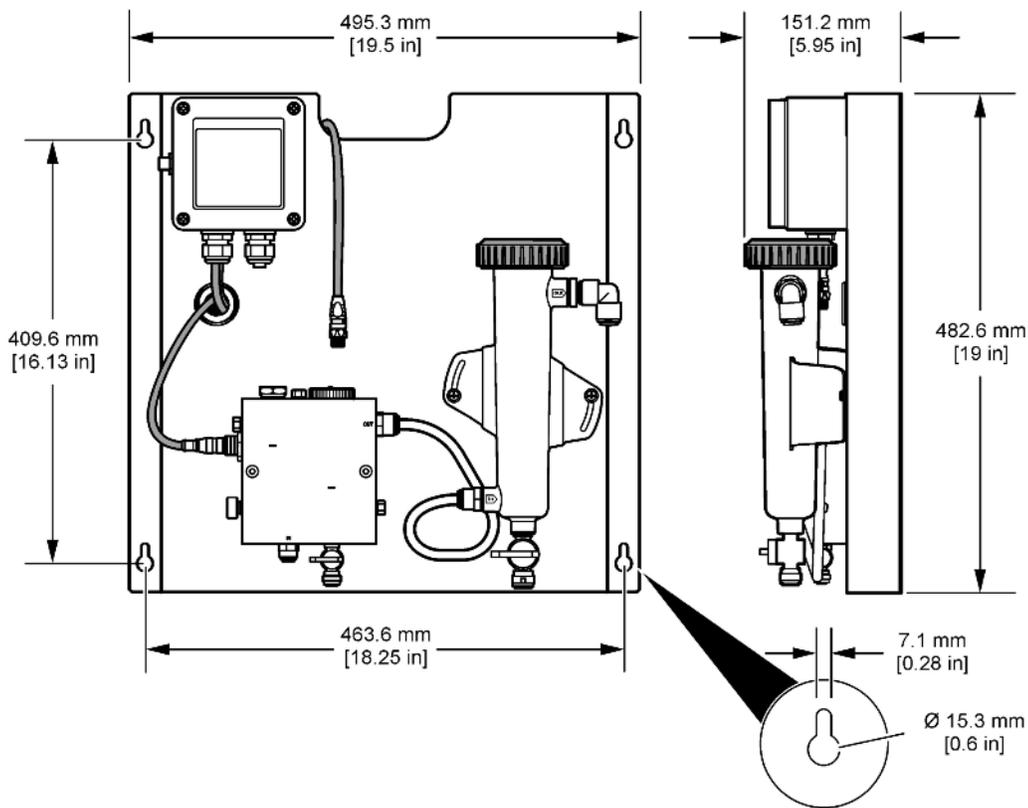
Below is a general schematic of the reduction-oxidation reaction taking place in a simple 2-electrode amperometric system:



In a three-electrode amperometric system, such as used in the CLF10 sc and CLT10 sc, the anode is essentially split into two parts—a reference and an auxiliary (or counter) electrode. These systems are always supported by special electrical circuit directing the voltage between all electrodes. The three-electrode design generally makes the measurements more stable and provides longer life for the working and reference electrodes.

Dimensions

The analyzer should be installed in an accessible location.* It can be mounted on a flat, vertical surface (such as a wall, panel, stand, etc.). It should allow for access for any checking or maintenance. Sample flow should meet the specifications on previous page.



*Do not mount the panel in direct sunlight. Indoor or enclosed installation is recommended. Shield the panel and panel components from any condensing moisture or humidity, especially at the sensor/cable interface.

Ordering Information

CLF10 sc Free Chlorine Sensor with sc200 Controller and SS Panel

2980900	CLF10 sc, sc200 Single Input, pH/D
2981000	CLF10 sc, sc200 Single Input, Combo pH
2981100	CLF10 sc, sc200 Single Input, Grab Sample
2982200	CLF10 sc, sc200 Dual Input Combo pH
2982100	CLF10 sc, sc200 Dual Input, pH/D
2982300	CLF10 sc, sc200 Dual Input, Grab Sample
2981200	CLF10 sc, sc200 Single Input, pH/D, Metric
2981300	CLF10 sc, sc200 Single Input, Combo pH, Metric
2981400	CLF10 sc, sc200 Single Input, Grab Sample, Metric
2982400	CLF10 sc, sc200 Dual Input, pH/D, Metric
2982500	CLF10 sc, sc200 Dual Input, Combo pH, Metric
2982600	CLF10 sc, sc200 Dual Input, Grab Sample, Metric
2987500	CLF10 sc, sc200 Single Input, pH/D, 24 Vdc, Metric
2987600	CLF10 sc, sc200 Single Input, Combo pH, 24 Vdc, Metric
2987700	CLF10 sc, sc200 Single Input, Grab Sample, 24 Vdc, Metric

CLT10 sc Total Chlorine Sensor with sc200 Controller and SS Panel

2981500	CLT10 sc, sc200 Single Input, pH/D
2981600	CLT10 sc, sc200 Single Input, Combo pH
2981700	CLT10 sc, sc200 Single Input, Grab Sample
2982700	CLT10 sc, sc200 Dual Input, pH/D
2982800	CLT10 sc, sc200 Dual Input, Combo pH
2982900	CLT10 sc, sc200 Dual Input, Grab Sample
2981800	CLT10 sc, sc200 Single Input, pH/D, Metric
2981900	CLT10 sc, sc200 Single Input, Combo pH, Metric
2982000	CLT10 sc, sc200 Single Input, Grab Sample, Metric
2983000	CLT10 sc, sc200 Dual Input, pH/D, Metric
2983100	CLT10 sc, sc200 Dual Input, Combo pH, Metric
2983200	CLT10 sc, sc200 Dual Input, Grab Sample, Metric
2987400	CLT10 sc, sc200 Single Input, pH/D, 24 Vdc, Metric
2987800	CLT10 sc, sc200 Single Input, Combo pH, 24 Vdc, Metric
2987900	CLT10 sc, sc200 Single Input, Grab Sample, 24 Vdc, Metric

Note: See LIT2665 for more information about the combinations possible with the sc200.

CLT10 sc Total Chlorine Analyzer Panel Only

LXV45B.99.13022	w/ pH/D Differential Sensor
LXV45B.99.12022	w/ pH Combination Sensor
LXV45B.99.11022	Grab Sample Only

Metric sizing available for all configurations.

Accessories

LZY051	Acidification/Cleaning Kit
9159900	Sample Conditioning Kit
9181500	pH/D Differential Analog pH Sensor, Ryton
9181600	Combination Analog pH Sensor, Ryton

Replacement Parts

9150400	Sensor, Free Chlorine
9150300	Sensor, Total Chlorine
9160200	Membrane Replacement Kit, Free Chlorine Sensor
9180900	Membrane Replacement Kit, Total Chlorine Sensor
9160600	Electrolyte, Free Chlorine Sensor 100 mL
9181400	Electrolyte, Total Chlorine Sensor 100 mL

Lab Products for Method 334.0

5870062	Pocket Colorimeter II System, Chlorine MR/HR
1426810	Chlorine Standard Solution, 10-mL Voluette® Ampule, 50–75 mg/L 16/pkg
2980500	DPD Chlorine-MR Spec✓ Secondary Standards Kit

For more information on this method, please visit: www.hach.com/method334

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In the interest of improving and updating its equipment,

Hach Company reserves the right to alter specifications to equipment at any time.



Be Right™