

Kashiyama Dry Pump

Mu Series

Service Port & Serial Interface Option

Communication Specification

Date	History
'05.02	Prepared
'05.03	first

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Warning

This specification is a serial communication module on Mu pump series.

It takes a serial communication protocol that resemble other Kashiya's vacuum pumps.

Do not use the other command or contents that were entered on this specification.

The following software version is necessary to use the serial communication function.

Model : Mu 100 = JP03.00. or higher**

Model : Mu 300 = MP02.00. or higher**

1. Interface specification

Synchronization : 2-wire Asynchronous
 Communication speed : 9600bps
 Communication code : Extended ASCII Code (Reference : 7. Code table)
 Error checking : Even parity
 Interface : RS-232C
 Character constitution : Start bit 1bit
 Data bit 7bit
 Parity 1bit
 Stop bit 2bit

2. Connections and signals

Connector form : D-sub 9 pin receptacle (Option)

Pin No.	Symbol		Function	Remarks
2	BB	RxD	Receive Data	Pump <= Host
3	BA	TxD	Transmit Data	Pump => Host
5	AB	GND	Ground	-

3. Communication procedure

Query & Response style <Host Link> Protocol

Send a Query command to the Mu-series Service Port Serial Interface (SPSI).

* In this case, **do not divide the command**, and need to send in one frame(sentence).

When it is not able to receive the terminator-code within 150m second after the Start

(@ (0x40)) code received, the SPSI cause a time-out. (No Response)

As a result a RESPONSE command is received from SPSI.

Empty intervals necessary in 100m second between a Command message (sending or receiving).

4. Request command & message format

Host (Master) → Pump SPSI (Slave)

4.1. Read Command Format

Data start Position	Data Size	Item	Detail
1	1	Header	'@' (0x40)
2	2	Node No.	'00' (0x30 0x30)
4	2	Function Code	'RE' (0x52 0x45)
6	2	Bank No.	'00' (0x30 0x30)
8	4	Target address	'4501' (0x34 0x35 0x30 0x31) Refer section 4.2
12	4	Number of byte 0001 : recommend 0030 : maximum	'0001' (0x30 0x30 0x30 0x31)
16	2	FCS (check sum)	Check SUM value (Exclusive OR) Refer section 6
18	1	Terminator	'*' (0x2A)
19	1	Terminator	'cr' (0x0D)

4.2. Target address table

Target address	Function	Detail	Read / Write	Refer
4501	Back pump (DP) Run/Stop	0001:Run 0000:Stop	R/	Mu 100/300
4502	Warning	0001:Warning 0000:Normal	R/	Mu 100/300
4503	Alarm	0001:Alarm 0000:Normal	R/	Mu 100/300
4504	Fore pump (MBP) Run/Stop	0001:Run 0000:Stop	R/	Mu 300
4505	Remote/Local	0001:Remote 0000:Local	R/	Mu 100/300
4506	EMO	0001:EMO 0000:Normal	R/	option
4521	NN code	Alarm/Warning code	R/	Refer Section 4.3
4542	Back pump (DP) Current	0000-9999(x 0.1A)	R/	Mu 100/300
4543	Back pump (DP) Temperature	0000-0500(Celsius)	R/	Mu 100/300
4544	Back pump (DP) Cooling Water	0005-0231(x 0.1 L/min)	R/	Mu 100/300
4545	Back pump (DP) Back Pressure	0004-0200(kPa)	R/	option
4546	Back pump (DP) N2 purge flow	0003-0200(x 0.1 SLM)	R/	option
4550	Fore pump (MBP) Current	0000-9999(x 0.1A)	R/	Mu 300
4552	Back pump (DP) Speed	0000-9999:(r.p.m.)	R/	Mu 100/300

4553	Fore pump (MBP) Speed	0000-9999:(r.p.m.)	R/	Mu 300
4601	Running Time (High Byte)	0000-9999:(x 1000 Hour)	R/	Mu 100/300
4602	Running Time (Low Byte)	0000-9999:(x 0.1Hour)	R/	Mu 100/300

4.3. NN Code (Alarm/Warning) Index Table

NN Code No.	Alarm/Warning	Detail
01	Case Temp Hi	Back pump (DP) case temperature high
02	CW Flow Low	Cooling water flow low
03	Exh Pres Hi	Exhaust pressure high
04	N2 Flow Low	N2 purge gas flow low
05	TC2 Temp Hi	Thermo couple 2 temperature high
25	DP MDR Err	Back Pump (DP) motor driver error
26	MBP MDR Err	Fore Pump (MBP) motor driver error (Mu300)
27	DP MTemp Hi	Back Pump (DP) motor temperature high
28	MBP MTemp Hi	Fore Pump (MBP) motor temperature high (Mu300)
38	MDR1ComErr	Back Pump (DP) motor driver communication error
39	DP Run Rtn	Back Pump (DP) running signal return error
40	Open Phase	Back Pump (DP) motor power open phase
41	DP IPM Fail	Back Pump (DP) motor driver power module fail
42	DP Over Load	Back Pump (DP) over load
43	DP Over SPD	Back Pump (DP) over speed error
44	DP Low SPD	Back Pump (DP) low speed error
45	DP Sen Fail	Back Pump (DP) motor sensor fail
46	DP Over V	Back Pump (DP) over voltage
47	DP Pwr Fail	Back Pump (DP) power fail
48	DP EPR fail	Back Pump (DP) EPR fail
49	DP Lock ALM	Back Pump (DP) lock alarm
50	DP CPU Fail	Back Pump (DP) motor driver CPU fail
51	DP Ext ALM	Back Pump (DP) external alarm
52	DP Over Cur	Back Pump (DP) motor driver over current
53	DP Reverse	Back Pump (DP) reverse error
55	MDR2ComErr	Fore Pump (MBP) motor driver communication error
56	MBP Run Rtn	Fore Pump (MBP) running signal return error
57	MBP IPM Fail	Fore Pump (MBP) motor driver power module fail
58	MBP Over Load	Fore Pump (MBP) over load
59	MBP Over SPD	Fore Pump (MBP) over speed error
60	MBP Low SPD	Fore Pump (MBP) low speed error
61	MBP Sen Fail	Fore Pump (MBP) sensor fail
62	MBP Over V	Fore Pump (MBP) over voltage
63	MBP Pwr Fail	Fore Pump (MBP) power fail
64	MBP EPR fail	Fore Pump (MBP) EPR fail
65	MBP Lock ALM	Fore Pump (MBP) lock alarm
66	MBP CPU Fail	Fore Pump (MBP) motor driver CPU fail
67	MBP Ext ALM	Fore Pump (MBP) external alarm
68	MBP Over Cur	Fore Pump (MBP) motor driver over current
69	MBP Reverse	Fore Pump (MBP) reverse error

Note

Mu 300 has a Fore pump (Booster Pump : MBP).

5. Response message format

5.1. Read response (Parameter)

<Success Response>

Data start Position	Data Size	Item	Detail
1	1	Header	'@' (0x40)
2	2	Node No.	'00' (0x30 0x30)
4	2	Function Code	'RE' (0x52 0x45)
6	2	End Code	'00' (0x30 0x30)
8	4 * n	Read Data	'1234'
8+(4*n)	2	FCS (check sum)	Check SUM value (Exclusive OR) Refer section 6
10+(4*n)	1	Terminator	'*' (0x2A)
11+(4*n)	1	Terminator	'cr' (0x0D)

<Error Response>

Data start Position	Data Size	Item	Detail
1	1	Header	'@' (0x40)
2	2	Node No.	'00' (0x30 0x30)
4	2	Function Code	'RE' (0x52 0x45)
6	2	End Code	'13' (0x31 0x33) Refer section 5.2
8	2	FCS (check sum)	Check SUM value (Exclusive OR) Refer section 6
10	1	Terminator	'*' (0x2A)
11	1	Terminator	'cr' (0x0D)

In the case that there is not an answer from Pump SPSI or there was an ERROR response.

Please retry to send the request command after waiting 100 m second.

5.2. End code

<Response (End) code>

End code	Contents	Cause
00	Normal completion	No problem
13	FCS error	FCS wrong
14	Format error	Command format wrong
15	Entry No. data error	Out of range or too long
18	Frame length error	Maximum 132 byte
A3	FCS error 2	
A8	Frame length error 2	

6. FCS (check-SUM) calculation method

FCS (check-SUM) is converted ASCII (JIS7) Code from Exclusive OR data.

Example) Read command (Dry Pump Run/Stop status)

Data start Position	Data size	Item	Code
1	1	Header	'@' (0x40)
2	1/2	Node No.	'0' (0x30)
3	2/2	Node No.	'0' (0x30)
4	1/2	Function Code	'R' (0x52)
5	2/2	Function Code	'E' (0x45)
6	1/2	Bank No.	'0' (0x30)
7	2/2	Bank No.	'0' (0x30)
8	1/4	Target address	'4' (0x34)
9	2/4	Target address	'5' (0x35)
10	3/4	Target address	'0' (0x30)
11	4/4	Target address	'1' (0x31)
12	1/4	Number of byte	'0' (0x30)
13	2/4	Number of byte	'0' (0x30)
14	3/4	Number of byte	'0' (0x30)
15	4/4	Number of byte	'1' (0x31)
16	1/2	FCS (check sum)	'5' (0x35)
17	2/2	FCS (check sum)	'6' (0x36)
18	1/2	Terminator	'*' (0x2A)
19	2/2	Terminator	'cr' (0x0D)

FCS calculation

Data start Position	Data size	Item	Code
1	1	Header	'@' (0x40)
2	1/2	Node No.	'0' (0x30)
3	2/2	Node No.	'0' (0x30)
4	1/2	Function Code	'R' (0x52)
5	2/2	Function Code	'E' (0x45)
6	1/2	Bank No.	'0' (0x30)
7	2/2	Bank No.	'0' (0x30)
8	1/4	Target address	'4' (0x34)
9	2/4	Target address	'5' (0x35)
10	3/4	Target address	'0' (0x30)
11	4/4	Target address	'1' (0x30)
12	1/4	Number of byte	'0' (0x30)
13	2/4	Number of byte	'0' (0x30)
14	3/4	Number of byte	'0' (0x30)
15	4/4	Number of byte	'1' (0x31)
Exclusive Or Total			0x56

7. Extended ASCII Code table (JIS7 Code)

	0	1	2	3	4	5	6	7
0	NUL	DEL	(SP)	0	@	P	`	p
1	SOH	DC1	!	1	A	Q	a	q
2	STX	DC2	“	2	B	R	b	r
3	ETX	DC3	#	3	C	S	c	s
4	EOT	DC4	\$	4	D	T	d	t
5	ENQ	NAK	%	5	E	U	e	u
6	ACK	SYN	&	6	F	V	f	v
7	BEL	ETB	‘	7	G	W	g	w
8	BS	CAN	(	8	H	X	h	x
9	HT	EM	)	9	I	Y	i	y
A	LF	SUB	*	:	J	Z	j	z
B	VT	ESC	+	;	K	[	k	{
C	FF	FS	,	<	L	¥	l	|
D	CR	GS	-	=	M	]	m	}
E	SO	RS	.	>	N	^	n	~
F	SI	US	/	?	O	_	o	DEL

Example

Letter, code	Hexadecimal code
‘1’	0x 31 (31 hex)
‘R’	0x 52
‘@’	0x 40
‘*’	0x 2A
‘CR’	0x 0D

Revision

Revision	Item	Date	Remark	Author
1.0a	The first edition	Mar/14/05		Hiroki Itoh