TWO WIRE PROTOCOL FOR PUMP COMMUNICATION

GENERAL DESCRIPTION

The scope of this document is to describe commands transmitted to pump and the data between the host and the pump.

This multi-drop protocol supports up to 12 pumps.

FUNCTIONS:

1. Authorization of the pump, pump stop command.
2. Money/Volume preset with or without grade or price level.
3. Price level change to pumps (from level 1 to 2, from level 2 to level 1)
4. Price change to pumps.
5. Pump status polling and responses.
6. Pump transaction data to the host.
7. Pump totals to the host.
8. Real time money transaction to the host.

EXPLANATION:

Command code : is an 8 bit word sent by yhe host

Data control word : is an 8 bit word, as part of data block. The most signifaicant nibble of the data control word is always F.

LRC Check character : is a 4 bit word, as part of the data block, used to detect longitudinal bit errors.

Data length : is an 8 bit word, is part of data block indicating the how many words to be transmitted.

Pump ID : is 4 bit address set at the pump at installation to indicate the address of the pump.

Each word consists of 11 bits.

Start bit.

8 data bits.

Even parity.

Stop bit.

The baud rate is 5787 bits/second (5787 8E1)

PROTOCOL

There are five types of data, these are:

Status

A single word command

Send data to pump

Send data to host

Special function command.

COMMAND CODES:

0 STATUS REQUEST

1 AUTHORIZATION

2 DATA NEXT

3 PUMP STOP

4 TRANSACTION DATA REQUEST

5 PUMP TOTALS DATA REQUEST

6 REAL TIME MONEY DATA REQUEST

FC ALL STOP

PUMP STATUS WORDS:

1. ERROR

6 OFF (IDLE)

7 CALL

8 AUTHORIZED/NOT DELIVERING

9 BUSY (DELIVERING FUEL)

A TRANSACTION COMPLETE

B TRANSACTION COMPLETE

C PUMP STOP

D SEND DATA (This status is returned only to the “data next command”)

STATUS

The pump responds to status command if ID matches.

Host (Console) : Status command with ID

t1

Pump : Status with ID

t2

Next Transmission to any pump.

t1 : 0-68 msec

t2 : at least 5 msec

Number of retries is atleast 5 times in case of no response.

The console (host) must frequently check the status of the pump.

STATUS POLLING:

Pump address= 1

HOST : 01

PUMP : 61 (OFF)

71 (CALL)

91 (BUSY/DELIVERING)

B1 (END OF TRANSACTION)

01 (ERROR)

LRC CHECK CHARACTER:

LRC IS A 2’S COMPLEMENT OF THE SUMMATION OF THE LEAST SIGNIFICANT NIBBLES OF ALL WORDS IN A DATA BLOCK.

DATA LENGTH:

THE LOWER NIBBLE OF DATA LENGTH IS THE MODULO 16 OF THE 2’S COMPLEMENT OF NUMBER OF WORDS IN THE DATA BLOCK EXCLUDING START OF TEXT AND DATA LENGTH CHARACTER.

AUTHORIZATION:

Pump address=1

HOST : 11

PUMP : NO RESPONSE

State after pump accepts this command: BUSY or AUTH (81 OR 91)

PUMP STOP COMMAND:

Pump address=1

HOST : 31

PUMP : NO RESPONSE

Pump state after this command: OFF, CALL OR STOP.

ALL STOP COMMAND:

Pump address=1

Valid pump state: BUSY or AUTH

HOST : 31

PUMP : NO RESPONSE

Pump state after this command: OFF, CALL OR STOP.

REQUEST FOR TRANSACTION DATA:

Pump address=1

Valid pump state : OFF , CALL, FEOT, PEOT and STOP

HOST : 41

PUMP : FF START OF TEXT

F1

F8 PUMP IDENTIFIER NEXT

EA PUMP IDENTIFIER DATA

E0 E0 PUMP 1; E1 PUMP 2; E2 PUMP3….

E0 E0 E0

F6 GRADE DATA NEXT

E0 X=0 GRADE 1

X=F GRADE 16

F4 TRANSACTION TYPE

E4 X=4 LEVEL 1

X=5 LEVEL 2

F7 PPU DATA NEXT

EX EX EX EX PPU XXXX FORMAT (BCD)

LSD TRANSMITTED FIRST

X=0-9

F9 TRANSACTION VOLUME DATA NEXT

EX EX EX EX EX EX MONEY XXX.XXX FORMAT (BCD)

LCD TRANSMITTED FIRST

X=0-9

FA TRANSACTION MONEY DATA NEXT

EX EX EX EX EX EX XXXXXX FORMAT (BCD)

LCD TRANSMITTED FIRST

X=0-9

FB LRC CHECK CHARACTER NEXT

EX LRC CHECK CHARACTER

F0 END OF TEXT

TOTAL BYTE NUMBER = 33 BYTES

REQUEST FOR PUMP TOTALS:

Pump address=1

Valid pump state : OFF , CALL, FEOT, PEOT and STOP

HOST : 51

FF START OF TEXT

F6 GRADE DATA NEXT

EX X=0 FOR GRADE 1

F9 PUMP VOLUME TOTAL DATA NEXT

EX EX EX EX EX EX EX EX VOLUME TOTAL

XXXXXXXX (BCD) LEAST SIGNIFICANT DIGIT TRANSMITTED FIRST.

X=0-9

FA MONEY TOTAL NEXT

EX EX EX EX EX EX EX EX MONEY TOTAL

XXXXXXXX (BCD) LEAST SIGNIFICANT DIGIT TRANSMITTED FIRST.

X=0-9

F4 PEVEL 1 PPU NEXT

EX EX EX EX LEVEL 1 PPU DATA

XXXX (BCD) LEAST SIGNIFICANT DIGIT TRANSMITTED FIRST.

X=0-9

F5 PEVEL 2 PPU NEXT

EX EX EX EX LEVEL 2 PPU DATA

XXXX (BCD) LEAST SIGNIFICANT DIGIT TRANSMITTED FIRST.

X=0-9

FB LRC CHECK CHARACTER NEXT

EX LRC CHECK CHARACTER

F0 END OF TEXT

TOTAL BYTE NUMBER = 34 BYTES FOR A PUMP SELLING 1 GRADE.

REQUEST FOR REAL TIME MONEY COMMAND:

Pump address=1

Valid pump state : BUSY

HOST : 61

PUMP :

EX EX EX EX EX EX :X=0-9

XXXXXX (BCD) LEAST SIGNIFICANT DIGIT TRANSMITTED FIRST.

THE PUMP DOES NOT CHANGE STATE AFTER THIS COMMAND.

EXTENDED STATUS COMMAND:

Pump address=1

HOST :

FF :START OF TEXT

E9 :EX=E9 9 BYTES DATA

FE E0 E1 E0

FB :LRC NEXT

EX :LRC CHARACTER

F0 :END OF TEXT

TOTAL OF 9 BYTES.

PUMP:

IDLE : BA B0 B3 B1 B0 B1 B0 B0 B0 B0 B0 B1 B0 B1 B1 C2 B1 8D 8A

CALL : BA B0 B3 B1 B0 B1 B0 B0 B0 B0 B0 B1 B1 B1 B1 C2 B1 8D 8A

Pump no off/call

:B0 PUMP1, B1 PUMP1,….. C1 PUMP10…

PRESET DATA:

VALID PUMP STATE: OFF, CALL

PUMP ADDRESS=1

HOST :21

PUMP :D1

HOST :

FF :START OF TEXT

EX :DATA LENGTH

X=3 GRADE AND PRICE LEVEL

X=5 PRICE LEVEL

FX :PRESET TYPE

X=1 VOLUME PRESET

X=2 MONEY PRESET

FX :PRICE LEVEL

X=4 LEVEL 1

X=5 LEVEL 2

F6 :GRADE DIGIT NEXT

EX :X=0-F FOR GRADE 1-16

F8 :PRESET AMOUNT NEXT

EX EX EX EX EX :XXXXX

X=0-9

OR

EX EX EX EX EX EX :XXXXXX

FB :LRC CHARACTER NEXT

EX :LRC CHARACTER

F0 :END OF TEXT

PRICE CHANGE DATA:

VALID PUMP STATE: OFF, CALL

PUMP ADDRESS=1

HOST :21

PUMP :D1

HOST :

FF :START OF TEXT

E5 :DATA LENGTH

FX :PRICE LEVEL

X=4 LEVEL 1, X=5 LEVEL 2

F6 :GRADE DIGIT NEXT

EX :GRADE DIGIT

E0 FOR PUMP1

E1 FOR PUMP2……

F7 PPU NEXT

EX EX EX EX :E0 E0 E0 E1 FOR 1.000 (LSD FIRST)

FB :LRC CHARACTER NEXT

EX :LRC CHARACTER

F0 :END OF TEXT

LEVEL CHANGE DATA:

VALID PUMP STATE : OFF, CALL

PUMP ADDRESS=1

HOST :21

PUMP :D1

HOST :

FF :START OF TEXT

EC :DATA LENGTH

FX :PPU LEVEL

X=4 FOR LEVEL 1, X=5 FOR LEVEL 2

FB :LRC CHARACTER NEXT

EX :LRC CHARACTER

F0 :END OF TEXT

DATA WORDS:

EX : X=0-F

DATA CONTROL WORDS

F0 :END OF TEXT

F1 :VOLUME PRESET

F2 :MONEY PRESET

F3 :FILL UP

F4 :LEVEL 1

F5 :LEVEL 2

F6 :GRADE DATA NEXT

F7 :PPU DATA NEXT

F8 :PUMP IDENTIFIER (FROM PUMP)

PRESET AMONUT NEXT (FROM HOST-CONSOLE)

F9 :VOLUME TOTAL NEXT

FA :MONEY TOTAL NEXT

FB :LRC NEXT

FD :UNUSED

FE :SPECIAL FUNCTION MODE NEXT

FF : START OF TEXT