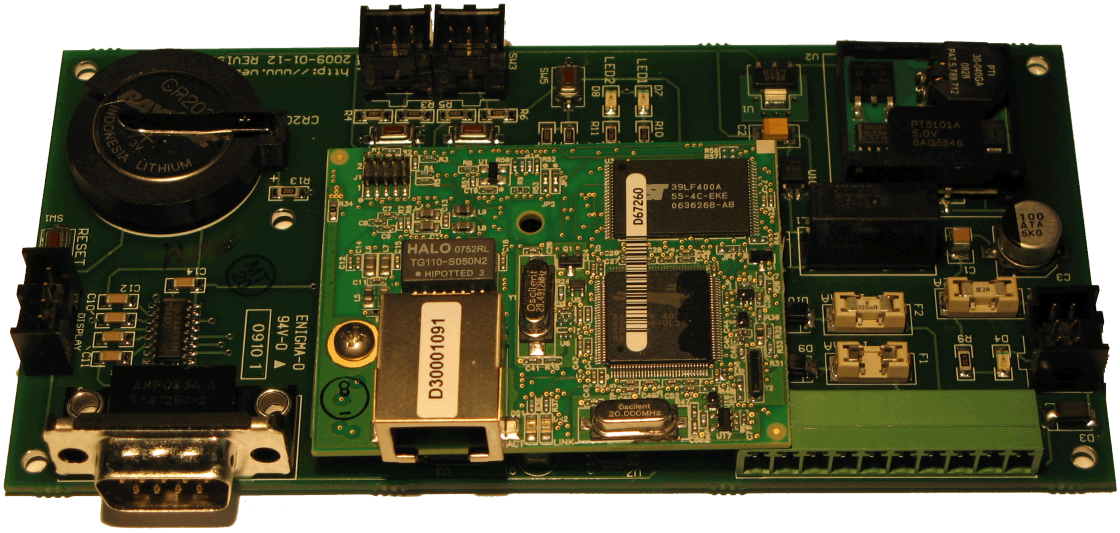
Web Transmitter



Instruction Manual

Revision 1.7

May 16th, 2021

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1. Introduction

The WebTransmitter has been developed to copy numerical data from the Internet seamlessly into a control system as a 4-20mA signal. Once in the control system, such as a Programmable Logic Controller (PLC), Distributed Control System (DCS), or Basic Process Control System (BPCS), the data may be utilized and displayed on the Human Machine Interface (HMI) to provide "near real-time" information to operations.

The process of coping data from the Internet is often referred to as scraping. Typically, data published on the Internet is copyrighted, and, therefore, it is the users responsibility to contact the owner of the data being copied to obtain permission.

2. Contact Information

Additional information as well as firmware updates can be obtained from the following:

Internet: http:/www.webtransmitter.com

Mail: R Engineering Inc.
Attn: Rudy Boonstra
95 Cougar Ridge Heights SW
Calgary, Alberta T3H 4X5

Email: rboonstra@reng.ca

3. System Requirements

To properly implement the WebTransmitter, the following minimum requirements are required:

Power: 15-30Vdc

Network: The RJ45 will need to be connected to a network that provides the device with an IP address via DHCP and has direct access to the Internet. Firewalls and Proxy Servers that either modify the header or require authentication may prevent the WebTransmitter from functioning properly.

Control System: A minimum of one 4-20mA analog input is required in the control system. This input must either be active such that it internally supplies the loop with approximate 24Vdc or passive complete with an external 24Vdc power supply. The maximum loop voltage is 36Vdc and the minimum loop voltage is 7.5Vdc, but 24Vdc is recommended and should be specified.

Additionally, the following optional features may be utilized:

Control System: A second 4-20mA analog input, the same as above, may be used.

A set of dry contacts, normally open, are included on the WebTransmittter. The default function for these dry contacts, which are rated for 5A at 30Vdc, are to provide a discrete input into the control system so that it can monitor the health of the WebTransmitter. Each time the WebTransmitter queries the Internet, the contacts close. Note that optional functionality can be made available for these dry contacts.

The control system can utilize a relay to reset the board. In the unlikely event that the WebTtransmitter is not responding properly, as detected by the dry contacts above, the WebTransmitter can be remotely reset.

Display: An optional LCD Display is available to provide status information of the WebTransmitter. Note that the display may be plugged in or removed while the WebTransmitter is power up and functioning.

External Switches: External switches are available that mimic the functionality of on board switches SW3 and SW4.

Computer: A computer with a serial port is able to monitor and interface to the WebTransmitter via the DB9 connector and a serial terminal session. HyperTerminal or Putty may be used with the serial port set to 19,200 baud, 8 data bits, no parity, and one stop bit (19.2k-8-N-1). Note that this is the same bit rate as the display port.

4. Consumable Parts

The WebTransmitter has the following consumable parts. They can either be sourced directly by the user or through R Engineering Inc.

Battery:	CR2032 3Vdc Lithium Ion Coin Cell Battery When this battery drops below ~2.9Vdc, and the board is without power via the terminal strip, the internal memory settings may be reset to default. Versions 0.x may need to be reprogrammed as via the internal WEB server. Versions 1.x and newer have a configuration file that is stored on the WEB as an .XML file; system memory is only used when this file is not available.
Fuses:	Main Board Power – LittelFuse 154 Series 2A 4-20mA Inputs (2x) – LittelFuse 154 Series 100mA

5. External Connections

The external connections are made via the ten (10) terminal Phoenix Contact connection header J2, as shown in Figure 1 below:

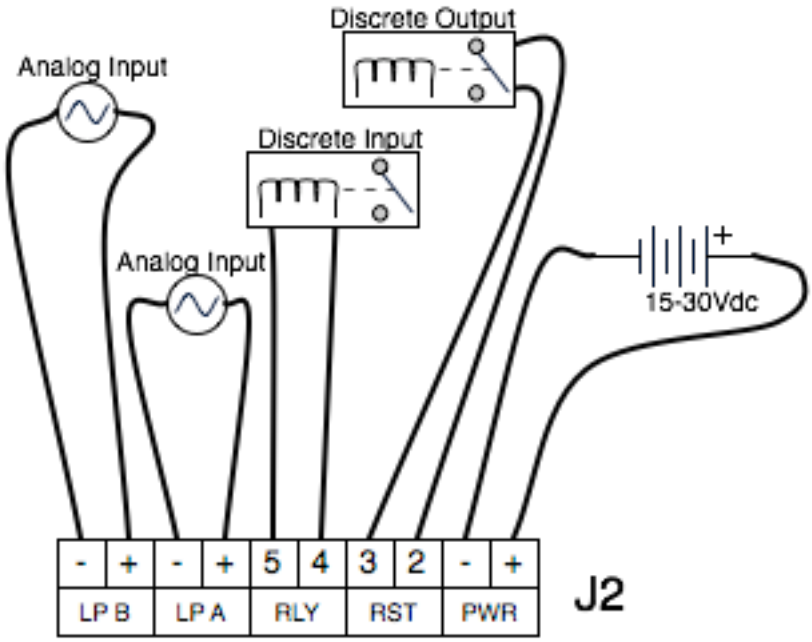

Figure 1: Wiring Diagram

For Loop B, if you have the optional external switch installed in SW4, the light will go on when there is loop power available.

For Loop A, if you have the optional external switch installed in SW3, the light will go on when there is loop power available.

For both Loop A and Loop B, if the control system does not see a signal, the external switch LED, if installed, may be used to indicate that there is

loop power. If the switch is not installed, and it is believed that all the connections have been made properly, one can verify that the corresponding 100mA fuse (Loop A = F2 and Loop B = F1) has not blown open.

If SW2 is on with 15-30Vdc power applied to terminals 0 and 1 (+ and – for PWR), the green LED labeled D4 should illuminate. If it does not light up, then the 2A fuse F3 may have blown open or the polarity may be reversed.

6. Network Connection

When you have a proper network connection and the WebTransmitter is properly powered up, you should see activity on the small green LEDs on located adjacent to the RJ45 connector. As soon as the WebTransmitter is powered up, it will try to obtain an IP address from the network DHCP server. After an IP address has been assigned, the WebTransmitter will download the configuration file. If the system clock is not properly set, the system clock is adjusted based on the time specified in the returned http header with the config file. At this point, the WebTransmitter is ready and will start the perpetual loop of obtaining WEB data every X minutes, where X is defined in the system configuration (typically every five minutes or 300,000 msec).

7. User Buttons

There are five user buttons on the WebTransmitter, as follows:

Label	Function	External Switch	Notes
SW1	On board system reset	No	This feature is also available by connecting J2 terminals 2 and 3 together.
SW2	Turn power on	Optional	Shorting block required if there is no optional switch
SW3	Display system info	Optional	Require optional display
SW4	Initiate WEB query	Optional	
SW5	Register MAC address and IP address	No	Register device data in the webtransmitter.com database
SW5 (Twice)	Reboot device	No	

In cases where the WebTransmitter is mounted with optional switches and the on-board switches are not accessible, the functions of SW5 can be obtained by pressing SW3 and SW4 simultaneously.

If you press the SW5 switch twice before a poll is initiated, the unit will do a soft reset. This is useful to force the unit to re-load the configuration .XML file should it be changed. The display is instrumental in allowing the user to watch the configuration parameters, and shows both the system values as well as the new values loaded from the configuration file.

Switch SW5 is not available with the RCM4210 single board computer; one can identify whether the device being used is the older RCM4010 or the newer RCM4210 based on the firmware – a "2" suffix is used for the RCM4210.

8. System Configuration Mode

The configuration .xml file can only be altered by R Engineering Inc. as they are stored on the http://www.webtransmitter.com web site. The following parameters are available for adjusting:

Loop Time - duration between polls; default value of five minutes or 300,000 msec; minimum is 1 minutes or 60,000 msec.

Loop Type - determines what data is to be obtained from the Internet, as listed below

- smp – AESO Projected Hour Ending System Marginal Electricity Price (C$/MWhr)
- SMP - AESO Most Recent System Marginal Electricity Price (C$/MWhr)
- E+3 - AESO Forecasted Electricity Price (C$/MWhr) Three (3) Hours Ahead Forecast
- AIL – AESO Alberta Internal Load (MW) - csv
- ail – AESO Alberta Internal Load (MW) - http

Loop Linear or Log Output - the output can be either linear (default) or logarithmic.

- Linear
- Log(PV)
- Log(10xPV) – eliminates pricing from $0 to $10 taking up 50% of scale

Loop Minimum Value - minimum value expected to be obtained from the Internet; default value is 0; this is referred to as "zero"

Loop Maximum Value - maximum value expected to be obtained from the Internet; default value is 1000; this value minus the minimum value is referred to as the "span"

Loop Error Maximum	-	number of times in a row a bad value may be read from the WEB before the 4-20mA output is driven to the “Loop A Error Value” state.
Loop Error Maximum Value	-	the value the 4-20mA output is set to when the Loop Error Maximum has been triggered.

9. Display

Upon startup, the unit will display a message similar to the following on the on the display, first obtaining an IP address, then downloading the most current configuration (if possible), and lastly initiating a WEB query to poll the information as per the downloaded configuration:

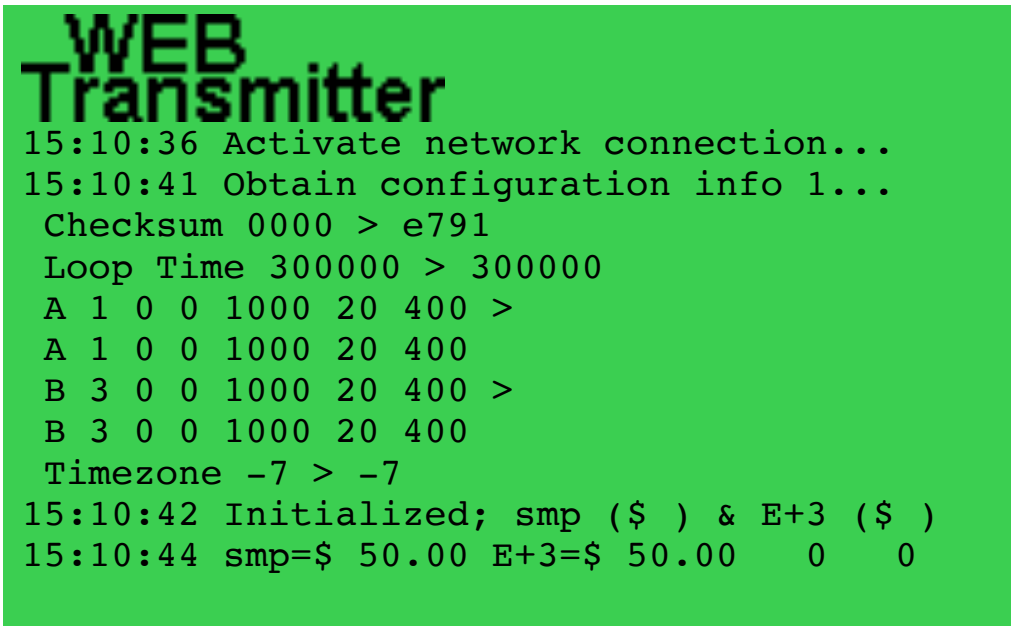

Figure 2: Display – Start Up

When the SW3 button is pressed, the system information is displayed:

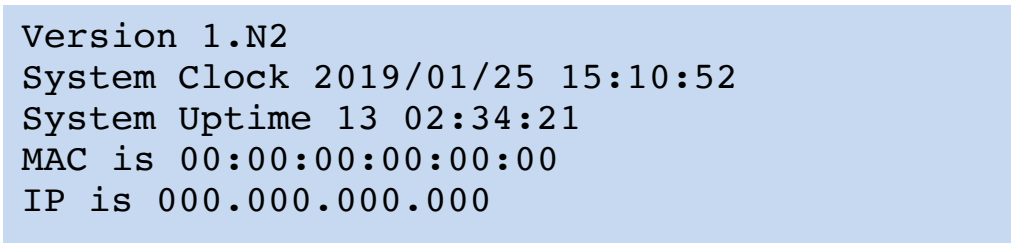

Figure 3: Display – System Information

When the SW5 button is pressed once, the IP address is registered on the WebTransmitter.com database. This option is provided to facilitate additional troubleshooting diagnostic information and confirm that the WebTransmitter is able to communicate to the Internet. This information is updated in the http://www.webtransmitter.com database and is displayed.

```
R Engineering Inc – S/N 7 at F/W 1.N2
Installed  2013-05-13 14:52:36
DB Updated 2019-01-25 15:11:44
```

Figure 4: Display – Network Information

10. Serial Interface

The serial interface is useful to confirm the device configuration, network connectivity, and verify that the control system is calibrated correctly. The following features are available (note that if a key is pressed that is not a valid entry, a legend is displayed showing available functions):

- D – Update the database
- I – Display device information
- P – Force poll
- R – Restart the device
- V – Force poll (verbose)
- C – Display Configuration Info
- 0 – Set both outputs to 0mA
- 1 – Set both outputs to 4mA
- 2 – Set both outputs to 8mA
- 3 – Set both outputs to 12mA
- 4 – Set both outputs to 16mA
- 5 – Set both outputs to 20mA
- 6 – Set both outputs to 20+mA
- 7 – Set only output “A” to 12mA; output “B” remains unchanged
- 8 – Set only output “B” to 12mA; output “A” remains unchanged

Functions 7 and 8 are used to confirm which output is which to the control system. Ensure that you initiate a poll or reset the device after forcing the outputs to bring the device into it’s normal state.

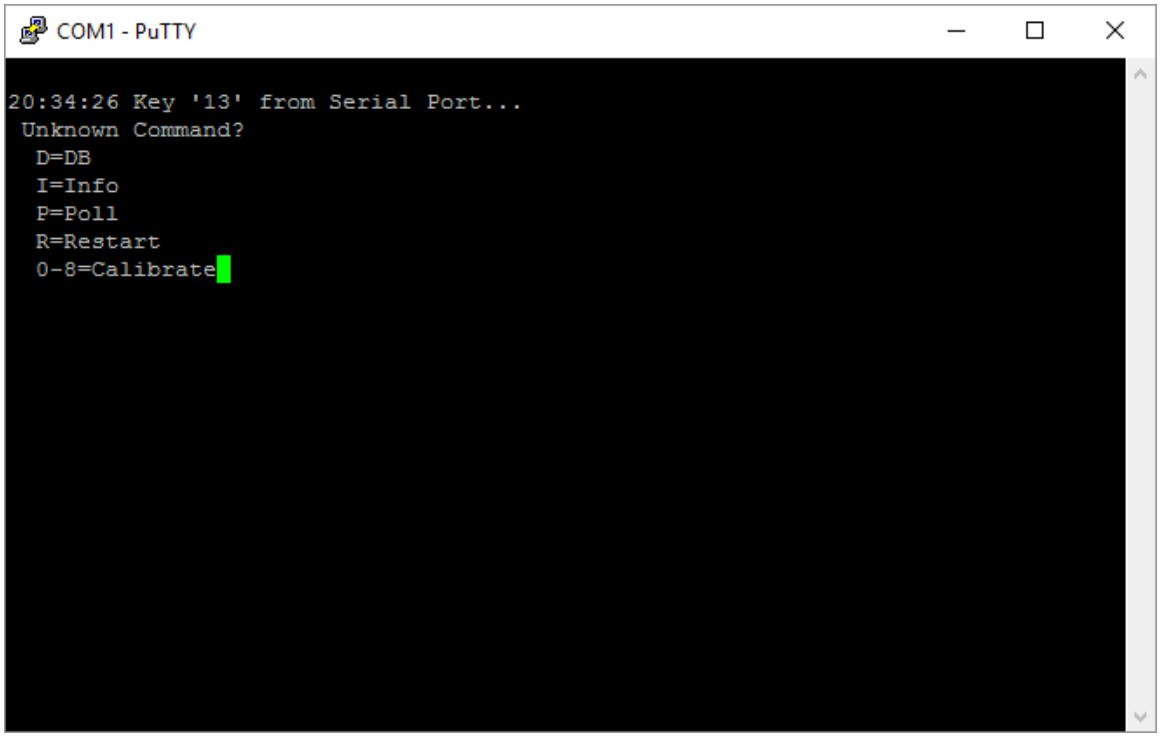

Figure 5: Serial Interface – Legend of Available Functions

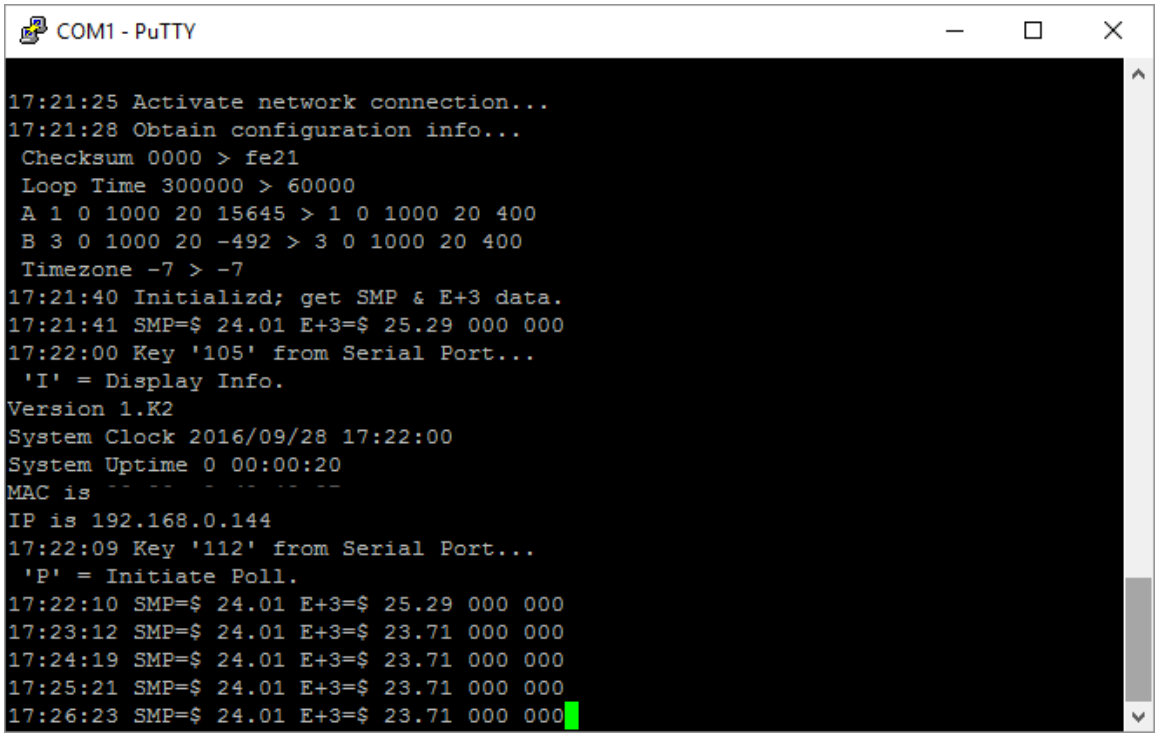

Figure 6: Serial Interface – Initial Boot, Display Info, and Poll

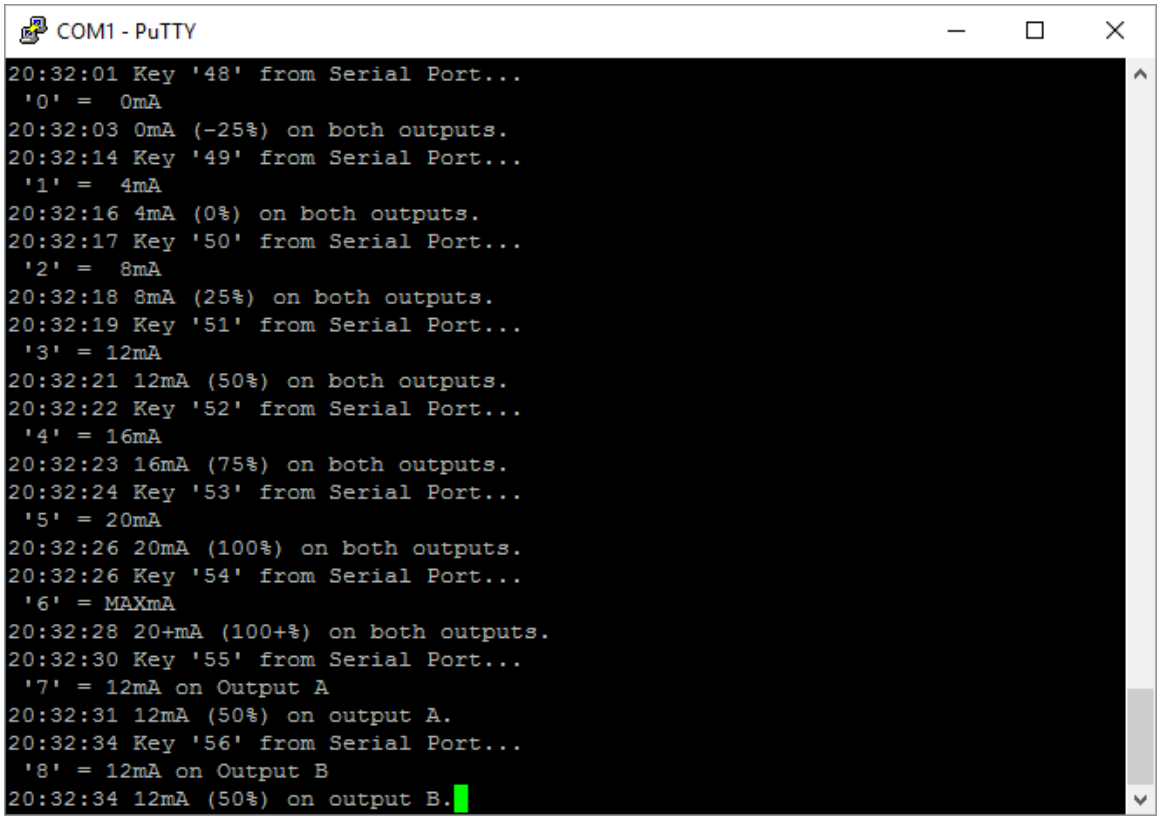

Figure 7: Serial Interface – Forced Output Response

11. Document Version Information

Version	Comments	Firmware	Author	Date
1.7	Updated for current firmware. Added ail and ‘c’ to display config info via terminal	1.R	RJB	2021.05.16
1.6	Updated for current firmware. Added AIL as alternate data type to poll.	1.N	RJB	2019.01.26
1.5	Updated for current firmware (log functions via terminal)	1.K	RJB	2016.09.28
1.4	Updated for current version of firmware	1.E	RJB	2013.05.13
1.3	Rewritten for 1.x firmware	1.D	RJB	2011.07.29
1.2	Updated for calibration mode and updating IP data to the database	0.1.P	RJB	2009.05.21
1.1	Updated for 4-20mA diagnostic mode	0.1.M	RJB	2009.04.26
1.0	Original Version	0.1.K	RJB	2009.03.14