ModMAG®

M-Series® | Electromagnetic Flow Meters

Electromagnetic Flow Meters

M1000 HART Protocol

Badger Meter

MAG-UM-03382-EN-02 (February 2021)

Installation Manual

CONTENTS

SCOPE OF THIS MANUAL

This manual is designed to instruct on how to set up the M1000 Flow Meter for HART communications.

BASIC SAFETY RECOMMENDATIONS

Please see "Basic safety recommendations" in the installation and operation manual ModMAG® M1000.

DYNAMIC VARIABLES

Primary Variable	Volumetric Flow rate
Secondary Variable	T1+
Tertiary Variable	T1-
Quaternary Variable	T1NET

Volumetric Flow Unit Codes

15	Cubic Feet per Minute
16	Gallons per Minute
17	Liters per Minute
18	Imperial Gallons per Minute
19	Cubic Meter per Hour
22	Gallons per Second
23	Million Gallons per Day
24	Liters per Second
25	Million Liters per Day
26	Cubic Feet per Second
27	Cubic Feet per Day
28	Cubic Meters per Second
29	Cubic Meters per Day
30	Imperial Gallons per Hour
31	Imperial Gallons per Day
130	Cubic Feet per Hour
131	Cubic Meters per Minute
132	Barrels per Second
133	Barrels per Minute
134	Barrels per Hour
136	Gallons per Hour
137	Imperial Gallons per Second
138	Liters per Hour
242	US Fluid ounces per minute

Volume Unit Code

40	Gallons
41	Liters
42	Imperial gallons
43	Cubic meters
46	Barrels
112	Cubic feet
236	Hectoliters
240	Mega gallons
241	Acre-feet

DEVICE VARIABLES

Code	Classification	Units	Value	Status	Response code
0	Volumetric flow	Selected flow unit	Actual flow rate	α	0
1	Velocity	m/s	Actual flow velocity	α	0
2	Volume	Selected volume unit	Totalizer T1+	β	0
3	Volume	Selected volume unit	Totalizer T1-	β	0
4	Volume	Selected volume unit	Totalizer T1Net	β	0
5	Analytical	%	Relative flow rate	α	0
6	Volumetric flow	m3/s	Actual flow rate	α	0
7	Volume	m3	Totalizer T1+	β	0
8	Volume	m3	Totalizer T1-	β	0
9	Volume	m3	Totalizer T1Net	β	0
10	Volume	m3	Totalizer T2+	β	0
11	Volume	m3	Totalizer T2-	β	0
12	Volume	m3	Totalizer T2Net	β	0
13	Analytical	%	Relative flow rate	α	14
14	Current	mA	Output current	α	14
15	Volumetric flow	Selected flow unit	Actual flow rate	α	14
16	Volume	Selected volume unit	Totalizer T1+	β	14
17	Volume	Selected volume unit	Totalizer T1-	β	14
18	Volume	Selected volume unit	Totalizer T1Net	β	14

Status α

Flow meter status	Device variable status
Flow simulation active	Manual fixed; Not limited
Bad	Bad; Not limited
Good	Good; Not limited

Status β

Flow meter status	Device variable status
Bad	Bad; Not limited
Good	Good; Not limited

FIELD DEVICE STATUS

Bit	Status indication	Meaning
7	Field device malfunction	Some fault occurred, except pulse output overload
6	Configuration changed	Set whenever a configuration change is made by any host, or through a local operator interface
5	Cold start	Set, for one transaction only to each master, when a field device is powered up
4	More status available	Some fault occurred. Use command #48 to retrieve further information
3	Analog output fixed	The device is in multidrop mode, or the flow simulation is active (command #241)
2	Analog output saturated	Analog output is out of range
1	Primary variable out of limits	Relative flow rate <0% or relative flow rate >100%
0	Non-primary variable out of limits	Not implemented, always 0

UNIVERSAL COMMANDS

Command 0 Read Transmitter Unique Identifier

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0	Device Type Code for Expansion	254
#1	Manufacturer Identification Mode	189 = Badger Meter
#2	Manufacturer Device Type	3 = M1000R
#3	Number of Requested Preambles	5
#4	Revision Level of Universal Command	7
#5	Revision Level of Transmitter Document	1
#6	Software Revision Level	14
#7	(Most Significant 5 Bits) Hardware Revision Level	1
	(Least Significant 3 Bits) Physical Signaling Code	0
#8	Flags, none defined at this time	0
#9	Device Identification Number, 24Bit, MSB	
#10	Device Identification Number, 24Bit	
#11	Device Identification Number, 24Bit, LSB	
#12	Number of Preambles to be sent	5 (5…20)*
#13	Maximum Number of Device Variables	13
#14	Configuration Change Counter, MSB	
#15	Configuration Change Counter, LSB	
#16	Extended Field Device Status	0
#17	Manufacturer Identification Code, MSB	0
#18	Manufacturer Identification Code, LSB	189 = Badger Meter
#19	Private Distributor Identification Code, MSB	0
#20	Private Distributor Identification Code, LSB	189 = Badger Meter
#21	Device Profile	1

* Configurable

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	02	80	00	00	82

Response Example:

Preamble	Start delimiter	Address	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	06	80	00	18	00 42	FE BD 03 05 07 01 0E 08 00 0A E1 39 05 0D 00 01 00 00 BD 00 BD 01	43

Command 1 Read Primary Variable

Request Data Bytes

Byte	Description
None	

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	01	00	EF

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	01	07	00 42	18 40 A0 C9 48	D7

Command 2 Read Loop Current and Percent of Range

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description
#0..#3	Primary Variable Loop Current (units of mA) , IEEE754
#4..#7	Primary Variable Percent of Range (units of percent) , IEEE754

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	02	00	EC

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	02	0A	00 00	41 61 78 9B 42 7C 4C 71	22

Data:

14.09194 mA

63.0746 %

Command 3 Read Dynamic Variables and Loop Current

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description
#0..#3	Primary Variable Loop Current (units of mA) , IEEE754
#4	Primary Variable Unit Code
#5..#8	Primary Variable, IEEE754
#9	Secondary Variable Unit Code
#10..#13	Secondary Variable, IEEE754
#14	Tertiary Variable Unit Code
#15..#18	Tertiary Variable, IEEE754
#19	Quaternary Variable Unit Code
#20..#23	Quaternary Variable, IEEE754

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	03	00	ED

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	03	1A	00 42	41 A0 00 00 18 40 A0 E0 91 29 49 4C EF 7C 29 42 7D F6 14 29 49 4C EB 84	D1

Data:

20 mA

5.0274128913879395 L/S

839415.75 L

63.49031066894531 L

839352.25 L

Command 3 Read Dynamic Variables and Loop Current

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0..#3	Primary Variable Loop Current (units of mA) , IEEE754	
#4	Primary Variable Unit Code	Volumetric Flow Unit Codes
#5..#8	Primary Variable, IEEE754	
#9	Secondary Variable Unit Code	Volume Unit Code
#10..#13	Secondary Variable, IEEE754	
#14	Tertiary Variable Unit Code	Volume Unit Code
#15..#18	Tertiary Variable, IEEE754	
#19	Quaternary Variable Unit Code	Volume Unit Code
#20..#23	Quaternary Variable, IEEE754	

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	03	00	ED

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	03	1A	00 42	41 A0 00 00 18 40 A0 E0 91 29 49 4C EF 7C 29 42 7D F6 14 29 49 4C EB 84	D1

Data:

20 mA

5.0274128913879395 L/S

839415.75 L

63.49031066894531 L

839352.25 L

Command 6 Write Polling Address

Request Data Bytes

Byte	Description	
#0	Polling Address	0..63
#1	Loop Current Mode	0 = signaling disabled; 1 = signaling enabled

Response Data Bytes

Byte	Description	
#0	Polling Address	0 (0..63)
#1	Loop Current Mode	0 = signaling disabled; 1 = signaling enabled

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Polling Address Selection
5	Too Few Data Bytes Received

Request Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	06	02	00 00	EA

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	06	04	00 48	00 00	A0

Data:

Polling address = 0

Loop Current Mode = 0 (signaling disabled)

Backward Compatibility TEST

Request Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	06	01	00	E9

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	06	04	00 40	00 01	A0

Data:

Polling address = 0

Loop Current Mode = 1 (signaling enabled)

Request Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	06	01	3F	D6

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	06	04	00 48	3F 00	9F

Data:

Polling address = 63

Command 7 Read Loop Configuration

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0	Polling Address	0 (0..63)
#1	Loop Current Mode	0=disabled; 1=enabled

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	07	00	E9

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	07	04	00 42	00 01	AA

Command 8 Read Dynamic Variable Classification

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0	Primary Variable Classification	66 = Volumetric Flow
#1	Secondary Variable Classification	68 = Volume
#2	Tertiary Variable Classification	68 = Volume
#3	Quaternary Variable Classification	68 = Volume

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	08	00	E6

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	08	06	00 42	42 44 44 44	A0

Command 9 Read Device Variable with Status

Request Data Bytes

Byte	Description
#0	Slot 0: Device Variable Code
#1	Slot 1: Device Variable Code
#2	Slot 2: Device Variable Code
#3	Slot 3: Device Variable Code
#4	Slot 4: Device Variable Code
#5	Slot 5: Device Variable Code
#6	Slot 6: Device Variable Code
#7	Slot 7: Device Variable Code

Response Data Bytes

Byte	Description	
#0	Extended Field Device Status	0
#1	Slot 0: Device Variable Code	
#2	Slot 0: Device Variable Classification	
#3	Slot 0: Units Code	
#4..#7	Slot 0: Device Variable Value	
#8	Slot 0: Device Variable Status	
#9..#16	Slot 1	
#17..#24	Slot 2	
#25..#32	Slot 3	
#33..#40	Slot 4	
#41..#48	Slot 5	
#49..#56	Slot 6	
#57..#64	Slot 7	
#65..#68	Time stamp	

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
14	Device Variables Returned for Device Variables
30	Command Response Truncated

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	09	08	00 00 00 00 00 00 00 00	EF

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	09	47	00 42	00 00 42 18 40 A0 F2 AC C0 01 43 15 40 23 F0 B3 C0 02 44 29 49 50 59 73 C0 03 44 29 42 7D F6 14 C0 04 44 29 49 50 55 7B C0 05 51 39 42 CC EC E0 C0 06 42 1C 3B A4 CF 8A C0 07 44 2B 44 55 59 8C C0 0E 8C 95 80	92

Data:

0 .. Extended Field Device Status

Slot 0: Volumetric Flow; 5.029623031616211 L/s; Good

Slot1: Velocity; 2.561566114425659 m/s; Good

Slot2: Volume; 853399.1875 L; Good

Slot3: Volume; 63.49031066894531 L; Good

Slot4: Volume; 853335.6875 L; Good

Slot 5: Analytical; 102.462646484375 %; Good

Slot 6: Volumetric Flow; 0.00502962339669466 m3/s; Good

Slot7: Volume; 853.399169921875 m3; Good

Time Stamp

Command 11 Read Unique Identifier Associated With Tag

Request Data Bytes

Byte	Description
#0..#5	Tag (Packed ASCII)

Response Data Bytes

Same as Command 0 Read Unique Identifier

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	00 00 00 00 00	0B	06	37 1C 30 C2 08 20	7E

Data:

"M1000 "

Response Example:

Preamble	Start delimiter	Address	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	00 00 00 00 00	0B	18	00 42	FE BD 03 05 07 01 0E 08 00 0A E1 39 05 0D 00 01 00 00 BD 00 BD 01	48

Command 12 Read Message

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description
#0..#23	Message (Packed ASCII)

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	0C	00	E2

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	0C	1A	00 42	08 11 07 15 28 0D 15 41 52 80 93 83 B2 03 71 C3 0C 20 82 08 20 82 08 20	29

Data:

“BADGER METER INC, M1000

Command 13 Read Tag Descriptor, and Date

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description
#0..#5	Tag (Packed ASCII)
#6..#17	Descriptor (Packed ASCII)
#18..#20	Date Code (Day, Month, Year)

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	0D	00	E3

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	0D	17	00 42	37 1C 30 C2 08 20 82 08 20 82 08 20 82 08 20 82 08 20 01 01 00	43

Data:

Tag: "M1000 "

Descriptor: " "

Day:1

Month: 1

Year: 1900

Command 14 Read PV Sensor Information

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0..#2	Transducer Serial Number	
#3	Transducer Limits and Minimum Span Units Code	Volumetric Flow Unit Codes
#4..#7	Upper Transducer Limit	12 m/s
#8..#11	Lower Transducer Limit	0.03m/s
#12..#15	Minimum Span	0.1*(Upper-Lower)

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	0E	00	E0

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	0E	12	00 42	0A E1 39 18 41 BC 7E DE 3D 71 46 3A 40 16 6B 62	4C

Data:

Transducer Serial Number: 0AE139

Transducer Limits and Minimum Span Units Code: L/s

Upper Transducer Limit: 23.561946868896484

Lower Transducer Limit: 0.05890486389398575

Minimum Span: 2.350304126739502

Command 15 Read PV Output Sensor Information

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0	PV Alarm Selection Code	0 .. High 1 … Low 251 … None 252 … Unknown
#1	PV Transfer Function Code	0 = linear
#2	PV Upper and Lower Range Values Units Code	Volumetric Flow Unit Codes
#3..#6	PV Upper Range Value	Full Scale Flow
#7..#10	PV Lower Range Value	0 (always zero)
#11..#14	PV Damping Value	0 (always zero)
#15	Write Protect Code	251 = Not Implemented
#16	Reserved	250
#17	PV Analog Channel Flags	0 (always zero)

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	0F	00	E1

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	0F	14	00 42	FB 00 18 40 9D 14 63 00 00 00 00 00 00 00 00 FB FA 00	FB

Data:

Alarm Selection: None

Transfer Function: Linear

Upper Range: 4.908738613128662L/s

Lower Range: 0 L/s

Damping Value: 0 s

Write Protect Code: None

Reserved: 250

Analog Channel Flags: 0

Command 16 Read Assembly Number

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description
#0..#2	Final Assembly Number

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	10	00	FE

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	10	05	00 42	0A 1B 2C	80

Data:

Final Assembly Number: 0A 1B 2C

Command 17 Write Message

Request Data Bytes

Byte	Description
#0..#23	Message (Packed ASCII)

Response Data Bytes

Byte	Description
#0..#23	Message (Packed ASCII)

Response Codes

Code	Description
0	No Command Specific Error
5	Too Few Data Bytes Received

Request Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	11	18	08 11 07 15 28 0D 15 41 52 80 93 83 B2 03 71 C3 0C 20 82 08 20 82 08 2D	7D

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	11	1A	00 40	08 11 07 15 28 0D 15 41 52 80 93 83 B2 03 71 C3 0C 20 82 08 20 82 08 2D	3B

Data:

"BADGER METER INC, M1000 -"

Command 18 Write Tag, Description, Date

Request Data Bytes

Byte	Description
#0..#5	Tag (Packed ASCII)
#6..#17	Descriptor (Packed ASCII)
#18..#20	Date Code (Day, Month, Year)

Response Data Bytes

Byte	Description
#0..#5	Tag (Packed ASCII)
#6..#17	Descriptor (Packed ASCII)
#18..#20	Date Code (Day, Month, Year)

Response Codes

Code	Description
0	No Command Specific Error
5	Too Few Data Bytes Received
9	Invalid Date Code Detected

Request Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	12	15	37 1C 30 C2 08 20 82 08 20 82 08 20 82 08 20 82 08 20 1B 08 72	79

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	12	17	00 42	37 1C 30 C2 08 20 82 08 20 82 08 20 82 08 20 82 08 20 1B 08 72	3D

Data:

Tag: "M1000 "

Descriptor: " "

Day:27

Month: 8

Year: 2014

Command 19 Write Assembly Number

Request Data Bytes

Byte	Description
#0..#2	Final Assembly Number

Response Data Bytes

Byte	Description
#0..#2	Final Assembly Number

Response Codes

Code	Description
0	No Command Specific Error
5	Too Few Data Bytes Received

Request Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	13	03	2C 1B 0A	C3

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	13	05	00 42	2C 1B 0A	83

Data:

Final Assembly Number: 2C 1B 0A

Command 20 Read Long Tag

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description
#0..#31	Long tag (Latin-1)

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	14	00	FA

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF F	86	BD 03 0A E1 39	14	22	00 42	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	9E

Command 21 Read Unique Identifier Associated With Long Tag

Request Data Bytes

Byte	Description
#0..#31	Long tag (Latin-1)

Response Data Bytes

Same as Command 0 Read Unique Identifier

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	00 00 00 00 00	15	20	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	B7

Response Example:

Preamble	Start delimiter	Address	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	00 00 00 00 00	15	18	00 42	FE BD 03 05 07 01 0E 08 00 0A E1 39 05 0D 00 02 00 00 BD 00 BD 01	55

Command 22 Write Long tag

Request Data Bytes

Byte	Description
#0..#31	Long tag (Latin-1)

Response Data Bytes

Byte	Description
#0..#31	Long tag (Latin-1)

Response Codes

Code	Description
0	No Command Specific Error
5	Too Few Data Bytes Received

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	16	20	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	D8

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	16	22	00 42	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	9C

Command 38 Reset Configuration Changed Flag

Request Data Bytes

Byte	Description
#0..#1	Configuration Change Counter

Response Data Bytes

Byte	Description
#0..#1	Configuration Change Counter

Response Codes

Code	Description
0	No Command Specific Error
5	Too Few Data Bytes
9	Configuration Change Counter Mismatch

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	26	00	C8

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	26	02	00 02	C8

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	26	04	00 02	00 02	C8

Command 48 Read Additional Device Status

Request Data Bytes

Byte	Description

Response Data Bytes

Byte	Description	
#0	Device Specific Status Bit 0 Low Power Warning Bit 1Measure Timeout Bit 2 Empty Pipe Bit 3 Common Mode Voltage Overload Bit 4 ∑ΔADC Over range Bit 5 Coil Current Error Bit 6 Flow Overload Bit 7 EEPROM Error	
#1	Device Specific Status Bit 0 Config Error Bit 1Pulse Overload Bit 2 Coil Disconnected Bit 3 Coil Shorted Bit 4 Excitation Frequency Error	
#2		Always 0
#3		Always 0
#4		Always 0
#5		Always 0
#6		Always 0
#7		Always 0
#8		Always 0

Response Codes

Code	Description
0	No Command Specific Error
5	Too Few Data Bytes
14	Dynamic Variables Returned For Device Variables

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	30	00	DE

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	30	0B	00 42	00 00 00 00 00 00 00 00 00 00	93

ADDITIONAL FEATURES

Command 40 Enter/Exit Fixed Current Mode

Request Data Bytes

Byte	Description
#0..#3	Primary Variable Fixed Current Level (units of mA) , IEEE754

Response Data Bytes

Byte	Description
#0..#3	Actual Primary Variable Current Level (units of mA) , IEEE754

Response Codes

Code	Description
0	No Command Specific Error
3	Passed Parameter Too Large
4	Passed Parameter Too Small
5	Too Few Data Bytes Received
11	Loop Current Not Active (Device in Multidrop Mode)

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	28	04	40 80 00 00	02

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	28	06	00 08	40 80 00 00	0C

Data:

4mAFixed

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	28	04	00 00 00 00	C2

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	28	06	00 00	41 61 8B FC	93

Data:

14.09667 mA Actual

Command 42 Perform Device Reset

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description
None	

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	2A	00	C4

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	2A	02	00 4A	88

Command 44 Write Primary Variable Units

Request Data Bytes

Byte	Description	
#0	Primary Variable Units Code	Volumetric Flow Unit Codes

Response Data Bytes

Byte	Description	
#0	Primary Variable Units Code	Volumetric Flow Unit Codes

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	2C	01	11	D2

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	2C	03	00 42	11	96

Command 59 Write Number of Response Preambles

Request Data Bytes

Byte	Description	
#0	Number of preambles to be sent with the response message from the Slave to the Master	5 .. 20

Response Data Bytes

Byte	Description	
#0	Number of preambles to be sent with the response message from the Slave to the Master	5 .. 20

Response Codes

Code	Description
0	No Command Specific Error
3	Passed Parameter Too Large
4	Passed Parameter Too Small
5	Too Few Data Bytes Received

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	3B	01	05	D1

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	3B	03	00 40	05	97

DEVICE SPECIFIC COMMANDS

Command 130 Read Product Code

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0..#1	Product Code	4 .. M1000R

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	82	00	6C

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	82	04	00 42	00 04	2A

Command 131 Read Product Name

Request Data Bytes

Byte	Description	
None		

Response Data Bytes

Byte	Description	
#0..#15	Product Name, Latin-1	“M1000R”

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	83	00	6D

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	83	12	00 42	4D 31 30 30 30 52 00 00 00 00 00 00 00 00 00 00	27

Command 132 Read Firmware Name

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0..#31	Firmware Name, Latin-1	"M1000R_E_STM32F107RC"

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	84	00	6A

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	84	22	00 42	4D 31 30 30 30 52 5F 45 5F 53 54 4D 33 32 46 31 30 37 52 43 00 00 00 00 00 00 00 00 00 00 00 00	7F

Command 133 Read Application Version

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description
#0..#19	Application Version, Latin-1

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	85	00	6B

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	85	16	00 42	31 2E 30 2E 31 36 62 30 37 00 00 00 00 00 00 00 00 00 00 00	58

Application Version = "1.0.16b07"

Command 134 Read Compile Date

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description
#0	Day
#1	Month
#2	Year

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	86	00	68

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	86	05	00 00	10 0A 72	01

Day = 16

Month = 10 (October)

Year =2014

Command 135 Read OTP Boot Checksum

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description
#0..#4	OTP Boot Checksum, Latin-1

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	87	00	69

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	87	07	00 42	36 62 34 37 00	7F

OTP Boot Checksum = "6b47"

Command 136 Read Flash OS Checksum

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description
#0..#4	Flash OS Checksum, Latin-1

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	88	00	66

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	88	07	00 42	33 63 66 34 00	25

Flash OS Checksum = "2a53"

Command 141 Read Serial Number

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description
#0..#8	Serial Number, Latin-1

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	8D	00	63

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	8D	0B	00 42	30 37 31 33 32 30 31 37 00	2F

Serial Number = “07132017”

Format:

WWYYMSSS, where WW – week, YY – year, M – PCB manufacturer, SSS – serial number in given week and year

Command 150 Read Detector Diameter

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0..#1	Detector Diameter	1 DN6 2 DN8 3 DN10 4 DN15 5 DN20 6 DN25 7 DN32 8 DN40 9 DN50 10 DN65 11 DN80 12 DN100 13 DN125 14 DN150 15 DN200 16 DN250 17 DN300 18 DN350 19 DN400 20 DN450 21 DN500 22 DN550 23 DN600 24 DN700 25 DN750 26 DN800 27 DN900 28 DN1000 29 DN1050 30 DN1200 31 DN1400 32 DN1600 33 DN1800 34 DN2000 35 DN1500

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	96	00	78

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	96	04	00 42	00 09	33

Detector Diameter = DN50

Command 154 Read Detector Factor

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description
#0..#4	Detector Factor , IEEE754

Adjusted by manufacturer during wet calibration

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	9A	00	74

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	9A	06	00 42	43 82 00 00	F5

Detector Factor = 260.0

Command 156 Read Detector Offset

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0..#4	Detector Offset [m/s], IEEE754	Adjusted by manufacturer during wet calibration

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	9C	00	72

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	9C	06	00 42	80 00 00 00	B2

Detector Offset = 0.0

Command 158 Read Amplifier Factor

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0..#4	Amplifier Factor [div/V], IEEE754	Adjusted by manufacturer during dry calibration

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	9E	00	70

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	9E	06	00 42	4B 81 64 42	DC

Amplifier Factor = 16959620.0

Command 160 Read Detector Current

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0..#4	Detector Current [A], IEEE754	Adjusted by manufacturer during dry calibration

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	A0	00	4E

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	A0	06	00 42	3D 8B 9F 72	55

Detector Current = 0.06817521

Command 162 Read Power Line Frequency

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0..#1	Power Line Frequency	0 50Hz 1 60Hz

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	A2	00	4C

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	A2	04	00 42	00 00	0E

Power Line Frequency = 50Hz

Command 163 Write Power Line Frequency

Request Data Bytes

Byte	Description	
#0..#1	Power Line Frequency	0 50Hz 1 60Hz

Response Data Bytes

Byte	Description	
#0..#1	Power Line Frequency	0 50Hz 1 60Hz

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
16	Access Restricted

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	A3	02	00 01	4E

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	A3	04	00 42	00 01	0E

Power Line Frequency = 60Hz

Command 164 Read Excitation Frequency

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0..#1	Excitation Frequency	See Excitation Frequency Enumeration

Excitation Frequency Enumeration

Power Line Frequency	50 Hz	60 Hz
1	3.125 Hz	3.75 Hz
2	6.25 Hz	7.5 Hz
3	12.5 Hz	15 Hz
4	2.083 Hz	2.5 Hz
5	1.0417 Hz	1.25 Hz
6	0.833 Hz	0.833 Hz

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	A4	00	4A

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	A4	04	00 42	00 03	0B

Command 165 Write Excitation Frequency

Request Data Bytes

Byte	Description	
#0..#1	Excitation Frequency	See Excitation Frequency Enumeration

Response Data Bytes

Byte	Description	
#0..#1	Excitation Frequency	See Excitation Frequency Enumeration

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
16	Access Restricted

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	A5	02	00 01	48

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	A5	04	00 42	00 01	08

Command 166 Read Scale Factor

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0..#3	Scale Factor, IEEE754	Typically 1.0 (0.95 … 1.05)

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	A6	00	48

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	A6	06	00 42	3F 80 00 00	B7

Scale Factor = 1.0

Command 167 Write Scale Factor

Request Data Bytes

Byte	Description	
#0..#3	Scale Factor, IEEE754	Typically 1.0 (0.95 … 1.05)

Response Data Bytes

Byte	Description	
#0..#3	Scale Factor, IEEE754	Typically 1.0 (0.95 … 1.05)

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
16	Access Restricted

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	A7	04	3F 80 00 00	F2

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	A7	06	00 42	3F 80 00 00	B6

Scale Factor = 1.0

Command 172 Read Polarization Voltage

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0..#3	Polarization Voltage [V], IEEE754	For debugging purposes

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	AC	00	42

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	AC	06	00 00	3A 80 4A ED	5D

Polarization Voltage = 0.000978795 V

Command 173 Read Full Scale Flow

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0..#3	Full Scale Flow [Actual Flow Rate Unit], IEEE754	Full Scale Flow is identical with PV Upper Range Value

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	AD	00	43

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	AD	06	00 42	43 93 43 1D	8D

Full Scale Flow = 294.5243

Command 174 Write Full Scale Flow

Request Data Bytes

Byte	Description	
#0..#3	Full Scale Flow [Actual Flow Rate Unit], IEEE754	Full Scale Flow is identical with PV Upper Range Value

Response Data Bytes

Byte	Description	
#0..#3	Full Scale Flow [Actual Flow Rate Unit], IEEE754	Full Scale Flow is identical with PV Upper Range Value

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
16	Access Restricted

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	AE	04	43 93 43 1D	CA

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	AE	06	00 42	43 93 43 1D	8E

Full Scale Flow = 294.5243

Command 175 Read Flow Unit

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0	Volumetric Flow Unit	Volumetric Flow Unit Codes

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	AF	00	41

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	AF	03	00 42	11	15

Flow Unit = Liters per Minute

Command 176 Write Flow Unit

Request Data Bytes

Byte	Description	
#0	Volumetric Flow Unit	Volumetric Flow Unit Codes

Response Data Bytes

Byte	Description	
#0	Volumetric Flow Unit	Volumetric Flow Unit Codes

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
16	Access Restricted

Request Example:

Start delimiter	Address	Command	Byte count	Data	Check sum
82	BD 03 0A E1 39	B0	01	11	4E

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	B0	03	00 42	11	0A

Flow Unit = Liters per Minute

Command 177 Read Volume Unit

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0	Volumetric Volume Unit	Volume Unit Codes

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	B1	00	5F

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	B1	03	00 42	2B	31

Volume Unit = Cubic Meters (m3)

Command 178 Write Volume Unit

Request Data Bytes

Byte	Description	
#0	Volumetric Volume Unit	Volume Unit Codes

Response Data Bytes

Byte	Description	
#0	Volumetric Volume Unit	Volume Unit Codes

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
16	Access Restricted

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	B2	01	29	74

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	B2	03	00 42	29	30

Volume Unit = Liters

Command 181 Read Full Scale Velocity

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description
#0…#3	Full Scale Velocity [m/s], IEEE754

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	B5	00	5B

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	B5	06	00 42	40 20 00 00	7B

Full Scale Velocity = 2.5 m/s

Command 182 Write Full Scale Velocity

Request Data Bytes

Byte	Description
#0…#3	Full Scale Velocity [m/s], IEEE754

Response Data Bytes

Byte	Description
#0…#3	Full Scale Velocity [m/s], IEEE754

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
16	Access Restricted

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	B6	04	41 20 00 00	3D

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	B6	06	00 40	41 20 00 00	7B

Full Scale Velocity = 10 m/s

Command 183 Read Low Flow Cut Off

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0…#3	Low Flow Cut Off [%], IEEE754	Percent of Full Scale Flow

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	B7	00	59

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	B7	06	00 00	40 00 00 00	1B

Low Flow Cut Off = 2.0 %

Command 184 Write Low Flow Cut Off

Request Data Bytes

Byte	Description	
#0…#3	Low Flow Cut Off [%], IEEE754	Percent of Full Scale Flow (0.0 … 10.0)

Response Data Bytes

Byte	Description	
#0…#3	Low Flow Cut Off [%], IEEE754	Percent of Full Scale Flow

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
16	Access Restricted

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	B8	04	00 00 00 00	52

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	B8	06	00 40	00 00 00 00	14

Low Flow Cut Off = 0.0 %

Command 185 Read Flow Direction

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0	Flow Direction	0 … Unidirectional (meter ignores negative flow rate) 1 … Bidirectional

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	B9	00	57

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	B9	03	00 00	00	50

Flow Direction = Unidirectional

Command 186 Write Flow Direction

Request Data Bytes

Byte	Description	
#0	Flow Direction	0 … Unidirectional (meter ignores negative flow rate) 1 … Bidirectional

Response Data Bytes

Byte	Description	
#0	Flow Direction	0 … Unidirectional (meter ignores negative flow rate) 1 … Bidirectional

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
16	Access Restricted

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	BA	01	01	54

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	BA	03	00 40	01	12

Flow Direction = Bidirectional

Command 189 Read Coil Settling Time

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0…#3	Coil Settling Time [s], IEEE754	For debugging purposes

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	BD	00	53

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	BD	06	00 00	3A 91 A2 B4	EC

Coil Settling Time = 0.00111111 s

Command 190 Read Digital Input Operation

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0	Digital Input Operation	0 … None 1 … Totalizer Reset (Active input resets totalizers) 2 … Zero Flow(Active input zeroes actual flow rate) 4 … ADE (Digital input is assigned to ADE communication)

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	BE	00	50

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	BE	03	00 00	00	57

Digital Input Operation = None

Command 191 Write Flow Direction

Request Data Bytes

Byte	Description	
#0	Digital Input Operation	0 … None 1 … Totalizer Reset (Active input resets totalizers) 2 … Zero Flow(Active input zeroes actual flow rate) 4 … ADE (Digital input is assigned to ADE communication)

Response Data Bytes

Byte	Description	
#0	Digital Input Operation	0 … None 1 … Totalizer Reset (Active input resets totalizers) 2 … Zero Flow(Active input zeroes actual flow rate) 4 … ADE (Digital input is assigned to ADE communication)

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
16	Access Restricted

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	BF	01	01	51

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	BF	03	00 40	01	17

Digital Input Operation = Totalizer Reset

Command 192 Read Digital Input Status

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0	Digital Input Status	0 … Not Active (Unpowered) 1 … Active (Powered)

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	C0	00	2E

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	C0	03	00 00	00	29

Digital Input Status = Not Active (Unpowered)

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	C0	03	00 00	01	28

Digital Input Status = Active (Powered)

Command 197 Write Alarm Mode

Request Data Bytes

Byte	Description	
#0	Alarm Mode	0 .. High 1 … Low 251 … None

Response Data Bytes

Byte	Description	
#0	Alarm Mode	0 .. High 1 … Low 251 … None 252 … Unknown

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
16	Access Restricted

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	C5	01	00	2A

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	C5	03	00 40	00	6C

Alarm Mode = High

Command 200 Read Pulses per Unit

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0…#3	Pulses per Unit, IEEE754	Refers to Actual Volume Unit

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	C8	00	26

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	C8	06	00 00	3F 80 00 00	9B

Pulses per Unit = 1.0

Command 201 Write Pulses per Unit

Request Data Bytes

Byte	Description	
#0…#3	Pulses per Unit, IEEE754	Refers to Actual Volume Unit

Response Data Bytes

Byte	Description	
#0…#3	Pulses per Unit, IEEE754	Refers to Actual Volume Unit

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
16	Access Restricted

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	C9	04	41 20 00 00	42

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	C9	06	00 40	41 20 00 00	04

Pulses per Unit = 10.0

Command 202 Read Pulse Width

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0…#1	Pulse Width [ms]	5…2000 ms 0 ms (means 50% duty cycle)

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	CA	00	24

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	CA	04	00 00	00 00	24

Pulse Width = 0 ms (50% duty cycle)

Command 203 Write Pulse Width

Request Data Bytes

Byte	Description	
#0…#1	Pulse Width [ms]	5 … 2000 ms 0 ms (means 50% duty cycle)

Response Data Bytes

Byte	Description	
#0…#1	Pulse Width [ms]	5 … 2000 ms 0 ms (means 50% duty cycle)

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
16	Access Restricted

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	CB	02	00 32	15

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	CB	04	00 40	00 32	57

Pulse Width = 50 ms

Command 204 Read Flow Alarm Min

If actual flow is outside the limit (lower than Min or higher than Max) corresponding output is activated.

Request Data Bytes

Byte	Description	
#0	Digital Output Number	1 … OUT1 2 … OUT2

Response Data Bytes

Byte	Description	
#0	Digital Output Number	1 … OUT1 2 … OUT2
#1	Flow Alarm Min [%]	0 … 100 %; Percent of Full Scale Flow

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	CC	01	01	22

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	CC	04	00 00	01 00	23

Digital Output Number = OUT1

Flow Alarm Min = 0 %

Command 205 Write Flow Alarm Min

If actual flow is outside the limit (lower than Min or higher than Max) corresponding output is activated.

Request Data Bytes

Byte	Description	
#0	Digital Output Number	1 … OUT1 2 … OUT2
#1	Flow Alarm Min [%]	0 … 100 %; Percent of Full Scale Flow

Response Data Bytes

Byte	Description	
#0	Digital Output Number	1 … OUT1 2 … OUT2
#1	Flow Alarm Min [%]	0 … 100 %; Percent of Full Scale Flow

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
16	Access Restricted

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	CD	02	01 01	21

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	CD	04	00 40	01 01	63

Digital Output Number = OUT1

Flow Alarm Min = 1 %

Command 206 Read Flow Alarm Max

If actual flow is outside the limit (lower than Min or higher than Max) corresponding output is activated.

Request Data Bytes

Byte	Description	
#0	Digital Output Number	1 … OUT1 2 … OUT2

Response Data Bytes

Byte	Description	
#0	Digital Output Number	1 … OUT1 2 … OUT2
#1	Flow Alarm Max [%]	0 … 100 %; Percent of Full Scale Flow

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	CE	01	01	20

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	CE	04	00 00	01 64	45

Digital Output Number = OUT1

Flow Alarm Max = 100 %

Command 207 Write Flow Alarm Max

If actual flow is outside the limit (lower than Min or higher than Max) corresponding output is activated.

Request Data Bytes

Byte	Description	
#0	Digital Output Number	1 … OUT1 2 … OUT2
#1	Flow Alarm Max [%]	0 … 100 %; Percent of Full Scale Flow

Response Data Bytes

Byte	Description	
#0	Digital Output Number	1 … OUT1 2 … OUT2
#1	Flow Alarm Max [%]	0 … 100 %; Percent of Full Scale Flow

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
16	Access Restricted

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	CF	02	01 60	42

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	CF	04	00 40	01 60	00

Digital Output Number = OUT1

Flow Alarm Max = 96 %

Command 208 Read Digital Output Mode

Request Data Bytes

Byte	Description	
#0	Digital Output Number	1 … OUT1 2 … OUT2

Response Data Bytes

Byte	Description	
#0	Digital Output Number	1 … OUT1 2 … OUT2
#1	Digital Output Mode	0 … Normally Open 1 … Normally Closed

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	D0	01	01	3E

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	D0	04	00 00	01 00	3F

Digital Output Number = OUT1

Digital Output Mode = Normally Open

Command 209 Write Digital Output Mode

Request Data Bytes

Byte	Description	
#0	Digital Output Number	1 … OUT1 2 … OUT2
#1	Digital Output Mode	0 … Normally Open 1 … Normally Closed

Response Data Bytes

Byte	Description	
#0	Digital Output Number	1 … OUT1 2 … OUT2
#1	Digital Output Mode	0 … Normally Open 1 … Normally Closed

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
16	Access Restricted

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	D1	02	01 01	3D

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	D1	04	00 40	01 01	7F

Digital Output Number = OUT1

Digital Output Mode = Normally Closed

Command 210 Read Digital Output Operation

Request Data Bytes

Byte	Description	
#0	Digital Output Number	1 … OUT1 2 … OUT2

Response Data Bytes

Byte	Description	
#0	Digital Output Number	1 … OUT1 2 … OUT2
#1	Digital Output Operation	See Digital Output Operation Enumeration

Digital Output Operation Enumeration

0	Off
1	Comparator
2	Empty Pipe
3	Error Alarm
4	Forward
6	Reverse
7	Frequency
8	Preset
9	Direction
10	Test
11	Ade
12	Loopback
13	Quadrature

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	D2	01	01	3C

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	D2	04	00 00	01 01	3C

Digital Output Number = OUT1

Digital Output Operation = Comparator

Command 211 Write Digital Output Operation

Request Data Bytes

Byte	Description	
#0	Digital Output Number	1 … OUT1 2 … OUT2
#1	Digital Output Operation	See Digital Output Operation Enumeration

Response Data Bytes

Byte	Description	
#0	Digital Output Number	1 … OUT1 2 … OUT2
#1	Digital Output Operation	See Digital Output Operation Enumeration

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
16	Access Restricted

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	D3	02	01 09	37

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	D3	04	00 40	01 09	75

Digital Output Number = OUT1

Digital Output Operation = Direction

Command 212 Read Full Scale Frequency

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description
#0…#3	Full Scale Frequency [Hz], IEEE754

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	D4	00	3A

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	D4	06	00 40	43 44 59 7C	5A

Full Scale Frequency = 196.3495 Hz

Command 213 Write Full Scale Frequency

Request Data Bytes

Byte	Description	
#0…#3	Full Scale Frequency [Hz], IEEE754	Max. 10 000 Hz

Response Data Bytes

Byte	Description
#0…#3	Full Scale Frequency [Hz], IEEE754

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
16	Access Restricted

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	D5	04	42 C8 00 00	B5

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	D5	06	00 40	42 C8 00 00	F3

Full Scale Frequency = 100.0 Hz

Command 214 Read Median

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0..#1	Median Filter	1 ... 13 Length of filter

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	D6	00	38

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	D6	04	00 00	00 01	39

Median = 1

Command 215 Write Median

Request Data Bytes

Byte	Description	
#0..#1	Median Filter	1 ... 13 Length of filter

Response Data Bytes

Byte	Description	
#0..#1	Median Filter	1 ... 13 Length of filter

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
16	Access Restricted

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	D7	02	00 01	3A

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	D7	04	00 40	00 01	78

Median = 1

Command 216 Read Moving Average

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0..#1	Moving Average Filter	1 ... 200 Length of filter

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	D8	00	36

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	D8	04	00 00	00 01	37

Median = 1

Command 217 Write Moving Average

Request Data Bytes

Byte	Description	
#0..#1	Moving Average Filter	1 ... 200 Length of filter

Response Data Bytes

Byte	Description	
#0..#1	Moving Average Filter	1 ... 200 Length of filter

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
16	Access Restricted

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	D9	02	00 01	34

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	D9	04	00 40	00 01	76

Moving Average = 1

Command 229 Read Menu Language Code

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0	Menu Language Code	0 … English 1 … German 2 … Czech 3 … Spanish 4 … French 5 … Russian 6 … Italian

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	E5	00	0B

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	E5	03	00 00	00	0C

Menu Language Code = English

Command 230 Write Menu Language Code

Request Data Bytes

Byte	Description	
#0	Menu Language Code	0 … English 1 … German 2 … Czech 3 … Spanish 4 … French 5 … Russian 6 … Italian

Response Data Bytes

Byte	Description	
#0	Menu Language Code	0 … English 1 … German 2 … Czech 3 … Spanish 4 … French 5 … Russian 6 … Italian

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
16	Access Restricted

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	E6	01	01	08

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	E6	03	00 40	01	4E

Menu Language Code = German

Command 231 Read Empty Pipe Mode

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0	Empty Pipe Mode	0 … Empty Pipe Detection Off 1 … Empty Pipe Detection On

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	E7	00	09

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	E7	03	00 00	01	0F

Empty Pipe Mode = Empty Pipe Detection On

Command 232 Write Empty Pipe Mode

Request Data Bytes

Byte	Description	
#0	Empty Pipe Mode	0 … Empty Pipe Detection Off 1 … Empty Pipe Detection On

Response Data Bytes

Byte	Description	
#0	Empty Pipe Mode	0 … Empty Pipe Detection Off 1 … Empty Pipe Detection On

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
16	Access Restricted

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	E8	01	00	07

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	E8	03	00 40	00	41

Empty Pipe Mode = Empty Pipe Detection Off

Command 233 Read Empty Pipe Threshold Resistance

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0…#3	Empty Pipe Threshold Resistance [Ω], IEEE754	60 000 Ω typ.

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	E9	00	07

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	E9	06	00 00	47 6A 60 00	48

Empty Pipe Threshold Resistance = 60 000 Ω

Command 234 Write Empty Pipe Threshold Resistance

Request Data Bytes

Byte	Description	
#0…#3	Empty Pipe Threshold Resistance [Ω], IEEE754	60 000 Ω typ.

Response Data Bytes

Byte	Description	
#0…#3	Empty Pipe Threshold Resistance [Ω], IEEE754	60 000 Ω typ.

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
16	Access Restricted

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	EA	04	47 6A 60 00	4D

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	EA	06	00 40	47 6A 60 00	0B

Empty Pipe Threshold Resistance = 60 000 Ω

Command 238 Read Empty Pipe Actual Resistance

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description
#0…#3	Empty Pipe Actual Resistance [Ω], IEEE754

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	EE	00	00

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	EE	06	00 40	42 A9 26 D4	5B

Empty Pipe Actual Resistance = 84.5758 Ω

Command 240 Read Flow Simulation

Request Data Bytes

Byte	Description
None	

Response Data Bytes

Byte	Description	
#0	Flow Simulation [%]	-128 … OFF + 0 … 0% +10 … +10% +20 … +20% +30 … +30% +40 … +40% +50 … +50% +60 … +60% +70 … +70% +80 … +80% +90 … +90% +100 … +100% -10 … -10% -20 … -20% -30 … -30% -40 … -40% -50 … -50% -60 … -60% -70 … -70% -80 … -80% -90 … -90% -100 … -100%

Response Codes

Code	Description
0	No Command Specific Error

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	F0	00	1E

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	F0	03	00 00	80	99

Flow Simulation = Off

Command 241 Write Flow Simulation

Request Data Bytes

Byte	Description	
#0	Flow Simulation [%], not stored to non-volatile memory	-128 … OFF + 0 … 0% +10 … +10% +20 … +20% +30 … +30% +40 … +40% +50 … +50% +60 … +60% +70 … +70% +80 … +80% +90 … +90% +100 … +100% -10 … -10% -20 … -20% -30 … -30% -40 … -40% -50 … -50% -60 … -60% -70 … -70% -80 … -80% -90 … -90% -100 … -100%

Response Data Bytes

Byte	Description	
#0	Flow Simulation [%]	-128 … OFF + 0 … 0% +10 … +10% +20 … +20% +30 … +30% +40 … +40% +50 … +50% +60 … +60% +70 … +70% +80 … +80% +90 … +90% +100 … +100% -10 … -10% -20 … -20% -30 … -30% -40 … -40% -50 … -50% -60 … -60% -70 … -70% -80 … -80% -90 … -90% -100 … -100%

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
16	Access Restricted

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	F1	01	64	7A

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	F1	03	00 00	64	7C

Flow Simulation = 100%

Command 242 Remote Login

Request Data Bytes

Byte	Description	
#0..#3	Login	Ask manufacturer for details.

Response Data Bytes

Byte	Description	
#0	Rights	0 ... RIGHTS_UNKNOWN, 1 ... RIGHTS_USER, 2 ... RIGHTS_SERVICE, 3 ... RIGHTS_ADMIN, 4 ... RIGHTS_FACTORY

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
16	Access Restricted

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	F2	04	00 00 00 00	18

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	F2	03	00 60	04	7F

Rights = RIGHTS_FACTORY(Even Factory variables can be modified)

Command 243 Read Rights

Request Data Bytes

Byte	Description

Response Data Bytes

Byte	Description	
#0	Rights	0 ... RIGHTS_UNKNOWN, 1 ... RIGHTS_USER, 2 ... RIGHTS_SERVICE, 3 ... RIGHTS_ADMIN, 4 ... RIGHTS_FACTORY

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
16	Access Restricted

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	F3	00		1D

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	F3	03	00 40	04	5E

Rights = RIGHTS_FACTORY(Even Factory variables can be modified)

Command 244 Command Action Request

Request Data Bytes

Byte	Description	
#0..#1	Command	8 … Clear Totalizers T2 23 … Restart of device Others … reserved for manufacturer purposes only

Response Data Bytes

Byte	Description	
#0..#1	Reserved	0

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
16	Access Restricted

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	F4	02	00 08	10

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	F4	04	00 00	00 00	1A

Command 247 Read Random

Generates Random Number necessary for login calculation.

Request Data Bytes

Byte	Description

Response Data Bytes

Byte	Description	
#0	Rights	0 ... RIGHTS_UNKNOWN, 1 ... RIGHTS_USER, 2 ... RIGHTS_SERVICE, 3 ... RIGHTS_ADMIN, 4 ... RIGHTS_FACTORY

Response Codes

Code	Description
0	No Command Specific Error
2	Invalid Selection
5	Too Few Data Bytes Received
16	Access Restricted

Request Example:

Preamble	Start delimiter	Address	Command	Byte count	Data	Checksum
FF FF FF FF FF	82	BD 03 0A E1 39	F3	00		1D

Response Example:

Preamble	Start delimiter	Address Long frame from slave	Command	Byte count	Status	Data	Checksum
FF FF FF FF FF	86	BD 03 0A E1 39	F3	03	00 40	04	5E

Rights = RIGHTS_FACTORY(Even Factory variables can be modified)

RIGHTS – SUMMARY

COMMAND_163_WRITE_POWER_LINE_FREQUENCY	Rights_User
COMMAND_165_WRITE_EXCITATION_FREQUENCY	Rights_Service
COMMAND_167_WRITE_SCALE_FACTOR	Rights_Service
COMMAND_174_WRITE_FULL_SCALE_FLOW	Rights_Factory
COMMAND_176_WRITE_FLOW_UNIT	Rights_User
COMMAND_178_WRITE_VOLUME_UNIT	Rights_User
COMMAND_182_WRITE_FULL_SCALE_VELOCITY	Rights_Factory
COMMAND_184_WRITE_LOW_FLOW_CUT_OFF	Rights_Admin
COMMAND_186_WRITE_FLOW_DIRECTION	Rights_Factory
COMMAND_191_WRITE_DIGITAL_INPUT_OPERATION	Rights_Service
COMMAND_197_WRITE_ALARM_MODE	Rights_Service
COMMAND_201_WRITE_PULSES_PER_UNIT	Rights_Service
COMMAND_203_WRITE_PULSES_WIDTH	Rights_Service
COMMAND_205_WRITE_FLOW_ALARM_MIN	Rights_Service
COMMAND_207_WRITE_FLOW_ALARM_MAX	Rights_Service
COMMAND_209_WRITE_DO_OUTPUT_MODE	Rights_Service
COMMAND_211_WRITE_DO_OUTPUT_OPERATION	Rights_Service
COMMAND_213_WRITE_FULL_SCALE_FREQUENCY	Rights_Service
COMMAND_215_WRITE_MEDIAN	Rights_Service
COMMAND_217_WRITE_MOVING_AVERAGE	Rights_Service
COMMAND_230_WRITE_MENU_LANGUAGE_CODE	Rights_User
COMMAND_232_WRITE_EMPTY_PIPE_MODE	Rights_Admin
COMMAND_234_WRITE_EMPTY_PIPE_THRESHOLD_RESISTANCE	Rights_Admin
COMMAND_241_WRITE_FLOW_SIMULATION	Rights_Service
COMMAND_244_ACTION_REQUEST	Rights_Admin