

III-2-6 Digital output profiles

(1) Overview

UFL-20A can provide digital data output of flowrate, velocity data, totalizing value as well as measurement status.

This digital data is output from DIGITAL port1 in CSV format (text data separated by commas) via EIA-232 (RS-232C) connection.

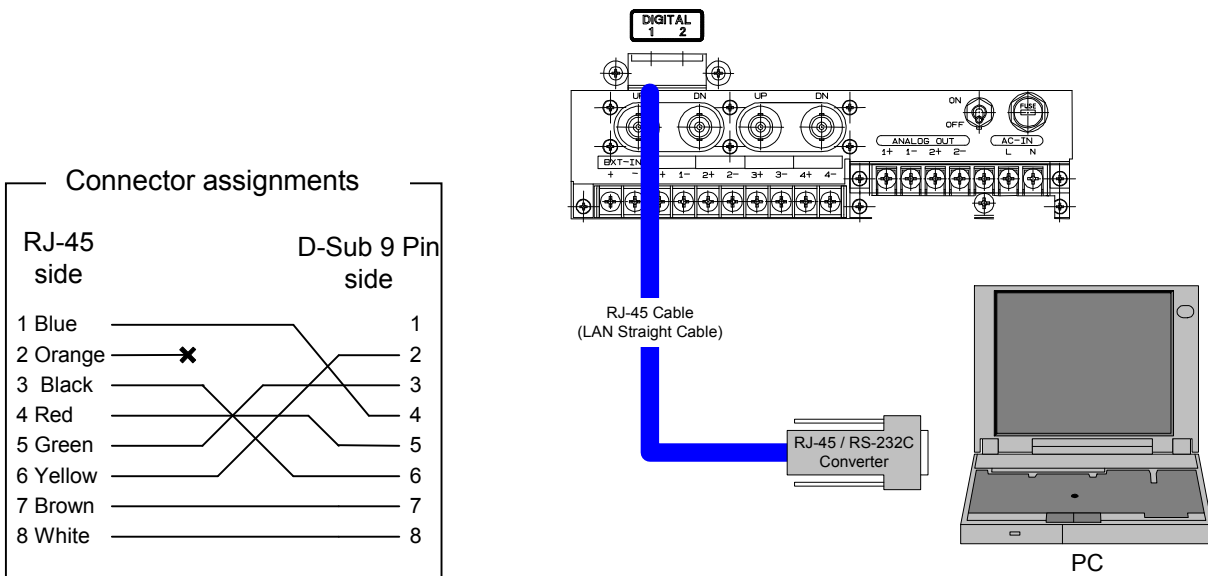
(2) Connection

UFL-20A and PC must be connected in accordance with the following steps.

- a. Connect cable to digital port1 (left side of 2 ports) of the main unit.
- b. Connect cable to the serial port of the PC through the converter (adapter).

NOTE

- **DO NOT CONNECT RJ-45 TO THE PC LAN Connector DIRECTLY.**
Direct connection to the PC may damage the flowmeter main unit.
- If you desire to maintain the IP class with digital communication, please consult TOKIMEC. The IP class cannot be maintained with standard LAN cables (straight type) with standard skin-top connector.



Danger

Be sure to turn off power to the main unit for cable connection work to prevent electrical shock.



Caution

Make sure that connections are made correctly as incorrect connections may result in damage to the main unit and connected accessories

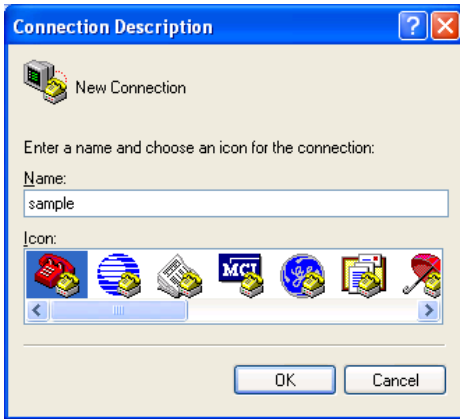
(3) Data receiving with Hyper-Terminal of Windows

Standard windows bundled software Hyper-Terminal handles digital data from the UFL-20A. Please refer to the following procedures.

(Note: The following instruction example is based on a Windows XP version display.)

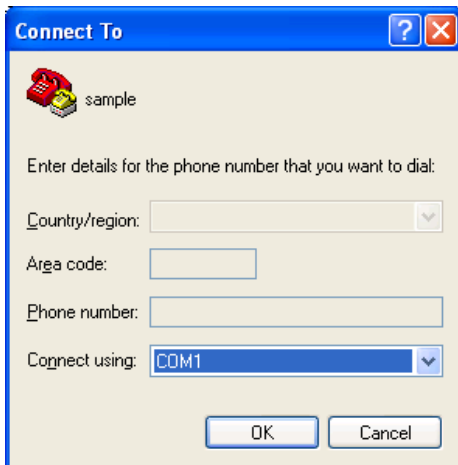
3.1. Activate Hyper-terminal

3.2. Enter "Connection Name"



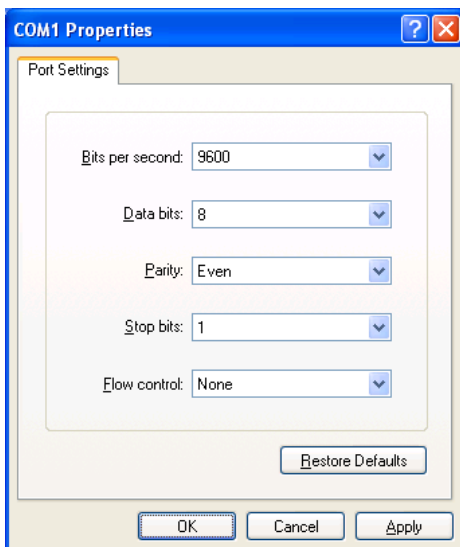
Instruction

You can use any name as the connection setting name. Enter the name, then click OK. (In this example, the name entered is "sample".)



Instruction

Select & set communication port.



Instruction

Set port settings as below.

Bit/sec	9600 ^{Note1}
Data bid	8
Parity	even
Stop bit	1
Flow control	none

Note 1

"Bit/sec" must match the main unit settings.

(4) Data Format

Detail format output from DIGITAL port 1 is as follows,

[Sample Data]

\$,F,0.000,0.000,,,E+3:m3/h,0.000,m/s,0000000,x1m3,,,,,ROFF,R1,,,,,OVER,,,,,ITG,*06[CR][LF]

Data output from UFL-20A are referred to as a line of data interchange. Data items in each line are contained in data FIELDS which are numbered, for example "field 0", "field 1" and so on until it ends at "field 28". Each data FIELD contains a single data VARIABLE. The order of data FIELDS on each line is defined by a data HEADING "\$", with the rest of the data line written in [CR][LF] code. The data field HEADINGS and data VARIABLES on each line are separated by commas.

Empty data FIELDS are enclosed by double quotes, " , , , , " .

The applicable FIELDS of data are as follows,

Table 4.1 Field Data

Field No.	Data Description	Sample
0	<i>Header</i> This character indicates the start of the line.	<u>\$</u>
1	<i>Operation mode</i> F ; FLOWMETER V ; VELOCITY	<u>F</u> <u>V</u>
2	<i>Flow volume</i> Result of average flow volume from each path. Main unit parameters determine numerical digits and decimal fractions. Any compensation settings are included in this result.	<u>0.123</u> <u>-0.123</u> <u>12.3</u> <u>123.456</u>
3	<i>Flow volume of path no.1</i>	Same as field 2
4	<i>Flow volume of path no.2</i>	Same as field 2
5	<i>Flow volume of path no.3</i>	Same as field 2
6	<i>Flow volume of path no.4</i>	Same as field 2
7	<i>Measuring Unit for flow rate</i> This unit is set by main unit parameters. Double quotes ":" will be inserted between exponential indicators and measurement units. If the exponential indicators are set as x1, double quotes ":" are omitted and only units are indicated.	<u>m3/h</u> <u>m3/min</u> <u>E+3:m3/h</u> <u>E-3:L/s</u>
8	<i>Velocity</i> During flowmeter operation mode, this value is calculated from flow volume. During velocity operation mode, this value is calculated from measured velocity with all compensation parameters such as "zero shift", "span correction" and "low-cut" functions added. Decimal fraction is fixed at 3 digits.	<u>0.123</u> <u>1.234</u> <u>12.345</u> <u>-0.123</u> <u>-12.345</u>
9	<i>Unit of velocity</i>	<u>m/s</u> <u>(ft/s)</u>
10	<i>Forward totalizing value</i> 7 digits If totalizing operation is not set, field will be blank.	<u>0000000</u> <u>9999999</u> <u>"_" (blank)</u>

11	<i>Unit of Forward totalizing</i> This unit is set by main unit parameters. If it is not set, field will be blank.	<u>x10m3</u> <u>x5m3</u> <u>x1m3</u> <u>x100L</u> "_" (blank)
12	<i>Backward totalizing value</i> 7 digits If totalizing operation is not set, field will be blank.	<u>0000000</u> <u>9999999</u> "_" (blank)
13	<i>Unit of Backward totalizing</i> This unit is set by main unit parameters. If it is not set, field will be blank.	<u>x10m3</u> <u>x5m3</u> <u>x1m3</u> <u>x100L</u> "_" (blank)
14	<i>"FULL SCALE" Status</i> "FS" is indicated in case of "Full Scale" status.	<u>FS</u> "_" (blank)
15	<i>"AGC" Status</i> "AGC" is indicated when "AGC" function is activated.	<u>AGC</u> "_" (blank)
16	<i>"Range" Status</i> "LOW" is indicated in case of low range. Blank refers to high range status.	<u>LOW</u> "_" (blank)
17	<i>"ROFF" Status</i> "ROFF" is indicated when ROFF warning is activated.	<u>ROFF</u> "_" (blank)
18	<i>Receiving status of Path No.1</i> <u>R1</u> is indicated in case of ROFF at Path No.1	<u>R1</u> "_" (blank)
19	<i>Receiving status of Path No.2</i> <u>R2</u> is indicated in case of ROFF at Path No.2	<u>R2</u> "_" (blank)
20	<i>Receiving status of Path No.3</i> <u>R3</u> is indicated in case of ROFF at Path No..3	<u>R3</u> "_" (blank)
21	<i>Receiving status of Path No.4</i> <u>R4</u> is indicated in case of ROFF at Path No..4	<u>R4</u> "_" (blank)
22	<i>"Limit" Status</i> <u>OVER</u> is indicated in case of "Range Over" status.	<u>OVER</u> "_" (blank)
23	<i>(Reserved)</i>	"_" (blank)
24	<i>Error Status</i> If an error occurs, an error number-code will be indicated. No error is indicated by a blank field. Refer to II-2-7 table 4-1; Error Code List for each error code.	<u>ERR01</u> <u>ERR63</u> "_" (blank)
25	<i>Status of Low-Battery</i> <u>LB</u> will be indicated in case of low battery. Totalizing value can not be maintained under low battery status. Battery replacement required.	<u>LB</u> "_" (blank)

26	<p><i>Check Status</i></p> <p>A: Analog output check, R: Fixed Range check, M: Multi-Path check "_" (blank)</p>	<p><u>C-ARM</u> <u>C-A</u> <u>C-R</u> <u>C-M</u> <u>C-AR</u> <u>C-AM</u> <u>C-RM</u> "_" (blank)</p>
27	<p><i>Totalizing Status</i></p> <p>Operating totalizing function indications. ITG : Manual totalizing operation mode ITG@T : Timer totalizing operation mode @T : Timer-totalizing completed "_" (blank): Manual-totalizing completed</p>	<p><u>ITG</u> <u>ITG@T</u> <u>@T</u> "_" (blank)</p>
28	<p><i>Check-Sum xx+ [CR][LF]</i></p> <p>Please refer to Chap.6 for example of detailed calculations. [CR][LF] indicates sentence completion.</p>	<p>*xx[CR][LF]</p>

(5) Specification for serial communication

5-1. Hardware settings

UFL-20A DIGITAL port1 communication specifications are provided in Table 5.1.

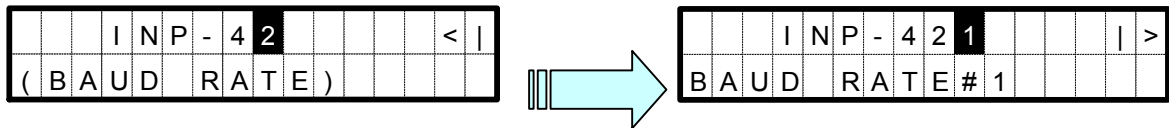
Table 5.1

Communication Parameters	Value
Standard	EIA-232 (RS-232C)
Baud rate ^{note1}	4800bps, 9600bps, 19200bps (Default; 9600bps)
Data bit	8
Parity	Even
Stop bit	1
Flow control	None
Output interval ^{note2}	Every 0~3600 seconds No output in case of "0" setting. (Default 1sec interval)

Note1

Baud rate for port 1 is set under MENU [INP-421 : BAUD RATE#1] by the main unit LCD key-pad only.

Select Menu INP-421, then enter baud rate selection as below.



3 speeds are selectable.

BAUD	RATE # 1
1 :	9 6 0 0 B P S

- 0: 4800bps
- 1: 9600bps (Default)
- 2: 19600bps

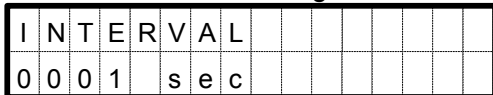
Note2

Output interval is set under MENU [INP-41] by the main unit LCD key-pad or through PC software, UF_VIEWER [UF-INPUT-RS232C]

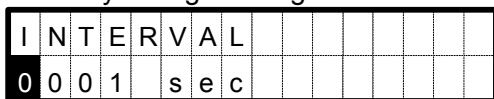
Select Menu INP-41 from LCD Key-pad



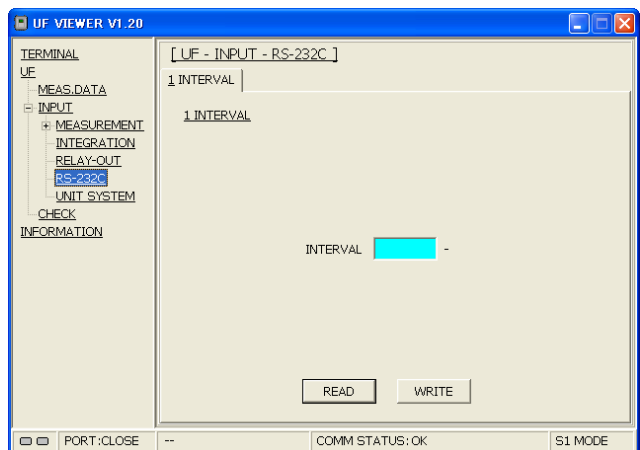
Enter INP-41, data settings viewable.



Manually change settings.



For PC software, set under [UF-INPUT-RS232C].



5-2. Connector Assignment

Table 5-2 shows pin assignment for DIGITAL port 1(RJ-45).

Table 5-2. DIGITAL port 1 Pin Assignment (EIA-561Standard)

Pin No.	Signal	Assignment
1	RI(DSR)	3(DTR)
2	DCD	Not Connected
3	DTR	1(RI DSR)
4	GND	GND
5	RD	Receiving
6	TD	Transmitting
7	CTS	8(RTS)
8	RTS	7(CTS)

(6) Appendix
6-1. ASCII code list

High order digit \ Low order digit	0	1	2	3	4	5	6	7
0		DE		0	@	P	'	p
1	SH	D1	!	1	A	Q	a	q
2	SX	D2	"	2	B	R	b	r
3	EX	D3	#	3	C	S	c	s
4	ET	D4	\$	4	D	T	d	t
5	EQ	NK	%	5	E	U	e	u
6	AK	SN	&	6	F	V	f	v
7	BL	EB	'	7	G	W	g	w
8	BS	CN	(	8	H	X	h	x
9	HT	EM	)	9	I	Y	i	y
A	LF	SB	*	:	J	Z	j	z
B	HM	EC	+	;	K	[	k	{
C	CL	→	,	<	L	¥	l	|
D	CR	←	-	=	M	]	m	}
E	SO	↑	.	>	N	^	n	—
F	SI	↓	/	?	O	_	o	

List 6-1 Hexadecimal description

6-2. Check-sum example

An "*" asterisk mark and double word check sum is added to the last character of the line. Check-sum will be calculated as EXOR converted to a Hexadecimal number in accordance with the character string which begins after the \$ mark and ending with the * mark (i.e. excluding the * mark but including the comma).

In the example of the following line, the check-sum value will be as follows.

Sample sentence : \$,1,2,*2F[CR][LF]
Check-sum : 0x2F

Table 6-1 Check-sum samples

ASCII Character	ASCII Character Binary-digit (Hexadecimal-digit)	Calculated result by EXOR Binary-digit (Hexadecimal-digit)
,	0010 1100 (0x2C)	0010 1100 (0x2C)
1	0011 0001 (0x31)	0001 1101 (0x1D)
,	0010 1100 (0x2C)	0011 0001 (0x31)
2	0011 0010 (0x32)	0000 0011 (0x03)
,	0010 1100 (0x2C)	0010 1111 (0x2F)