Fluke 289/287 Remote Interface Specification

Technical Note

Fluke is providing this information to those few customers who would like this information. **We give this information with the understanding that Fluke will not provide any additional support on this information**. This means that our Product Support Service will not be able to answer any questions concerning this document.

Introduction

This document describes some of the serial interface capabilities of Fluke model 289 and 287 Digital Multimeters.

Communication Protocol (model 289 and 287)

The Fluke 289 and 287 have the same infrared (IR) serial interface as the model 189 and 187. While the IR hardware is somewhat different, the serial communications will operate with the same RS-232 mode at a higher baud rate:

- 115200 Baud, no parity, 8 bits, 1 stop bit

The IR adapter cable for the Fluke 289 and 287 does not need any special control of its signal lines. It can be used just like a traditional serial cable.

HyperTerminal settings for communicating with Fluke 28X

Disconnect (hang up phone icon)
File Menu -> Properties
Under Connect To Tab

Connect using: select com port that your cable is plugged into.
Configure button
 Bits per second: 115200
 Data bits: 8
 Parity: None
 Stop bits: 1

Flow control: None

Under Settings Tab

Function, arrow, and ctrl keys act as: either one
Backspace key sends: doesn't really matter
  (remote interface does not do any command line editing)
Emulation: VT100
Terminal Setup... Your choice
ASCII Setup button
  ASCII Sending
    check Send line ends with line feeds
    check Echo typed characters locally
    Line delay: 0
    Character delay: 0

  ASCII Receiving
    check Append line feeds to incoming line ends
    uncheck Force incoming data to 7 bit ASCII
    check Wrap lines that exceed terminal width (actually your choice)

Connect (left phone from cradle icon)

Command Summary

Commands consist of 2 or more letter codes that are sent from a computer or other serial device to the meter. The commands can be sent as lower or upper case.

DS	Default Setup	Settings that are reset to default are: Hz trigger edge, Pulse Width and Duty Cycle polarity, Continuity beeper enable/disable, and Continuity beep on short/open. See **remarks** in Command Syntax.
ID	Identification	Returns model, serial number, and software version information.
RI	Reset Instrument	Resets all instrument settings to factory settings, *except* calibration constants. This is same operation as Reset Meter under Setup front panel soft key.
RMP	Reset Meter Properties	Reset meter properties to their factory default state. This is the same operation as Reset Setup under Setup front panel soft key.
QM	Query Primary Measurement	Query primary measurement displayable value.
QDDA	Query Displayed Data	Query the present data that is displayed on the LCD display (not including the bargraph). The response to this query command is an ASCII response.

See the section on Command Syntax for further detail regarding the command set.

Command Acknowledge (CMD_ACK) response

The meter will acknowledge a command with a single digit, the CMD_ACK, followed by a carriage return <CR>. Here is a list of the possible responses:

CMD_ACK	Description
'0'	OK, normal operation, no error.
'1'	Syntax error
'2'	Execution error

'5'	No data available

Note difference between 189 and 289: In most cases, the 189 prefixed the command acknowledge response with the name of the originating command followed by a comma. The 289 does not do this. See Command Syntax below.

Command Parameters

Unless otherwise stated, command response parameters are ASCII digits or letters.

Command Syntax

DS	**Default Setup**	
	Purpose:	Settings that are reset to default are: Hz trigger edge, Pulse Width and Duty Cycle polarity, Continuity beeper enable/disable, and Continuity beep on short/open.
	Command Syntax:	DS<CR>
	Response Syntax:	CMD_ACK<CR>
	Remarks:	This shouldn't be confused with the Reset Instrument (RI) command. **Note:** This is **not** the same as pressing the ON/OFF button.

ID	**Identification**	
	Purpose:	Returns model, serial number, and software version information.
	Command Syntax:	ID<CR>
	Response Syntax:	CMD_ACK<CR>{identify string}<CR>
	Remarks:	{identify string} is in ASCII. Format: Model #, Software version, Serial # The first 5 letters of the identity string will be "FLUKE" in uppercase letters. Example: FLUKE 289,V1.00,95081087

RI	Reset Instrument	
	Purpose:	Resets all instrument settings to factory settings, *except* calibration constants. This is same operation as Reset Meter under Setup front panel soft key.
	Command Syntax:	RI<CR>
	Response Syntax:	CMD_ACK<CR>

RMP	Reset Meter Properties	
	Purpose:	Reset meter properties to their factory default state. This is the same operation as Reset Setup under Setup front panel soft key. information.
	Command Syntax:	RMP<CR>
	Response Syntax:	CMD_ACK<CR>

QM	Query Measurement	
	Purpose:	Query primary measurement displayable value. The value returned is the value shown in the primary display (assuming any pop up windows are not present). If the primary display is in the hold state, then the value returned is also the held value. If the primary display is showing a relative value, then the relative value is returned. The response to this query command is an ASCII response.
	Command Syntax:	QM<CR>
	Response Syntax:	CMD_ACK<CR> READING_VALUE, UNIT, STATE, ATTRIBUTE <CR>
	Response Parameters:	
	READING_VALUE	Floating point number in "base units of measure" (like volts, ohms, amps, farads, etc.)
	UNIT	NONE VDC VAC ADC AAC VAC_PLUS_DC

			AAC_PLUS_DC V (used in peak) A (used in peak) OHM SIE (for Siemens) Hz, S (for seconds) F (for Farads) CEL (for Celsius) FAR (for Fahrenheit) PCT (for Percent), dBm dBV dB CREST_FACTOR
		STATE	INVALID NORMAL BLANK DISCHARGE (discharge error in capacitance) OL (overload) OL_MINUS (negative overload) OPEN_TC (open thermocouple)
		ATTRIBUTE	NONE OPEN_CIRCUIT SHORT_CIRCUIT GLITCH_CIRCUIT GOOD_DIODE LO_OHMS NEGATIVE_EDGE POSITIVE_ELDGE HIGH_CURRENT (displayed value is flashing)
	Remarks		Overload and invalid will return value of 9. 99999999e+37
	Examples		-0.023E-3,VDC,NORMAL,NONE 0.255E-3,VAC,NORMAL,NONE 9.323E0,VDC,NORMAL,NONE +9.99999999E+37,VDC,OL,NONE 58.99E0,VAC,NORMAL,NONE 63.679E0,Hz,NORMAL,POSITIVE_EDGE 262.39E-3,VAC,NORMAL,NONE 75.0E0,FAR,NORMAL,NONE 23.9E0,CEL,NORMAL,NONE 50.75E0,OHM,NORMAL,NONE 50.762E0,OHM,NORMAL,NONE +9.99999999E+37,OHM,OL,NONE 0.95E-6,F,NORMAL,NONE 0.5498E0,VDC,NORMAL,GOOD_DIODE

		0.2785E0,VAC_PLUS_DC,NORMAL,NONE 979.0E-6,ADC,NORMAL,NONE 1.000E-3,ADC,NORMAL,NONE

QDDA command response explanation

The QDDA command response is complex and has a logical data structure associated with it. Understanding this structure will make it easier to understand the QDDA command response and the syntax table below. The QDDA response is one long line of ASCII, but can logically be viewed as follows:

QDDA Command Response =
       primaryFunction,
       secondaryFunction,
       rangeData,
       lightningBolt,
       minMaxStartTime,
       numberOfModes,
       N repetitions of measurementMode, where N = numberOfModes
       numberOfReadings,
       N repetitions of readingData, where N = numberofReadings

Each of the qdda command response parameters are defined in the syntax table below. rangeData and readingData parameters from above are themselves logical data structures shown below. Parameters in the following logical data structures are also found in the syntax table below.

rangeData =
       autoRangeState
       baseUnit,
       rangeNumber,
       unitMultiplier

readingData =
       readingID,
       readingValue,
       baseUnit,
       unitMultiplier,
       decimalPlaces,
       displayDigits,
       readingState,
       readingAttribute,
       timeStamp

QDDA	**Query Display Data**	

	Purpose:	Query the present data that is displayed on the LCD display (not including the bargraph). The response to this query command is an ASCII response.
	Command Syntax:	QDDA<CR>
	Response Syntax:	CMD_ACK<CR> primaryFunction, secondaryFunction, rangeData, lightningBolt, minMaxStartTime, numberOfModes, N*measurementModes, numberOfReadings, M*readingData Where N = numberOfModes and M = numberOfReadings and "*" means "repetition of".
	Response Parameters:	

		primaryFunction	LIMBO
			V_AC
			MV_AC
			V_DC
			MV_DC
			V_AC_OVER_DC
			V_DC_OVER_AC
			V_AC_PLUS_DC
			MV_AC_OVER_DC
			MV_DC_OVER_AC
			MV_AC_PLUS_DC
			A_AC
			MA_AC
			UA_AC (for micro amps)
			A_DC
			MA_DC
			UA_DC (for micro amps)
			A_AC_OVER_DC
			A_DC_OVER_AC
			A_AC_PLUS_DC
			MA_AC_OVER_DC
			MA_DC_OVER_AC
			MA_AC_PLUS_DC
			UA_AC_OVER_DC
			UA_DC_OVER_AC
			UA_AC_PLUS_DC
			TEMPERATURE
			OHMS
			CONDUCTANCE
			CONTINUITY
			CAPACITANCE
			DIODE_TEST
			V_AC_LOZ
			OHMS_LOW
		secondaryFunction	NONE
			HERTZ
			DUTY_CYCLE
			PULSE_WIDTH
			DBM
			DBV
			DBM_HERTZ
			DBV_HERTZ
			CREST_FACTOR
			PEAK_MIN_MAX

		rangeData	autoRangeState, baseUnit, rangeNumber, unitMultiplier This information represents the range information at the end of the bargraph
		lightningBolt	ON OFF This information represents the state of the lightning bolt.
		minMaxStartTime	Double Float Time is in units of seconds from midnight on the morning of January 1, 1970, not counting leap seconds. The whole (integer) portion of the float represents POSIX time or UNIX time. The fraction portion represents fractions of a second with a resolution around one millisecond). Value is 0.000 if MIN_MAX not enabled.
		numberOfModes	Integer indicating the number measurementModes to follow. Notice that "0" is returned instead of "1,NONE". If numberOfModes is zero then measurementMode is not present.
		measurementMode	AUTO_HOLD, HOLD, LOW_PASS_FILTER, MIN_MAX_AVG, RECORD, REL, (for relative) REL_PERCENT, (for relative %)
		numberOfReadings	Integer indicating the number readingData to follow. This number is ≥ 2.
		readingData	readingID, readingValue, baseUnit, unitMultiplier, decimalPlaces, displayDigits, readingState, readingAttribute, timestamp
		rangeData Parameters	These parameters represent information found at the end of the bargraph.
		autoRangeState	AUTO MANUAL
		baseUnit	See UNIT parameter under QM command syntax.
		rangeNumber	Integer 1, 10, 100, 1000, 5, 50, 500, 5000, or 30

		unitMultiplier	Integer: -9 for n (nano – used in capacitance) -6 for u (micro) -3 for m (milli) 0 for no multiplier 3 for k (kilo) 6 for M (Mega)
	readingData Paramenters		These parameters represent information associated with one of the readings that can appear on the LCD.
		readingID	Identifies which area of the LCD the readingData is associated with and is one of the following: LIVE (live reading that would appear in the mini reading at the top of the LCD in the center of the status bar) PRIMARY SECONDARY REL_LIVE (live relative reading that would appear in the mini reading at the top of the LCD in the center of the status bar) BARGRAPH MINIMUM MAXIMUM AVERAGE REL_REFERENCE DB_REF (dB reference) TEMP_OFFSET
		readingValue	See READING_VALUE parameter under QM command syntax. Keep in mind, this value is in base units.
		baseUnit	See UNIT parameter under QM command syntax.
		unitMultiplier	See unitMultiplier under rangeData parameters in this table. This parameter indicates which unit multiplier is being used to display the readingValue (which is given in terms of base units).
		decimalPlaces	Precision. Number of digits to the right of the decimal point and displayed on meter.
		displayDigits	Significance. Number of displayed digits: 3, 4, or 5
		readingState	See STATE parameter under QM command syntax.
		readingAttribute	See ATTRIBUTE parameter under QM command syntax.

	timeStamp	Meter's time when reading was taken.
		Double Float
		Time is in units of seconds from midnight on the morning of January 1, 1970, not counting leap seconds. The whole (integer) portion of the float represents POSIX time or UNIX time. The fraction portion represents fractions of a second with a resolution around one millisecond).
	Examples	qdda 0 MV_AC, NONE, AUTO,VAC,50,-3, OFF, 0.000, 0, 2, LIVE,0.005029,VAC,- 3,3,5,NORMAL,NONE,1197308998.282, PRIMARY,0.005029,VAC,-3,3,5,NORMAL,NONE, 1197308998.282 qdda 0 MV_AC, PEAK_MIN_MAX, AUTO,VAC,50,-3, OFF, 1197309132.612, 1,MIN_MAX_AVG, 5, LIVE,0.00515,VAC,- 3,2,5,NORMAL,NONE,1197309141.806, PRIMARY,0.00 515,VAC,-3,2,5,NORMAL,NONE,1197309141.806, MINIMUM,-0.0211,V,- 3,2,5,NORMAL,NONE,1197309133.616, MAXIMUM,0.03055,V,-3,2,5,NORMAL,NONE, 1197309133.366, AVERAGE,0.00529,VAC,-3,2,5,NORMAL,NONE, 1197309141.806