Measurement · Weighing · Control

G5 Weighing Instrument

Program version 1.5.X (PM and RM)
Program version 3.5.X (RMD)







Fieldbus Option Manual

PM RM and RMD types

BLH NOBEL
A VPG Brand

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PRECAUTIONS

READ this manual BEFORE operating or servicing this instrument. FOLLOW these instructions carefully. SAVE this manual for future reference.



WARNING

Only permit qualified personnel to install and service this instrument. Exercise care when making checks, tests and adjustments that must be made with power on. Failing to observe these precautions can result in bodily harm.

DO NOT allow untrained personnel to operate, clean, inspect, maintain, service, or tamper with this instrument.

INTENDED USE

The G5 Instrument family are measuring and control devices intended for industrial systems. Its basic function is to convert the signals from transducers to useful information. Transducer excitation is included as well as parameter controlled signal processing, indication of output levels, error supervision and operation of optional external equipment. The instrument supports several types of communication interfaces.

INSTRUMENT INSULATION AND GROUNDING

The cable connector for mains power supply should include protective grounding for safety. The cable for 24VDC power supply (screw terminal connector) should include a ground connected to terminal GND.

The input groups of the instrument are insulated from each other by functional insulation. The mains connection of AC-powered instruments has reinforced insulation according to IEC 61010. Terminals intended for connection of cable shields are connected to the protective ground of the mains or GND terminal of 24VDC input but must not be considered as protective grounding. Shield connection of load cell input is not connected to mains protective ground or 24VDC GND terminal.

Change description

Program version 1.4.X, document revision 0: First release of this document.
Compared to Program version 1.3.X the following is added:
- Fieldbus option PROFINET.
- EtherNet/IP Network Configuration is not a Parameter Set-up.

Document revision 1: EtherNet/IP M40 Industrial Ethernet Module added. This change applies from program versions 1.5.0 and 3.5.0.

1. Introduction

General

The G5 Instruments are high performance single-channel weight indicators (PM model, panel mounted) or weight transmitters (RM model, DIN rail mounted) intended for industrial systems.

This manual describes the functionality of the optional Fieldbus interface of the G5 Instrument.

The instrument supports the following busses:

- Profibus DP
- DeviceNet
- ControlNet
- EtherNet/IP
- PROFINET

The optional fieldbus module is mounted in the Fieldbus slot.

The fieldbus settings are done from the instrument. No settings are done on the fieldbus module itself. PROFINET network properties are normally done by the IO controller.

Module installation

Make sure the instrument power supply is off or disconnected. Remove the plastic cover from the fieldbus slot. Insert the adaptor **very carefully and make absolutely sure that the adaptor slides correctly into the guides** in the connector on the PCB. Tighten the two fastening screws at the adaptor front and check that the two securing hooks locks into the PCB.

Module type	Connector	Baud rate	Address
Profibus DP 	Profibus 9-pin, female D-sub (DB9F)	9.6 kbps – 12 Mbps or Auto set by parameter	1 – 125, set by parameter
DeviceNet 	5 pin male connector.	125, 250, 500 kbps or Auto set by parameter.	0 – 63, set by parameter
	Bus Supply Voltage: According to DeviceNet (Node) specification, nominal 24 VDC, range 11 – 25 VDC.		
ControlNet 	BNC.	Fixed 5 Mbit/s.	1 – 99, set by parameter
EtherNet/IP M30/M40 	Dual RJ45 (Only port 1 ,P1) is supported		Selectable Static or DHCP. If static choosen IP-address, Net Mask and Default Gateway are configurable in the Network Configuration menu.
PROFINET 	Dual RJ45		All network properties are set by the IO Controller.

Ordering information

If an (optional) fieldbus module is needed it must be ordered together with the instrument. Ordering numbers are shown below. If multiple instruments and/or fieldbus modules are purchased in the same order it must be clearly specified which module should be mounted in which instrument.

Optional ProfibusDP fieldbus module

P/N: 110559 (ordering number).

Optional DeviceNet fieldbus module

P/N: 110560 (ordering number).

Optional ControlNet fieldbus module

P/N: 110838 (ordering number).

Optional EtherNet/IP M30 Industrial Ethernet module

(Obsolete, only as spare part)

P/N: 110859 (ordering number).

Optional EtherNet/IP M40 Industrial Ethernet module

(Only from program version 1.5.X / 3.5.X)

P/N: 111086 (ordering number).

Optional PROFINET Industrial Ethernet module

P/N: 110858 (ordering number).



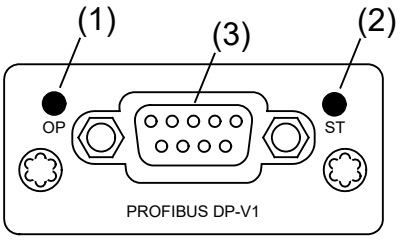
Example showing product information and installed option(s).

2. Modules

Profibus-DP Module

Profibus module front view

(1) Operation mode LED.
(2) Status LED.
(3) Profibus connector.



Operation mode LED

State	Indication
Off	Not online / No power
Green	On-line, data exchange
Flashing Green	On-line, clear
Flashing Red (1 flash)	Parameterization error
Flashing Red (2 flashes)	Profibus configuration error

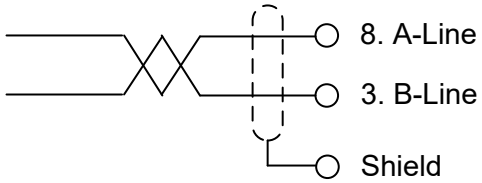
Status LED

State	Indication
Off	No power or not initialised
Green	Initialised
Flashing Green	Initialised, diagnostic event(s) present
Red	Exception error

Profibus connector (DB9F)

Pin	Signal	Description
1	-	-
2	-	-
3	B line	Positive RxD/TxD, RS485 level
4	RTS	Request to send
5	GND Bus	Ground (isolated)
6	+ 5V Bus Output	+5V termination power (isolated)
7	-	-
8	A line	Negative RxD/TxD, RS485 level
9	-	-
Housing	Cable shield	Functional ground internally connected to the module protective ground via cable shield filters according to the Profibus standard.

For connection of the adaptor to the Profibus master, use a Profibus standard cable and connector according to the diagram below.



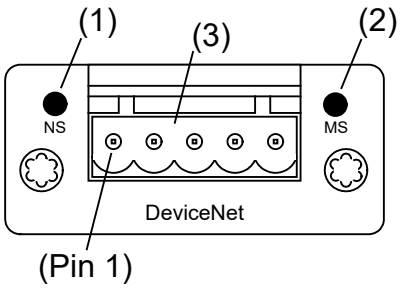
For reliable fieldbus function, line termination must be arranged in both ends of the transmission line. For a G5 instrument, at the end of the cable, a connector with line termination should be used. For all other G5 Instruments, connection without line termination should be used.

For configuration of the adaptor, a GSD file (VISH0F83.GSD) is available and should be installed in the master.

DeviceNet Module

DeviceNet module front view

(1) Network Status LED.
(2) Module Status LED.
(3) DeviceNet connector.



Network Status LED

State	Indication
Off	Not online / No power
Green	On-line, one or more connections are established
Flashing Green (1 Hz)	On-line, no connections established
Red	Critical link failure
Flashing Red (1 Hz)	One or more connections time out
Alternating Red/Green	Self-test

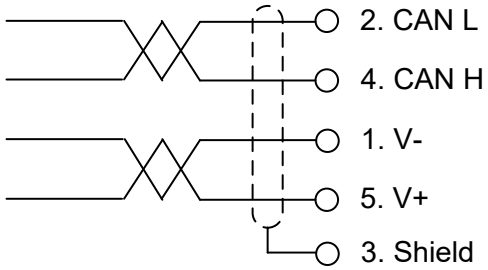
Status LED

State	Indication
Off	No power
Green	Operating in normal condition
Flashing Green (1 Hz)	Missing or incomplete configuration
Red	Unrecoverable fault(s)
Flashing Red (1 Hz)	Recoverable fault(s)
Alternating Red/Green	Self-test

DeviceNet connector

Pin	Signal	Description
1	V-	Negative bus supply voltage
2	CAN L	CAN low bus line
3	Shield	Cable shield, functional ground.
4	CAN H	CAN high bus line
5	V+	Positive bus supply voltage

For connection of the adaptor to the DeviceNet master, use a standard cable for DeviceNet or similar shielded cable with twisted pairs and a connector according to the diagram below. The bus supply voltage shall be 11 – 25 VDC.



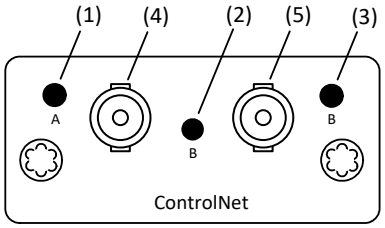
For reliable fieldbus function, line termination must be arranged in both ends of the transmission line. For a G5 Instrument placed at the end of the line, terminate line by placing a 121-ohm resistor between CAN L (pin 2) and CAN H (pin 4).

For configuration of the adaptor an EDS file is supplied with the instrument that should be installed in the master. Note that the EDS file is a generic type supplied by the module manufacturer. The file doesn’t contain any reference to the G5 Instrument or to BLH Nobel.

ControlNet Module

ControlNet module front view

(1) Network Status LED A.
(2) Module Status LED.
(3) Network Status LED B.
(4) ControlNet connector A.
(5) ControlNet connector B.



Network Status LED A/B

LED	State	Indication
LED A and B	Off	Not online / No power
	Flashing Red (1 Hz)	Incorrect node configuration, duplicate MAC ID etc.
	Alternating Red/Green	Self-test of bus controller
	Red	Fatal event or faulty unit
LED A or B	Off	Channel is disabled
	Alternating Red/Green	Invalid link configuration
	Flashing Green (1 Hz)	Temporary errors (node will self-correct) or node is not configured to go online
	Green	Normal operation
	Flashing Red (1 Hz)	Media fault or no other nodes on the network

Status LED

State	Indication
Off	No power
Green	Operating in normal condition, controlled by a Scanner in run state
Flashing Green (1 Hz)	The module has not been configuration or Scanner in idle state
Red	Unrecoverable fault(s), EXCEPTION, fatal event
Flashing Red (1 Hz)	Recoverable fault(s), MAC ID has been changed after initialization etc.

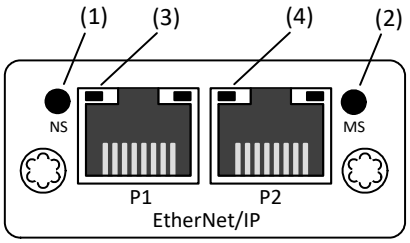
ControlNet connectors

These connectors provide ControlNet connectivity. If redundancy is wanted both connectors should be used. Otherwise either connector can be used.

EtherNet/IP Module M30/M40

EtherNet/IP module front view

(1) Network Status LED.
(2) Module Status LED.
(3) Link/Activity Port 1.
(4) Link/Activity Port 2.



Network Status LED

LED State	Indication
Off	No power or no IP address
Green	Online, one or more connections established (CIP class 1 or 3)
Green, flashing	Online, no connections established
Red	Duplicate IP address, fatal error
Red, flashing	One or more connections timed out (CIP class 1 or 3)

Module Status LED

State	Indication
Off	No power
Green	Controlled by a Scanner in run state
Flashing Green (1 Hz)	Not configured or Scanner in idle state
Red	Major fault (EXCEPTION state, fatal error etc.)
Flashing Red (1 Hz)	Recoverable fault(s)

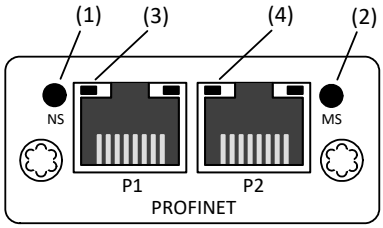
Link/Activity LED 3/4

State	Indication
Off	No link, no activity
Green	Link (100 Mbit/s) established
Green, flickering	Activity (100 Mbit/s)
Yellow	Link (10 Mbit/s) established
Yellow, flickering	Activity (10 Mbit/s)

PROFINET Module

PROFINET module front view

(1) Network Status LED.
(2) Module Status LED.
(3) Link/Activity Port 1.
(4) Link/Activity Port 2.



Network Status LED

LED State	Description	Comments
Off	Offline	No power or No connection with IO Controller
Green	Online (RUN)	-Connection with IO Controller established -IO Controller in RUN state
Green, 1 flash	Online (STOP)	-Connection with IO Controller established -IO Controller in STOP state or IO data bad -IRT synchronization not finished
Green, blinking	Blink	Used by engineering tools to identify the node on the network
Red	Fatal event	Major internal error (this indication is combined with a red module status LED)
Red, 1 flash	Station Name error	Station Name not set
Red, 2 flashes	IP address error	IP address not set
Red, 3 flashes	Configuration error	Expected Identification differs from Real Identification

Module Status LED

LED State	Description	Comments
Off	Not Initialized	No power OR Module in SETUP or NW_INIT state.
Green	Normal Operation	Module has shifted from the NW_INIT state.
Green, 1 flash	Diagnostic Event(s)	Diagnostic event(s) present
Red	Exception error	Device in state EXCEPTION.
	Fatal event	Major internal error (this indication is combined with a red network status LED)
Alternating Red/Greed	Firmware update	Do NOT power off the module. Turning the module off during this phase could cause permanent damage.

Link/Activity LED

LED State	Description	Comments
Off	No Link	No link, no communication present
Green	Link	Ethernet link established, no communication present
Green, flickering	Activity	Ethernet link established, communication present

3. Set-up

General

All operating functions in the G5 Instrument are controlled by parameters. The parameter values are permanently stored in the instrument and will not be lost when the unit is switched off. At delivery the parameters are factory-set to default values, giving the instrument an initial standard function.

The actual setting of the parameter values can be read and edited during normal measuring operation in sub menu ‘Parameter Set-up’. Editing of parameter values can be performed using the color display and keys on the front panel of the instrument or by using a Web Browser on a PC connected on the same network as the instrument. After editing hardware parameters the instrument will be restarted.

In the instrument there are two levels of security locks provided to protect from unauthorized access to instrument functions and editing of parameters and values. The locks are opened by four-digit codes.

Fieldbus related parameters

On the following pages a survey of fieldbus related parameters is presented. The parameters are divided in groups following the menu they belong to. For choice parameters the available choices are given. For numerical parameters, a value range is given.

At the end of the table, the default value is given in < >.

To the right there is a short parameter explanation and, *in italic,* the results for the different alternatives.

Range/Alternatives <default value>	Explanation and result of alternatives.
Menu Hardware Configuration	
Fieldbus Module	
None Profibus DeviceNet ControlNet EtherNet/IP PROFINET < None >	Available Fieldbus choices. When this set-up is changed the instrument will be restarted. The user must confirm that the instrument is restarted. If the set-up does not match the installed module the instrument will start up in error state. After the mismatch is corrected and the instrument is restarted the instrument will be operational again.

Range/Alternatives <default value>	Explanation and result of alternatives.

Menu Fieldbus

Note: The Fieldbus menu is not shown if parameter **Fieldbus** (in **Hardware Configuration** menu) is set to **None.**

Profibus, Address

Range 1 - 125
< 126 >

Profibus address setting.

Note: This parameter is only shown if parameter **Fieldbus** (in Hardware Configuration menu) is set to **Profibus**.

DeviceNet, Address

Range 0 - 63
< 63 >

DeviceNet address setting

Note: This parameter is only shown if parameter **Fieldbus** (in Hardware Configuration menu) is set to **DeviceNet**.

ControlNet, Address

Range 1 - 99
< 99 >

ControlNet address setting

Note: This parameter is only shown if parameter **Fieldbus** (in Hardware Configuration menu) is set to **ControlNet**.

DeviceNet, Baudrate

125 kbps
250 kbps
500 kbps
Auto
< Auto >

The baud rate for a DeviceNet type of module. Must be selected to suite the master.

125 kbps: *Fixed baudrate 125 kbits/s.*
250 kbps: *Fixed baudrate 250 kbits/s.*
500 kbps: *Fixed baudrate 500 kbits/s.*
Auto: *Auto setting 125 – 500 kbits/s.*

Note: This parameter is only shown if parameter **Fieldbus** (in Hardware Configuration menu) is set to **DeviceNet**.

Data Format

Floating Point
Integer
< Floating Point >

Sets what data format should be used. The data format choice applies to weight and some other values. Status, error code and other similar data which is inherently integer data is always given as integers (no decimals)
Floating Point*: IEEE 32 bit floating point format.*
Integer: *32 bit integer format.*

Note: This parameter is shown if parameter **Fieldbus** (in Hardware Configuration menu) is set to other than **None**.

4. Output Data

Output data mapping is shown in the table below. Output data is 8 bytes as described in table below. Data direction is from network (PLC) to G5 Instrument.

Byte	Size	Description
0 – 1	2	Command
2 – 3	2	Parameter ID
4 – 7	4	Data to write

Command

Bytes 0 - 1: The command byte is used when writing data to the instrument and to issue various scale related commands such as taring, zeroing etc.

Note that a new command is detected when the content of the command register is changed. If the same command shall be issued again, the command byte must first be set to 0 and this should be verified by reading command acknowledge. Then the desired command may be issued.

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

Parameter ID

Bytes 2 - 3: The selected Level (1 - 4) or Setpoint (1 - 4) to set. The data in byte 2 and 3 are ignored for any other commands than 221 and 222.

Data to write

Bytes 4 to 7: The value of the Preset tare, Level, Setpoint, Digital outputs or Analog Output to set. Note that the format of the value should be floating point or integer depending on the **Data Format** parameter. The data in bytes 4 to 7 are ignored for any other commands than 200, 201, 220 – 222. No of decimals in an integer value is according to the weight and flow rate set-up. Analog output (command 200) is always 3 decimals.

Example: A value with 3 decimals e.g. 7.234 should be written as 7234 to the bytes 4 – 7.

Byte order

The byte order in multi byte values (more than one byte) is depending on the type of fieldbus used.

Profibus DP: MSB first (Most Significant Byte first).

DeviceNet: MSB first.

ControlNet: MSB first.

EtherNet/IP: LSB first (Least Significant Byte first).

PROFINET: MSB first.

Commands

Cmd #	Command Name	Description
0	No action	When the same command is repeated the no action should be sent between the commands to make it possible for the instrument to detect new commands.
1	Start operation	When the instrument is in 'Wait for start state', this command can be used to start up the instrument.
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	Auto tare	Perform a tare operation
11	Set scale to zero	Zero the gross weight
12	Select gross mode	Switch to gross mode (display)
13	Select net mode	Switch to net mode (display)
14	Weight display	Switch from flow to weight display
15	Flow rate display	Switch from weight to flow display
16	Print command	Initiate a print output
100	Activate setpoint 1	Activate the setpoint
101	Deactivate setpoint 1	Deactivate the setpoint
102	Activate setpoint 2	
103	Deactivate setpoint 2	
104	Activate setpoint 3	
105	Deactivate setpoint 3	
106	Activate setpoint 4	
107	Deactivate setpoint 4	
132	Activate setpoints 1 - 4	Activates all 4 setpoints
133	Deactivate setpoints 1 - 4	Deactivates all 4 setpoints
200	Set Analog output	Remote control of analog output. Set actual current or voltage output value.
201	Set digital outputs	Remote control of digital outputs. Set or reset the 4 outputs.
220	Set Preset Tare value	Set Preset Tare to desired value.
221	Set Level value	Set selected Level to desired value.
222	Set Setpoint value	Set selected Setpoint to desired value.
223	Clear Acc. Weight	Set accumulated weight to zero.
252	Clear Program reset bit	Clear the Program reset bit in the Instrument Status register. Set at power up.

5. Input Data

Byte	Size	Description	Note
0	1	Instrument error	8
1	1	Instrument Status	8
2	1	Instrument State	8
3	1	Command acknowledge	8
4	1	Command error	8
5	1	Level status	8
6	1	Setpoint status	8
7	1	Input and Output status	8
8 – 9	2	Error code	8
10 – 11	2	Scale status	8
12 – 15	4	Gross weight	1, 2
16 – 19	4	Net weight	1, 2
20 – 23	4	Flow rate	1, 3
24 – 27	4	Input signal	1, 4
28 – 31	4	Level 1	1, 2, 3
32 – 35	4	Level 2	1, 2, 3
36 – 39	4	Level 3	1, 2, 3
40 – 43	4	Level 4	1, 2, 3
44 – 47	4	Setpoint 1	1, 2, 3
48 – 51	4	Setpoint 2	1, 2, 3
52 – 55	4	Setpoint 3	1, 2, 3
56 – 59	4	Setpoint 4	1, 2, 3
60 – 63	4	Preset tare	1, 2
64 – 67	4	Acc. weight Low	1, 5
68 – 71	4	Acc. weight High	1, 5
72 – 75	4	Analog Output	1, 6
76 – 79	4	Aux. analog input	1, 7
80 – 81	2	Clock, year	8
82	1	Clock, month	8
83	1	Clock, day	8
84	1	Clock, hour	8
85	1	Clock, minute	8
86	1	Clock, second	8
87	1	Not used	8
88	1	No of decimals in weight values	8
89	1	No of decimals in flow rate	8
90 - 105	16	Spare	9

Note 1: This value is in integer format if parameter **Data Format** is set to **Integer** or in float format if parameter **Data Format** is set to **Floating Point**.

Note 2: The number of decimals used in these values depends on the resolution setting for the scale. Actual number of decimals is shown in byte 88.

Note 3: The number of decimals used in flow rate depends on the resolution setting for the flow rate. Actual number of decimals is shown in byte 89.

Note 4: The input signal always has 5 decimals. Unit is mV/V.

Note 5: Low part has 3 decimals.

Note 6: Analog output value always with 3 decimals.

Note 7: Analog input value always with 3 decimals.

Note 8: The value is in integer format, i.e. it does not have any decimals.

Note 9: These bytes are not used in the standard version of the G5 software. The content is always 0.

Input data mapping is shown in the table on previous page. Input data is 106 bytes as described in the table. Data direction is from G5 Instrument to network (PLC).

Instrument error

This register holds the overall error code for the instrument.
Normally this register should contain ‘00’ which means no error.

Instrument status

This register holds the overall status for the instrument

Bits set to 1 in this register have the following meaning:

Bit no	Function	Comment
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. The bit is reset as Instrument status is read, over serial communication (Modbus RTU) or over Ethernet (Modbus TCP), for the first time after reset/power-up. Note that the reply contains the set bit if it was set. Reading Instrument Status via Fieldbus interface will not reset this bit. To reset this bit with fieldbus interface a specific 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.
2-15	Not used	

Instrument state

This register contains the state of the G5 instrument.

Code	Description
00	**'Starting up' state.** The instrument is starting up after a reset or power on.
01	**'Wait for start' state.** The instrument is waiting for a start command to go in process.
02	**'Warming up state'** The parameter 'Warm up time' is set to a value other than zero, and the instrument is waiting for the warming up time to pass.
03	**'Normal' state.** There are no parameter errors in the system. **Note:** Weight errors still indicate normal state.
04	**'Error' state.** An error has been detected during startup of the instrument.
05	**'Fatal error' state.** An error has been detected during startup of the instrument. It's not possible to enter any other state from here.
06	**'Power fail' state.** A power fail has been detected and the instrument will respond to communication for a short moment until the power supply reserves are empty (this is normally just a few ms). Weight values should be regarded as invalid.

Command acknowledge

This byte returns the value of the command if it could be executed. If there was an error executing the command the value 240 (hex F0) will be returned in this byte. This byte should be used to verify that a command has been executed.

Note that a new command is detected when the content of the command register is changed. If the same command shall be issued again, the command byte must first be set to 0 and this should be verified by reading command acknowledge. Then the desired command may be issued.

Command error

This byte holds the error code when a command has been sent to the instrument. Normally this register should contain '00' which means no error. Error codes 0 to 255 are valid in this register.

Level status 1 - 4

Bits in this byte have the following meaning:

Bit no	Function	Comment
0	Above level 1	The weight is above Level 1.
1	Above level 2	The weight is above Level 2.
2	Above level 3	The weight is above Level 3.
3	Above level 4	The weight is above Level 4.

Setpoint status 1-4

Bits in this byte have the following meaning:

Bit no	Function	Comment
0	Setpoint 1 activated	See description for setpoint function.
1	Setpoint 1 cycle done	-“-
2	Setpoint 2 activated	-“-
3	Setpoint 2 cycle done	-“-
4	Setpoint 3 activated	-“-
5	Setpoint 3 cycle done	-“-
6	Setpoint 4 activated	-“-
7	Setpoint 4 cycle done	-“-

Status of digital inputs and outputs

Bits in this byte have the following meaning:

Bit no	Function
0	Digital input 1 activated.
1	Digital input 2 activated.
2	Digital input 3 activated.
3	Digital input 4 activated.
4	Digital output 1 activated.
5	Digital output 2 activated.
6	Digital output 3 activated.
7	Digital output 4 activated.

Scale Error code

This register holds the error code for the scale. Normally this register should contain ‘000’ which means no error. Error codes 000 to 255 are valid in this register.

Scale Status

Bits set to 1 in this register have the following meaning:

Bit no	Function	Comment
0	Not used	Not used in the fieldbus interface
1	Not used	Not used in the fieldbus interface
2	Not used	Not used in the fieldbus interface
3	Good zero (disp. weight)	
4	Good zero Gross	
5	Good zero Net	
6	Net Mode	'1' = Net mode ‘0' = Gross mode
7	Motion	Unstable weight
8	Not used	
9	Not used	
10	Not used	
11	Flow rate display	Flow rate is shown in the display.
12	Net weight > 6 digits	The net weight value is out of precision and should normally not be used.
13	Gross weight > 6 digits	The gross weight value is out of precision and should normally not be used.
14	Not used	
15	Not used	

Gross weight

The gross weight value consists of 4 bytes. The weight should **not** be read alone because the status and error codes are stored in other registers. The weight is only valid when the register ‘Scale Error code’ equals 00. Gross weight can be in integer format or floating point format depending on the setting. The number of decimals used in the gross weight can be read in byte 88.

Net weight

The net weight value consists of 4 bytes. The weight should **not** be read alone because the status and error codes are stored in other registers. The weight is only valid when the register ‘Scale Error code’ equals 00. Net weight can be in integer format or floating point format depending on the setting. The number of decimals used in the net weight can be read in byte 88.

Flow rate

The flow rate value consists of 4 bytes. The weight should **not** be read alone because the status and error codes are stored in other registers. The flow rate is only valid when the register 'Scale Error code' equals 00. Flow rate can be in integer format or floating point format depending on the setting. The number of decimals used in the flow rate can be read in byte 89.

Input signal (mV/V)

These 4 bytes hold the current input signal in mV/V. The signal is always with 5 decimals and can be in integer format or floating point format depending on the setting.

Level 1 - 4 value

The level values are each 4 bytes. They can either be in integer format or floating point format depending on the setting. The number of decimals can be read in byte 88 if the level supervise the weight or in byte 89 if the level supervise the flow.

Setpoint 1 - 4 value

The setpoint values are each 4 bytes. They can either be in integer format or floating point format depending on the setting. The number of decimals can be read in byte 88 if the setpoint use the weight or in byte 89 if the setpoint supervise use the flow.

Scale Preset tare value

The preset tare value (4 bytes) has the same number of decimals as the weight resolution setting, No of decimals can be read in byte 88. The value can either be in integer format or floating point format depending on the setting.

Accumulated weight

Accumulated weights are updated when a print command is issued. The accumulated values can also be read in the 'Accumulated Weights' menu in the 'Main menu'. In this menu it is also possible to zero the accumulated weight.

An accumulated weight is represented by two values (HIGH, LOW). To get the resulting value multiply value HIGH by 10000 and add value LOW. LOW is a value between ±9999.999 with 3 decimals. HIGH is a value without decimals between ±999999.

The values can either be in integer format or floating point format depending on the setting.

Analog output value

These 4 bytes hold the value of the analog output. The value is rounded to 3 decimals and can be in integer format or floating point format depending on the setting.

Aux. Analog input

These 4 bytes hold the voltage value of the analog input. The value is given in V with 3 decimals. The range of the input is +-11V. It can be in integer format or floating point format depending on the setting.

Clock

These bytes are used to read the time and date from the instrument.

Year is given in 2 bytes while month (1 – 12), day (1 – 31), hour (0 – 23), minute (0 – 59) and second (0 – 59) is one byte each.

Number format

Byte order

The byte order in multi byte values (more than one byte) is depending on the type of fieldbus used.

Profibus DP: MSB first (Most Significant Byte first).

DeviceNet: MSB first.

ControlNet: MSB first.

EtherNet/IP: LSB first (Least Significant Byte first).

PROFINET: MSB first.

Scaled integer

Values stored in a 4 byte integer value (with sign). The number of decimals is either fixed for some values or depends on the resolution set-up.

Example: 12345678 (32 bit number) with 3 decimals: 12345.678.

Floating point

Float numbers (numbers with decimals) is in IEEE floating point format.

Examples

Example 1: Setting ‘Level 2 Value’ to 123.5.

1. Make sure that the previous command was not 221.
   Set command to 0 if the previous command was 221.
2. Set parameter ID to 2 (bytes 2 - 3).
3. Set the Data to Write (bytes 4 – 7) to the value to write (123.5).
4. Set the Command to 221(bytes 0 – 1).

Byte	Description	Dec	Hex
0 – 1	Command	221	DD
2 – 3	Parameter ID	2	02
4 – 7	Data to Write.	123.5	00 00 F7 42

Note byte order is LSB first in this example.

Example 2: Setting ‘Setpoint 4 value’ to 123.5. Here we are assuming that the setpoint has 3 decimals.

1. Make sure that the previous command was not 222.
   Set command to 0 if previous command was 222.
2. Set parameter ID to 4 (bytes 2 - 3).
3. Set the Data to Write (bytes 4 – 7) to the value to write (123.5).
4. Set the Command to 222 (bytes 0 – 1).

Byte	**Description**	**Dec**	**Hex**
0 – 1	Command	222	DE
2 – 3	Parameter ID	4	04
4 – 7	Data to Write.	123500	1E26C

Example 3: Reset the ‘Program reset’ bit in ‘Instrument status’.

1. Make sure that the previous command was not 252.
2. Set the Command to 252.

Byte	**Description**	**Dec**	**Hex**
0 – 1	Command	252	FC
2 – 3	Parameter ID	—	—
4 – 7	Data to Write.	—	—

Example 3: Other commands like Taring, Zeroing etc. See chapter **4 Output Data** for a list of available commands.

1. Make sure that the previous command was not the desired command.
2. Set the desired Command.

Byte	**Description**	**Dec**	**Hex**
0 – 1	Command	XXX	XX
2 – 3	Parameter ID	—	—
4 – 7	Data to Write.	—	—

Note that a dash in Dec. or Hex columns above indicates that the value is unimportant and not used for the function described.

6. Fieldbus interface

The optional fieldbus interface is based on a network communication module from HMS Industrial Networks. Available fieldbuses are Profibus, DeviceNet, ControlNet, EtherNet/IP and PROFINET. With setup parameters the fieldbus interface is configured for the specific needs of an installation. It is possible to setup address, baud rate (if applicable to the actual fieldbus type) and if the weight values shall be in integer or floating point format.

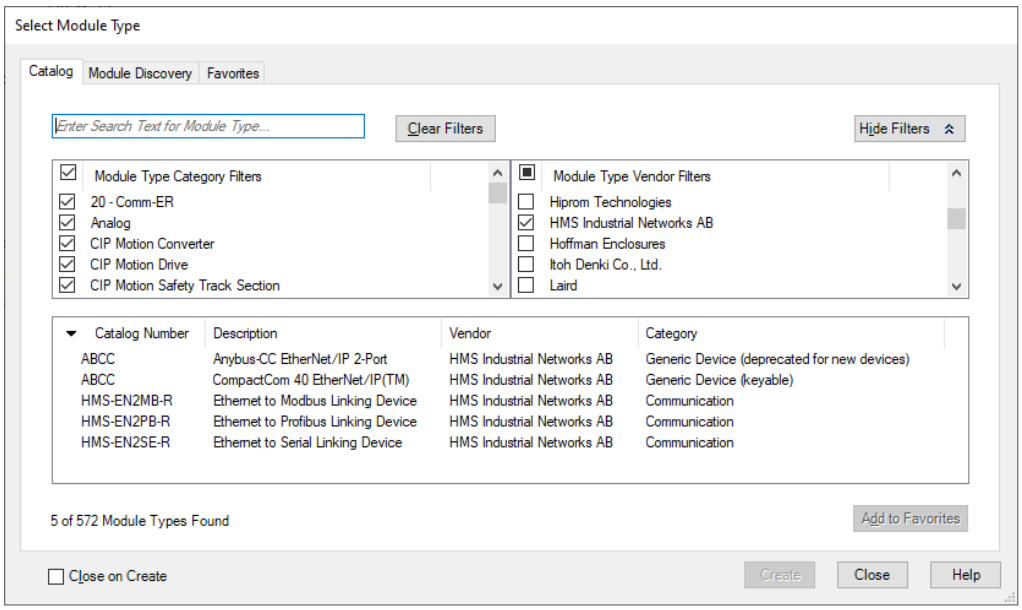
See table defining data mapping on the fieldbus. The mapping in the master and the instrument must always correspond.

Setup of fieldbus communication

- Complete the set-up of fieldbus communication before connecting it to the network to avoid possible network failure due to mismatch in configuration between network and instrument.
- Select the fieldbus type used in the Hardware Configuration menu.
  Note that the instrument will be restarted after changes in the hardware setup.
- Select the appropriate device address for the instrument. Address is setup in menu Communication – Fieldbus (Not for EtherNet/IP and PROFINET).
  Note that the address range is depending on type of fieldbus.
- Select baud rate, if applicable, according to the used baud rate in the network. Some fieldbuses may support automatic baud rate setting. Use fixed baud rate setting if there are difficulties to connect to the network or if the network baud rate is known.
- Connect to the network.

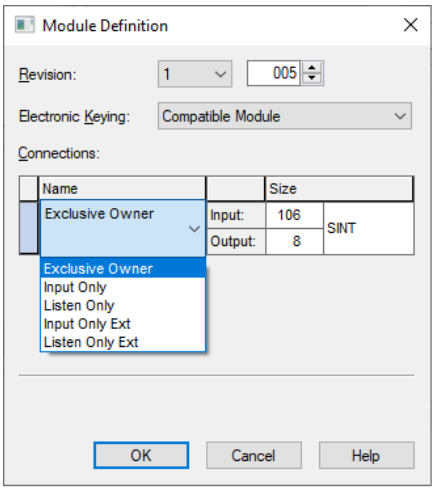
EtherNet/IP M30/M40

Use the EDS file provided when installing the G5 in a system.
EDS file name is **005A0000002E0100.eds** for the EtherNet/IP M30 module and **005A002B00370100.eds** for the M40 module.
After installing the EDS file in the development system of the PLC, create a G5 in the PLC system. In the **Select Module Type** pop-up window select HMS Industrial Networks AB in the Vendor filter and choose the correct ABCC module (Anybus-CC EtherNet/IP 2-Port for the M30 module and CompactCom 40 EtherNet/IP(TM) for the M40 module).



Select Module Type pop-up window

In the Module Properties window and general Tab set module name, ip-address etc. and the click Change button in the Module Definition section. In the pop-up window Module Definition choose Exclusive Owner unless another master is used as exclusive owner, if so select Input Only (Ext) or Listen Only (Ext). Set the data sizes to Input = 106 bytes and Output = 8 bytes. If other than Exclusive Owner is selected Output will be 0 bytes. Only the exclusive owner will transmit data to the instrument.



Network Configuration for the EtherNet/IP Fieldbus module is found under Main Menu -> Network Configuration -> EtherNet/IP IP Config.

This menu is only shown if Fieldbus Module is selected as EtherNet/IP in the Hardware Configuration.

Following network configuration settings are available:

Range/Alternatives	Explanation and result of alternatives
IP address assignment	
Auto. by DHCP Manually (static IP)	Selects how the IP Address, Subnet Mask and Default Gateway should be set.
IP Address	
Range: 0.0.0.0 to 255.255.255.255	The IP Address for the EtherNet/IP module. Note: **IP Address** is only shown if **IP address assignment** is set to **Manually (static IP)**.
Subnet Mask	
Range: 0.0.0.0 to 255.255.255.255	The Subnet Mask for the EtherNet/IP module. Note: **Subnet Mask** is only shown if **IP address assignment** is set to **Manually (static IP)**.
Default Gateway	
Range: 0.0.0.0 to 255.255.255.255	Default Gateway for the EtherNet/IP module. Note: **Default Gateway** is only shown if **IP address assignment** is set to **Manually (static IP)**.

If one or more of above settings are changed the new settings have to be saved with the Save (F2) key. When new settings are saved the fieldbus module is restarted and then it checks if the new IP address can be established. This will take approximately 5 seconds.

If the new IP address could not be established when saving the new settings, a warning message will be shown and the IP address will be set to 0.0.0.0.

Press the ‘Esc’ key or F4 (Escape) key if the new settings not liked to be saved.

Note:
Network configuration for the EtherNet/IP module is not done with set-up parameters and is for that reason not saved with the instrument back-up function.

Profibus DP-V1

Use the provided GDS file VISH0F83 with revision 2. This revision is intended for G5 with SW revision 1.3.0 or later. Revision 1 of the GDS file is used with G5 with SW revision 1.0.0, 1.2.0 or 2.0.1 but cannot be used with 1.3.0 or later that is described in this manual. This is because the mapping and amount of data exchanged is different.

After installing the GDS file select the modules as:

Output module 4 words
4 words = 8 bytes.

Input Module 4 words
Input Module 10 words
Input Module 16 words
Input Module 10 words
Input Module 5 words
Input Module 8 words
53 words = 106 bytes.

Each module has consistent data within the module. The modules sizes are chosen to fit the different group in the mapping. Configuration must match exactly to be valid.

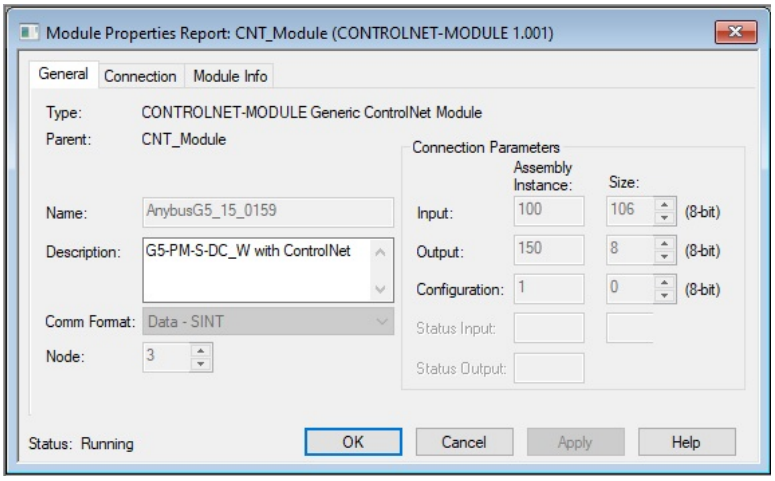
Note that the Profibus module will by default get the address 126 which is not valid but will prevent the module from causing address collision when connected to the network. Select the desired address.

DeviceNet

Use the 005A000000620200.eds file for the DeviceNet module if needed. Data sizes should be selected for 8 bytes to the G5 instrument and 106 bytes from the instrument.

ControlNet

There are 2 eds files available for ControlNet, **EDS_ABCC_CNT_V_1_02.eds** and **EDS_PLC-5_ABCC_CNT_V_1_02.eds**. Make sure data sizes are set-up correctly.



PROFINET

Install the provided GSDML file **GSDML-V2.33-BLH Nobel-G5-20171207.xml** with related picture bitmap file **GSDML-03FF-0001-G5.bmp** in the development system for the PLC.

The G5 instrument will be added to the Hardware catalog:
Other field devices->PROFINET IO->General->BLH Nobel

There are two ways to communicate with G5 via PROFINET, Cyclic Process data and/or Acyclic data (ADI).

For Output data (see Chapter 4) it is recommended to only use one of them.

Cyclic Process Data

The G5 instrument will be automatically set up with following cyclic Process data:

- Slot 1 = Output data; Type = byte array according to Chapter 4; No of bytes = 8
- Slot 2 = Input data; Type = byte array according to Chapter 5; No of bytes = 106

Each data in the byte array shall be converted to suitable data type in the PLC, according to Chapter 4 and 5.

If a command is written at the command bytes a command acknowledgement is set in the cyclic Input data.

Note:

Data type can be selected as Integer or Floating Point in the G5 instrument.

Acyclic data (ADI)

G5 has following ADI (Application Data Instances) for acyclic communication:

- ADI # 1 = Output data; Type = byte array according to Chapter 4; No of bytes = 8
- ADI # 2 = Input data; Type = byte array according to Chapter 5; No of bytes = 106

Each data in the byte array shall be converted to suitable data type in the PLC, according to Chapter 4 and 5.

Note:

Data type can be selected as Integer or Floating Point in the G5 instrument.

Notes for ADI # 1

ADI #1 is Output data according Chapter 4 and supports read and write.

Data length has to be 8 bytes at read and write.

If a command is written at the command bytes a command acknowledgement is set in the acyclic Input data (ADI #2).

If data size is not equal to 8 bytes when writing to ADI #1 the command will be invalid, but the received data will be saved at acyclic Output data anyway.

Notes for ADI # 2

ADI #2 is Input data according the Chapter 5 and support only read.

Data length has to be 106 bytes at read.

Conformance Class

Conformance Class C (IRT)

Ethernet Interface

100 Mbit full duplex

IP settings / Network Configuration

IP settings / Network configuration are set by the IO Controller. Discovery and Configuration Protocol (DCP) is used to identify/configure PROFINET Devices. IP settings are:

- IP address
- Subnet mask
- Gateway address
- DHCP enable (not recommended to set)
- Station name

IP address for the PROFINET module can be seen in G5 instrument:

Main Menu->Maintenance->Diagnostics->Fieldbus

PROFINET IO Object Information:

Vendor ID: 03FF (Hex)

Device ID: 0001 (Hex)

Recommended software to scan PROFINET network:

- Siemens Proneta (free software)
- HMS Ipconfig (free software)

Following PROFINET functions are not supported:

- Fast startup
- PROFIenergy Profile
- PROFIsafe
- Remap
- SMTP

PROFINET General:

- The PROFINET module supports Media Redundancy Protocol (MRP).
- It is possible to update firmware in the PROFINET module when the module is mounted in the G5 instrument. Use software HMS Firmware Manager.
- It is possible to use a Web browser to configure the network settings, see status of the module and to see acyclic data. Use the IP address for the PROFINET module.

7. Maintenance

General

This chapter describes the maintenance functions when handled from the local display.

The Maintenance menu includes a number functions used for diagnostics, maintenance and program upgrade purposes. The Maintenance menu is found under the Main menu.

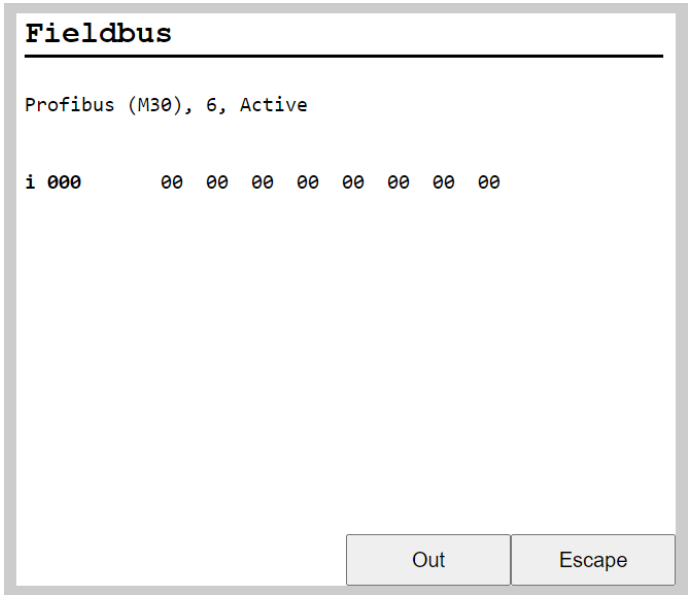
The Fieldbus diagnostics shows data input or output in hexadecimal format. It can be used to compare with how data is shown in the PLC to trouble shoot byte swap, alignment etc.

F1 (Previous) and F2 (Next) are used to scroll within the instrument output data. A screen will show 40 bytes and pressing F1/F2 will scroll to next/previous 40 bytes of data.

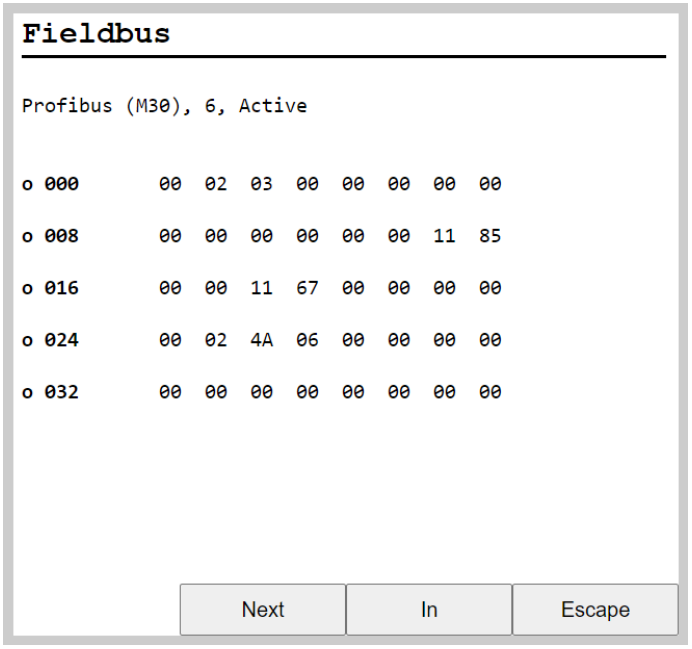
F3 (In or Out) will toggle between input and output data.

Press Escape button to leave the menu.

The first line of text shows which type of Fieldbus that is used, the instrument fieldbus address and the actual status of the connection.



Instrument input data (from master)



Instrument output data (to master)

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