LVC MODBUS DESCRIPTION

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Reynolds Equipment Co., Inc.

This document contains a brief description of the LVC 323 MODBUS implementation. Also included is a mock report showing fields that are available when using the native protocol.

MODBUS.

ASCII character format:
- 7 data bits.
- Even parity.
- 1 Stop bit.

Supported baud rates:
- 19200 bps.
- 9600 bps.
- 2400 bps.
- 1200 bps.
- 300 bps.

MODBUS device address may be 1 to 247. Broadcast address zero is not supported. Default address is 1.

Supported data types:

Reg #	Description
0701	Hourly History Record.

30nn 16 bit unsigned integer.

	MSB		LSB	
Bytes	NNNN	NNNN	NNNN	NNNN
Order	B0,	B1,	B2,	B3

50nn, 32 bit unsigned long integer, format:

	MSB							LSB
Bytes	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN
Order	B0,	B1,	B2,	B3,	B4,	B5,	B6,	B7

70nn, IEEE Float, format:

Sign bit, Exponent, Mantissa

Bytes	SEEE	EEEE	EMMM	MMMM	MMMM	MMMM	MMMM	MMMM
Order	B6,	B7,	B4,	B5,	B2,	B3,	B0,	B1

Supported Function Codes:

Function Code 3, Read Numeric, Read 1 or more registers in register number order.
Function Code 6, Set Single Numeric.

Supported Error Responses:

Code 01, Illegal Function Code.
Code 02, Illegal Data address.
Code 03, Illegal Data value.

Supported Registers: (R/O indicates read only registers)

0701, R/O, Hourly History Record.

Response record contains:
Float, Date (MMDDYY.0).
Float, Time (hhmm.ss).
Float, Uncorrected volume for hour (ACF).
Float, Corrected volume for hour (SCF).
Float, Average gas pressure for hour.
Float, Average gas temperature for hour.

3001, status Short Int, R/O, Instrument status, 16 Boolean bits.

B0: High pressure alarm active.
B1: Low pressure alarm active.
B2: High temp alarm active.
B3: Low temp alarm active.
B4: Low battery alarm active.
B5: Door ajar.
B6: Calibration in progress.
B7: Unused.
B8: Unused.
B9: Unused.
B10: Unused.
B11: Unused.
B12: Unused.
B13: Unused.
B14: Unused.
B15: Unused.

3002, ctrl Short Int, Control, 16 Boolean bits.

B0: Enable Alarm 1, High pressure.
B1: Enable Alarm 2, Low pressure.
B2: Enable Alarm 3, High temp.
B3: Enable Alarm 4, Low temp.
B4: Enable Alarm 5, Low battery.
B5: Enable Calibration.
B6: Enable fast index sampling.
B7: Decode clock wise index rotation.
B8: Fixed/Auto Pressure.
B9: Fixed/Auto Temperature.
B10: Fixed/Auto Fpv.
B11: Gauge/Absolute Xducer.
B12: Pulse/Minute wakeups.
B13: Continuous wake up.
B14: Pulse(s) out Enable.
B15: Pressure decimals, 0 = 2, 1 = 1.

3003, auxctrl Short Int, Auxiliary Control, 16 Boolean bits.

B0: Request one wake up.
B1: Update local communications configuration.
B2: Enable leading zeros, corrected volume LCD display.
B3: Enable leading zeros, uncorrected volume LCD display.
B4: Unused, set to zero.
B5: Unused, set to one.
B6: Unused.
B7: Unused.
B8: Unused.
B9: Unused.
B10: Unused.
B11: Unused.
B12: Reset Profiler.
B13: Reset Uncorrected volume pulse out.
B14: Reset Corrected volume pulse out.
B15: Reset all Alarms.

5001, serial	Long Int,	R/O, Serial number.
5002, ucv_pls	Long Int,	Uncorrected volume pulse output count.
5003, cv_pls	Long Int,	Corrected volume pulse output count.
5004, ucvol	Long Int,	Uncorrected Volume accumulator.
5005, cvol	Long Int,	Corrected Volume accumulator.

7001, Virtual RTC Time as HHMMSS.0 Float.
7002, Virtual RTC Time as MMDDYY.0 Float.
7003, gaspres Float, R/O, Pressure used for calculations.
7004, gastemp Float, R/O, Gas temperature used for calculations, Deg F.
7005, fpv2Fact Float, R/O, Fpv Squared factor.
7006, tempFact Float, R/O, Temperature Factor.
7007, presFact Float, R/O, Pressure Factor.
7008, corfact Float, R/O, Correction factor.
7009, xpower Float, R/O, External power.
7010, caset Float, R/O, Case temperature, Deg F.
7011, icfac Float, Input scale factor.
7012, ucvsf Float, Uncorrected vol display scale factor.
7013, cvsf Float, Corrected vol display scale factor.
7014, ucpoutf Float, Uncorrected volume pulse output scale factor.
7015, cvpoutf Float, Corrected volume pulse output scale factor.
7016, fxpres Float, Fixed pressure.
7017, fxgtemp Float, Fixed gas temperature.
7018, fxfpv Float, Fixed Fpv.
7019, pctc02 Float, Percent Carbon Dioxide.
7020, pctn Float, Percent Nitrogen.
7021, spcgvy Float, Specific Gravity.
7022, bpres Float, Base Pressure.
7023, zpres Float, Zone Pressure.
7024, btemp Float, Base Temperature in Deg F.
7025, Float, R/O, Last Record Number (1.0 - 840.0) of Hourly History.

Instrument information available when using native protocol:

ABC Natural Gas Co Reynolds Equipment Demo
LVC 0.16 05-Dec-1996 410 South Kirby Street
IOR Database Garland, TX 75042

Meter Number 987654321 18:37:45 Mon 15-Jul-1996
Serial Number 08430123

Uncorrected Vol 71871 X 100 ACF Meter Drive x 100
Corrected Vol 326291 X 100 SCF Remainder 258.1559
Pressure 48.18 PSIA (Auto)
Gas Temperature 52.6 Deg F (Auto) Case Temperature 77.3 Deg F

Base Pressure 14.73 PSIA Pressure Factor 4.2635
Zone Pressure 14.62 PSIA Temperature Factor 1.0144
Base Temperature 60.0 Deg F Fpv Squared 1.0074 (Auto)
Specific Gravity 0.6000
Carbon Dioxide 1.5 mol %
Nitrogen 1.5 mol % Correction Factor 4.3572

Battery Voltage 5.8 Meter Rotation Counter Clockwise
Wake up Once per minute Meter Speed Slow (15 RPM Maximum)

Alarm Name	Mode	Limit	State
High Pressure	Ignore	80.0	Reset
Low Pressure	Ignore	10.0	Reset
High Temperature	Manual	120.0	16:09:45 Tue 15-Oct-1996
Low Temperature	Ignore	0.0	Reset
Low Battery Voltage	Ignore	4.0	Reset

Pulser Output Enabled	Pulses Sent
A Uncorrected Volume x1000	119627
B Corrected Volume x1000	521238

CALIBRATION STATUS	Date Instrument Last Calibrated (Two Point)	Date Instrument Last Adjusted (Single Point)
Pressure	09:00:12 Mon 18-Nov-1996	NEVER
Gas Temperature	09:07:24 Mon 18-Nov-1996	NEVER
Case Temperature	13:21:51 Mon 18-Nov-1996	18:30:53 Tue 19-Nov-1996

	Calibration Scale	Calibration Offset
Pressure	0.000000E+00	0.000000E+00
Gas Temperature	0.000000E+00	0.000000E+00
Case Temperature	0.000000E+00	0.000000E+00

Transducer Number 12345
Transducer Description Demo
Transducer Full Scale 100 PSI

Zero (Null) Polynomial Terms		Gain (Span) Polynomial Terms	
(0)	3.864454E-05	(0)	9.917237E-02
(1)	-8.467647E-07	(1)	2.784841E-05
(2)	2.191981E-08	(2)	9.902526E-07
(3)	9.796419E-01	(3)	-1.706828E-08
(4)	3.053725E-01	(4)	-1.107429E-10
(5)	-3.151271E-13	(5)	1.592565E-12

Communication Settings

Sandia Protocol Unit ID 16
MODBUS Protocol Unit ID 240
Remote Modem Baud Rate 2400
Pre RTS Delay 3000 ms
Post RTS Delay 150 ms