



Thermal Mass Flow Meter / Controller

MODEL 8700 SERIES

RS-485 Communications Instruction Manual

KOFLOC Corp.

Table of Contents

	Page
1. Foreword	3
2. RS-485 Communication Specifications	3
3. Example of Connection	4
4. How to Enable the RS485 Communication Terminator	5
5. List of Communication Commands and Addresses	6-14
6. Operation-Confirmed Converter for PC	14

1 . Foreword

This document describes the specifications and operation of the RS-485 communications function installed as a standard feature in Model 8700.

The wiring, installation and operating procedures, other than communications, are presented in a separate instruction manual. Prior to use, please read it also.

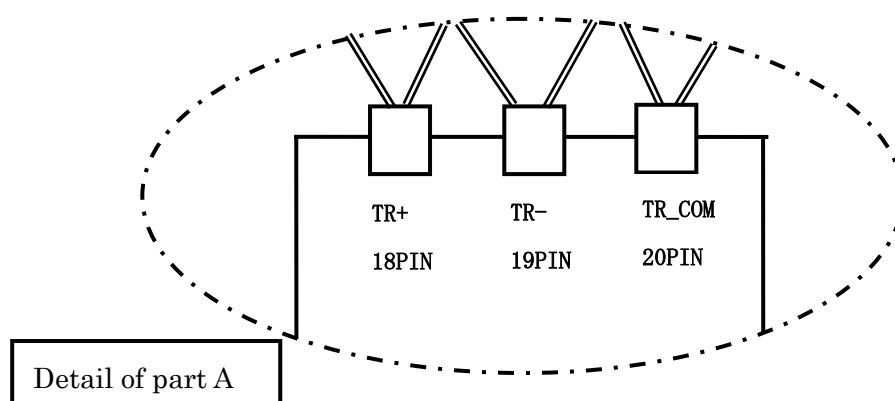
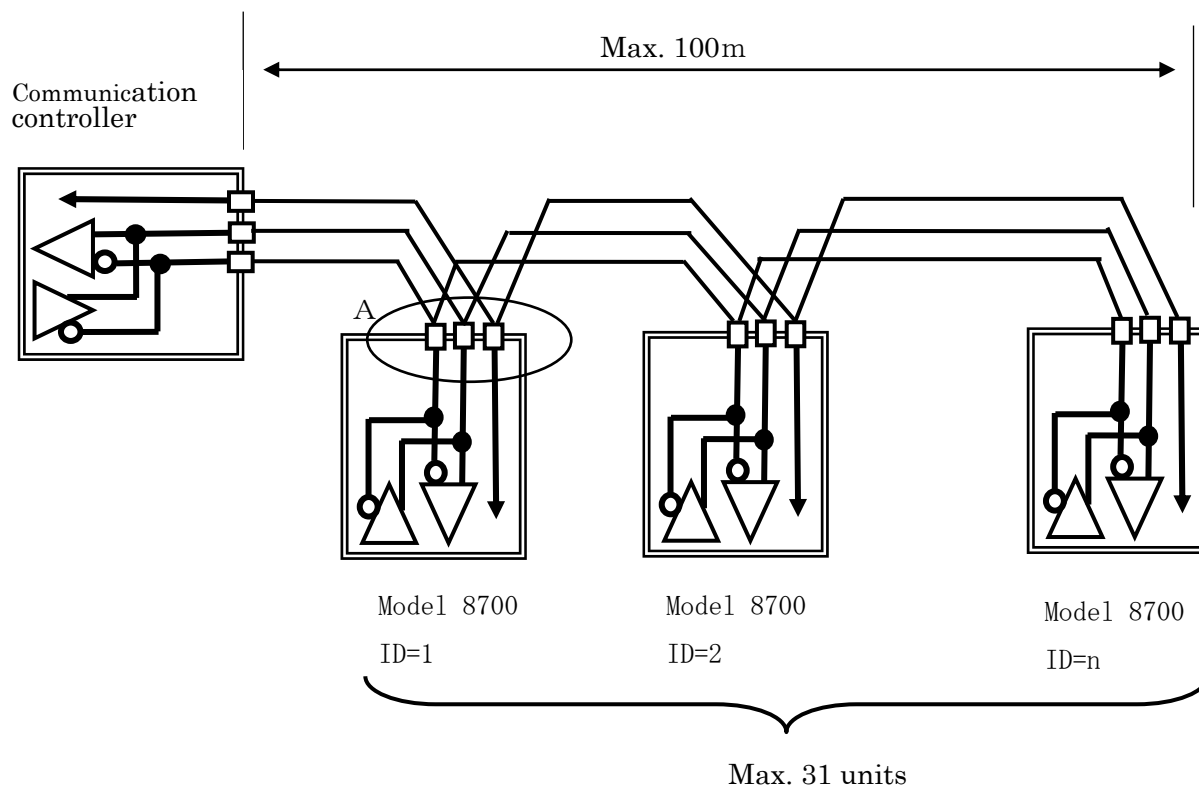
2 . RS-485 Communication Specifications

Item	Specifications
Synchronization	Start-stop
Transmission speed	9600bps
Frame structure	Start: 1 bit Data length: 8 bits Stop: 1 bit Parity: None
Transmission system	Half duplex (3-wire type)
Insulation	Between communications – control circuit: Not insulated Between communications – power supply (24 VDC): Not insulated
Setting of ID at shipment	01

3. Example of Connection

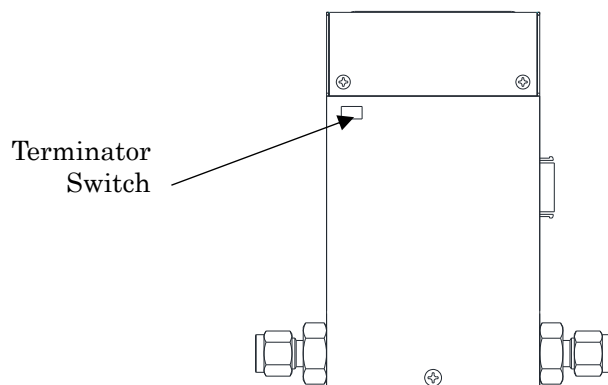
An example (reference) of wire connection is shown below.

In the following example, the terminator is turned on in Communication controller Model 8700 (ID=n).



4 . How to Enable the RS485 Communication Terminator

This equipment incorporates an RS485 terminator ($120\ \Omega$). When the equipment is shipped, it has not been enabled. Where it is considered that communications are disturbed by reflective noise, etc., conduct an operation to enable the terminator as explained below.



5. List of Communication Commands and Addresses

◆ Command messages

① Byte read

				Command						Checksum				
02H	30H	30H	31H	52H	42H	31H	30H	30H	30H	03H	45H	42H	0DH	0AH
STX	0	0	1	R	B	1	0	0	0	ETX	E	B	CR	LF
Equipment ID				Address										

② Word read

				Command						Checksum				
02H	30H	30H	31H	52H	44H	31H	30H	30H	30H	03H	45H	44H	0DH	0AH
STX	0	0	1	R	D	1	0	0	0	ETX	E	D	CR	LF
Equipment ID				Address										

③ Byte write

Command						Separator				Write data			
02H	30H	30H	31H	57H	42H	31H	30H	30H	30H	3AH	2BH	30H	30H
STX	0	0	1	W	B	1	0	0	0	:	+	0	0
Equipment ID						Address				Sign			
Checksum													
03H	42H	35H	0DH	0AH									
ETX	B	5	CR	LF									

④ Word write

Command						Separator						
02H	30H	30H	31H	57H	44H	31H	30H	30H	30H	3AH	2BH	
STX	0	0	1	W	D	1	0	0	0	:	+	
Equipment ID						Address						Sign
Write data						Checksum						
30H	30H	30H	30H	03H	31H	37H	0DH	0AH				
0	0	0	0	ETX	1	7	CR	LF				

◆ Normal/abnormal response messages

① Byte read

Command										Exit code	
02H	30H	30H	31H	52H	42H	31H	30H	30H	30H	30H	30H
STX	0	0	1	R	B	1	0	0	0	0	0
Equipment ID				Address							
Read data											
2BH	30H	30H	03H	44H	36H	0DH	0AH				
+	0	0	ETX	D	6	CR	LF				
Sign		Checksum									

② Word read

Command										Exit code	
02H	30H	30H	31H	52H	44H	31H	30H	30H	30H	30H	30H
STX	0	0	1	R	D	1	0	0	0	0	0
Equipment ID					Address						
Read data											
2BH	30H	30H	30H	30H	03H	33H	38H	0DH	0AH		
+	0	0	0	0	ETX	3	8	CR	LF		
Sign					Checksum						

③ Byte write

Command										Exit code				
02H	30H	30H	31H	57H	42H	31H	30H	30H	30H	30H	30H	03H	35H	30H
STX	0	0	1	W	B	1	0	0	0	0	0	ETX	5	0
Equipment ID				Address						Checksum				
0DH	0AH													
CR	LF													

④ Word write

				Command				Exit code						
02H	30H	30H	31H	57H	44H	31H	30H	30H	30H	30H	30H	03H	35H	32H
STX	0	0	1	W	D	1	0	0	0	0	0	ETX	5	2
Equipment ID				Address							Checksum			
0DH	0AH													
CR	LF													

◆ Detailed explanation

① STX

Indicates the head of the message.

Fixed to 02H.

When STX is received, the equipment unconditionally judges it is the first letter of the message.

② Equipment ID

Specify the destination equipment ID (1 - 127).

③ Command

A command to the equipment.

RB ... Data (byte) read

RD ... Data (word) read

WB ... Data (byte) write

WD ... Data (word) write

④ Address

Specify the head address of read/write data.

⑤ Separator (Used only for writing)

A symbol to separate the address and data.

Fixed to 3AH.

⑥ Exit code (Response message only)

00 ... Normal response

40 ... Specifies a communication access disabled area

41 ... Specifies an invalid item address

42 ... Specifies an undefined command

⑦ ETX

Indicates that the previous part is the body of the message.

Fixed to 03H.

⑧ Checksum calculation

Example: Data (word) write is used as an example for explanation.

① Message from STX to ETX added at every byte.

The lower 1 byte of the calculation result is "EBH".

② Converted to a character code.

Result "EBH" to (45H) and (42H).

⑨CR and LF

Indicate the end of the message.

CR fixed "0DH" and LF fixed to "0AH".

◆Data address

※Use FRAM if the data will be retained when the power is turned off.

※In case of the rewriting to FRAM, it will be reflected in action when the power is turned on again.

※There are invalid data for meter.

Communication Data	RAM Address	FRAM Address
Basic mode data	1000 – 1029	4000 – 4029
Function setting mode (set) data	1100 – 1121	4100 – 4121
Function setting mode (parameter) data	1200 – 1247	4200 – 4247
Run set mode data	1300	4300
Integrated flow rate data	1400 – 1405	4400 – 4405
Reset integrated flow rate (Command)	9002	

◆List of communication data

Meaning of symbols in R/W columns: ○ … Possible, × …Not possible

① Basic mode data

Indication	Data Range	Size	RAM			FRAM		
			Add.	R	W	Add.	R	W
Instantaneous flow rate	-9999~9999	Word	1000	○	×	4000	×	×
SP No. being used	00:SP0 01:SP1 02:SP2 03:SP3 04:SP4 05:SP5	Byte	1002	○	○	4002	○	○

② Function setting mode (set) data

Section with (d-xx) links to the list of function setting mode in the instruction manual.

Indication	Data Range	Size	RAM			FRAM		
			Add.	R	W	Add.	R	W
Key lock setting (d-06)	00: No key lock 01: Key lock of settings other than flow rate setting (SP) 02: Key lock of all settings	Byte	1100	○	○	4100	○	○

Indication	Data Range	Size	RAM			FRAM		
			Add.	R	W	Add.	R	W
RUN key action selection (d-07)	00: RUN key not used 01: RUN key used	Byte	1101	○	○	4101	○	○
Flow rate setting method selection (d-01)	00: Digital setting 01: Analog setting	Byte	1102	○	○	4102	○	○
Event 1 output type allocation (d-18)	00: Not used (normally off)	Byte	1104	○	○	4104	○	○
	01: On when integration flow rate event occurs							
	02: On when flow rate is OK							
	03: On when operation mode = Control							
	04: On when operation mode = Fully opened							
	05: On when operation mode = Fully closed							
Event 2 output type allocation (d-19)	00: Not used (normally off)	Byte	1105	○	○	4105	○	○
	01: On when integration flow rate event occurs							
	02: On when flow rate is OK							
	03: On when operation mode = Control							
	04: On when operation mode = Fully opened							
	05: On when operation mode = Fully closed							

Indication	Data Range	Size	RAM			FRAM		
			Add.	R	W	Add.	R	W
Flow rate alarm set type (d-13)	00:Not used 01:Only upper limit alarm used 02: Only lower limit alarm used 03:Upper/lower alarms used	Byte	1109	○	○	4109	○	○
Selection of action when alarm occurs(d-14)	00:Control continue & alarm output normally on 01:Forced fully closed & alarm output normally on	Byte	1110	○	○	4110	○	○
Flow rate indication reference condition selection (d-02)	00:20°C, 1 atm 01:0°C, 1 atm 02:25°C, 1 atm	Byte	1112	○	○	4112	○	○
Direct setting function(d-26)	00:No function 01:Function used	Byte	1113	○	○	4113	○	○
PV filter (instantaneous flow rate averaging)(d-27)	00:No PV filter 01:Moving average of sampling 2 times 02: Moving average of sampling 4 times 03: Moving average of sampling 8 times 04: Moving average of sampling 16 times 05: Moving average of sampling 32 times	Byte	1114	○	○	4114	○	○
Indication update cycle (Indicator)(d-28)	00:No update cycle 01:50-msec cycle 02:100-msec cycle 03:200-msec cycle 04:500-msec cycle 05:1000-msec cycle	Byte	1115	○	○	4115	○	○
PV (instantaneous flow rate) forced zero function(d-08)	00:No function 01:Function used	Byte	1116	○	○	4116	○	○
Equipment address(d-43)	0001~127	Word	1117	○	○	4117	○	○
0-2% range indication setting(d-29)	00:0-2% flow rate indication 01:0 indication	Byte	1120	○	○	4120	○	○
PV (instantaneous flow rate) indication decimal point position function(d-31)	00:No decimal point (1000) 01:Decimal point used (100.0) 02: Decimal point used (10.00) 03: Decimal point used (1.000)	Byte	1121	○	○	4121	○	○

③ Function setting mode (parameter) data

Indication	Data Range	Size	RAM			FRAM		
			Add.	R	W	Add.	R	W
Flow rate OK judgment range(d-22)	0005~1000 (0.5%~100.0% FS)	Word	1200	○	○	4200	○	○
Flow rate deviation upper limit alarm value(d-15)	0005~1000 (0.5%~100.0%FS)※1 0000~1000 (0.0%~100.0%FS)※2	Word	1204	○	○	4204	○	○
Flow rate deviation lower limit alarm value(d-16)	0005~1000 (0.5%~100.0%FS) ※1 0000~1000 (0.0%~100.0%FS) ※2	Word	1206	○	○	4206	○	○
Flow rate deviation alarm judgment delay time(d-17)	0005~9999 (0.5sec~999.0sec)	Word	1208	○	○	4208	○	○
Event output 1 delay time (d-20)	0000~9999 (0.0sec~999.0sec)	Word	1210	○	○	4210	○	○
Event output 2 delay time (d-21)	0000~9999 (0.0sec~999.0sec)	Word	1212	○	○	4212	○	○
Integration event flow rate (lower 4 digits)(d-10)	0000~9999	Word	1216	○	○	4216	○	○
Integration event flow rate (middle 4 digits)(d-11)	0000~9999	Word	1218	○	○	4218	○	○
Integration event flow rate (upper 4 digits)(d-12)	0000~9999	Word	1220	○	○	4220	○	○

※1 : For the controller

※2 : For the meter

Indication	Data Range	Size	RAM			FRAM		
			Add.	R	W	Add.	R	W
PV forced zero function delay time(d-09)	0000~9999 (0.0sec~999.0sec)	Word	1222	○	○	4222	○	○
SP upper limit flow rate (d-32)	0000~1000 (0.0%~100.0% FS)	Word	1224	○	○	4224	○	○
SP lower limit flow rate (d-33)	0000~1000 (0.0%~100.0% FS)	Word	1226	○	○	4226	○	○
SP0 (Set flow rate)(d-35)	0~Full Scale※3	Word	1228	○	○	4228	○	○
SP1 (Expanded set flow rate)(d-36)	0~Full Scale※3	Word	1230	○	○	4230	○	○
SP2 (Expanded set flow rate)(d-37)	0~Full Scale※3	Word	1232	○	○	4232	○	○
SP3 (Expanded set flow rate)(d-38)	0~Full Scale※3	Word	1234	○	○	4234	○	○
SP4 (Expanded set flow rate)(d-39)	0~Full Scale※3	Word	1236	○	○	4236	○	○
SP5 (Expanded set flow rate)(d-40)	0~Full Scale※3	Word	1238	○	○	4238	○	○
SP8 (Analog set flow rate)	0~Full Scale※3	Word	1244	○	×	4244	×	×
Full scale flow rate(d-30)	0100~9999	Word	1246	○	○	4246	○	○

※3 : Control may not operate when inputting a value less than 2% of full scale.

④ RUN set mode data

Indication	Data Range	Size	RAM			FRAM		
			Add.	R	W	Add.	R	W
Operation mode	00:Valve fully opened 01:Valve control 02:Valve fully closed	Byte	1300	○	○	4301	○	○

⑤ Integrated flow rate data

Indication	Data Range	Size	RAM			FRAM		
			Add.	R	W	Add.	R	W
Integrated flow rate (lower 4 digits)	0000~9999	Word	1400	○	×	4400	×	×
Integrated flow rate (middle 4 digits)	0000~9999	Word	1402	○	×	4402	×	×
Integrated flow rate (upper 4 digits)	0000~9999	Word	1404	○	×	4404	×	×

⑥ Reset integrated flow rate (Command)

Indication	Data Range	Size	RAM/FRAM		
			Add.	R	W
Reset integrated flow rate	0000	Word	9002	×	○

※ : Upper, middle, lower, and RAM/FRAM are all reset to 0.

6 . Operation-Confirmed Converter for PC

Manufacturer

LINE EYE

Model

SI-35USB

KOFLOC Corp.

URL : <http://www.kofloc.co.jp>