Digital Mass Flow Controller
MC-700 series Command List

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1. Introduction

This manual explains the digital commands of the mass flow controllers of the MC-700 mass flow controllers (Hereafter, it is called "MFC").
Please read through this manual and other separate volumes carefully to familiarize yourself with the features of the MFC. Details of the communication protocols are described in the Digital interface manual.

2. Type of command

There are 3 types of commands available for transmitting. Please transmit commands using ASCII code. Delimiters are either CR or LF.
For Type 2 and Type 3 command, please make sure to transmit the next command after the reception of return data. For Type 1 commands, as there is no return data, except for RE, please wait for 100ms before transmitting the next command. With RE, wait for 1s before transmitting the next command.

Types of command

Type	Contents	Transmitting and receiving example
Type 1	Commands with no return data from MFC.	**,##[CR][LF] (HOST → MFC)
Type 2	Commands with return data from MFC.	**,##[CR][LF] (HOST → MFC) **, ○○○○○ [CR][LF] (HOST ← MFC)
Type 3	ACK answer from MFC is expected, and the command transmits data after receipt.	**,##[CR][LF] (HOST → MFC) **,AK[CR][LF] (HOST ← MFC) **, ○○○○○ [CR][LF] (HOST → MFC) **, ○○○○○ [CR][LF] (HOST ← MFC)

**:Device number of MFC 00 to 99 ##:Command ○○○○○:Data
Type 1 is used for change in the operation mode. And, it can direct the plural at the same time by using AL for the device number.
Type 2 is used for the data readout from the MFC
Type 3 is used for writing data to the MFC.

3. "Read-out" commands (Type2)

No.	Transmission		Reply	
	Command	Contents	Reply data	Contents (example)
1	**,OR	Actual flow rate read out	**,±○○○○○	10000 = Actual flow rate 100.00%
2	**,SR	Flow rate setting read out	**,+○○○○○	10000 = Flow rate setting 100.00%
3	**,SA	Analog flow rate setting read out	**,±○○○○○	10000 = Analog flow rate setting 100.00%
4	**,SD	Digital flow rate setting read out	**,+○○○○○	10000 = Digital flow rate setting 100.00%
5	**,FR	Variable range read out	**,○○○○○	10000 = Variable Range 1.0000
6	**,VR	Valve voltage read out	**,○○○○○	10000 = Valve voltage 100.00% (100%=120V)
7	**,ST	Status readout read out	**,○○○○○○	EDASFN = (Refer to ST code table)
8	**,AR	Alarm A range read out	**,○○	10 = ±10%SP
9	**,BR	Alarm B range read out	**,○○	10 = ±10%SP
10	**,RA	Alarm code read out	**,○○	C0 = (Refer to Alarm Code table)
11	**,TR	Alarm timer read out	**,○○	10 = 10sec
12	**,T2	Alarm off timer read out	**,○○	10 = 10sec
13	AL,DR	Device number read out	**,**	01 = Device number 01 (00 to 99)
14	**,GR	Group number read out	**,G○	G○ = (0 to 9, A to Z, Any 1 character)
15	**,PR	Digital setting at time of power on read out	**,±○○○○○	10000 = Flow rate setting 100.00%
16	**,LR	Ramping time read out	**,○○○○	0060 = 60s (Max.1310sec)
17	**,R0 to 9	Preset flow rate setting value read out	**,+○○○○○	10000 = Flow rate setting 100.00%
18	**,M0 to 3	Memory read out	**,○○○○○	○○○○○= Any 5 ASCII characters
19	**,IR	Totalized value read out	**,+○○○○○	00150 = 3000L (Running F.S. 2SLM MFC at flow set100% 2*10*150=3000 Max 65535) (Note1)
20	**,1R or 2R	Totalizer alarm level read out	**,+○○○○○	DEG = (Refer to ST code table)
21	**,RI	Totalizer mode status read out	**,○○○	

ST Code table

Digit	Code	Contents
1	D	Alarm A disable
	E	Alarm A enable
2	D	Alarm B disable
	E	Alarm B enable
3	A	Analog control
	D	Digital control
4	H	Internal valve hold
	S	Internal valve servo
	1	Valve voltage max
	0	Valve voltage min
5	F	Fast response speed
6	C	2% close
	H	2% hold
	N	Control normal

Alarm Code table

Digit	Code	Condition	Alarm timer	LED indicator
1	0	Alarm A none	-	Green (every 1sec flashing)
	P	Power supply voltage (+15VDC) drop	Disabled	Off
	2	Flow totalizer alarm level 2	Disabled	Continuous Red
	C	Setting value ≠ flow rate output	Enabled	Continuous Red
	F	Rotary switch setting error	Fixed value (Note3)	Continuous RED (Note2)
2	0	Alarm B none	-	Green (every 1sec flashing)
	Z	Abnormal zero offset	Disabled	Red (every 0.5sec flashing) (Note2)
	V	Valve of voltage change	Disabled	Red (every 0.5sec flashing)
	1	Flow totalizer alarm level 1	Disabled	Red (every 0.5sec flashing)

Note2) Regardless of Enabled / Disabled, alarm A and B (Type 1 command), indicate in the LED by the alarm event
Note3) Alarm timer and alarm off timer are fixed in 5s, so time cannot be changed.

Flow totalizer mode status code table

Digit	Code	Contents
1	D	Flow totalizer alarm level 1 Disable
	E	Flow totalizer alarm level 1 Enable
2	D	Flow totalizer alarm level 2 Disable
	E	Flow totalizer alarm level 2 Enable
3	G	Flow totalizer functioning
	S	Flow totalizer stopped

4. “Write-in” commands (Type3)

No.	Transmission (Level 1)		Reply data	Transmission (Level 2)		Reply data
	Command	Contents		Command	Contents (example)	
1	**,SW	Write digital flow rate setting (Default = 00000)	**,AK	**,○○○○○	10000 = Flow rate setting value 100.00% (00000 to 10000)	**,+○○○○○
2	**,FW	Write variable range (Dependent on full scale flow rate)		**,○○○○○	10000 = Variable range 1.0000 (05000 to 20000)	**,○○○○○
3	**,DW	Write device number setting (Default = 00)		**,○○	01 = Device number 01 (00 to 99)	○○, ○○
4	**,TS	Write baud rate setting (Default = 04)		**,○○	04 = 9600bps (Refer to Baud rate code table)	**,○○
5	**,TP	Write communication protocol setting (Default = 01)		**,○○	01 = (Refer to Communication protocol table)	**,○○
6	**,AW	Write alarm A range (Default = 05)		**,○○	10 = ±10%SP (01 to 99)	**,○○
7	**,BW	Write alarm B range (Default = 20)		**,○○	10 = ±10%SP (01 to 99)	**,○○
8	**,TW	Write alarm timer (Default = 05)		**,○○	10 = 10sec (00 to 99)	**,○○
9	**,T1	Write alarm off timer (Default = 02)		**,○○	10 = 10sec (00 to 99)	**,○○
10	**,Wn (n=0 to 9)	Write preset flow rate setting value (Default = 00000)		**,○○○○○	10000 = Flow rate setting value 100.00%	**,+○○○○○
11	**,LW	Write ramping time (Default = 00000) (Note4)		**,○○○○○	00010 = Ramping time 10sec (Max. 1310sec)	**,○○○○○
12	**,Un (n=0 to 3)	Write memory write (Default = …..)		**,○○○○○	○○○○○ = Any 5 ASCII characters	**,AK
13	**,GW	Write group number (Default = G0)		**,G○	G○ = (0 o 9, A to Z, Any 1 character)	**,G○
14	**,PW	Write digital setting at time of power on (Default = 00000)		**,○○○○○	10000 = Flow rate setting 100.00% (00000 to 10000)	**,+○○○○○
15	**,1W **,2W	Write flow totalizer alarm level write (Default = 65535)		**,○○○○○	00150 = 3000L (Running F.S.2SLM MFC at 100% 2*10*150=3000 Max 65535) (Note1)	**,○○○○○

5.”Operation change” commands (Type1)

****=AL: changed simultaneously**

No.	Transmission (Level 1)	
	Command	Contents
1	**,CD	Digital control mode
	**,CA	Analog control mode
2	**,ZS	Zero reset switch
3	**,RE	Software reset
4	**,VC	Internal valve close
	**,VO	Internal valve open
	**,VH	Internal valve hold
	**,VS	Internal valve servo
5	**,C3	2% close mode (Note4)
	**,C4	2% hold mode (Note5)
	**,CN	Normal control mode
6	**,DA	Disable alarm A output
	**,EA	Enable alarm A output
7	**,DB	Disable Alarm B output
	**,EB	Enable Alarm B output
8	**,BS	Alarm B preset
9	**,CL	Alarm code clear
10	**,S○	Change to preset value 0 to 9
11	**,IG	Flow totalizer start
12	**,IS	Flow totalizer stop
13	**,II	Flow totalized value clear
14	**,IM	Flow totalized value store (EEPROM)
15	**,D1 or 2	Disable flow totalizer alarm 1 or 2
	**,E1 or 2	Enable flow totalizer alarm 1 or 2
16	G○,##	Group control ○:Group number, ##:Command
17	**,PA	Analog control mode in powered on
	**,PD	Digital control mode in powered on

Baud rate code table

Code	Baud rate
01	1200bps
02	2400bps
03	4800bps
04	9600bps
05	19200bps
06	38400bps

Communication protocol table

Code	Parity	Character length	Stop Bit
01	None	7	2
02	None	7	1
03	None	8	2
04	None	8	1
05	Odd	7	2
06	Odd	7	1
07	Odd	8	2
08	Odd	8	1
09	Even	7	2
0A	Even	7	1
0B	Even	8	2
0C	Even	8	1

Note1) Please refer to Additional Digital Function Manual.

Note4) Ramping function and 2% Close mode cannot be used simultaneously.
Please turn mode into Control Normal (CN) or 2% Hold (C4) when using ramping function.
Ramping function is available only under digital control. Flow rate controlling is normally working under analog control even if ramping time is set.

Note5) On 2% Hold mode, if the flow rate was set to 0.6%F.S. (30mV) or less, flow rate is automatically altered to 1.8%F.S. and Alarm A will be triggered (set ≠ output).
Therefore, to avoid alarm A, please set the flow rate above 0.6%F.S. (30mV).