Digital Mass Flow Controller / Mass Flow Meter

LC-3000L/LM-3000L Series Command List

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1. Introduction

This list shows commands tables of digital communication for LC-3000L series mass flow controller/LM-3000L series mass flow meter (Hereinafter, referred as "LM").
For basic operation instructions, please refer to the main Instruction Manual.
For details of digital communications, please refer to Digital Interface Instruction Manual.

2. Types of Command

There are three kinds of commands from Type1 to Type3 as shown in the following table. The transmission code is ASCII and, code CR and LF are for the delimiter.
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.
Mass flow Meter is not equipped with control valve, so the commands which marked by (M) are not functional or different from valve function (Except the Mass flow Meter connecting to external actuator as a liquid controller).

Type of command

Type	Contents	Transmitting and receiving examples	
Type 1	Command with no response from LM	**,##[CR][LF]	(HOST → LM)
Type 2	Command with response from LM	**,##[CR][LF] **, ○○○○○[CR][LF]	(HOST → LM) (HOST → LM)
Type 3	Command to transmit data after receiving an ACK response from LM	**,##[CR][LF] **,AK[CR][LF] **, ○○○○○[CR][LF] **, ○○○○○[CR][LF]	(HOST → LM) (HOST → LM) (HOST → LM) (HOST → LM)

**: Device number of LM 00 to 99 ##: Command ○○○○○: Data
Type 1 is used to change the operation mode and possible to command the plural LMs simultaneously with device number AL.
Type 2 is used for data read-out from LM.
Type 3 is used for data write-in to LM.

3. "Read-out" Commands (Type2)

No.	Transmission		Reply	
	Command	Contents	Reply data	Contents (ex.)
1	**,OR	Actual flow rate read out	**,±○○○○○	10000 = Actual flow rate 100.00%
2	**,SR	Flow rate setting read out (M: Flow rate monitoring setting)	**,+○○○○○	10000 = Flow rate setting 100.00%
3	**,SA	Analog flow rate setting read out (M: Analog flow rate monitoring)	**,±○○○○○	10000 = Analog flow rate setting 100.00%
4	**,SD	Digital flow rate setting read out (M: Digital flow rate monitoring)	**,+○○○○○	10000 = Digital flow rate setting 100.00%
5	**,VR	Valve voltage read out (M: Disable)	**,○○○○○	10000 = Valve voltage 100.00%※ (Piezoelectric actuator: 100%=120VDC solenoid actuator: 100%=15VDC)
6	**,ST	Status read out	**,○○○○○○	EDASFN = (Ref. ST code table)
7	**,AR	Alarm A range read out	**,○○	10= ±10%SP
8	**,BR	Alarm B range read out	**,○○	10= ±10%SP
9	**,RA	Alarm code read out	**,○○	C0= (Ref. Alarm code table)
10	**,TR	Alarm timer read out	**,○○	10= 10sec.
11	AL,DR	Device number read out	**,**	01= Device No.01 (00 to 99)
12	**,GR	Group number read out	**,G○	G○ = (0 to 9, A to Z Any 1 character)
13	**,LR	Ramping time read out (M: Disable)	**,○○○○	0060 = 60sec. (Max. 1310sec.)
14	**,R0 to 9	Preset flow rate setting read out (M: Flow rate monitoring setting)	**,+○○○○○	10000 = Flow rate setting value 100.00%
15	**,M0 to 3	Memory read out	**,○○○○○	○○○○○ = Any 5 ASCII code characters
16	**,IR	Totalized value read out	**,+○○○○○	00150 = 3000g/min (ex. Flow 100% with LM of 2g/min 2×10×150=3000g/min max.65535) (Note 1)
17	**,1R or 2R	Totalizer alarm level read out	**,+○○○○○	DEG = (Refer to Flow totalizer mode status code table)
18	**,RI	Totalizer mode status read out	**,○○○	

ST code

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

Alarm code

Digit	Code	Condition	Alarm timer	LED indicator
1	0	Alarm A none	-	Green (flashing every 1sec)
	P	Power supply voltage (+15VDC) drop	Disable	Off
	2	Flow totalizer alarm level2		Continuous Red
	C	Setting value ≠ flow rate output (M: Monitoring value ≠ Actual flow value)	Enable	Continuous Red
2	0	Alarm B none	-	Green (flashing every 1sec)
	Z	Abnormal zero offset	Disable	Red (flashing every 0.5sec) (Note2)
	V	Valve of voltage control change (M: Disable)	Disable	Red (flashing every 0.5sec)
	1	Flow totalizer alarm level 1	Disable	Red (flashing every 0.5sec)

Flow totalizer mode status code

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

Note2) Zero adjustment error alarms regardless of the "Enable" / "Disable" of the alarm.
※Read out value of valve voltage is as below.
·LC with built-in piezo actuator:100%=120VDC
·External valve or vaporizer with built-in piezo actuator:100%=120VDC
·External valve or vaporizer with built-in solenoid actuator:100%=15VDC

4. "Write-in" Commands (Type 3)

No.	Transmission (Level 1)		Reply data	Transmission (Level 2)		Reply data
	Command	Contents		Command	Contents (ex.)	
1	**,SW	Write in digital flow rate value (Default =10000) (M: Flow rate monitoring value)	**,AK	**,○○○○○	10000 = Flow rate setting value 100.00% (00000 to 10000)	**,+○○○○○
2	**,DW	Write in device number setting (Default=00)		**,○○	01 = Device No. 01 (00 to 99)	○○,○○
3	**,TS	Write in baud rate setting (Default=04)		**,○○	04 = 9600bps (Refer to: Baud rate code table)	**,○○
4	**,TP	Write in communication protocol setting (Default=01)		**,○○	01 = (Refer to: Communication protocol table)	**,○○
5	**,AW	Write in alarm A range (Default=05)		**,○○	10 = ±10%SP (01 to 99)	**,○○
6	**,BW	Write in alarm B range (Default=20)		**,○○	10 = ±10%SP (01 to 99)	**,○○
7	**,TW	Write in alarm timer (Default=05)		**,○○	10 = 10sec (00 to 99)	**,○○
8	**,Wn (n=0 to 9)	Write in preset flow rate setting value (Default=00000) (M: Flow rate monitoring setting)		**,○○○○○	10000 = Flow rate setting value 100.00%	**,+○○○○○
9	**,LW	Write in ramping time (M: Disable) (Default=00000) (Note 3)		**,○○○○○	00010=Ramping time10sec. (max.1310sec)	**,○○○○○
10	**,Un (n=0 to 3)	Write in memory (Default=…..)		**,○○○○○	○○○○○ = Any 5 ASCII code characters	**,AK
11	**,GW	Write in group number (Default=G0)		**,G○	G○ = (0 to 9, A to Z: Any 1 character)	**,G○
12	**,1W **,2W	Write in totalizer alarm level (Default=65535)		**,○○○○○	00150 = 3000g/min (ex. Flow 100% with LM of 2g/min 2×10×150=3000g/min max.65535) (Note 1)	**,○○○○○

5. "Operation Change" Commands (Type1)

**=AL: Command all LMs simultaneously

No.	Transmission (Level 1)	
	Command	Contents
1	**,CD	Digital control mode
	**,CA	Analog control mode
2	**,ZS	Zero reset
3	**,RE	Software reset
4	**,VC	Valve close (M: Disable)
	**,VO	Valve open (M: Disable)
	**,VH	Valve hold (M: Disable)
	**,VS	Valve servo (M : Disable)
5	**,CS	Slow response mode (M: Disable)
	**,CF	Fast response mode (M: Disable)
6	**,C3	2% Close mode (M: Disable) (Note 3)
	**,C4	2% Hold mode (M: Disable) (Note 4)
	**,CN	Normal control mode (M : Disable)
7	**,DA	Alarm A LED indicate disabled
	**,EA	Alarm A LED indicate enabled
8	**,DB	Alarm B LED indicate disabled
	**,EB	Alarm B LED indicate enabled
9	**,BS	Alarm B preset (M : Disable)
10	**,CL	Alarm code C clear
11	**,S○	Change to preset value 0 to 9
12	**,IG	Flow totalizer start
13	**,IS	Flow totalizer stop
14	**,I I	Flow totalized value clear
15	**,IM	Flow totalized value store (EEPROM)
16	**,D1 or 2	Flow totalizer alarm disable [1 or 2]
	**,E1 or 2	Flow totalizer alarm enable [1 or 2]
17	G○,##	Group control ○: Group No. ##: Command
18	**,PA	Analog control mode when power on
	**,PS	Operation mode before power on

Baud rate code

Code	Baud Rate
04	9600bps
05	19200bps
06	38400bps

Communication protocol

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

Note 1) Please refer to Additional Digital Function Manual.

Note 3) 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.

Note 4) On 2% Hold mode, if the flow rate was set to 1.6%F.S. (80mV) 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 1.6%F.S. (80mV).