

# G6 Multi Channel Force Instrument

Program version 3.1.x



EtherNet/IP Program Option  
Technical Manual Supplement  
PM/RM types



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# 1 Introduction

This manual is a supplement to the Technical Manual of the G6 Multi Channel Force Instrument. It covers the EtherNet/IP communication option.

For any information besides EtherNet/IP please refer to the Technical Manual.

To be able to use the EtherNet/IP option an option code must be purchased and entered in the Program Options menu. Contact your supplier for more information. Note that the option code is valid only for the specific G6-CPU S/N it was purchased for.

This manual is aimed at the practical use of the EtherNet/IP interface of the G6 Instrument and the information needed during commissioning of the communication is placed first.

The EtherNet/IP is intended for communication of process data (measured force, status etc.). Configuration of the EtherNet/IP communication between PLC and G6 Instrument is done via a PLC program development system. To be able to add a G6 Force Instrument in the PLC project the EDS file (Electronic Data Sheet) 'BLHNobel\_G6\_F\_EIP\_V1.0.eds' should be installed.

Configuration of the instrument is done via the front panel or by using remote access.

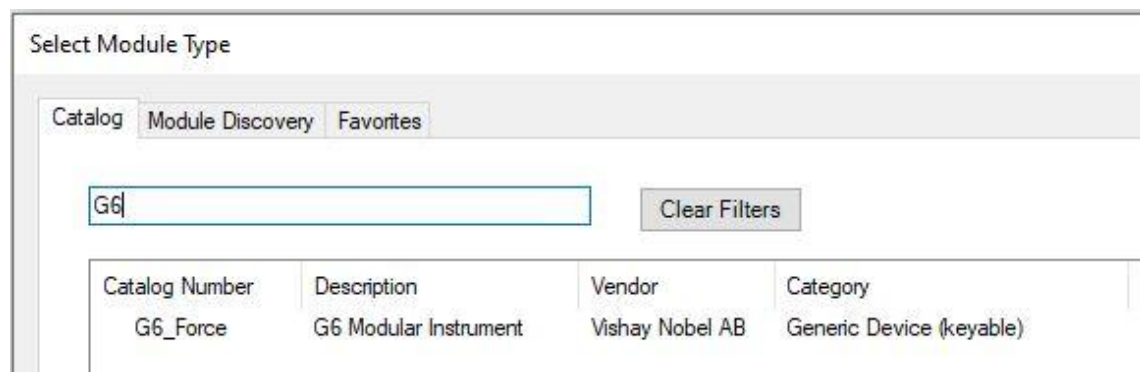


## 2 Using the EtherNet/IP interface

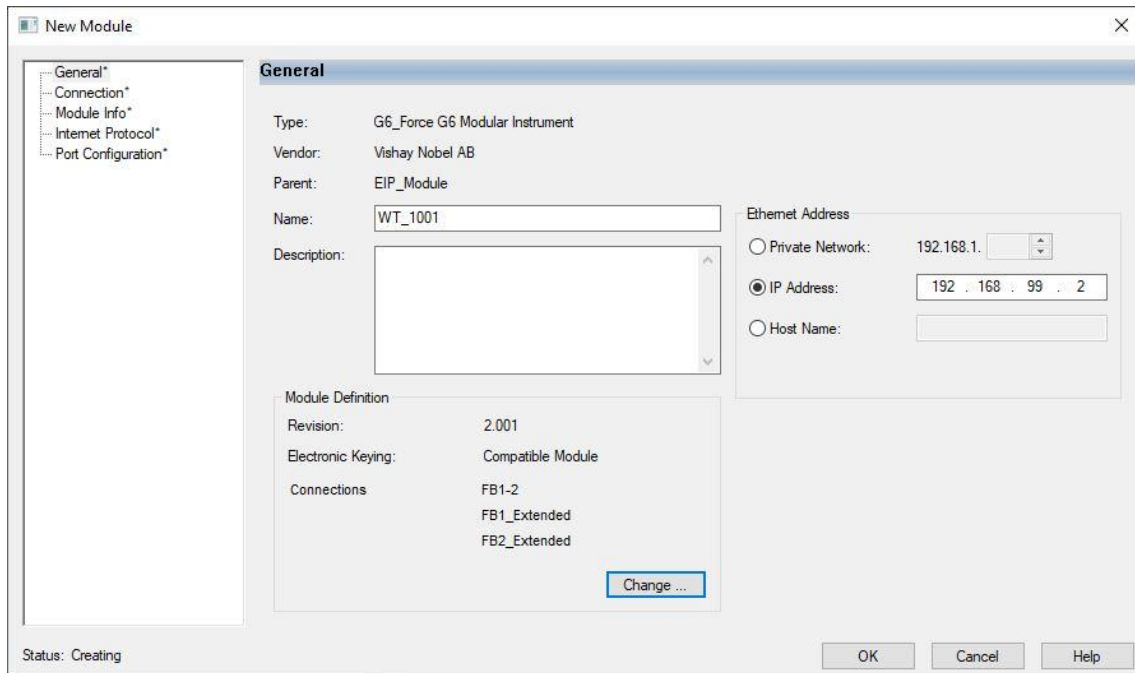
The EtherNet/IP interface of the G6 instrument lets the user read and write data to the instrument in a variety of ways making it possible to adapt to the specific requirements of the particular application. This chapter gives some guidance how to use the interface in the best way.

1. Activate the EtherNet/IP option code. Note that it is tied to the G6-CPU S/N. This is the only action needed in the G6 to activate EtherNet/IP. All other setup will be done in the PLC.
2. Setup the IP-address of the instrument and connect it to the network via the Ethernet port at the G6 Instrument CPU Module.
3. Install the EDS file for the G6 Instrument in the PLC program development system. The file name is 'BLHNobel\_G6\_F\_EIP\_V1.0.eds'.
4. Create a G6\_Force Instrument in the PLC project and select the connections necessary in the properties window for the new module. See example below.
5. Choose how many function blocks that are used in the instrument. Select one of connection 1 to connection 4. Only one can be chosen. These connections contain both input and output data. See chapter 3, 'Connections' for details.
6. Decide if any extra data is needed. Select one or more of connection 5 to connection 19. These connections contain only input data. See chapter 3, 'Connections' for details.
7. Ready.

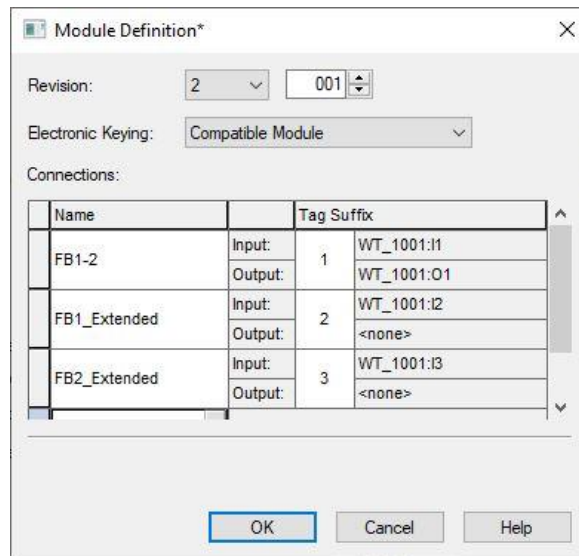
Below are pictures from a PLC program development system when adding and configuring a G6 instrument.



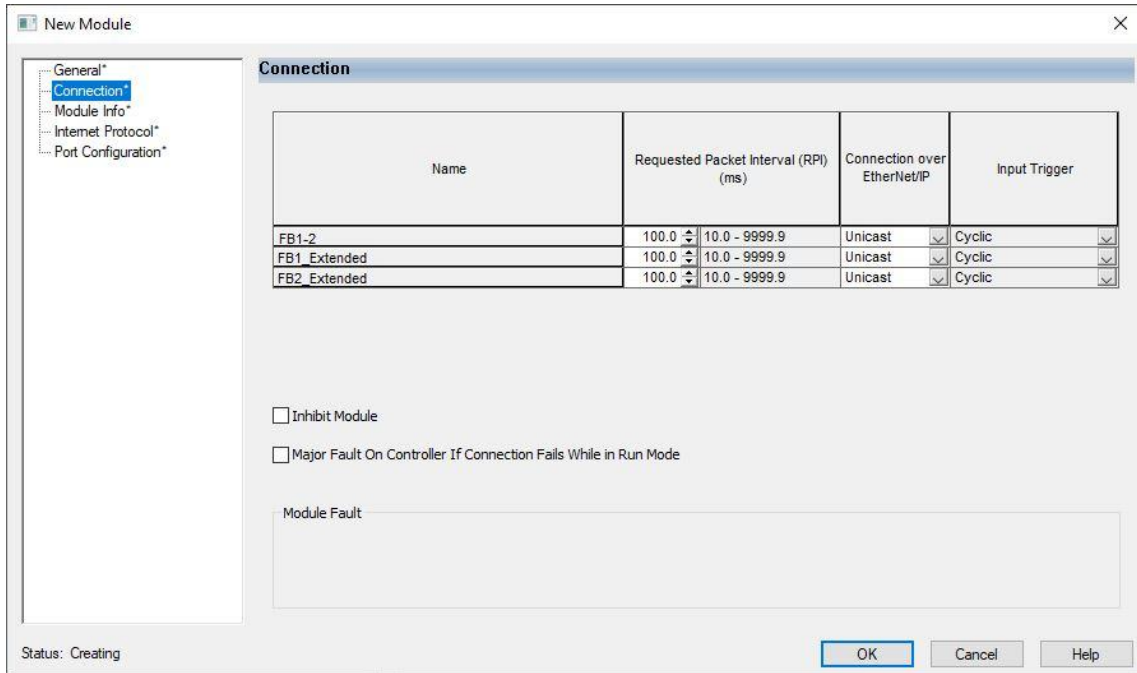
*Select Module type window*



The New Module dialog window



The Module Definition dialog window



New Module Connection dialog window

A two function block system is shown in the figures above. Besides function block 1-2 information (connection 1), function block 1 extended (connection 7) and function block 2 extended (connection 8) are also read. The IP-address of the G6 Instrument is 192.168.99.2.

Below are the Controller Tags windows shown with tag names in plain text and the data in correct format. Name and data type are received from the EDS-file.

[-] WT_1001:01	{...}	{...}		_049B:G6_Force_A4CB635A:...
[+] WT_1001:01.Command	0		Decimal	INT
[+] WT_1001:01.ParameterNo	0		Decimal	INT
[-] WT_1001:01.ParameterValue	0.0		Float	REAL

Output Controller Tags

Name	Value	Force Mask	Style	Data Type
[-] WT_1001:11	{...}	{...}		_049B:G6_Force_E78158B4:1:0
[-] WT_1001:11.ConnectionFaulted	0		Decimal	BOOL
[+] WT_1001:11.InstrumentError	0		Decimal	INT
[+] WT_1001:11.InstrumentStatus	2		Decimal	SINT
[+] WT_1001:11.InstrumentState	3		Decimal	SINT
[+] WT_1001:11.CommandAck	0		Decimal	INT
[+] WT_1001:11.CommandError	0		Decimal	INT
[+] WT_1001:11.Levels1to16Status	0		Decimal	INT
[+] WT_1001:11.Levels17to32Status	0		Decimal	INT
[+] WT_1001:11.FB1ErrorCode	0		Decimal	INT
[+] WT_1001:11.FB1Status	0		Decimal	INT
[-] WT_1001:11.FB1Sum	190.0		Float	REAL
[-] WT_1001:11.FB1Difference	10.0		Float	REAL
[-] WT_1001:11.FB1Output1	100.0		Float	REAL
[-] WT_1001:11.FB1Output2	90.0		Float	REAL
[+] WT_1001:11.FB2ErrorCode	0		Decimal	INT
[+] WT_1001:11.FB2Status	0		Decimal	INT
[-] WT_1001:11.FB2Sum	1000.0		Float	REAL
[-] WT_1001:11.FB2Difference	100.0		Float	REAL
[-] WT_1001:11.FB2Output1	550.0		Float	REAL
[-] WT_1001:11.FB2Output2	450.0		Float	REAL

Input Controller Tags FB 1-2

WT_1001:I2	{...}	{...}		_049B:G6_Force_7618140F:I0
- WT_1001:I2.ConnectionFaulted	0		Decimal	BOOL
+ WT_1001:I2.FB1ErrorCode	0		Decimal	INT
+ WT_1001:I2.FB1Status	0		Decimal	INT
- WT_1001:I2.FB1Sum	190.0		Float	REAL
- WT_1001:I2.FB1Difference	10.0		Float	REAL
- WT_1001:I2.FB1Output1	100.0		Float	REAL
- WT_1001:I2.FB1Output2	90.0		Float	REAL
- WT_1001:I2.FB1Output3	0.0		Float	REAL
- WT_1001:I2.FB1Output4	0.0		Float	REAL
- WT_1001:I2.FB1Output5	0.0		Float	REAL
- WT_1001:I2.FB1Output6	0.0		Float	REAL
- WT_1001:I2.FB1Output7	0.0		Float	REAL
- WT_1001:I2.FB1Output8	0.0		Float	REAL
- WT_1001:I2.FB1InputA_Force	100.0		Float	REAL
- WT_1001:I2.FB1InputB_Force	90.0		Float	REAL
- WT_1001:I2.FB1InputC_Force	0.0		Float	REAL
- WT_1001:I2.FB1InputD_Force	0.0		Float	REAL
- WT_1001:I2.FB1InputA_Signal	0.200094		Float	REAL
- WT_1001:I2.FB1InputB_Signal	0.180848		Float	REAL
- WT_1001:I2.FB1InputC_Signal	0.0		Float	REAL
- WT_1001:I2.FB1InputD_Signal	0.0		Float	REAL

*Input Controller Tags FB1 Extended*

WT_1001:I3	{...}	{...}		_049B:G6_Force_867D2DA6:I0
- WT_1001:I3.ConnectionFaulted	0		Decimal	BOOL
+ WT_1001:I3.FB2ErrorCode	0		Decimal	INT
+ WT_1001:I3.FB2Status	0		Decimal	INT
- WT_1001:I3.FB2Sum	1000.0		Float	REAL
- WT_1001:I3.FB2Difference	100.0		Float	REAL
- WT_1001:I3.FB2Output1	550.0		Float	REAL
- WT_1001:I3.FB2Output2	450.0		Float	REAL
- WT_1001:I3.FB2Output3	0.0		Float	REAL
- WT_1001:I3.FB2Output4	0.0		Float	REAL
- WT_1001:I3.FB2Output5	0.0		Float	REAL
- WT_1001:I3.FB2Output6	0.0		Float	REAL
- WT_1001:I3.FB2Output7	0.0		Float	REAL
- WT_1001:I3.FB2Output8	0.0		Float	REAL
- WT_1001:I3.FB2InputA_Force	550.0		Float	REAL
- WT_1001:I3.FB2InputB_Force	450.0		Float	REAL
- WT_1001:I3.FB2InputC_Force	0.0		Float	REAL
- WT_1001:I3.FB2InputD_Force	0.0		Float	REAL
- WT_1001:I3.FB2InputA_Signal	1.100236		Float	REAL
- WT_1001:I3.FB2InputB_Signal	0.899751		Float	REAL
- WT_1001:I3.FB2InputC_Signal	0.0		Float	REAL
- WT_1001:I3.FB2InputD_Signal	0.0		Float	REAL

*Input Controller Tags FB2 Extended*

## 3 Connections

### 3.1 Overview

No.	Input Assembly	Size (bytes)	Output Assembly	Size (bytes)	Name	Default RPI
1	101	52	100	8	Function Blocks 1 - 2.	100
2	102	92	100	8	Function Blocks 1 - 4.	100
3	103	132	100	8	Function Blocks 1 - 6.	100
4	104	172	100	8	Function Blocks 1 - 8.	100
5	105	46	198	0	Analog out, dig I/O status, clock	1000
6	106	128	198	0	Level 1 – 32 values	1000
7	107	76	198	0	Function Block 1 Extended	100
8	108	76	198	0	Function Block 2 Extended	100
9	109	76	198	0	Function Block 3 Extended	100
10	110	76	198	0	Function Block 4 Extended	100
11	111	76	198	0	Function Block 5 Extended	100
12	112	76	198	0	Function Block 6 Extended	100
13	113	76	198	0	Function Block 7 Extended	100
14	114	76	198	0	Function Block 8 Extended	100
15	115	80	198	0	FLOAT32 Spare 1 (20 pcs)	100
16	116	80	198	0	FLOAT32 Spare 2 (20 pcs)	100
17	117	40	198	0	INT16 Spare (20 pcs)	100
18	118	80	198	0	INT32 Spare (20 pcs)	100
19	119	76	198	0	Function Block Extended Spare	100

Default RPI (Requested Package Interval) is given in ms and is possible to change between 10 ms and 20 s for connection 1 to 4, 7 to 19 and between 100 ms and 20 s for connection 5 and 6. Avoid an unnecessary low RPI since it will slow down other functionality in the instrument.

The provided EDS file also includes AOP (Add On Profile) information that will simplify the use regarding connection names, data names and data format.

Data types are defined according to following table:

Data type	Data type name <sup>1)</sup>	Data type code <sup>2)</sup>	Data type description
Int. 8	SINT	C2	Signed 8-bit integer value
Int. 16	INT	C3	Signed 16-bit integer value
Int. 32	DINT	C4	Signed 32-bit integer value
Float 32	REAL	CA	32-bit floating point value

Note:

- 1) 'Data type name' are used in PLC program development system.
- 2) 'Data type code' are used in the EDS file.

## 3.2 Connection 1 – 4 Output data

The output data of connections 1 to 4 is the Assembly Instance 100 (Consuming instance). Output data is 8 bytes as described in table below. Least significant byte is always first.

Bytes	Contents	Type
0 – 1	Command	Int. 16
2 – 3	Parameter No	Int. 16
4 – 7	Parameter value	Float32

### Command, Bytes 0 – 1:

The command byte is used when writing data to the instrument and to issue various function block related commands such as Set zero.

Note that a new command is detected when the content of the command register is changed. If the same command is used more than once another command e.g. 0 must be used in between.

The response to a given command is the 'Command acknowledge' and the 'Command error' bytes in the input data of the connection.

See the Technical Manual for detailed information on Function block functions, levels etc.

### Parameter No, Bytes 2 – 3:

The number of the Level (1 - 32) to set. The data in bytes 2 and 3 are disregarded for any other command than 221.

### Parameter value, Bytes 4 to 7:

The value of the Level to set in floating point format. The data in bytes 4 to 7 are disregarded for any other command than 221.

## Examples

### Function Block 1 Set zero:

Command = 10, Parameter No = no significance, Parameter value = no significance

### Set Level 1 (value) to 65.4:

Command = 221, Parameter No = 1, Parameter value = 65.4

### Enter remote operation:

Command = 1, Parameter No = no significance, Parameter value = no significance

## Important:

Data must be set when the command is transmitted. Do not set command during one scan cycle and data during next or similar that can give an unintended result.

### 3.3 Connection 1 – 4 Commands

#### Commands:

Cmd	Action activated in instrument	Description
0	No action	
1	Start operation	When the instrument is in 'Wait for start state', this command can be used to start up the instrument in operation.
2	Enter Remote operation	This command disables the keys on the instrument. This means that an external computer is controlling the instrument or the instrument is controlled using digital inputs.
3	Exit Remote operation	This command enables the keys and leaves the remote operation.
10	Function Block 1: Set zero	Used to set all Function Block 1 inputs to zero. Parameter No = don't care Parameter value = don't care
20	Function Block 2: Set zero	Used to set all Function Block 2 inputs to zero. Parameter No = don't care Parameter value = don't care
30	Function Block 3: Set zero	Used to set all Function Block 3 inputs to zero. Parameter No = don't care Parameter value = don't care
40	Function Block 4: Set zero	Used to set all Function Block 4 inputs to zero. Parameter No = don't care Parameter value = don't care
50	Function Block 5: Set zero	Used to set all Function Block 5 inputs to zero. Parameter No = don't care Parameter value = don't care
60	Function Block 6: Set zero	Used to set all Function Block 6 inputs to zero. Parameter No = don't care Parameter value = don't care
70	Function Block 7: Set zero	Used to set all Function Block 7 inputs to zero. Parameter No = don't care Parameter value = don't care
80	Function Block 8: Set zero	Used to set all Function Block 8 inputs to zero. Parameter No = don't care Parameter value = don't care
221	Set Level value	Used to set a Level value. Parameter No = Level number (1 – 32). Parameter value = Desired Level value.
252	Clear the Program reset bit in the Instrument Status register.	Used to Clear the Program reset bit. Parameter No = don't care Parameter value = don't care

### 3.4 Connection 1 Input data

The input data of connection 1 is the Assembly Instance 101 (Producing instance). Connection 1 input data consists of 52 bytes as described in table below. This instance contains the data of Function Block 1 and 2. Least significant byte is always first.

Bytes	Contents	Type	
0 – 1	Instrument error	Int. 16	
2	Instrument Status	Int. 8	
3	Instrument State	Int. 8	
4 – 5	Command acknowledge	Int. 16	
6 – 7	Command error	Int. 16	
8 – 9	Level 1 – 16, status	Int. 16	
10 – 11	Level 17 – 32, status	Int. 16	
12 – 13	Error code	Int. 16	Function Block 1
14 – 15	Status	Int. 16	
16 – 19	Sum	Float32	
20 – 23	Difference	Float32	
24 – 27	Output 1	Float32	
28 – 31	Output 2	Float32	
32 – 33	Error code	Int. 16	Function Block 2
34 – 35	Status	Int. 16	
36 – 39	Sum	Float32	
40 – 43	Difference	Float32	
44 – 47	Output 1	Float32	
48 – 51	Output 2	Float32	

### 3.5 Connection 2 Input data

The input data of connection 2 is the Assembly Instance 102 (Producing instance). Connection 2 input data consists of 92 bytes as described in table below. This instance contains the data of Function Block 1 to 4. Least significant byte is always first.

Bytes	Contents	Type	
0 – 1	Instrument error	Int. 16	
2	Instrument Status	Int. 8	
3	Instrument State	Int. 8	
4 – 5	Command acknowledge	Int. 16	
6 – 7	Command error	Int. 16	
8 – 9	Level 1 – 16, status	Int. 16	
10 – 11	Level 17 – 32, status	Int. 16	
12 – 13	Error code	Int. 16	Function Block 1
14 – 15	Status	Int. 16	
16 – 19	Sum	Float32	
20 – 23	Difference	Float32	
24 – 27	Output 1	Float32	
28 – 31	Output 2	Float32	
32 – 33	Error code	Int. 16	Function Block 2
34 – 35	Status	Int. 16	
36 – 39	Sum	Float32	
40 – 43	Difference	Float32	
44 – 47	Output 1	Float32	
48 – 51	Output 2	Float32	
52 – 53	Error code	Int. 16	Function Block 3
54 – 55	Status	Int. 16	
56 – 59	Sum	Float32	
60 – 63	Difference	Float32	
64 – 67	Output 1	Float32	
68 – 71	Output 2	Float32	
72 – 73	Error code	Int. 16	Function Block 4
74 – 75	Status	Int. 16	
76 – 79	Sum	Float32	
80 – 83	Difference	Float32	
84 – 87	Output 1	Float32	
88 – 91	Output 2	Float32	

### 3.6 Connection 3 Input data

The input data of connection 3 is the Assembly Instance 103 (Producing instance). Connection 3 input data consists of 132 bytes as described in table below. This instance contains data of Function Block 1 to 6. Least significant byte always first.

Bytes	Contents	Type	
0 – 1	Instrument error	Int. 16	
2	Instrument Status	Int. 8	
3	Instrument State	Int. 8	
4 – 5	Command acknowledge	Int. 16	
6 – 7	Command error	Int. 16	
8 – 9	Level 1 – 16, status	Int. 16	
10 – 11	Level 17 – 32, status	Int. 16	
12 – 13	Error code	Int. 16	Function Block 1
14 – 15	Status	Int. 16	
16 – 19	Sum	Float32	
20 – 23	Difference	Float32	
24 – 27	Output 1	Float32	
28 – 31	Output 2	Float32	
32 – 33	Error code	Int. 16	Function Block 2
34 – 35	Status	Int. 16	
36 – 39	Sum	Float32	
40 – 43	Difference	Float32	
44 – 47	Output 1	Float32	
48 – 51	Output 2	Float32	
52 – 53	Error code	Int. 16	Function Block 3
54 – 55	Status	Int. 16	
56 – 59	Sum	Float32	
60 – 63	Difference	Float32	
64 – 67	Output 1	Float32	
68 – 71	Output 2	Float32	
72 – 73	Error code	Int. 16	Function Block 4
74 – 75	Status	Int. 16	
76 – 79	Sum	Float32	
80 – 83	Difference	Float32	
84 – 87	Output 1	Float32	
88 – 91	Output 2	Float32	
92 – 93	Error code	Int. 16	Function Block 5
94 – 95	Status	Int. 16	
96 – 99	Sum	Float32	
100–103	Difference	Float32	
104–107	Output 1	Float32	
108–111	Output 2	Float32	
112–113	Error code	Int. 16	Function Block 6
114–115	Status	Int. 16	
116–119	Sum	Float32	
120–123	Difference	Float32	
124–127	Output 1	Float32	
128–131	Output 2	Float32	



Table continues in right column

### 3.7 Connection 4 Input data

The input data of connection 4 is the Assembly Instance 104 (Producing instance). Connection 4 input data consists of 172 bytes as described in table below. This instance contains the data of Function Block 1 to 8. Least significant byte always first.

Bytes	Contents	Type		Bytes	Contents	Type	
0 – 1	Instrument error	Int. 16		92 – 93	Error code	Int. 16	
2	Instrument Status	Int. 8		94 – 95	Status	Int. 16	
3	Instrument State	Int. 8		96 – 99	Sum	Float32	
4 – 5	Command acknowledge	Int. 16		100–103	Difference	Float32	
6 – 7	Command error	Int. 16		104–107	Output 1	Float32	
8 – 9	Level 1 – 16, status	Int. 16		108–111	Output 2	Float32	
10 – 11	Level 17 – 32, status	Int. 16		112–113	Error code	Int. 16	
12 – 13	Error code	Int. 16	Function Block 1	114–115	Status	Int. 16	Function Block 6
14 – 15	Status	Int. 16		116–119	Sum	Float32	
16 – 19	Sum	Float32		120–123	Difference	Float32	
20 – 23	Difference	Float32		124–127	Output 1	Float32	
24 – 27	Output 1	Float32		128–131	Output 2	Float32	
28 – 31	Output 2	Float32		132–133	Error code	Int. 16	
32 – 33	Error code	Int. 16	Function Block 2	134–135	Status	Int. 16	Function Block 7
34 – 35	Status	Int. 16		136–139	Sum	Float32	
36 – 39	Sum	Float32		140–143	Difference	Float32	
40 – 43	Difference	Float32		144–147	Output 1	Float32	
44 – 47	Output 1	Float32		148–151	Output 2	Float32	
48 – 51	Output 2	Float32		152–153	Error code	Int. 16	
52 – 53	Error code	Int. 16	Function Block 3	154–155	Status	Int. 16	Function Block 8
54 – 55	Status	Int. 16		156–159	Sum	Float32	
56 – 59	Sum	Float32		160–163	Difference	Float32	
60 – 63	Difference	Float32		164–167	Output 1	Float32	
64 – 67	Output 1	Float32		168–171	Output 2	Float32	
68 – 71	Output 2	Float32					
72 – 73	Error code	Int. 16	Function Block 4				
74 – 75	Status	Int. 16					
76 – 79	Sum	Float32					
80 – 83	Difference	Float32					
84 – 87	Output 1	Float32					
88 – 91	Output 2	Float32					



Table continues in right column

### 3.8 Connection 1 - 4 Instrument info

Least significant byte is always first.

Instrument error, Bytes 0 and 1:

Contains the actual instrument error information (the value 0 means no error). Please refer to the Technical Manual for details on error codes.

Instrument Status, Byte 2:

The instrument status consists of 1 byte of data as 8-bit integer. Bits set to 1 have the following meaning:

Bit	Function	Description
0	Remote operation	'1' = On / '0' = Off
1	Program reset	The bit is set each time the program starts, and it indicates that volatile data is lost. To reset this bit with EtherNet/IP the reset command must be used. Care must be taken if more than one interface is used to communicate with the instrument and the Program reset bit is to be used.
2-7	Not used	

Instrument State, Byte 3:

The instrument state consists of 1 byte of data as 8-bit integer. Values (codes) have the following meaning:

Code	State	Description
00	Starting up	The instrument is starting up after a reset or power on.
01	Wait for start	The instrument is waiting for a start command to go in process.
03	Normal	There are no parameter errors in the system. <b>Note:</b> Function block errors still indicate normal state.
04	Error	An error has been detected during start-up of the instrument.
05	Fatal error	An error has been detected during start-up of the instrument. It's not possible to enter any other state from here.

### 3.9 Connection 1 - 4 Command response

Least significant byte is always first.

#### Command acknowledge, Byte 4 and 5:

The 'Command acknowledge'. It will be equal to the command number if the command was successfully executed. If the command failed the value 240 (hex F0) is returned.

#### Command error, Byte 6 and 7:

These bytes return the 'Command error' code. The error code is explained in chapter 'Troubleshooting – Error codes' in the Technical manual. This byte will be zero if a command is correctly executed.

### 3.10 Connection 1 - 4 Level status

Least significant byte is always first.

Bit set to 1 indicates that the force is above the corresponding level.

#### Level 1 – 16 status, Bytes 8 and 9:

These bytes show the status of levels 1 – 16.

Bit 0 to bit 7 in byte 8 is status of level 1 to level 8.

Bit 0 to bit 7 in byte 9 is status of level 9 to level 16.

#### Level 17 – 32 status, Bytes 10 to 11:

These bytes show the status of levels 17 – 32.

Bit 0 to bit 7 in byte 10 is status of level 17 to level 24.

Bit 0 to bit 7 in byte 11 is status of level 25 to 32.

### 3.11 Connection 1 – 4 Function block data

#### Error code

The error code consists of 2 bytes of data as a 16-bit integer. Least significant byte is always first. These bytes hold the first error code for a Function Block. Normally it should contain '0' which means no error. Error codes 000 to 255 and 000 to X255 are valid, where X (1-4) indicates which input channel (A-D) the three digit error code belongs to. Please refer to the Technical Manual for details on error codes.

Status

The status consists of 2 bytes of data as 16-bit integer. Least significant byte is always first. These bytes holds the status for a Function Block. Bits set to 1 have the following meaning:

Bit no	Function	Comment
0	Input A faulty	It is an error on Input A. See section 'Error code' above.
1	Input B faulty	It is an error on Input B. See section 'Error code' above.
2	Input C faulty	It is an error on Input C. See section 'Error code' above.
3	Input D faulty	It is an error on Input D. See section 'Error code' above.
4 - 15	Not used	

Sum

These bytes holds the sum value for a Function Block. The actual use of the sum value varies with type of Function Block. The value consists of 4 bytes of data in floating point format. Least significant byte is always first.

The value is only valid when 'Error code' for the actual Function Block equals 0.

Difference

These bytes holds the difference value for a Function Block. The actual use of the difference value varies with type of Function Block. The value consists of 4 bytes of data in floating point format. Least significant byte is always first.

The value is only valid when 'Error code' for the actual Function Block equals 0.

Output 1 (to 8)

These bytes holds the output values for a Function Block. The actual use of the output values varies with type of Function Block. If the output is not used 0 will be output. The values consists of 4 bytes of data in floating point format. Least significant byte is always first.

The values are only valid when 'Error code' for the actual Function Block equals 0.

Input A (to D) Force

These bytes holds the input force values for a Function Block. If the input is not used 0 will be output. The values consists of 4 bytes of data in floating point format. Least significant byte is always first.

The values are only valid when 'Error code' for the actual Function Block equals 0.

Input A (to D) Signal (mV/V)

These bytes holds the input signal (mV/V) values for a Function Block. If the input is not used 0 will be output. The values consists of 4 bytes of data in floating point format. Least significant byte is always first.

The values are only valid when 'Error code' for the actual Function Block equals 0.

### 3.12 Connection 5 Input data

The input data of connection 5 is the Assembly Instance 105 (Producing instance). Connection 5 input data consists of 46 bytes as described in table below. This instance contains the output value of analog outputs 1 to 4, digital input status, digital output status, real time clock data, instrument type and program version. Least significant byte is always first.

Bytes	Contents	Type
0 – 3	Analog output 1	Float32, rounded to 3 decimals
4 – 7	Analog output 2	Float32, rounded to 3 decimals
8 – 11	Analog output 3	Float32, rounded to 3 decimals
12 – 15	Analog output 4	Float32, rounded to 3 decimals
16	Status of Inputs Slot 1	Int. 8
17	Status of Inputs Slot 2	Int. 8
18	Status of Inputs Slot 3	Int. 8
19	Status of Inputs Slot 4	Int. 8
20	Status of Inputs Slot 5	Int. 8
21	Status of Inputs Slot 6	Int. 8
22	Status of Outputs Slot 1	Int. 8
23	Status of Outputs Slot 2	Int. 8
24	Status of Outputs Slot 3	Int. 8
25	Status of Outputs Slot 4	Int. 8
26	Status of Outputs Slot 5	Int. 8
27	Status of Outputs Slot 6	Int. 8
28 – 29	Clock, Year	Int. 16
30 – 31	Clock, Month	Int. 16
32 – 33	Clock, Day	Int. 16
34 – 35	Clock, Hour	Int. 16
36 – 37	Clock, Minute	Int. 16
38 – 39	Instrument type	Int. 16
40 – 41	Program number	Int. 16
42 – 43	Program major version	Int. 16
44 – 45	Program minor version	Int. 16

A set bit in an Input or Output status byte indicates that the corresponding input or output is activated. The number of inputs or outputs for a specific slot depends on the type of I/O module in that slot. Bit 0 correspond to input/output 1, bit 1 to input/output 2 etc.

### 3.13 Connection 6 Input data

The input data of connection 6 is the Assembly Instance 106 (Producing instance). Connection 6 input data consists of 128 bytes as described in table below. This instance contains Level 1 to 32 values in floating point format. Least significant byte is always first.

Bytes	Contents	Type
0 – 3	Level value 1	Float32
4 – 7	Level value 2	Float32
8 – 11	Level value 3	Float32
12 – 15	Level value 4	Float32
16 – 19	Level value 5	Float32
20 – 23	Level value 6	Float32
24 – 27	Level value 7	Float32
28 – 31	Level value 8	Float32
32 – 35	Level value 9	Float32
36 – 39	Level value 10	Float32
40 – 43	Level value 11	Float32
44 – 47	Level value 12	Float32
48 – 51	Level value 13	Float32
52 – 55	Level value 14	Float32
56 – 59	Level value 15	Float32
60 – 63	Level value 16	Float32

Bytes	Contents	Type
64 – 67	Level value 17	Float32
68 – 71	Level value 18	Float32
72 – 75	Level value 19	Float32
76 – 79	Level value 20	Float32
80 – 83	Level value 21	Float32
84 – 87	Level value 22	Float32
88 – 91	Level value 23	Float32
92 – 95	Level value 24	Float32
96 – 99	Level value 25	Float32
100 – 103	Level value 26	Float32
104 – 107	Level value 27	Float32
108 – 111	Level value 28	Float32
112 – 115	Level value 29	Float32
116 – 119	Level value 30	Float32
120 – 123	Level value 31	Float32
124 – 127	Level value 32	Float32

### 3.14 Connection 7 Input data

The input data of connection 7 is the Assembly Instance 107 (Producing instance). Connection 7 input data consists of 76 bytes as described in table below. This instance contains the Function Block 1 extended data. Least significant byte is always first.

Bytes	Contents	Type
0 – 1	Function Block 1: Error code	Int. 16
2 – 3	Function Block 1: Status	Int. 16
4 – 7	Function Block 1: Sum	Float32
8 – 11	Function Block 1: Difference	Float32
12 – 15	Function Block 1: Output 1	Float32
16 – 19	Function Block 1: Output 2	Float32
20 – 23	Function Block 1: Output 3	Float32
24 – 27	Function Block 1: Output 4	Float32
28 – 31	Function Block 1: Output 5	Float32
32 – 35	Function Block 1: Output 6	Float32
36 – 39	Function Block 1: Output 7	Float32
40 – 43	Function Block 1: Output 8	Float32
44 – 47	Function Block 1: Input A Force	Float32
48 – 51	Function Block 1: Input B Force	Float32
52 – 55	Function Block 1: Input C Force	Float32
56 – 59	Function Block 1: Input D Force	Float32
60 – 63	Function Block 1: Input A Signal (mV/V)	Float32
64 – 67	Function Block 1: Input B Signal (mV/V)	Float32
68 – 71	Function Block 1: Input C Signal (mV/V)	Float32
72 – 75	Function Block 1: Input D Signal (mV/V)	Float32

See description of data in chapter 'Connection 1-4 Function block data'.

### 3.15 Connection 8 Input data

The input data of connection 8 is the Assembly Instance 108 (Producing instance). Connection 8 input data consists of 76 bytes as described in table below. This instance contains the Function Block 2 extended data. Least significant byte is always first.

Bytes	Contents	Type
0 – 1	Function Block 2: Error code	Int. 16
2 – 3	Function Block 2: Status	Int. 16
4 – 7	Function Block 2: Sum	Float32
8 – 11	Function Block 2: Difference	Float32
12 – 15	Function Block 2: Output 1	Float32
16 – 19	Function Block 2: Output 2	Float32
20 – 23	Function Block 2: Output 3	Float32
24 – 27	Function Block 2: Output 4	Float32
28 – 31	Function Block 2: Output 5	Float32
32 – 35	Function Block 2: Output 6	Float32
36 – 39	Function Block 2: Output 7	Float32
40 – 43	Function Block 2: Output 8	Float32
44 – 47	Function Block 2: Input A Force	Float32
48 – 51	Function Block 2: Input B Force	Float32
52 – 55	Function Block 2: Input C Force	Float32
56 – 59	Function Block 2: Input D Force	Float32
60 – 63	Function Block 2: Input A Signal (mV/V)	Float32
64 – 67	Function Block 2: Input B Signal (mV/V)	Float32
68 – 71	Function Block 2: Input C Signal (mV/V)	Float32
72 – 75	Function Block 2: Input D Signal (mV/V)	Float32

See description of data in chapter 'Connection 1-4 Function block data'.

### 3.16 Connection 9 Input data

The input data of connection 9 is the Assembly Instance 109 (Producing instance). Connection 9 input data consists of 76 bytes as described in table below. This instance contains the Function Block 3 extended data. Least significant byte is always first.

Bytes	Contents	Type
0 – 1	Function Block 3: Error code	Int. 16
2 – 3	Function Block 3: Status	Int. 16
4 – 7	Function Block 3: Sum	Float32
8 – 11	Function Block 3: Difference	Float32
12 – 15	Function Block 3: Output 1	Float32
16 – 19	Function Block 3: Output 2	Float32
20 – 23	Function Block 3: Output 3	Float32
24 – 27	Function Block 3: Output 4	Float32
28 – 31	Function Block 3: Output 5	Float32
32 – 35	Function Block 3: Output 6	Float32
36 – 39	Function Block 3: Output 7	Float32
40 – 43	Function Block 3: Output 8	Float32
44 – 47	Function Block 3: Input A Force	Float32
48 – 51	Function Block 3: Input B Force	Float32
52 – 55	Function Block 3: Input C Force	Float32
56 – 59	Function Block 3: Input D Force	Float32
60 – 63	Function Block 3: Input A Signal (mV/V)	Float32
64 – 67	Function Block 3: Input B Signal (mV/V)	Float32
68 – 71	Function Block 3: Input C Signal (mV/V)	Float32
72 – 75	Function Block 3: Input D Signal (mV/V)	Float32

See description of data in chapter 'Connection 1-4 Function block data'.

### 3.17 Connection 10 Input data

The input data of connection 10 is the Assembly Instance 110 (Producing instance). Connection 10 input data consists of 76 bytes as described in table below. This instance contains the Function Block 4 extended data. Least significant byte is always first.

Bytes	Contents	Type
0 – 1	Function Block 4: Error code	Int. 16
2 – 3	Function Block 4: Status	Int. 16
4 – 7	Function Block 4: Sum	Float32
8 – 11	Function Block 4: Difference	Float32
12 – 15	Function Block 4: Output 1	Float32
16 – 19	Function Block 4: Output 2	Float32
20 – 23	Function Block 4: Output 3	Float32
24 – 27	Function Block 4: Output 4	Float32
28 – 31	Function Block 4: Output 5	Float32
32 – 35	Function Block 4: Output 6	Float32
36 – 39	Function Block 4: Output 7	Float32
40 – 43	Function Block 4: Output 8	Float32
44 – 47	Function Block 4: Input A Force	Float32
48 – 51	Function Block 4: Input B Force	Float32
52 – 55	Function Block 4: Input C Force	Float32
56 – 59	Function Block 4: Input D Force	Float32
60 – 63	Function Block 4: Input A Signal (mV/V)	Float32
64 – 67	Function Block 4: Input B Signal (mV/V)	Float32
68 – 71	Function Block 4: Input C Signal (mV/V)	Float32
72 – 75	Function Block 4: Input D Signal (mV/V)	Float32

See description of data in chapter 'Connection 1-4 Function block data'.

### 3.18 Connection 11 Input data

The input data of connection 11 is the Assembly Instance 111 (Producing instance). Connection 11 input data consists of 76 bytes as described in table below. This instance contains the Function Block 5 extended data. Least significant byte is always first.

Bytes	Contents	Type
0 – 1	Function Block 5: Error code	Int. 16
2 – 3	Function Block 5: Status	Int. 16
4 – 7	Function Block 5: Sum	Float32
8 – 11	Function Block 5: Difference	Float32
12 – 15	Function Block 5: Output 1	Float32
16 – 19	Function Block 5: Output 2	Float32
20 – 23	Function Block 5: Output 3	Float32
24 – 27	Function Block 5: Output 4	Float32
28 – 31	Function Block 5: Output 5	Float32
32 – 35	Function Block 5: Output 6	Float32
36 – 39	Function Block 5: Output 7	Float32
40 – 43	Function Block 5: Output 8	Float32
44 – 47	Function Block 5: Input A Force	Float32
48 – 51	Function Block 5: Input B Force	Float32
52 – 55	Function Block 5: Input C Force	Float32
56 – 59	Function Block 5: Input D Force	Float32
60 – 63	Function Block 5: Input A Signal (mV/V)	Float32
64 – 67	Function Block 5: Input B Signal (mV/V)	Float32
68 – 71	Function Block 5: Input C Signal (mV/V)	Float32
72 – 75	Function Block 5: Input D Signal (mV/V)	Float32

See description of data in chapter 'Connection 1-4 Function block data'.

### 3.19 Connection 12 Input data

The input data of connection 12 is the Assembly Instance 112 (Producing instance). Connection 12 input data consists of 76 bytes as described in table below. This instance contains the Function Block 6 extended data. Least significant byte is always first.

Bytes	Contents	Type
0 – 1	Function Block 6: Error code	Int. 16
2 – 3	Function Block 6: Status	Int. 16
4 – 7	Function Block 6: Sum	Float32
8 – 11	Function Block 6: Difference	Float32
12 – 15	Function Block 6: Output 1	Float32
16 – 19	Function Block 6: Output 2	Float32
20 – 23	Function Block 6: Output 3	Float32
24 – 27	Function Block 6: Output 4	Float32
28 – 31	Function Block 6: Output 5	Float32
32 – 35	Function Block 6: Output 6	Float32
36 – 39	Function Block 6: Output 7	Float32
40 – 43	Function Block 6: Output 8	Float32
44 – 47	Function Block 6: Input A Force	Float32
48 – 51	Function Block 6: Input B Force	Float32
52 – 55	Function Block 6: Input C Force	Float32
56 – 59	Function Block 6: Input D Force	Float32
60 – 63	Function Block 6: Input A Signal (mV/V)	Float32
64 – 67	Function Block 6: Input B Signal (mV/V)	Float32
68 – 71	Function Block 6: Input C Signal (mV/V)	Float32
72 – 75	Function Block 6: Input D Signal (mV/V)	Float32

See description of data in chapter 'Connection 1-4 Function block data'.

## 3.20 Connection 13 Input data

The input data of connection 13 is the Assembly Instance 113 (Producing instance). Connection 13 input data consists of 76 bytes as described in table below. This instance contains the Function Block 7 extended data. Least significant byte is always first.

Bytes	Contents	Type
0 – 1	Function Block 7: Error code	Int. 16
2 – 3	Function Block 7: Status	Int. 16
4 – 7	Function Block 7: Sum	Float32
8 – 11	Function Block 7: Difference	Float32
12 – 15	Function Block 7: Output 1	Float32
16 – 19	Function Block 7: Output 2	Float32
20 – 23	Function Block 7: Output 3	Float32
24 – 27	Function Block 7: Output 4	Float32
28 – 31	Function Block 7: Output 5	Float32
32 – 35	Function Block 7: Output 6	Float32
36 – 39	Function Block 7: Output 7	Float32
40 – 43	Function Block 7: Output 8	Float32
44 – 47	Function Block 7: Input A Force	Float32
48 – 51	Function Block 7: Input B Force	Float32
52 – 55	Function Block 7: Input C Force	Float32
56 – 59	Function Block 7: Input D Force	Float32
60 – 63	Function Block 7: Input A Signal (mV/V)	Float32
64 – 67	Function Block 7: Input B Signal (mV/V)	Float32
68 – 71	Function Block 7: Input C Signal (mV/V)	Float32
72 – 75	Function Block 7: Input D Signal (mV/V)	Float32

See description of data in chapter 'Connection 1-4 Function block data'.

### 3.21 Connection 14 Input data

The input data of connection 14 is the Assembly Instance 114 (Producing instance). Connection 14 input data consists of 76 bytes as described in table below. This instance contains the Function Block 8 extended data. Least significant byte is always first.

Bytes	Contents	Type
0 – 1	Function Block 8: Error code	Int. 16
2 – 3	Function Block 8: Status	Int. 16
4 – 7	Function Block 8: Sum	Float32
8 – 11	Function Block 8: Difference	Float32
12 – 15	Function Block 8: Output 1	Float32
16 – 19	Function Block 8: Output 2	Float32
20 – 23	Function Block 8: Output 3	Float32
24 – 27	Function Block 8: Output 4	Float32
28 – 31	Function Block 8: Output 5	Float32
32 – 35	Function Block 8: Output 6	Float32
36 – 39	Function Block 8: Output 7	Float32
40 – 43	Function Block 8: Output 8	Float32
44 – 47	Function Block 8: Input A Force	Float32
48 – 51	Function Block 8: Input B Force	Float32
52 – 55	Function Block 8: Input C Force	Float32
56 – 59	Function Block 8: Input D Force	Float32
60 – 63	Function Block 8: Input A Signal (mV/V)	Float32
64 – 67	Function Block 8: Input B Signal (mV/V)	Float32
68 – 71	Function Block 8: Input C Signal (mV/V)	Float32
72 – 75	Function Block 8: Input D Signal (mV/V)	Float32

See description of data in chapter 'Connection 1-4 Function block data'.

### 3.22 Connection 15 Input data

The input data of connection 15 is the Assembly Instance 115 (Producing instance). Connection 15 input data consists of 80 bytes as described in table below.

This instance contains 20 pcs of 32-bits floating point format data as spare (values are 0). Least significant byte is always first.

Bytes	Contents	Type
0 - 3	Data_1001	Float32
4 - 7	Data_1002	Float32
8 - 11	Data_1003	Float32
12 - 15	Data_1004	Float32
16 - 19	Data_1005	Float32
20 - 23	Data_1006	Float32
24 - 27	Data_1007	Float32
28 - 31	Data_1008	Float32
32 - 35	Data_1009	Float32
36 - 39	Data_1010	Float32
40 - 43	Data_1011	Float32
44 - 47	Data_1012	Float32
48 - 51	Data_1013	Float32
52 - 55	Data_1014	Float32
56 - 59	Data_1015	Float32
60 - 63	Data_1016	Float32
64 - 67	Data_1017	Float32
68 - 71	Data_1018	Float32
72 - 75	Data_1019	Float32
76 - 79	Data_1020	Float32

### 3.23 Connection 16 Input data

The input data of connection 16 is the Assembly Instance 116 (Producing instance). Connection 16 input data consists of 80 bytes as described in table below.

This instance contains 20 pcs of 32-bits floating point format data as spare (values are 0). Least significant byte is always first.

Bytes	Contents	Type
0 - 3	Data_1021	Float32
4 - 7	Data_1022	Float32
8 - 11	Data_1023	Float32
12 - 15	Data_1024	Float32
16 - 19	Data_1025	Float32
20 - 23	Data_1026	Float32
24 - 27	Data_1027	Float32
28 - 31	Data_1028	Float32
32 - 35	Data_1029	Float32
36 - 39	Data_1030	Float32
40 - 43	Data_1031	Float32
44 - 47	Data_1032	Float32
48 - 51	Data_1033	Float32
52 - 55	Data_1034	Float32
56 - 59	Data_1035	Float32
60 - 63	Data_1036	Float32
64 - 67	Data_1037	Float32
68 - 71	Data_1038	Float32
72 - 75	Data_1039	Float32
76 - 79	Data_1040	Float32

### 3.24 Connection 17 Input data

The input data of connection 17 is the Assembly Instance 117 (Producing instance). Connection 17 input data consists of 40 bytes as described in table below.

This instance contains 20 pcs of 16-bits integer data as spare (values are 0). Least significant byte is always first.

Bytes	Contents	Type
0 - 1	Data_2001	Int. 16
2 - 3	Data_2002	Int. 16
4 - 5	Data_2003	Int. 16
6 - 7	Data_2004	Int. 16
8 - 9	Data_2005	Int. 16
10 - 11	Data_2006	Int. 16
12 - 13	Data_2007	Int. 16
14 - 15	Data_2008	Int. 16
16 - 17	Data_2009	Int. 16
18 - 19	Data_2010	Int. 16
20 - 21	Data_2011	Int. 16
22 - 23	Data_2012	Int. 16
24 - 25	Data_2013	Int. 16
26 - 27	Data_2014	Int. 16
28 - 29	Data_2015	Int. 16
30 - 31	Data_2016	Int. 16
32 - 33	Data_2017	Int. 16
34 - 35	Data_2018	Int. 16
36 - 37	Data_2019	Int. 16
38 - 39	Data_2020	Int. 16

## 3.25 Connection 18 Input data

The input data of connection 18 is the Assembly Instance 118 (Producing instance). Connection 18 input data consists of 80 bytes as described in table below.

This instance contains 20 pcs of 32-bits integer data as spare (values are 0). Least significant byte is always first.

Bytes	Contents	Type
0 - 3	Data_3001	Int. 32
4 - 7	Data_3002	Int. 32
8 - 11	Data_3003	Int. 32
12 - 15	Data_3004	Int. 32
16 - 19	Data_3005	Int. 32
20 - 23	Data_3006	Int. 32
24 - 27	Data_3007	Int. 32
28 - 31	Data_3008	Int. 32
32 - 35	Data_3009	Int. 32
36 - 39	Data_3010	Int. 32
40 - 43	Data_3011	Int. 32
44 - 47	Data_3012	Int. 32
48 - 51	Data_3013	Int. 32
52 - 55	Data_3014	Int. 32
56 - 59	Data_3015	Int. 32
60 - 63	Data_3016	Int. 32
64 - 67	Data_3017	Int. 32
68 - 71	Data_3018	Int. 32
72 - 75	Data_3019	Int. 32
76 - 79	Data_3020	Int. 32

### 3.26 Connection 19 Input data

The input data of connection 19 is the Assembly Instance 119 (Producing instance). Connection 19 input data consists of 76 bytes as described in table below.

This instance contains spare data with same structure as the extended Function Blocks (values are 0). Least significant byte is always first.

Bytes	Contents	Type
0 – 1	Data_4001	Int. 16
2 – 3	Data_4002	Int. 16
4 – 7	Data_4003	Float32
8 – 11	Data_4004	Float32
12 – 15	Data_4005	Float32
16 – 19	Data_4006	Float32
20 – 23	Data_4007	Float32
24 – 27	Data_4008	Float32
28 – 31	Data_4009	Float32
32 – 35	Data_4010	Float32
36 – 39	Data_4011	Float32
40 – 43	Data_4012	Float32
44 – 47	Data_4013	Float32
48 – 51	Data_4014	Float32
52 – 55	Data_4015	Float32
56 – 59	Data_4016	Float32
60 – 63	Data_4017	Float32
64 – 67	Data_4018	Float32
68 – 71	Data_4019	Float32
72 – 75	Data_4020	Float32



# 4 Diagnostics

## 4.1 General

This chapter describes the EtherNet/IP related diagnostics functions when handled from the local display or via Remote Access.

These screens give the possibility to study the content of used instances (data to or from the scanner). The function is useful for advanced trouble shooting in case of problems with the communication.

Diagnostics for EtherNet/IP can be found under 'Main Menu/Maintenance/Diagnostics' in the G6 Instrument.

## 4.2 PM display

The content of the selected instance is displayed in hexadecimal form with up to six lines on the display. On each line eight byte values are displayed, preceded by the address of the first byte.

Keys F1 (Prev.) and F2 (Next) are used to scroll data if there is not enough room for all data on one screen.

Use key F3 (Inst.) to display next instance (100 – 101 – 102 – 103 – ..... – 100 etc).

If a scanner is connected to this instance, 'Active' is shown. Otherwise 'Inactive' is shown. No data is shown if instance is inactive.

EtherNet/IP				
Instance 103 Active Updating				
000	00	00	00	9C 41
008	0F	A2	00	65 00 00 00
016	27	0F	00	0C 35 20 00 00
024	00	00	00	00 00 00 00
032	00	00	00	00 00 00 00
040	00	00	00	00 00 00 00
Prev.	Next	Inst.	Escape	

*PM local display*

### 4.3 RM display

The content in the selected instance is displayed in hexadecimal form with two lines on the display. On each line four byte values are displayed, preceded by the address of the first byte.

The first screen show selected instance. If a scanner is connected to the shown instance Active is show else is Inactive shown. No data is shown if the instance is inactive.

The '+' and '-' keys are used to step the displayed addresses forwards / backwards. Use key '↵' to display next instance (100 – 101 – 102 – 103 – ..... – 100 etc).

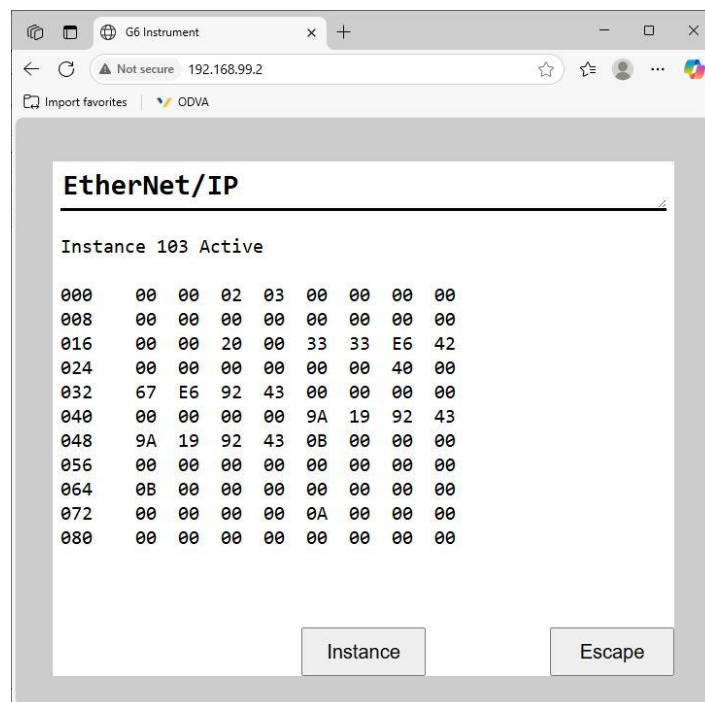
```
EtherNet/IP  
I:103 Active
```

```
000 00 00 00 02  
004 00 00 9C 41
```

RM local display

### 4.4 Remote

Use key 'Instance' to display next instance (100 – 101 – 102 – 103 – ..... – 100 etc). If a scanner is connected to this instance 'Active' is shown otherwise 'Inactive' is shown. No data is shown if instance is inactive.



## 4.5 Data format

This section describes data format of the EtherNet/IP interface with a few examples. Data is transmitted with the least significant byte first. When studying the diagnostics screen data is therefore shown least significant byte first. This is important when converting between floating point and integer data to hex representation.

### Example Function Block 3: Set zero command:

Command = 30, Parameter No = no significance, Parameter value = no significance

Bytes	Data type	Diagn. Screen (hex)	Actual value	Description
0 – 1	Int. 16	1E 00	30	Command
2 – 3	Int. 16	–	–	Parameter No
4 – 7	Float 32	–	–	Parameter value

Complete message on diagnostics screen: 1E 00 XX XX XX XX XX XX  
XX means no significance.

### Example Set Level value 7 to 65.4 command:

Command = 221, Parameter No = 7, Parameter value = 65.4

Bytes	Data type	Diagn. Screen (hex)	Actual value	Description
0 – 1	Int. 16	DD 00	221	Command
2 – 3	Int. 16	07 00	7	Parameter No
4 – 7	Float 32	CD CC 82 42	65.4	Parameter value

Complete message on diagnostics screen: DD 00 07 00 CD CC 82 42

### Example Enter remote operation command:

Command = 2, Parameter No = no significance, Parameter value = no significance

Bytes	Data type	Diagn. Screen (hex)	Actual value	Description
0 – 1	Int. 16	02 00	2	Command
2 – 3	Int. 16	–	–	Parameter No
4 – 7	Float 32	–	–	Parameter value

Complete message on diagnostics screen: 02 00 XX XX XX XX XX XX  
XX means no significance.

In a PLC data can be shown in different ways. Either it's shown as actual values in correct floating point format, integer format etc. Data can also be shown in hexadecimal format either as the bytes are transmitted or as they are interpreted i.e. least significant byte to the right.

### Example:

Float value

65.4

Hex format in G6 diagnostics screen:

CD CC 82 42 (this is the order that the bytes are transmitted in).

PLC showing the data in hex format:

16#4282CCCD (16# means hexadecimal representation)



## 5 Details on EtherNet/IP

The optional EtherNet/IP interface of the G6 Instrument enables Ethernet communication using the EtherNet/IP protocol. It is intended for accessing measured force data, function block status, input and output status, level status and analog output data. Commands for e.g. 'Function Block 1: Set zero' can be issued over the EtherNet/IP interface.

The interface is not intended for set-up of the instrument. Use the instrument front panel user interface or remote access for set-up.

Note: OS Version in the G6 Instrument shall be 8.0.5.11 or later.

Information about EtherNet/IP and the ODVA can be obtained from the ODVA web site: [www.odva.org](http://www.odva.org)

The G6 Instrument is classified as a CIP Adapter Class device of Generic Device Type.

The EtherNet/IP interface of the instrument supports three types of transports:

1. Unconnected messaging
2. Class 3 connected messaging
3. Class 1 connected real-time data transfer (I/O connection)

Class 1 I/O connections can be configured to different RPI (Requested Packet Interval). It's strongly recommended to not set the RPI lower than needed or lower than the actual instrument update rate setting. Choosing lower than necessary RPI will only affect (degrade) the performance of the instrument specifically the user interface responsiveness and communication response delays.

### 5.1 CIP Object definitions

The following CIP objects are defined in the instrument:

1. Identity Object.
2. Message Router.
3. Assembly Object.
4. Connection Manager Object.
5. TCP/IP Interface Object.
6. Ethernet Link Object.

## 5.2 Identity Object

The Identity Object class code is 0x01.

### Supported Class Attributes:

No.	Attribute name	Value
1	Revision	1
2	Max Instance	1
3	Number of Instances	1
4	Optional Attribute list	0, Not supported
5	Optional Service list	0, Not supported
6	Max Class Attribute No	0, Not supported
7	Max Instance Attribute No	7

### Supported Instance Attributes:

No.	Attribute name	Value
1	Vendor ID	1179
2	Device Type	Generic Device Type
3	Product Code	3
4	Revision	2.1
5	Status	
6	Serial Number	CPU module serial number
7	Product name	"G6 Modular Instrument"

### Supported Services:

Code	Name	Class	Instance
0x01	Get_Attribute_All	Yes	Yes
0x0E	Get_Attribute_Single	Yes	Yes
0x05	Reset	Yes	Yes

The Reset Service support type 0 reset only. This is a power cycle type of reset.

## 5.3 Message Router Object

The Message Router Object class code is 0x02.

### Supported Class Attributes:

No.	Attribute name	Value
1	Revision	1
2	Max Instance	1
3	Number of Instances	1
4	Optional Attribute list	2, 1, 2. 2 Optional attributes, no 1 and 2
5	Optional Service list	1, 0x0A
6	Max Class Attribute No	7
7	Max Instance Attribute No	2

### Supported Instance Attributes:

No.	Attribute name	Value
1	Object list	6, 0x01, 0x02, 0x04, 0x06, 0xF5, 0xF6
2	Max number of connections	16

### Supported Services:

Code	Name	Class	Instance
0x01	Get_Attribute_All	Yes	Yes
0x0A	Multiple_Service_Packet	No	Yes
0x0E	Get_Attribute_Single	Yes	Yes

## 5.4 Assembly Object

The Assembly Object class code is 0x04.

The Assembly object is used to receive and transmit data to and from the G6 instrument. This data is measurements, status, input and output status etc. Any communication regarding this type of instrument data is done through the Assembly object.

Note that the Assembly Object is defined as a static assembly meaning that it cannot be configured.

For convenience the instrument ignores any reference to any configuration instance. It will not generate an error response to a connection attempt that includes a configuration instance.

### Supported Class Attributes:

No.	Attribute name	Value
1	Revision	2
2	Max Instance	119
3	Number of Instances	20
6	Max Class Attribute No	7
7	Max Instance Attribute No	4

### Supported Instance Attributes:

No.	Attribute name	Remark
3	Data	
4	Size of Instance	See table below

### Supported Services:

Code	Name	Class	Instance
0x0E	Get_Attribute_Single	Yes	Yes
0x10	Set_Attribute_Single	No	Yes (Instance 100 data only)

**Assembly Object Instances**

<b>No.:</b>	<b>Direction of data</b>	<b>Size (bytes)</b>	<b>Description</b>
100	Consumer	8	G6 control (data to the G6)
101	Producer	52	Function Blocks 1 - 2.
102	Producer	92	Function Blocks 1 - 4.
103	Producer	132	Function Blocks 1 - 6.
104	Producer	172	Function Blocks 1 - 8.
105	Producer	46	Analog out, dig I/O status, clock
106	Producer	128	Level 1 – 32 values
107	Producer	76	Function Block 1 Extended
108	Producer	76	Function Block 2 Extended
109	Producer	76	Function Block 3 Extended
110	Producer	76	Function Block 4 Extended
111	Producer	76	Function Block 5 Extended
112	Producer	76	Function Block 6 Extended
113	Producer	76	Function Block 7 Extended
114	Producer	76	Function Block 8 Extended
115	Producer	80	FLOAT32 Spare 1 (20 pcs)
116	Producer	80	FLOAT32 Spare 2 (20 pcs)
117	Producer	40	INT16 Spare (20 pcs)
118	Producer	80	INT32 Spare (20 pcs)
119	Producer	76	Function Block Extended Spare

## 5.5 Connection Manager

The Connection Manager class code is 0x06.

The 32 Run/Idle-Header for Originator to Target Connection (Scanner to device) is required. The system supports Unicast and Multicast.

### Supported Class Attributes:

No.	Attribute name	Value
1	Revision	1
2	Max Instance	1
3	Number of Instances	1
4	No. of instance attributes + list of attributes	8, 1, 2, 3, 4, 5, 6, 7, 8 (8 attributes, attributes 1 – 8 supported)
5	Optional Service List	0, Not supported
6	Max Class Attribute No	7
7	Max Instance Attribute No	8

### Supported Instance Attributes:

No.	Attribute name	Value
1	Open requests	Actual counts
2	Open format rejects	Actual counts
3	Open resource rejects	Actual counts
4	Open other rejects	Actual counts
5	Close request	Actual counts
6	Close format rejects	Actual counts
7	Close other rejects	Actual counts
8	Connection timeouts	Actual counts

### Supported Services:

Code	Name	Class	Instance
0x01	Get_Attribute_All	Yes	Yes
0x02	Set_Attribute_All	No	Yes
0x0E	Get_Attribute_Single	Yes	Yes
0x10	Set_Attribute_Single	No	Yes
0x4E	Forward_Close	No	Yes
0x54	Forward_Open	No	Yes
0x5A	Get_Connection_Owner	No	Yes

## 5.6 TCP/IP Interface Object

The TCP/IP Interface Object class code is 0xF5.

### Supported Class Attributes:

No.	Attribute name	Value
1	Revision	3
2	Max Instance	1
3	Number of Instances	1
4	No. of instance optional attributes + list	2, 8, 9 (2 attributes, attributes 8 and 9 supported)
5	Optional Service List	0, Not supported
6	Max Class Attribute No	7
7	Max Instance Attribute No	9

### Supported Instance Attributes:

No.	Attribute name	Remarks
1	Status	1
2	Configuration Capability	No configuration capability over EtherNet/IP
3	Configuration Control	No configuration control support
4	Physical Link Object	Ethernet Link Object
5	Interface Configuration	See EIP spec.
6	Host name	"G6ModInstr"
7	Safety network Number	0, Not supported
8	TTL Value	See EIP spec.
9	Mcast Config	See EIP spec.

### Supported Services:

Code	Name	Class	Instance
0x0E	Get_Attribute_Single	Yes	Yes
0x01	Get_Attribute_All	Yes	Yes

## 5.7 Ethernet Link Object

The Ethernet Link Object class code is 0xF6.

### Supported Class Attributes:

No.	Attribute name	Value
1	Revision	3
2	Max Instance	1
3	Number of Instances	1
4	No. of instance optional attributes + list	4, 7, 8, 9, 10 (4 attributes, attributes 7 to 10 supported)
5	Optional Service List	0, Not supported
6	Max Class Attribute No	7
7	Max Instance Attribute No	10

### Supported Instance Attributes:

No.	Attribute name	Remarks
1	Interface Speed	Value 0 (Speed indeterminate)
2	Interface Flags	See EIP spec.
3	Physical Address	MAC Address
4	Interface Counters	0, Not supported
5	Media Counters	0, Not supported
6	Interface Control	0, Not supported
7	Interface Type	2, Twisted pair
8	Interface State	See EIP spec.
9	Admin State	-
10	Interface Label	IP address string

### Supported Services:

Code	Name	Class	Instance
0x01	Get_Attribute_All	Yes	Yes
0x0E	Get_Attribute_Single	Yes	Yes



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