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IMW3000 CNG DISPENSERS

Installation, Operation and Maintenance Manual



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OVERVIEW

This manual deals with the installation, maintenance, function and operation of the IMW CNG dispenser.

Where possible supplier information has been added together with detailed reports on the operation and installation of all products used in manufacturing the dispenser.

This manual is provided to clients of IMW to assist in the setup, installation and maintenance of their dispenser.

This manual is laid out as follows:



Section 1 – Information

Cautionary advise, general information on systems functions and components and warranty information.

Section 2 – Installation

Provides all information for the successful and complete installation of the IMW dispenser and the related equipment.

Section 3 – Maintenance

Supplies preventative maintenance instructions and trouble shooting tips should any problems occur.

Section 4 – Technical Data

Contains information for all component compliances and relevant mechanical and electrical drawings.

Section 5 – Quality Control

Contains data from the IMW quality control manual for client dispenser.

Section 6 – Component Bulletins

Where possible supplier catalog information is included as well as technical specifications and installation/maintenance documentation for parts used in the dispenser.

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SECTION 1

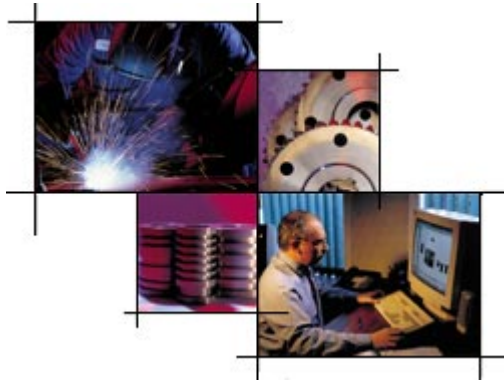
Introduction & Table of Contents

- 1.1.1 About IMW
- 1.1.2 Service and Product Support
- 1.1.3 Warranty and Policy Procedures

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 - 1.2.3 Maintenance Safety

- 1.3 Emergency Procedures

1.1.1 About IMW



Welcome to IMW

IMW designs, manufactures and supports a full range of roll-forming products, and compressor system products. We specialize in compressed natural gas (CNG) compressors and complete fueling systems.

Experience gained through our general machine shop and manufacturing operations has led to cutting-edge technologies and the know-how to meet increasingly complex demands worldwide.

State-of-the-art...

...CNG refueling systems have earned IMW a worldwide reputation for quality, performance, and reliability through precision engineering and manufacturing. IMW uses only the highest-quality components in its systems, including integrated PLC controls and custom-designed compressor assemblies, available exclusively from IMW Compressor Systems. In-house capabilities and a commitment to growth ensure that our products remain affordable.

Full in-house capabilities...

...for designing and building complete CNG refueling systems make IMW Compressor Systems a single-source supplier of CNG equipment. We offer an extensive range of standard and custom CNG products and maintain a large inventory of components to facilitate same-day response to our customers' requests whenever possible. Qualified technicians, meanwhile, are available around-the-clock for consultation or for service dispatch globally.

Innovative...

...Compressor technology is the foundation of IMW's CNG refueling systems. IMW is a pioneer in the development and production of low-speed, non-lubricated compressors and of complete, high-volume transit fueling systems. Our CNG compressors produce clean gas—low in oil content—while operating at low noise and vibration levels, thereby enhancing system usability and component life, yet they boast a discharge flow capacity equal to any compressor on the market.

1.1.2 Service and Product Support

Should you experience any difficulty with your dispenser and all efforts have been exhausted and all procedures shown in the trouble-shooting guide have been carried out then service by an IMW qualified technician is available by following the procedure listed below.

1. Document the following

- i. Make a detailed list of the problems occurring, including events that took place immediately before and after the problems surfaced.
- ii. Detail all corrective action that was attempted to rectify the problem and the results if any of that action.
- iii. Note the model and serial number located on the side of the dispenser unit.
- iv. Purchase order information
- v. Date of installation
- vi. Equipment location, street address and location on site.

2. Contact the IMW service department.

- i. Tel: (604) 795-9491 (Office Hours)
- ii. Tel: (604) 792-5660
- iii. Tel: (604) 798-9272
- iv. Fax: (604) 792-3806
- v. Pager (604) 979-4190 (Pager)

One of our qualified service technicians will be able to get your system restored and running either by instruction over the phone or an on site visit.

A detailed explanation of costs and equipment covered is provided in the IMW Industries warranty policy included with the package.

1.1.3 Warranty Policy and Procedures

SAMPLE SERVICE REPORT

SERVICE REPORT		AUTHORIZATION #	
DISPENSER IDENTIFICATION			
MODEL #			
SERIAL #			
DATE OF INSTALLATION			
DATE OF START UP			
ORIGINAL SALES ORDER #			
ORIGINAL WORK ORDER #			
DISPENSER LOCATION			
COMPANY			
ADDRESS		CITY	
PRIVINCE / STATE		POSTAL CODE	
PHONE No.			
FAX No.			
REPORTED PROBLEM			
CORRECTIVE ACTION TAKEN			
COMMENTS			
WARRANTY INVOICE BREAKDOWN			
TOTAL PARTS COST	\$		
TOTAL LABOR HOURS		x HOURLY RATE:	= \$
TOTAL SERVICE COST	\$		
TOTAL MILEAGE		x MILEAGE RATE	= \$
CUSTOMER SIGNATURE			
X		DATE	
IMW SERVICE TECHNICIANS SIGNATURE			
X		DATE	

1.2 General Safety

a. GENERAL

The instructions and information contained in this manual will enable the operator and service personnel to provide the optimum in service and maintenance to the IMW CNG Dispensers.

The operator and service personnel should become familiar with all maintenance techniques, service requirements and safety procedures of this manual so that efficient and long, trouble-free service can be realized.

b. SAFETY INSTRUCTIONS

The following instructions are provided for the protection of the life and health of all operation and maintenance personnel. Included are some general instructions for good machinery maintenance and repair works practice.

DO NOT ALLOW UNAUTHORIZED PERSONNEL IN THE COMPRESSOR, CASCADE, OR DISPENSER AREA.

c. GENERAL REMARKS

Highly compressed gases contain a large amount of energy and are very dangerous! Carry out maintenance and repair works on entirely vented pressure systems only!

Installation, operation, maintenance and repair works shall be carried out only by qualified personnel and in accordance with the corresponding regulations for operation and safety.

Do not store easily inflammable materials near the dispenser unit!

Smoking is strictly forbidden in the proximity of oil and fuel systems. Do not touch blank wires and live (current-carrying) parts, when the electrical system is energized!

Never interrupt electrical protective conductors!

The dispenser is explosion-proof and located in a class 1, division 1, group D area. The dispenser must have electrical power disconnected and locked out before the start of any electrical work.

1.2.1 Filling Safety

FILLING PROCEDURE

The IMW series CNG Dispensers are designed for fast fill refueling of any NGV vehicle equipped with a compatible on board refueling receptacle. A single trained person can safely use the dispenser to refuel the NGV vehicle by following the procedure below.

1. Position the NGV vehicle such that the refueling receptacle of the vehicle is within the range of the dispenser refueling hose.
2. Connect the refueling nozzle to the vehicle-refueling receptacle. If a proper connection has been made, the nozzle will remain securely fastened to the receptacle.
3. Open the fill nozzle valve by rotating the handle 1/4 turn counter clockwise.
4. Move the dispenser authorization lever to the on position. Gas will now begin to flow into the vehicle.
5. When the vehicle has finished refueling, a buzzer will indicate end of fill.
6. Close the fill nozzle valve by rotating the handle a 1/4 turn clockwise. As the nozzle valve is closed a small amount of gas will be vented to atmosphere through a return line or directly at the valve.
7. Remove the fill nozzle from the vehicle receptacle.
8. Return the fill nozzle back to its holder on the dispenser.

Important!

The above procedure is typical for North America market and it is the customer's responsibility to adopt the above procedure for local markets and to provide training to operators and users of the equipment.

1.2.2 Hose Safety

Visual Inspection Hose/Fitting:

Any of the following conditions require immediate shut down and replacement of the hose assembly:

- Fitting slippage on hose,
- Damaged, cut or abraded cover (any reinforcement exposed)
- Hard, stiff, heat cracked, or charred hose;
- Cracked, damaged, or badly corroded fittings;
- Leaks at fitting or in hose;
- Kinked, crushed, flattened or twisted hose; and
- Blistered, soft, degraded, or loose cover.

Visual Inspection:

The following items must be tightened, repaired or replaced as required:

- Leaking port conditions;
- Remove excess dirt buildup;
- Clamps, guards, shields; and

Operation

Do not exceed the maximum working pressure of the hose (5000 psig, 345 Bar)

Do not kink or twist the hose.

Never attempt to repair or re couple a damaged hose.

Do no stretch the hose.

Do not use the hose as to pull or lift equipment.

1.2.3 Maintenance Safety

When work is done in the compressor enclosure, storage cascade area or dispenser the atmosphere shall be monitored for O₂ deficiency and explosive limits, in accordance to W.C.B. - I.S.H.R. reg. 13.17.

When working on gas containing equipment, be sure the area is well ventilated, in accordance to W.C.B. - I.S.H.R. reg. 13.17.

Footwear shall be in accordance with W.C.B. - I.S.H.R. reg. 14.08.

When near any pressurized area the worker shall wear eye protection which is attached to their head, in accordance with W.C.B. - I.H.S.R. reg. 14.21.

* All regulations referenced are Canadian worker safety standards. For installations outside of Canada refer to local applicable equivalent standards.

LOCKOUT PROCEDURE

The dispenser and related electrical equipment shall be locked out in accordance with W.C.B. I.H.S.R. reg. 16.02.

If work is to be done on any electrical circuit, it must be de-energized, in accordance with W.C.B. I.H.S.R. reg. 22.20. Watch for control systems that may have more than one source of power.

Gas supply lines to the dispenser must be locked-out so that no person can open them inadvertently. The use of a pad-lock and chain are an acceptable means. This procedure must be done when removing any lines or piping from the dispenser

1.2.3 Maintenance Safety (Continued)**REMARKS ON THE MAINTENANCE AND REPAIR WORKS**

Maintenance and repair works may be carried out only on the shutdown and entirely vented dispenser unit.

Only use original spare parts and recommended products for maintenance and repair works on the dispenser unit!

The manufacturer does not take over any responsibility for physical harms or damages on the dispenser unit caused by the non-observance of the safety precautions or by omission of the diligence and caution generally usual with such works being necessary for handling, operation, maintenance or repair of NGV. Refueling station equipment.

1.3 Emergency Procedures

In case of an emergency in the dispenser area or other station areas, involving a break away disconnection, major gas leaks, fire, or other malfunctions or accidents, the following precautions should be taken.

1. The dispenser area will have a red push button switch called an emergency shutdown (ESD) push button. The location of this device should be made familiar to all personnel. In case of emergency, manually depress the ESD push button. Upon depressing, all station operation shuts down immediately. Upon ESD activation the follow will occur:
 - i. The compressor(s) shut down.
 - ii. The pressure vessel storage cascade is isolated from the rest of the station with the fail-safe emergency shutdown (ESD) valves.
 - iii. The sequencing valves or flow control valves in the dispenser rotate closed isolating gas from the fill nozzle.
 - iv. All station operation ceases until the station electrical controls are reset.
2. The dispenser has an emergency shut off valve on the dispenser cabinet. In case of emergency manually close this valve.

SECTION 2

Introduction & Table of Contents

This section of the manual explains the installation requirements and procedures of the IMW3000 dispenser.

- 2.1** Foundation Requirements
- 2.2** Gas Supply Piping and filters
- 2.3** Electrical Installation
- 2.4** Flow Meter Zeroing Procedure

2.1 Foundation Requirements

The dispenser must be provided with a suitable flat and level concrete foundation for mounting. Recommended practice is to provide a concrete dispenser island with a curb at least 8" above grade. The dispenser island is also provided with a pit into which buried gas piping and electrical lines emerge. The dispenser is then positioned and mounted over the pit for convenient access of electrical conduit and gas piping lines into the dispenser cabinet. The pit also extends beyond the dispenser footprint for access. The area not covered with the dispenser cabinet is covered with a removable steel plate recessed into the concrete top surface.

Most installation codes require bollard protection posts for dispenser crash protection. These can be cast into the concrete island and sized in accordance with code requirements.

The dispenser cabinet includes mounting holes in the base frame. Bolt down studs can be cast into the concrete to match these mounting hole locations or the dispenser can be bolted to suit after positioning with the use of "Hilti" type concrete fasteners.

2.2 Gas Supply Piping and Filters

High pressure lines must be provided between any ground storage pressure vessels and the dispenser. The sizing of these lines is dependent on dispenser flow performance requirements, in line component flow characteristics and lengths of piping runs.

A common practice is to install 1" Sch. 160 pipe that is buried and runs underground to the dispenser pit at a depth of 24" to 36". The 1" Sch. 160 pipe should be yellow jacket coated and catholically protected as per local code requirements. At the dispenser pit, the three piping lines emerge into insulating flanges.

It is required that a filter and isolation ball valve be installed on each dispenser line. The filter provides final filtering of gas and protection from any pipe scale or other dirt particles fouling valve seats and other critical componentry. An isolation ball valve located up stream of the filter will facilitate filter element replacement or other maintenance work requiring piping system depressurization. Installation of a needle valve drain in the bottom of the filter bowl is also recommended.

Important!

Filters are not sold with IMW dispensers unless ordered by the customer.

Warranty will be voided without these filters in place!

2.3 Electrical Installation

The dispenser is electrically classified as Class 1, Division 1, Group D, explosion proof. All wiring into the dispenser must be explosion proof in accordance with a Class 1, Division 1, Group D classification. Wiring requirements include, power to the dispenser head, wiring for Emergency Shutdown push buttons, and any wiring interconnections for control consoles or card access systems. For wiring installation details refer to the dispenser electrical installation drawings.

2.4 Flow Meter Zeroing Procedure

Flow Meter type: Micromotion CNG050 with LCD display

IMW dispensers are factory calibrated and tested to ensure the best quality. **IMW strongly recommends the flow meters be zeroed** using the following procedure

CAUTION:

Failure to zero the flowmeter at initial startup could cause the transmitter to produce inaccurate signals.

Before you start:

1. Apply power to the IMW dispenser and allow it to warm up for at least 30 minutes
2. Allow gas to flow through the sensor for at least 10 minutes so that the sensor temperature will equal the normal gas operating temperature.
3. Make sure the sensor is completely filled with gas

Ensure zero flow

1. Ensure zero flow through the sensor.
2. Zero the meter under pressure as quickly as possible by first closing the downstream valve, then closing the upstream valve
3. Make sure the sensor tubes are completely full and gas flow through the sensor is completely stopped during flowmeter zeroing

NOTE: Zeroing the flowmeter establishes the flowmeter's point of reference when there is no flow.

The default zero time is 20 seconds.

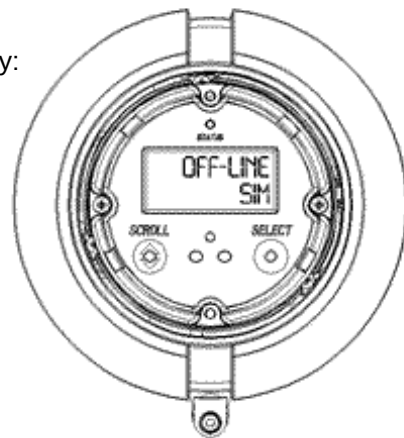
Zero the transmitter in the following way:

On the LCD display,

Go to **OFF-LINE MAINT**

select **OFF-LINE ZERO**

press **ZERO YES**



Dots will traverse the top line of the display while the zero is in progress

If the transmitter displays **TEST OK**, then the zero was successful. If **TEST FAIL** appears, the zero procedure failed, contact your IMW service representative immediately.

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SECTION 3

Introduction & Table of Contents

This section of the manual explains the maintenance procedures of the IMW3000 dispenser.

- 3.1** Dome Loaded Regulator
- 3.1.1** Reference Vessel Pressure Adjustment
- 3.2** Breakaway Disconnect
- 3.2.1** Breakaway Disconnect Installation Procedure
- 3.2.2** Breakaway Disconnect Lubrication Procedure
- 3.3** Relief Valve
- 3.4** Recommended Maintenance and Service Schedule
- 3.5** Trouble Shooting Guide

3.1 Dome Loaded Regulator

A dome loaded regulator is used to stop the flow of gas to the NGV vehicle at the correct temperature compensated fill pressure. The regulator shut off pressure is controlled by pressurized natural gas in the dome of regulator. Pressurized gas to the regulator is supplied by a small pressure vessel called the Reference Vessel. This vessel is located inside the cabinet of the dispenser. The pressure inside this vessel is dependent on ambient temperature. On higher temperature days, the regulator shut off pressure will be higher than on cooler days. This feature is used to maintain safe dispenser final fill pressures under all temperature conditions.

If it is found that the reference vessel pressure very quickly (over the course of a day) goes out of adjustment by more than 100 psig, then it may be that the dome loaded regulator seals require replacing. If the dome loaded regulator seals leak then gas from the reference vessel can escape into the gas stream flowing to the NGV vehicle. Gas leakage may also occur into the reference vessel from the dispensing gas stream causing a rise in reference vessel pressure. Before rebuilding the dome load regulator however, check for any other sources of gas leakage such as leaking needle valves or fitting/tubing lines. If any leaks are found and corrected, readjust the reference vessel to the correct pressure. Observe the reference vessel pressure over a day to see if the problem has been solved before rebuilding the dome load regulator.

3.1.1 Reference Vessel Pressure Adjustment

A pressure gauge on the side of the dispenser is provided for service and maintenance personnel to check reference vessel pressure. The pressure of the reference vessel should be checked daily to assure that the correct pressure adjustment is being maintained

For reference pressure checking and adjustment use the following procedure:

- i. Find out what the ambient temperature is.
- ii. Use the following table to find the correct reference vessel pressure corresponding to the current ambient temperatures.
- iii. Read the reference vessel pressure gauge at the dispenser. Compare the reading to tabulated pressure for the current ambient temperature on the table. If the reference vessel pressure is lower than the pressure on the table the reference vessel must be charged. If the pressure is lower some reference vessel gas must be allowed to bleed off.

To charge the reference vessel, use the following procedure:

- i. At the dispenser open needle valve 1 (refer to the dispenser flow schematic).
- ii. Slowly open needle valve 2 until gas begins to bleed into reference vessel causing the pressure gauge to rise. Once the pressure gauge reading matches the pressure for the ambient temperature, found on the table, close needle valve 2 and 1.

Reduce reference vessel pressure as follows:

- i. At the dispenser open needle valve 1 (refer to the dispenser flow schematic).
- ii. Slowly open needle valve 3 until the pressure gauge reading starts to drop. Once the pressure gauge reading matches the pressure found on the table for the ambient temperature, close needle valve 3 and 1.

TABLE

**TESCOM 44-4200 SERIES DOME LOADED REGULATOR
REFERENCE VESSEL PRESSURE SETTINGS**

TEMPERATURE <u>°C</u>	SET PRESSURE <u>PSIG</u>
10	2800
12	2840
14	2880
16	2920
18	2960
20	3000
22	3040
24	3080
26	3120
28	3160
30	3200 (20 MPa)
32	3240
34	3280
36	3320
38	3360
40	3400
42	3440
44	3480
46	3520

TABLE

**MODEL J200 DOME LOADED REGULATOR
REFERENCE VESSEL PRESSURE SETTINGS**

TEMPERATURE		SET PRESSURE
<u>°F</u>	<u>°C</u>	<u>PSIG</u>
104	40	2778
95	35	2734
86	30	2689
77	25	2659
68	20	2600
59	15	2555
50	10	2511
41	5	2466
32	0	2422
23	-5	2377
14	-10	2333
5	-15	2288
-4	-20	2243
-13	-25	2200
-22	-30	2154
-31	-35	2110
-40	-40	2065

Note: This table provides reference vessel adjustments for final fill pressures of 3000 psig @ 20 deg. C or 68 deg. F. At 20 deg. C the reference vessel is adjusted to 2600 psig. This adjustment will provide a 3000 psig vehicle final fill pressure. The difference in pressure between reference vessel and final fill pressure is due to the actuator rod area on one side of the plunger. This results in unequal pressure areas on the plunger surfaces and therefore unequal adjustment and fill pressures.

3.2 Breakaway Disconnect

The breakaway disconnect is mounted on the dispenser cabinet at the upstream end of the flexible fill hose. The breakaway disconnect is a safety feature and protects the dispenser in case an NGV vehicle drives off without the fill nozzle disconnected. As the vehicle pulls on the fill hose a leverage is applied to the arm of the breakaway housing, causing the high pressure coupling inside to disconnect and the retractor line to sever. The high pressure coupling automatically shuts off the gas flow preventing gas leakage.

If a disconnect has occurred, the operator should immediately activate an ESD push button and then close the emergency shut off valve on the dispenser. Even though no gas leaks should occur, this is an added precaution.

Once it has been determined there is no damage to the dispensing equipment nor any gas leaks, the dispenser can be reset for operation.

3.2.1 Breakaway Disconnect Installation Procedure

In the case of a disconnection, use the following procedure to reinstall the breakaway disconnect.

1. Open the fill valve and vent valve and bleed any gas left in the hose assembly. Close the vent valve and fill valve.
2. Inspect the fill nozzle, hose, breakaway coupling and housing for damage and repair/replace as necessary.
3. Close the emergency shut off valve on the dispenser.
4. Open the vent needle valve at the fill pressure gauge, inside the dispenser, and vent the gas between the emergency shut off valve and disconnect coupling so that the coupling can be reconnected. Close the vent valve.
5. Reconnect the female half coupling of the breakaway housing to the mating male coupling half on the dispenser. To reconnect, hold the hose steady and pull back on the breakaway housing to retract the sleeve of the female coupling half. At the same time, push the female coupling half onto the male coupling half and release the breakaway housing thereby releasing the female coupling half sleeve.
6. If the breakaway disconnect holds steady, a positive connection has been made.
7. Slowly open the emergency shut off valve to re-pressurize the hose.
8. Check for leaks with snoop detection fluid.
9. Reconnect the retractor cord to the retractor.

3.2.2 Breakaway Disconnect Lubrication Procedure

The breakaway disconnect coupling must be disconnected and lubricated every 1000 hours as part of a scheduled maintenance and service program.

Lubricate the coupling using the following procedure.

1. Close the emergency shut off valve on the dispenser.
2. Open the vent valve inside the dispenser cabinet at the fill pressure gauge. Close the vent valve.
3. Disconnect the breakaway coupling by pulling directly downwards on the housing.
4. Manually apply a film of grease to the male coupling half on the dispenser cabinet staying away from the poppet of the check valve.
5. Manually apply a film of grease to the female coupling half in the breakaway housing also staying away from the poppet of the check valve.
6. Reconnect the female half coupling of the breakaway housing to the mating male coupling half on the dispenser. To reconnect, hold the hose steady and pull back on the breakaway housing to retract the sleeve of the female coupling half. At the same time, push the female coupling half onto the male coupling half and release the breakaway housing thereby releasing the female coupling half sleeve.
7. If the breakaway disconnect holds steady, a positive connection has been made.
8. Slowly open the emergency shut off valve to re-pressurize the hose.

3.3 Relief Valve (if applicable)

The dispenser relief valve provides over pressure protection to the pressure containing components of the dispenser and the NGV vehicle. Relief valves are adjusted and tested at the factory to vent gas at a precise pressure setting as determined by the maximum working pressures of the components it is protecting.

NEVER TAMPER WITH A RELIEF VALVE!

It is recommended that all relief valves be removed and retested by a certified (E.g. ASME or equivalent) relief valve testing shop every 2 years, as part of a scheduled maintenance and service program.

WARNING: IF A RELIEF VALVE HAS BEEN REMOVED, DO NOT PLUG THE RELIEF VALVE PORT. DO NOT OPERATE THE DISPENSER. LOCK OFF THE DISPENSER WITH THE KEY SWITCH AT THE DISPENSER CONTROL PANEL.

3.4 Recommended Maintenance Schedule

It is imperative that a scheduled maintenance and service program for the IMW3000 Series CNG Dispensers commence immediately after the equipment has been commissioned. Dispenser maintenance and service should be carried out by trained technicians. They should possess a range of practical knowledge, from mechanics to electrical and be experienced in the maintenance of industrial equipment. Service personnel should also be fully aware of all dangers, hazards, and safety procedures.

Service and maintenance should be systematic, thorough and well documented with a maintenance log book.

The following table outlines a recommended maintenance and service schedule. The maintenance schedule is based on hours accrued on the compressor hour meter. The frequency of operation of the dispenser is in direct proportion to the hours run by the compressor(s). In multiple dispenser installation, some dispensers may be used more frequently than others, however, the station maintenance personnel can make adjustments to the maintenance schedule based on their experience with the station.

In addition to this, it is recommended that a "walk around" cursory inspection of the dispenser(s) be made on a daily basis by the operator. This inspection should include the following:

- i. Dispenser is operating correctly.
- ii. Visual inspection for anything unusual.
- iii. Check reference vessel pressure on dispenser(s).

MAINTENANCE

ITEM	MAINTENANCE ITEM	every 2 wks	every 500 hrs/ 2 mths	every 1000 hours	every 2000 hrs/1 yr.	every 5000 hours
1	Check log sheet	x				
2	Drain dispenser filters	x				
3	Check fill nozzle seals for leakage/wear	x				
4	Check correct operation of flow control or sequencing valves during a fill	x				
5	Check the flow control or sequencing valves for leakage	x				
6	Inspect fill hoses	x				
7	For dome loaded regulators check reference pressure against ambient temperature on the chart and adjust if necessary. For spring regulators, set pressure to required fill pressure.	x				
8	Check fill valve for gas leakage		x			
9	Change dispenser filters			x		
10	Lubricate breakaway disconnect			x		
11	Snoop test dispenser for leaks			x		
12	Visually check pressure relief device				x	
13	Recertify pressure relief device set point					5 yrs
14	Rebuild flow control or sequencing valve if applicable	as required				
15	Rebuild fill nozzle valve	as required				
16	Rebuild dome loaded regulator or spring regulator	as required				
17	Replace fill hose as necessary	as required				

3.5 Trouble Shooting Guide

The following trouble shooting guide is provided to help trained service personnel to pinpoint dispenser operational problems should they arise.

NO	PROBLEM DESCRIPTION	POSSIBLE CAUSE
1	No gas at dispenser	- ESD push button activated - loss of pilot pressure to ESD valves - isolation valves closed - dispenser operation procedure not followed - storage cascade vessel isolation valves closed - storage cascade empty of gas - power failure at dispenser - breakaway disconnect not connected
2	Low dispenser fill pressure	- low storage cascade pressure - reference vessel pressure set too low - cold ambient temperature - electrically actuated ball valves not opening properly - valves not sequencing correctly - restrictions in gas line
3	High dispenser fill pressure	- reference vessel pressure set too high - regulator leaking through
4	Dispenser not turning on	- authorize signal not getting to dispenser head - no power to dispenser - key switch authorization at dispenser control panel off - faulty dispenser authorization limit switch - ESD push button activated
5	Gas venting to atmosphere, loud bursts of gas	- relief valve venting gas - regulator leaking - excessive pressure - electrically actuated ball valves leaking
6	ESD activated	- ESD push button activated - power failure - loss of pilot gas to ESD valve pneumatic actuators
7	Oil in gas	- dispenser filters not drained or changed - compressor scrubbers and filters not drained regularly
8	General gas leaks	- ball valve stem packings leaking - ball valves need rebuilding or replacement - loose fittings

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SECTION 4

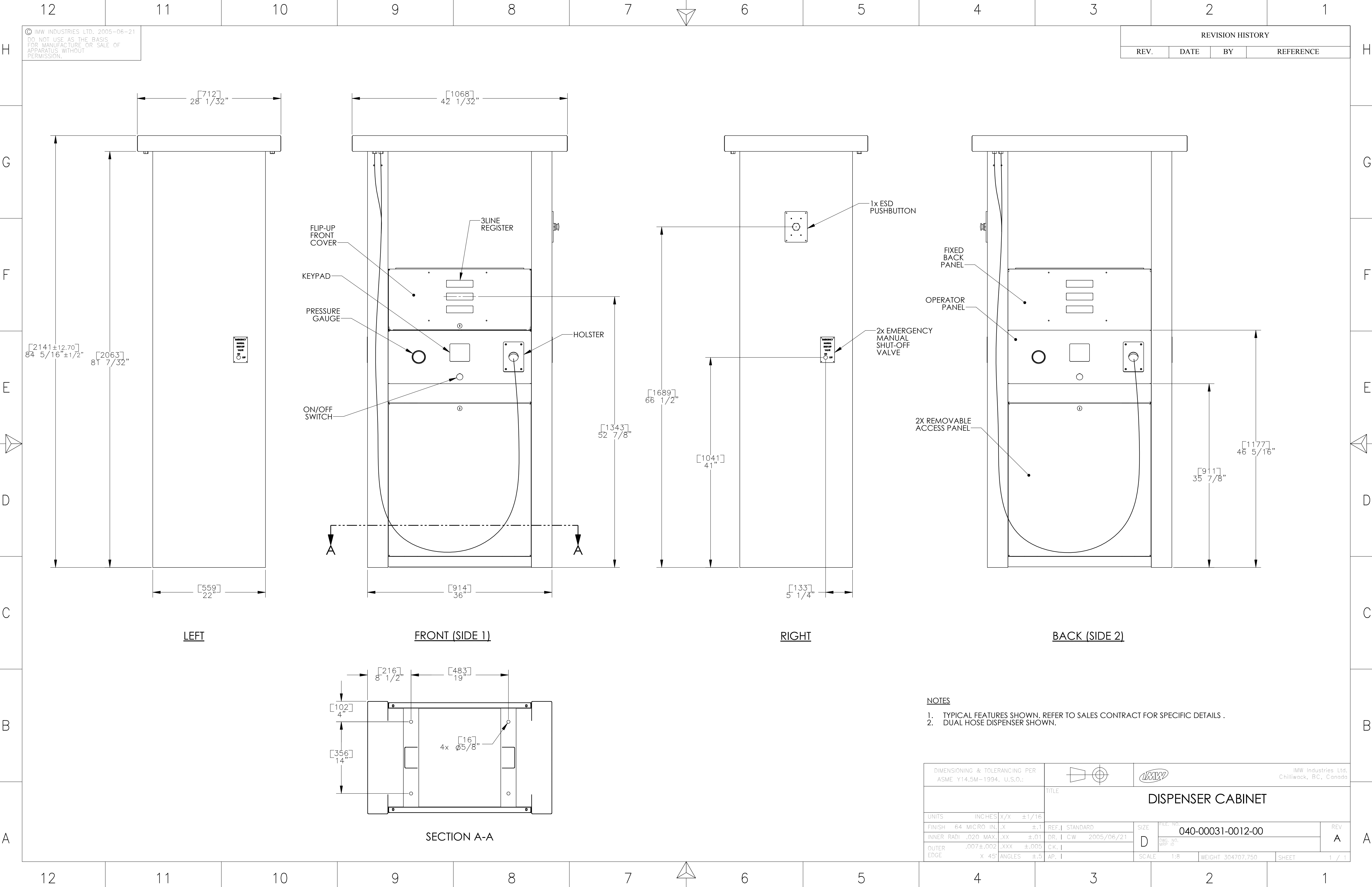
Introduction & Table of Contents

This section includes inserts of both relevant IMW mechanical and electrical diagrams, as well as component compliances (where applicable).

Includes:

- Product Specification
- General Arrangement
- Piping Diagrams
- Electrical Schematic
- Miscellaneous Diagrams
- Component Compliances

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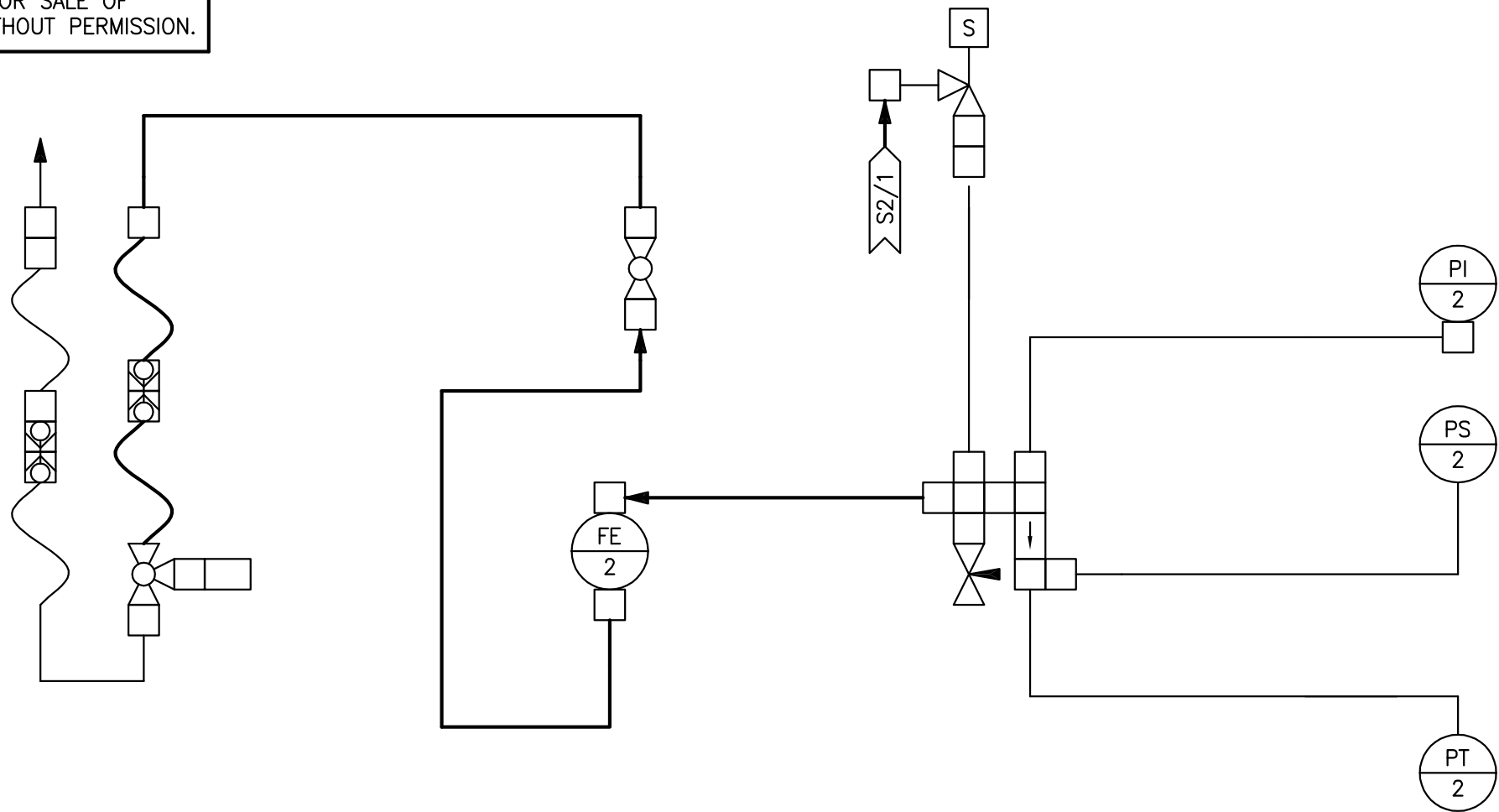
REVISION HISTORY			
REV.	DATE	BY	REFERENCE

- NOTES**
1. TYPICAL FEATURES SHOWN, REFER TO SALES CONTRACT FOR SPECIFIC DETAILS .
 2. DUAL HOSE DISPENSER SHOWN.

DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994. U.S.O.:							IMW Industries Ltd. Chilliwack, BC, Canada		
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INNER RADI	.020 MAX.	.XX ±.01	DR.	I	CW 2005/06/21	D	DWG. NO. WRP ID.		
OUTER	.007±.002	.XXX ±.005	C.K. I						
EDGE	X 45°	ANGLES ±.5	AP.	I		SCALE	1:8	WEIGHT	304707.750
						SHEET		1 / 1	

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MANUFACTURE OR SALE OF
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REVISION HISTORY	
ALL SHEETS SAME REVISION STATUS. HISTORY FILE: [DWG.NO.]REV.DOC	LAST REVISED 2007/05/10



SIDE 2

DRAWING NOTES

1. ALL STAINLESS STEEL TUBING: ASTM A 269 OR ASME SA-213 GRADE TP316 COLD FINISHED
2. ALL CARBON STEEL TUBING: ASTM A 179/A179M-90a OR ASME SA-179
3. SEE WORK ORDER FOR PARTS LIST DETAILS.
4. CUSTOMER TO PROTECT DISPENSING AND VEHICULAR SYSTEMS FROM OVERPRESSURISATION PER LOCAL CODES AND REGULATIONS.
5. * PART 712 IS EITHER A FITTING OR A SHORT HOSE, SEE BOM.

LEGEND

T1/4x035SS	TUBE, 1/4" O.D. x 0.035" WALL, STAINLESS STEEL
CS	CARBON STEEL
H/2	OFF PAGE REFERENCE: "H" ON SHEET "2"

DESIGN PARAMETERS

STATION	PRESSURE (PSIG)	TEMPERATURE (°F)	
		MIN.	MAX.
1	4000	-20	150
2	3750	-20	200

		IMW Industries Ltd. Chilliwack, BC, Canada	
REF.		TITLE	
DR. BVK, 2007/03/02		DISPENSER PIPING 1LINE 2HOSE 1FILTER ORV	
CK. / /		SIZE B	REV B
AP. / /		DWG. NO. 400069-XX	
		SCALE	WEIGHT N/A SHEET 2/2

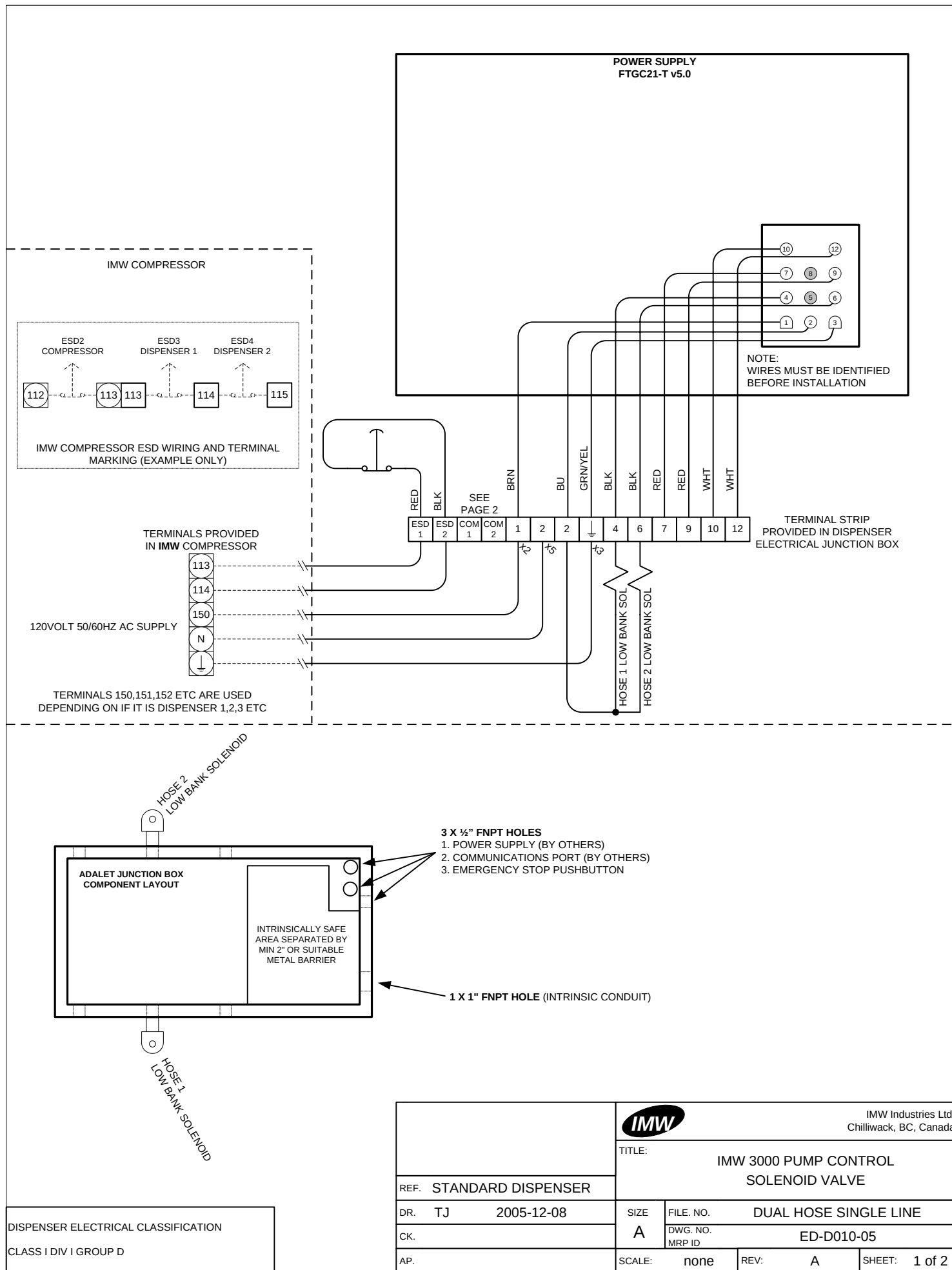
Parts and Components of Engineering Master

WorkOrder/Eng. Master: 400069-03

<i>Ref</i>	<i>Part ID</i>	<i>Description</i>	<i>QTY per Asm</i>	<i>QTY per W/O</i>	<i>Sub W/O</i>
-----	.	INLET	1.00	1.00	
001	..321053	VALVE BALL B8L 2WAY 0.500T SS	1.00	1.00	
002	..321622	CONNECTOR TUBE MALE 0.500 - 0.500MNPT SS	2.00	2.00	
003	..321882	FILTER COALESCING 1/2" NPT 5000 PSIG	1.00	1.00	
004	..310759	VALVE NEEDLE H5 0.250FNPT - 0.250MNPT CS	1.00	1.00	
005	..321639	REDUCER TUBE SS 0.500T - 0.375STUB	1.00	1.00	
006	..321638	TEE TUBE UNION SS 0.375T	1.00	1.00	
-----	.	SOLENOID VALVE	2.00	2.00	
101	..322584	SOLENOID VALVE 2 WAY 3/8 NPT 3600 PSIG	1.00	2.00	
102	..303779	NIPPLE PIPE HEX CS 0.375MNPT	1.00	2.00	
105	..322023	ELBOW TUBE MALE SS 0.375T - 0.375MNPT	1.00	2.00	
-----	.	MANIFOLD	2.00	2.00	
201	..321642	CONNECTOR 3/8 X 3/8 MNPT SS-600-1-6	2.00	4.00	
202	..303864	CROSS PIPE FEMAL 0.375	1.00	2.00	
203	..303793	BUSHING RED CS 0.375MNPT - 0.250FNPT	2.00	4.00	
204	..310759	VALVE NEEDLE H5 0.250FNPT - 0.250MNPT CS	1.00	2.00	
205	..322180	CONNECTOR TUBE MALE 0.250 - 0.250MNPT SS	1.00	2.00	
206	..305379	TEE PIPE BRANCH CS 0.250FNPT - 0.250MNPT	1.00	2.00	
207	..321630	ADAPT PIPE SNUB SS 0.250FNPT - 0.250MNPT	1.00	2.00	
208	..321644	TEE PIPE RUN SS 0.250FNPT - 0.250MNPT	1.00	2.00	
209	..303776	NIPPLE PIPE HEX CS 0.250MNPT	1.00	2.00	
210	..307013	VALVE CHECK 2WAY 0.375FNPT @6000PSI	1.00	2.00	
211	..321578	ADAPTER SS 0.375T X 0.375 MNPT	1.00	2.00	
-----	.	PRESSURE INSTRUMENTATION	2.00	2.00	
-----	..310065	CONNECTORS STRAIN RELIEF PLASTIC	2.00	4.00	
301	..322459	GAUGE PRES 2.5IN DIAL 345 BAR/ 5000 PSIG	1.00	2.00	
302	..321645	ELBOW TUBE FEMALE 0.250T - 0.250FNPT SS	1.00	2.00	
303	..312832	SWITCH PRES FIX DIFF 290-652PSI 2-POS	1.00	2.00	
305	..319944	TRANSMITTER 0-5000 PSIG	1.00	2.00	
503	..321646	CONNECTOR TUBE MALE 0.375 - 0.750MNPT SS	1.00	2.00	
-----	.	FLOW SENSOR	2.00	2.00	
-----	..316851	SUPPORT KIT TUBE SINGLE 1.000IN	2.00	4.00	
-----	..20D017-02	FLOW SENSOR MOUNTING BLOCK	2.00	4.00	

<i>Ref</i>	<i>Part ID</i>	<i>Description</i>	<i>QTY per Asm</i>	<i>QTY per W/O</i>	<i>Sub W/O</i>
----	..301944	BOLT HH SS 0.250-20UNC X 3.000	4.00	8.00	
----	..301033	NUT HEX SS 0.250UNC	4.00	8.00	
----	..302352	WASHER LOCK SS 0.250IN	4.00	8.00	
----	..320201	TRIM EDGE 623-6683	5.75	11.50	
----	..310065	CONNECTORS STRAIN RELIEF PLASTIC	1.00	2.00	
501	..322021	ELBOW TUBE MALE SS 0.375T - 0.750MNPT	1.00	2.00	
502	..320168	CNG50 MVD SOLO D/C c/w BARRIER	1.00	2.00	
503	..321646	CONNECTOR TUBE MALE 0.375 - 0.750MNPT SS	1.00	2.00	
-----	.	SHUTOFF VALVE	2.00	2.00	
601	..321890	CONNECTOR 3/8 X 1/4 MNPT SS-600-1-4	2.00	4.00	
602	..320210	VALVE BALL .25 INCH	1.00	2.00	
-----	.	HOSE ASSEMBLY	2.00	2.00	
----	..20D017-03	BULKHEAD FITTING SPACER	1.00	2.00	
----	..202708-00	DISPENSER FILL NOZZLE POSITIONING PLATE	1.00	2.00	
----	..303747	TUBE SS T316 0.250 X 0.035 SA-213	6.00	1.00	
----	..303747	TUBE SS T316 0.250 X 0.035 SA-213	22.50	45.00	
701	..322020	BULKHEAD TUBE FEM 0.250T - 0.250FNPT SS	1.00	2.00	
702	..320145	ADAPTER,HOSE TO PIPE	1.00	2.00	
703	..307946	HOSE	2.00	4.00	
704	..320146	ADAPTER,HOSE TO PIPE	1.00	2.00	
705	..312699	BREAKAWAY VENT LINE VLB 0.563-18 350PSI	1.00	2.00	
706	..321066	HOSE ENCAPSULATED TWIN HOSE ASSEMBLY	1.00	2.00	
707	..321991	BULKHEAD TUBE FEM 0.375T - 0.250FNPT SS	1.00	2.00	
708	..321067	HOSE ENCAPSULATED SINGLE HOSE 1/4 IN	1.00	2.00	
709	..309795	BREAKAWAY INLINE 0.563-18 FUNF 3600PSI	1.00	2.00	
710	..312356	VALVE BALL 3-WAY 3-PIECE SS 0.250FNPT	1.00	2.00	
711	..203178-00	FILL PROBE NZS 5425	1.00	2.00	
712	..321141	HOSE SINGLE LINE 1/4" 10" LONG MNPT ENDS	1.00	2.00	
713	..322180	CONNECTOR TUBE MALE 0.250 - 0.250MNPT SS	1.00	2.00	

----- End of List -----





MANUFACTURER'S CERTIFICATE OF QUALITY

oil-free natural gas

In order to comply with decreto 4570 of December 12, 2005 issued by the Ministry of Commerce, Industry and Tourism Colombia, we are hereby issuing a certificate of conformity for the following products:

This dispenser(s) are manufactured to comply with the requirements as defined in NTC 4820 and NTC 4823.

Type: CNG Dispenser

Use: Dispense Natural Gas

Set Pressure: 2900 PSIG

Model: IMW3000XH-2

Date Of Manufacture: July, 2009

Serial #: 35835-1-2

IMW Industries Ltd. certifies that this dispenser is manufactured with new materials and components only, and is designed and certified in accordance with the applicable codes and standards set forth for the manufacture of CNG equipment in North America (Table 1).

IMW Industries Ltd. certifies that all electrical components incorporated into this equipment are approved by the Canadian Standards Association (CSA) or Underwriter's Laboratories (UL) and are suitable for the environment in which they are used.

IMW Industries Ltd. certifies that this equipment is suitable for the purpose for which it was designed and can be operated safely when used in accordance with the manufacturer's instructions and recommendations.

The equipment referenced on the certificate has been manufactured / assembled in Canada.

TABLE 1

COMPONENT / ASSEMBLY	CODE / STANDARD	CERTIFICATION
Dispenser piping and tubing.	CSA B51-03, ASME/ANSI B31.3	Manufactured under CSA B51-03 quality system
Filter housing (if applicable)	CSA B51-03, ASME Sec VIII Div 1	Manufactured under CSA B51-03 quality system
Relief valves	ASME UV stamped	
Hoses for Natural Gas Vehicles and	CSA/ANSI/IAS NGV 4.2-1999	
Breakaway Devices for Natural Gas	CSA/ANSI/IAS NGV 4.4-1999	
Manually Operated Valves for Natural Gas	CSA/ANSI/IAS NGV 4.6-1999	
Compressed Natural Gas Vehicle (NGV)	Addenda A-M97; Addenda B-M98;	
NGV Dispensing Systems	CSA/ANSI/IAS NGV 4.1-1999	
Natural Gas Fueling Station Reciprocating	CSA/ANSI NGV 4.8-2002	
Electrical components	CSA and or UL	CSA and or UL
Electrical wiring	NFPA52, CSA C22.1-01 Canadian Elec. Code, NFPA70	Comply in design/manufacturing
NGV Dispenser construction System	NFPA 52, CSA12.5	Comply in design/manufacturing

CODE / STANDARD	DESCRIPTION
CSA B51-03	Boiler, Pressure Vessel and Pressure Piping Code.
ASME/ANSI B31.3 – 2007	ASME process piping.
ASME Section VIII 8 Div 1- 2007	ASME Boiler and pressure vessel code.
CSA C22.1-06	Canadian electrical code.
NFPA 52 2006	Standard for CNG vehicular fuel Systems.
ANSI B16.34	Valves flanged, Threaded and welding end.
NFPA70 - 2005	National Electrical code (USA).

Certified true and correct,

Martin Loffler

Quality Assurance Manager

www.imw.ca

IMW Industries Ltd. 43676 Progress Way, Chilliwack, BC, Canada V2R 0C3 Tel: 604-795-9491 Fax: 604-792-3806 info@imw.ca

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Dispenser Pressure Test Report

Work Order: 35835

Serial No: 35835-1

Date: 2009-07-31

Piping Design Drawing No: 400069-03

Description Dispenser piping 1 line 2 hose 1 filter 0 prv

Piping Fabricator:

Piping Segment Identification	Pressure Line	Vent Line
Process Fluid	Natural Gas	
Design Pressure (psig)		
Design Temperature (°F)	°F to °F	°F to °F
Material Specifications		
Pipe Size		
Test Pressure (psig)		
Additional Exam	Snoop Test	 Sign
Time On	10:20 PM	
Pressure On (psig)	3600	
Sign and Date	07/30/09	AS
Time Off	10:40 PM	
Pressure Off (psig)	3600	
Sign and Date	07/30/09	RS

Side 1

Flow Meter 13007166
Solenoid valve 35832
Relief valve —
Filter —

Filter 321882

Side 2

Flow Meter 13007210
Solenoid valve 35832
Relief valve —
Filter —



DISPENSER MASS FLOW METER CALIBRATION WORKSHEET

W/O No: 35835 SERIAL NO: 35835-1 DATE: 2009-07-31
CUSTOMER: _____ TEST PERSONNEL: RAJAL SINGH

MASS FLOW METER SIDE 1 SERIAL NUMBER: _____

MASS FLOW METER SIDE 2 SERIAL NUMBER: _____

13007166

13007210

SIDE 1

Test	Pressures		Quantities		Registration Error		
	Initial	Final	Display [1]	Scale [2]	Sign (+/-)	Absolute [3]=[1]-[2]	Relative [3]÷[2]×100
	(psig)	(psig)	(kg)	(kg)		(kg)	(%)
Fast	<u>0</u>	<u>1250</u>	<u>2.86</u>	<u>2.86</u>	<u>—</u>	<u>—</u>	<u>—</u>
Slow	<u>1250</u>	<u>2700</u>	<u>3.08</u>	<u>3.10</u>	<u>-</u>	<u>.02</u>	<u>0.64</u>
Full (ambient)	<u>0</u>	<u>2700</u>	<u>5.89</u>	<u>5.92</u>	<u>-</u>	<u>.03</u>	<u>0.51</u>

SIDE 2

Test	Pressures		Quantities		Registration Error		
	Initial	Final	Display [1]	Scale [2]	Sign (+/-)	Absolute [3]=[1]-[2]	Relative [3]÷[2]×100
	(psig)	(psig)	(kg)	(kg)		(kg)	(%)
Fast	<u>0</u>	<u>1150</u>	<u>2.73</u>	<u>2.74</u>	<u>-</u>	<u>.01</u>	<u>0.36</u>
Slow	<u>1150</u>	<u>2700</u>	<u>3.21</u>	<u>3.22</u>	<u>-</u>	<u>.01</u>	<u>0.31</u>
Full (ambient)	<u>0</u>	<u>2600</u>	<u>5.71</u>	<u>5.72</u>	<u>-</u>	<u>.01</u>	<u>0.17</u>



DISPENSER MASS FLOW METER CALIBRATION WORKSHEET

	Side 1	Side 2
Short Fill (FAST), Ambient temperature, 0-1000PSI: stop fill at 1000PSI and disconnect hose from fill vessel, record weights and temperature in table.	☐	☐
Short Fill (SLOW), Ambient temperature, 1000-3000PSI: stop fill at 3000PSI and disconnect hose from fill vessel, record weights and temperature in table.	☐	☐
Full Fill, Ambient temperature: Allow dispenser to fill to its maximum temperature compensation fill pressure. Disconnect hose from fill vessel, record weights and temperature in table. Verify the pressure transmitter and pressure switch shut down at assigned pressure.	☐	☐
If Filling steps have a relative error below 2%. Skip CAL factor steps. If relative error is above 2% do CAL Factor steps and repeat filling steps until relative error is less than 2%.	☐	☐
a. Add values recorded for the dispenser display to obtain total dispensed. b. Add totals from scale to obtain total scale. c. Divide total from scale to obtain total scale, and multiply the rest by the cal factor d. This will be the new cal factor $CAL \ FACTOR = \left(\frac{TOTAL \ DISPENSED}{TOTAL \ SALE} \right)$ Connect to the flow meter using pro link and locate the cal factor entry box, enter the new cal factor value in this box.	☐	☐

ATTACH MANUFACTURER'S TEST SHEETS



DISPENSER PROGRAM WORKSHEET (PUMP CONTROL)

Work Order: 35835 Dispenser Part No.: 230015

Customer: _____ Dispenser Serial
Number: 35835-1

Board Serial Number: 4115 Date: 2009-07-31

BK Power Supply SN: 900 Software Version: V1.14-0.0

MM Power Supply SN: 830 Test Technician: Raval Sma

Voltage (circle): 110 220

Pressure Transmitters Calibrated: Side 1: ✓ Side 2: ✓

DISPENSER PROGRAM WORKSHEET (PUMP CONTROL)

Firmware version GC21XP			* Site dependent		** Operation / Calibration
ENGLISH	IMW DEFAULT VALUE	Initial (if X)	SIDE 1	SIDE 2	DESCRIPTION
PRICE	1		*	*	Fuel price setting
dEnSit	1		*	*	Fuel density setting
ConnPC	NO				Enabling sale authorization through PC communication
Id_n	1				Identification number of dispenser within a net
L_Flou	45				Cut flow for determining sale end
End_t	3				Sale-end time after reaching cut flow
FL_LEA	20				Maximum enabled flow leakage
Sec_P	1 Bank = Serial 2 & 3 = Parallel		✓	✓	Valve sequence layout
Ch_F_L	1 Bank = 90 2 & 3 Bank = 60		✓	✓	Flow for changing from low to mid bank
Ch_F_h	70				Flow for changing from mid to high bank
Ch_Pre	55				Flow below which MSW and PT work
PrE_t	2				MSW delay cut time
ini_T	40				Maximum period of time for starting a sale
iniUol	0.12		✓	✓	Minimum initial volume for displaying a sale
Lo_Pre	50		✓	✓	Minimum enabled preset in a sale
Pr_UOL	0.16		**	**	In advance cutting volume for a preset sale
Err_Pr	1		**	**	Maximum error enabled in a preset sale
P_t	YES				Enabling pressure compensation by temperature
PrConf	n_open				Pressure switch type configuration
Pr_oFF	200				Desired pressure when finishing a sale
Pr_On	193		✓	✓	Enabled hysteresis in the end of sale pressure
CAL_0	GOOD	X	✓	✓	Pressure transducer calibration to 0 bar
CAL200	GOOD	X	✓	✓	Pressure transducer calibration to 200 bar
PrConn	NO		*	*	Enabling temperature compensation
tEnPEr	Ambient (°F)		**	**	Ambient temperature
oFF t	-2°F				Temperature correction
SenSor*	CNG-50				Selection of mass meter used
Cero_u	1-2	X	✓	✓	Mass meter zeroing
FIL_dir	1P-2P		**	**	Meter flow direction
id_Sen*	1-2	X	✓	✓	Identification number for the mass meter
LPI	Yes		✓	✓	Enabling of the predictive sale function
PT_PS	YES		✓	✓	Allows checking of pressure switch and pressure transmitter
G_PulS**	N/A				Number of grams per pulse
H_PRes	25				Error range between pressure switch and pressure transmitter
CAL_FA	1		**	**	Correction on the mass meter calibration
EFLOuu	300 / 450				Excessive flow cutoff (300 for car, 450 for bus)
FrAu_t	3				Minimum time between sales
Start	N5		*	*	Computer start options
LAnGua	ENG				Device language
DPaint	4				Decimal point position
Round	N0		*	*	Round up non-visible digit from dispatch
LCd	0				Number of displays connected to the computer
test display		X	✓	✓	Display testing
test ual	7	X	✓	✓	Valve testing
test key		X	✓	✓	Keypad test
test Key		X	✓	✓	Pressure switch test
C_pass			**	**	Password setting
P_2			**	**	Password level 2
P_3			**	**	Password level 3
Sett in			**	**	Parameter setting backup
Update			**	**	Firmware update

Product Code	Serial ID	Order ID	Line	Item	Customer Tag
CNG050S239NWBAEZZZ	13007210	31018975	1	14	

35835-1

SIDE 2

Process

Detail

Process ID:5.23231015

Process Time:2009.07.01 9:47:02

Process Stand:TSGCNG@SSCN

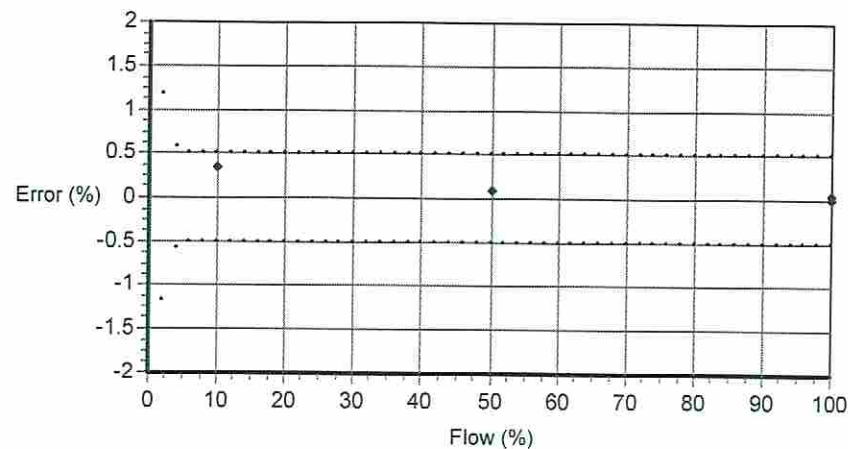
Stand Uncertainty:± 0.03%

Fluid:H2O

100% Rate:38.6 KG/MIN

Pickoff:1

100% P/T:37.1 PSIG/25.1 C



Results

Status:PASS

D1:0

D2:1

K1:4109.323

K2:4275.23

DT:4.25

FD:0

DTG:0

DFQ1:0

DFQ2:0

FlowCal:140.174.50

FFQ:0

FTG:0

DensCal:04109042754.25

FCF:140.17

FT:4.5

Flow (%)	Flow Rate (kg/min)	Meter Total (kg)	Reference Total (kg)	Error (%)	Specification (±%)
100.0	38.6	29.3746	29.37098	0.012	0.500
10.0	3.86	2.932741	2.922837	0.339	0.500
50.0	19.3	14.65184	14.63663	0.104	0.500
100.0	38.6	28.64429	28.63334	0.038	0.500

LAN SHEN

Technician

Product Code	Serial ID	Order ID	Line	Item	Customer Tag
CNG050S239NWBAEZZZ	13007166	31018975	1	20	

35835-1

SIDE 1

Process

Detail

Process ID:5.23230483

Process Time:2009.06.29 13:02:11

Process Stand:TSGCNG@SSCN

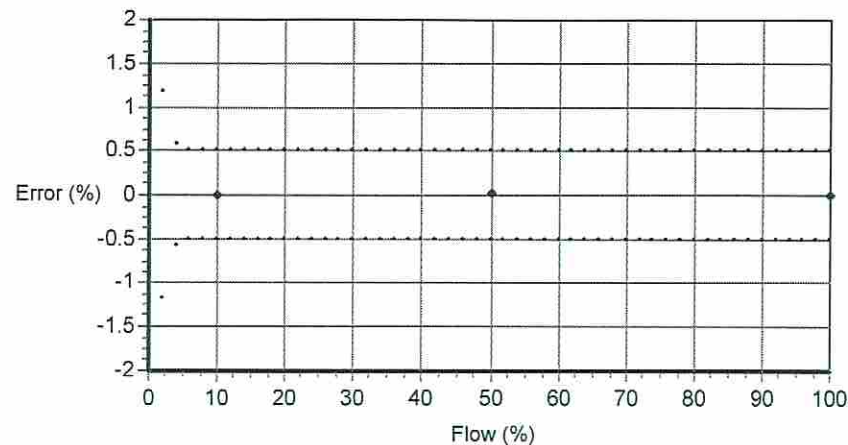
Stand Uncertainty:+/- 0.03%

Fluid:H2O

100% Rate:38.6 KG/MIN

Pickoff:1

100% P/T:39.59 PSIG/25.1 C



Results

Status:PASS

D1:0

D2:1

K1:4087.016

K2:4251.354

DT:4.25

FD:0

DTG:0

DFQ1:0

DFQ2:0

FlowCal:141.364.50

FFQ:0

FTG:0

DensCal:04087042514.25

FCF:141.36

FT:4.5

Flow (%)	Flow Rate (kg/min)	Meter		Reference		Error (%)	Specification (±%)
		Total (kg)	Total (kg)	Total (kg)	Total (kg)		
100.0	38.6	29.40712	29.4066			0.002	0.500
10.0	3.86	2.947621	2.947952			-0.011	0.500
50.0	19.3	14.7948	14.7917			0.021	0.500
100.0	38.6	28.74474	28.74176			0.010	0.500

LAN SHEN

Technician



Dispenser Pressure Test Report

Work Order: 35835

Serial No: 35835-2

Date: 2009-07-31

Piping Design Drawing No: 400069-03

Description Dispenser piping 1 line 2 hose 1 filter 0 prv

Piping Fabricator:

Piping Segment Identification	Pressure Line	Vent Line
Process Fluid	Natural Gas	
Design Pressure (psig)		
Design Temperature (°F)	°F to °F	°F to °F
Material Specifications		
Pipe Size		
Test Pressure (psig)		
Additional Exam	Snoop Test	 Sign
Time On	11:30 pm	
Pressure On (psig)	3600	
Sign and Date	07/30/09	
Time Off	12:00 am	
Pressure Off (psig)	3600	
Sign and Date	07/30/09	

Side 1

Flow Meter 13007218
Solenoid valve 35832
Relief valve —
Filter —

Filter 321882

Side 2

Flow Meter 13007133
Solenoid valve 35832
Relief valve —
Filter —



DISPENSER MASS FLOW METER CALIBRATION WORKSHEET

W/O No: 35835 SERIAL NO: 35835-2 DATE: 2009-07-31
CUSTOMER: _____ TEST PERSONNEL: MAHAR Sanyal

MASS FLOW METER SIDE 1 SERIAL NUMBER: 13007218

MASS FLOW METER SIDE 2 SERIAL NUMBER: 13007133

SIDE 1

Test	Pressures		Quantities		Registration Error		
	Initial	Final	Display [1]	Scale [2]	Sign (+/-)	Absolute [3]=[1]-[2]	Relative [3]÷[2]×100
	(psig)	(psig)	(kg)	(kg)		(kg)	(%)
Fast	0	1150	2.73	2.76	-	.03	1.09
Slow	1150	2850	3.64	3.64	/	/	/
Full (ambient)	0	2650	5.92	5.94	-	.02	0.34

SIDE 2

Test	Pressures		Quantities		Registration Error		
	Initial	Final	Display [1]	Scale [2]	Sign (+/-)	Absolute [3]=[1]-[2]	Relative [3]÷[2]×100
	(psig)	(psig)	(kg)	(kg)		(kg)	(%)
Fast	0	1200	2.88	2.88	/	/	/
Slow	1200	2700	3.29	3.30	-	.01	0.3
Full (ambient)	0	2650	5.95	5.96	-	.01	0.17



DISPENSER MASS FLOW METER CALIBRATION WORKSHEET

	Side 1	Side 2
Short Fill (FAST), Ambient temperature, 0-1000PSI: stop fill at 1000PSI and disconnect hose from fill vessel, record weights and temperature in table.	☐	☐
Short Fill (SLOW), Ambient temperature, 1000-3000PSI: stop fill at 3000PSI and disconnect hose from fill vessel, record weights and temperature in table.	☐	☐
Full Fill, Ambient temperature: Allow dispenser to fill to its maximum temperature compensation fill pressure. Disconnect hose from fill vessel, record weights and temperature in table. Verify the pressure transmitter and pressure switch shut down at assigned pressure.	☐	☐
If Filling steps have a relative error below 2%. Skip CAL factor steps. If relative error is above 2% do CAL Factor steps and repeat filling steps until relative error is less than 2%.	☐	☐
a. Add values recorded for the dispenser display to obtain total dispensed. b. Add totals from scale to obtain total scale. c. Divide total from scale to obtain total scale, and multiply the rest by the cal factor d. This will be the new cal factor $CAL \ FACTOR = \left(\frac{TOTAL \ DISPENSED}{TOTAL \ SALE} \right)$ Connect to the flow meter using pro link and locate the cal factor entry box, enter the new cal factor value in this box.	☐	☐

ATTACH MANUFACTURER'S TEST SHEETS



DISPENSER PROGRAM WORKSHEET (PUMP CONTROL)

Work Order: 35835 Dispenser Part No.: 230015

Customer: _____

Dispenser Serial
Number: 35835-2

Board Serial Number: 4090

Date: 2009-07-31

BK Power Supply SN: 547

Software Version: V1.14.0.0

MM Power Supply SN: 849

Test Technician: RAVAL SINGH

Voltage (circle): 110 220

Pressure Transmitters Calibrated: Side 1: ✓ Side 2: ✓

DISPENSER PROGRAM WORKSHEET (PUMP CONTROL)

Firmware version GC21XP			* Site dependent		** Operation / Calibration
ENGLISH	IMW DEFAULT VALUE	Initial (if X)	SIDE 1	SIDE 2	DESCRIPTION
PRICE	1		*	*	Fuel price setting
dEnSit	1		*	*	Fuel density setting
ConnPC	NO				Enabling sale authorization through PC communication
Id_n	1				Identification number of dispenser within a net
L_Flou	45				Cut flow for determining sale end
End_t	3				Sale-end time after reaching cut flow
FL_LEA	20				Maximum enabled flow leakage
Sec_P	1 Bank = Serial 2 & 3 = Parallel		✓	✓	Valve sequence layout
Ch_F_L	1 Bank = 90 2 & 3 Bank = 60		✓	✓	Flow for changing from low to mid bank
Ch_F_h	70				Flow for changing from mid to high bank
Ch_Pre	55				Flow below which MSW and PT work
PrE_t	2				MSW delay cut time
ini_T	40				Maximum period of time for starting a sale
iniUol	0.12				Minimum initial volume for displaying a sale
Lo_Pre	50		✓*	✓*	Minimum enabled preset in a sale
Pr_UOL	0.16		**	**	In advance cutting volume for a preset sale
Err_Pr	1		**	**	Maximum error enabled in a preset sale
P_t	YES				Enabling pressure compensation by temperature
PrConf	n_open				Pressure switch type configuration
Pr_oFF	200				Desired pressure when finishing a sale
Pr_On	193				Enabled hysteresis in the end of sale pressure
CAL_0	GOOD	X	✓**	✓**	Pressure transducer calibration to 0 bar
CAL200	GOOD	X	✓**	✓**	Pressure transducer calibration to 200 bar
PrConn	NO		*	*	Enabling temperature compensation
tEnPER	Ambient (°F)		**	**	Ambient temperature
oFF t	-2°F				Temperature correction
SenSor*	CNG-50				Selection of mass meter used
Cero_u	1-2	X	✓**	✓**	Mass meter zeroing
FIL_dir	1P-2P		**	**	Meter flow direction
id_Sen*	1-2	X	✓**	✓**	Identification number for the mass meter
LPI	Yes				Enabling of the predictive sale function
PT_PS	YES		✓	✓	Allows checking of pressure switch and pressure transmitter
G_PulS**	N/A				Number of grams per pulse
H_PRes	25				Error range between pressure switch and pressure transmitter
CAL_FA	1		**	**	Correction on the mass meter calibration
EFLOuu	300 / 450				Excessive flow cutoff (300 for car, 450 for bus)
FrAu_t	3				Minimum time between sales
Start	N5		*	*	Computer start options
LAnGua	ENG				Device language
DPaint	4				Decimal point position
Round	N0		*	*	Round up non-visible digit from dispatch
LCd	0				Number of displays connected to the computer
test display		X	✓**	✓**	Display testing
test ual	7	X	✓**	✓**	Valve testing
test key		X	✓**	✓**	Keypad test
test Key		X	✓**	✓**	Pressure switch test
C_pass			**	**	Password setting
P_2			**	**	Password level 2
P_3			**	**	Password level 3
Sett in			**	**	Parameter setting backup
Update			**	**	Firmware update

Micro Motion, Inc.

Mass Flowmeter Calibration Certificate

13007218

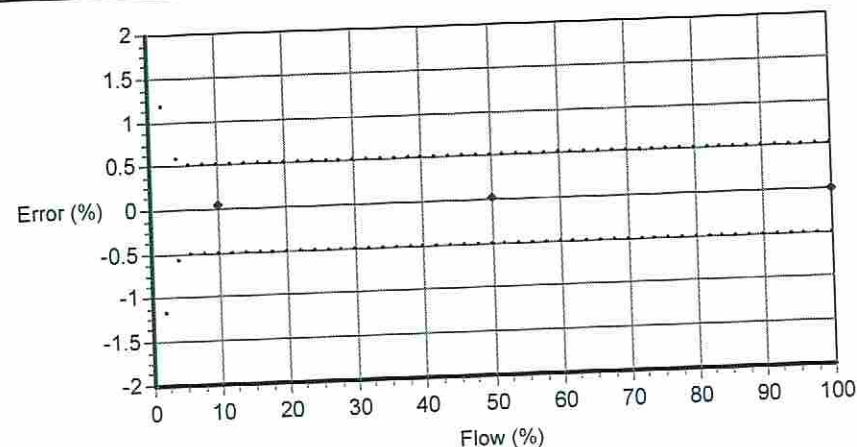
Product Code	Serial ID	Order ID	Line	Item	Customer Tag
CNG050S239NWBAEZZZ	13007218	31018975	1	18	35835-2

Side 1

Process

Detail

Process ID: 5.23231037
 Process Time: 2009.07.01 10:15:58
 Process Stand: TSGCNG@SSCN
 Stand Uncertainty: $\pm 0.03\%$
 Fluid: H2O
 100% Rate: 38.6 KG/MIN
 Pickoff: 1
 100% P/T: 38.99 PSIG/25 C



Results

Status: PASS

D1: 0
 D2: 1
 K1: 4092.145
 K2: 4256.784
 DT: 4.25
 FD: 0
 DTG: 0
 DFQ1: 0
 DFQ2: 0
 FlowCal: 141.664.50
 FFQ: 0
 FTG: 0
 DensCal: 04092042574.25
 FCF: 141.66
 FT: 4.5

Flow (%)	Flow Rate (kg/min)	Meter Total (kg)	Reference Total (kg)	Error (%)	Specification ($\pm\%$)
100.0	38.6	29.38078	29.37917	0.005	0.500
10.0	3.86	2.893417	2.892051	0.047	0.500
50.0	19.3	14.82177	14.81759	0.028	0.500
100.0	38.6	28.81886	28.8169	0.007	0.500

LAN SHEN
Technician

Micro Motion, Inc.

Mass Flowmeter Calibration Certificate

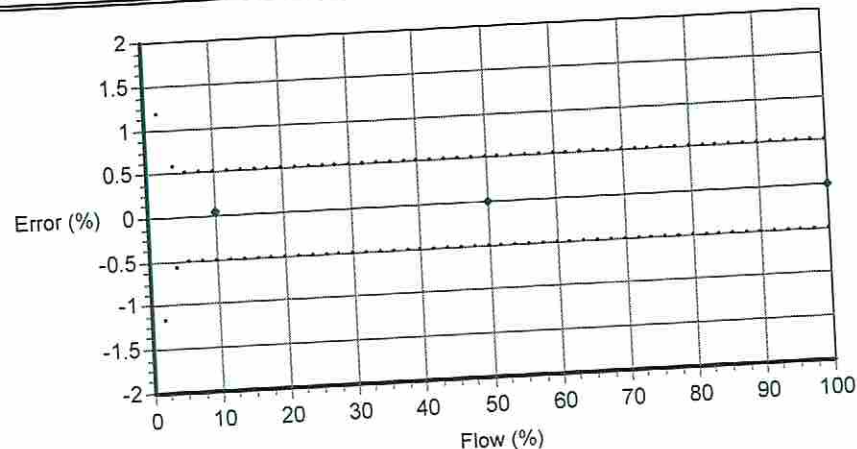
13007133

Product Code CNG050S239NWBAEZZZ Serial ID 13007133 Order ID 31018975 Line 1 Item 19 Customer Tag 35835-2 Side 2

Process

Detail

Process ID: 5.23230012
 Process Time: 2009.06.24 12:03:19
 Process Stand: TSGCNG@SSCN
 Stand Uncertainty: +/- 0.03%
 Fluid: H2O
 100% Rate: 38.6 KG/MIN
 Pickoff: 1
 100% P/T: 38.89 PSIG/25.6 C



Results

Status: PASS

D1: 0
 D2: 1
 K1: 4069.458
 K2: 4232.665
 DT: 4.25
 FD: 0
 DTG: 0
 DFQ1: 0
 DFQ2: 0
 FlowCal: 141.604.50
 FFQ: 0
 FTG: 0
 DensCal: 04069042334.25
 FCF: 141.6
 FT: 4.5

Flow (%)	Flow Rate (kg/min)	Meter Total (kg)	Reference Total (kg)	Error (%)	Specification (±%)
100.0	38.6	29.26411	29.26359	0.002	0.500
10.0	3.86	2.927173	2.925634	0.053	0.500
50.0	19.3	14.76402	14.76398	0.000	0.500
100.0	38.6	28.79328	28.79181	0.005	0.500

LAN SHEN

Technician

Traceable to International Standards. Meter total based on pulse output. Details at www.micromotion.com.

2009.07.13 14:06:06

1/1