Measurement · Weighing · Control

G6 Multi Channel Crane Weighing Instrument

Program version 4.1.x

Technical Manual

Panel mounted, type PM

BLH NOBEL
A VPG Brand

PRECAUTIONS

Read this manual BEFORE operating or servicing this instrument. The manual helps you use the instrument safely and efficiently. Follow the instructions provided here and in the following chapters. Save this manual for future reference.

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, perform service, or in any other way handle this instrument.

Meaning of symbols in this manual and on the product

Direct current

Alternating current

Caution, risk of danger. Documentation needs to be consulted

Protective conductor terminal

Ground terminal

WARNING Warning text that points out a risk or danger that you need to be aware of

INTENDED USE

General

The G6 instrument is a multi-channel measuring and control device intended for industrial use. Its basic function is to convert 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 is modular and can be equipped with different types of I/O units. There are transducer interface modules, digital and analog input/output modules. The instrument supports several types of communication interfaces.

CE considerations

The instrument is classified as class A group 1 equipment. This means that the instrument:

* is not designed to intentionally generate and/or use radio frequency energy; and

* is intended for use in environment other than domestic or environment sharing low voltage power supply network with residential environment.

> ***WARNING***
>
> *This product may cause interference if used in residential environment. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts. This can, for instance, be done by keeping a distance of at least 10 m between this product and any sensitive radio equipment.*
> *Note, however, that this product can be directly connected to a domestic low voltage power supply network without any special measures.*

FCC considerations

The instrument is classified as class A digital device, according to the US Federal Regulations.

> ***NOTE***
>
> *This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.*

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1. Introduction

General

The G6 Instrument, is a high performance multi-channel weight indicator intended for crane weighing systems with overload supervising and life cycle measurement.

Its basic function is to convert the signals from strain gauge transducers to useful weight 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 can be equipped with up to eight synchronized weighing channels.

The instrument is modular and can be equipped with different types of **I/O units** to match the demands in the specific applications. There are strain gauge transducer interface modules, a digital input/output module and analog output modules.
Internal solid-state outputs in the instrument can be used for output functions from level supervision, etc. or 'In process' indication, reporting the operating status of the G6 Instrument.

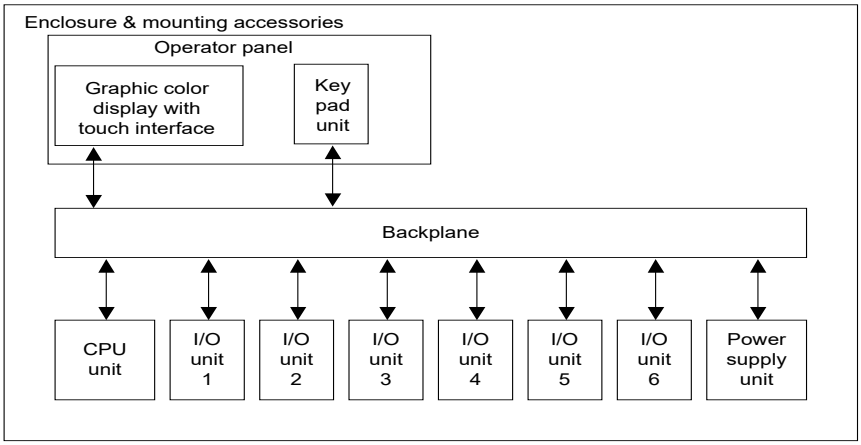
The **CPU unit** in the instrument has several communication interfaces. It has a serial communication port, an Ethernet port, a USB port and a fieldbus slot.
Several G6 Instruments can be remote controlled from a master computer or PLC.
Serial communication interface is RS485 for communication with a computer/PLC (using Modbus RTU protocol) or for transmitting data to an external display.
The Ethernet interface is using Modbus TCP or (optional) EtherNet/IP and the optional fieldbus interface uses PROFIBUS, DeviceNet or PROFINET.

It is possible to access the instrument, set-up and maintenance functions, remotely over the Ethernet connection using a Web Browser on a connected PC.

In the crane weighing program you can activate the EtherNet/IP program option. By entering its option code the program option is enabled. The option code can be purchased from your supplier.

It is possible to load new software into the instrument using the USB port.

All functions in the G6 Instrument are controlled by set-up parameters. Setting of parameter values can be performed with **keys** and/or **graphical touch display** on the front panel. 24 V DC or 110-240 V AC powers the G6 Instrument. All input and output signals are galvanic isolated from the power supply by operational insulation.



Block structure of a G6 PM instrument

Functions

Measurement with strain gauge transducers
Both excitation voltage and output signal are measured at the transducer to avoid influence from voltage drop in the connection cable. Excitation to the transducer, from the G6 Instrument is provided over separate wires.

A/D conversion
The analog signals from the transducer are converted to digital form and filtered to give an internal transducer signal with high resolution.

Calculation
The transducer excitation and signal values are combined to form an internal transducer signal, representing the load on the transducer. Influenced by calibration data, this signal is converted to a digital measurement value, the weight value, which can be presented at the local display window and at external equipment.

Error supervision
As long as the error supervision does not detect any error, the ‘In process’ signal will be ‘ON’ but if an error is detected, ‘In process’ will be ‘OFF’ and a specific error message will be displayed. ‘In process’ can be set to control any digital output. Note that there are weighing channel specific and instrument specific error detection.

Levels
32 level comparators in the instrument can be set to switch at defined signal levels with any selected hysteresis added, meaning that the switch level can be different for increasing and decreasing signal. It is also possible set delays for increasing and decreasing signal. Output signals from these comparators are available on the communication interfaces. The level comparator outputs can also be set to control digital outputs from the instrument.

Communication
The G6 Instrument utilizes the serial interface, Ethernet and a fieldbus interface for communication with control computer. The serial interface consists of a RS485/RS422 connection, can be used with 2- or 4-wire connection.
Weight values, level status, error status etc. can be collected and commands given through the communication interfaces. Modbus RTU protocol is used for the serial interfaces, Modbus TCP and EtherNet/IP for the Ethernet connection. For the optional fieldbus interface PROFIBUS, DeviceNet or PROFINET can be used. The serial communication interface can also be used to send weight data to external displays.

Instrument modes
In normal operation mode the G6 Instrument is presenting the measurement values on the front panel graphical display. Crane weights or separate weighing channels can be shown. The user can configure the display via set-up parameters.
During parameter set-up the instrument will continue normal operation. However, if hardware set-up parameters have been changed the instrument will be restarted.
The operator will always be notified before the instrument is restarted.

Parameter setting
In the instrument all operating functions are controlled by set-up parameters with numerical values, string values, or pre-selected values from a list of alternatives. Parameter set-up is performed by the keys at the front panel of the instrument and/or by using the buttons displayed on the touch display or by Remote Access.

Presentation
The instrument can present measured or calculated values, status of levels, parameter settings etc. at the front panel. An extensive system of menus gives the possibility to present various information about the instrument.
Measured or calculated values, status of levels and so on, can be transferred to external equipment via the different communication interfaces (some are optional).

Crane weighing functions

- Main Hoist weight values.
- Side A weight values (first half of Main Hoist).
- Side B weight values (second half of Main Hoist).
- Side A-Side B weight values (difference between sides).
- Sum of all channels weight values (not only channels included in Main hoist).
- Main Hoist Calibration.
- Life Cycle Measurements (Service Information).
- Mean value calculations.
- Rope Weight compensation.
- Replacement Channel for a faulty load cell at Main Hoist.

Note, if Main Hoist consists of an uneven number of scales, the last channel is included in ‘Side B’.

Program option 03: Ethernet/IP
Communication via Ethernet/IP can be enabled with program option 03. This optional interface is intended for accessing weight data, different status, and commands. The interface is not intended for set-up of the instrument.

Remote Access
It is possible to access the instrument through the Ethernet connection. Using a Web Browser on the connected PC most set-up and maintenance functions are available on the PC. This possibility will simplify commissioning and service. It will make it possible to access instruments from outside the local network (internet) providing the network allow this.

Safety information

Before connecting power to the instrument, check that all fixation screws of the modules are tightened so that the functional grounding of the instrument by the housing is obtained.

The instrument may only be utilized for the measurement and control functions, described in this Technical Manual. It is especially important to adhere to the load limits of the input/output connectors. We accept no responsibility for any damage arising from improper operation.

Any changes to the instrument, which cause any function changes, may only be carried out by the manufacturer, or after discussion with and permission by the manufacturer.

Maintenance

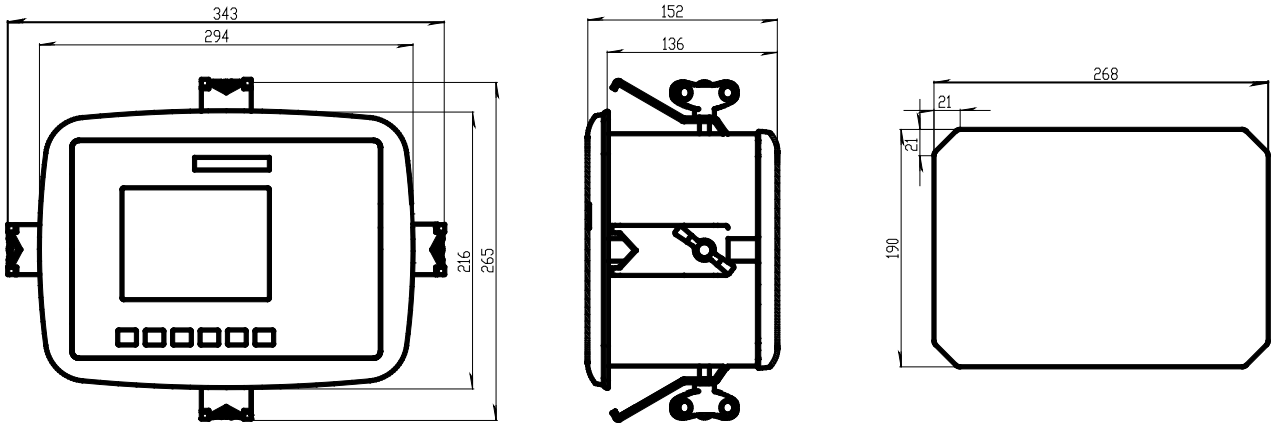
The G6 instrument needs no maintenance, performed by the end-user. Any service or repair work must be performed by qualified personnel.
Contact your supplier.

Before cleaning the G6 instrument, make sure to disconnect from the external power source. Use a soft cloth to clean the exterior of the instrument. For cleaning the instrument front panel, a soft, damp, cloth may be used.

This product contains a built-in lithium coin cell battery (CR2025) used for the clock function. The battery is easily accessible and located on the circuit board of the CPU-module. During disassembly or replacement, the battery must be removed by authorized service personnel and handed over to an approved recycling operator. For more information, refer to the national collection system. If in doubt, contact your supplier for further guidance.

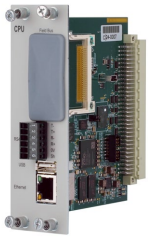
Technical data

Mounting	Panel mount (PM)
Enclosure	Aluminium housing, plastic panel
Dimensions	See figure on the next page. Panel thickness: 2 – 25 mm
Display	Colour TFT LCD screen with backlighting, 5.7” 320x240 pixels
Keyboard	Touch screen and 34 membrane keys
Temperature range	Rated performance: -10 to +50°C Storage, transport: -25 to +85°C
Relative humidity	Max. 85% up to 40°C, decreasing linear to 50% at 50°C
Rated pollution	Pollution degree 2
Degree of protection	IP65 (when mounted in panel), indoor use
Altitude	Up to 2000 m
EMC	Class A group 1 equipment, industrial electromagnetic environment (acc. to EN 61326-1 and IEC 61326-1). Class A digital device (acc. to 47 CFR part 15)
Electrical safety	Equipment verified acc. to EN 61010-1
Compliance	CE, FCC



PM - Panel mount enclosure outlines and panel cutout

CPU

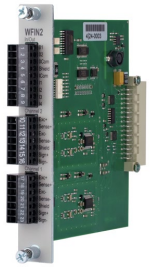


Module type	CPU module		
RTC backup battery	Lithium battery CR2025 3V	Manufacturer Panasonic Energizer FDK America	Type CR2025L/BN CR2025VP CR2025
Serial port (RS485)	For process data and control. Isolated by operational insulation		
Protocol	Modbus RTU		
Baud rate	Up to 115 kbaud		
Fieldbus	For process data and control (optional)		
Types	PROFIBUS, DeviceNet or PROFINET		
USB	Version 2.0		
Keyboard	USB keyboard for PC		
USB Memory	USB type for PC For backup and restore of set-up parameters For change to a new program version		
Ethernet	10/100/1000BASE-T For process data, control, file transfer and remote access		
Protocols	Modbus TCP, EtherNet/IP, ftp, http		
RJ45 Indications	Green:1000BASE-T, Green&Yellow:100BASE-T, Yellow:10BASE-T. Flashing indicates activity		

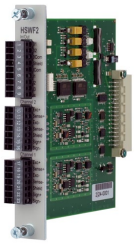
DC SUPPLY	
Module type	Power supply module
Input voltage	24 V⎓ ±15% including fluctuations, 40W
Output voltage	24 V⎓ output, 0.1 A The same voltage as input voltage

AC SUPPLY	
Module type	Power supply module
Input voltage	110 – 240 V~ +10% -15% including fluctuations, 50/60 Hz, 40W Impulse withstand (overvoltage) category II (acc. to EN 61010-1)
Output voltage	24 V⎓ output, 0.1 A

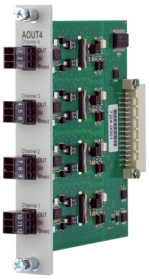
WFIN, WFIN2



Module type	Weight/force input module
Maximum number of transducers	8 (350 Ohm) per channel Maximum 48 transducers per instrument
Excitation voltage	5 VDC
A/D conversion	3.9 kHz, 16 000000 units (24 bits)
Input range	+/- 7 mV/V
Update rate	2.3 – 300 readings per second
Filtering	See section 'Filter function' for details
Number of channels	WFIN has one weight/force channel WFIN2 has two weight/force channels
Sensitivity	0.1 μV
Zero drift	<10 nV/V/K
Span drift	<2 ppm/K
Digital I/O	4 inputs, 24 V ±15%, 5 mA from external power supply, isolated by operational insulation and with common return 2 outputs, 24 V ±15%, max 100 mA from external power supply, isolated by operational insulation and with common return

HSWF2	
	
Module type	High speed weight/force input module
Maximum number of transducers	4 (350 Ohm) per channel
Excitation voltage	10 VDC
A/D conversion	20 kHz, 16 000000 units (24 bits)
Input range	+/- 4.5 mV/V
Update rate	12.5 – 800 readings per second
Filtering	See section 'Filter function' for details
Number of channels	HSWF2 has two weight/force channels, separately isolated by operational insulation
Sensitivity	0.1 μV
Zero drift	<10 nV/V/K
Span drift	<2 ppm/K
Digital I/O	4 inputs, 24 V ±15%, 5 mA from external power supply, isolated by operational insulation and with common return 2 outputs, 24 V ±15%, max 100 mA from external power supply, isolated by operational insulation and with common return

DIO8	
Module type	Digital input/output module
Separate I/O module	2 units can be used
Digital I/O	8 inputs, 24 V ±15%, 5 mA from external power supply, isolated by operational insulation and with common return 8 outputs, 24 V ±15%, max 100 mA from external power supply, isolated by operational insulation and with common return

AOUT1, AOUT4	
	
Module type	Analog output module
Number of channels	One or four channels, separately isolated by operational insulation
Resolution	65000 units, 16 bits
Non-linearity	< 0.025% of range
Voltage output	0 – 10 V, -10 – 10 V; > 1 kOhm load
Current output	4 – 20 mA, 0 – 20 mA, -12 – 20 mA, -20 – 20 mA; < 500 Ohm load
Update rate	Scale update rate, adjustable smoothing filter
EMI	At most 1% inaccuracy at 10 V/m radio-frequency electromagnetic field

PROFIBUS-DP	
Module type	PROFIBUS-DP fieldbus adaptor
Connector	PROFIBUS 9-pin, female D-sub (DB9F)
Baudrate	Auto setting 9.6 kbps – 12 Mbps
Address	1 – 125, set by parameter
Fieldbus data	16 bytes from fieldbus to instrument. 32 – 224 bytes from instrument to fieldbus (may be limited by the master). See chapter ‘Communication’ section ‘Fieldbus interface’ for details on fieldbus data mapping.
Mounting	The fieldbus adaptor is mounted through the front of the CPU module with LED’s and connector accessible through the CPU front panel. Remove the plastic cover from the fieldbus slot in the CPU module front panel. Insert the adaptor very carefully and make absolutely sure that the adaptor slides correctly into the guides in the connector on the CPU PCB. Tighten the two fastening screws at the adaptor front and check that the two securing hooks locks into the CPU PCB.
Settings	All fieldbus settings are done with setup parameters in the instrument. No settings are done on the module itself.

DeviceNet	
Module type	DeviceNet fieldbus adaptor
Connector	5 pin male connector
Baudrate	125, 250, 500 kbps or Auto. Set by parameter
Address	0 – 63, set by parameter
Fieldbus data	16 bytes from fieldbus to instrument. 32 – 224 bytes from instrument to fieldbus (may be limited by the master). See chapter ‘Communication’ section ‘Fieldbus interface’ for details on fieldbus data mapping.
Mounting	The fieldbus adaptor is mounted through the front of the CPU module with LED’s and connector accessible through the CPU front panel.

	Remove the plastic cover from the fieldbus slot in the CPU module front panel. Insert the adaptor very carefully and make absolutely sure that the adaptor slides correctly into the guides in the connector on the CPU PCB. Tighten the two fastening screws at the adaptor front and check that the two securing hooks locks into the CPU PCB.
Settings	All fieldbus settings are done with setup parameters in the instrument. No settings are done on the module itself.
Bus supply voltage	Acc. to the DeviceNet (Node) Specification: nominal 24 VDC, range 11 – 25 VDC

PROFINET	
Module type	PROFINET fieldbus adaptor
Connector	Ethernet RJ45
Fieldbus data	16 bytes from fieldbus to instrument. 32 – 224 bytes from instrument to fieldbus (may be limited by the master). See chapter ‘Communication’ section ‘Fieldbus interface’ for details on fieldbus data mapping.
Mounting	The fieldbus adaptor is mounted through the front of the CPU module with LED’s and connector accessible through the CPU front panel. Remove the plastic cover from the fieldbus slot in the CPU module front panel. Insert the adaptor very carefully and make absolutely sure that the adaptor slides correctly into the guides in the connector on the CPU PCB. Tighten the two fastening screws at the adaptor front and check that the two securing hooks locks into the CPU PCB.
Settings	All network properties are set by the IO Controller. Data blocks are set in the instrument

Ordering information

G6-PM-FB-S1-S2-S3-S4-S5-S6-P-SW

G6	Instrument type		
PM	Enclosure type	PM	Panel mount
FB	Fieldbus interface	0 P D N	None PROFIBUS DeviceNet PROFINET
Si	Slot 1 to 6 type	0 2 3 4 6 7 8	Blank HSWF2 High speed weight/force input module, 2 chan. WFIN Weight/force input module, 1 channel WFIN2 Weight/force input module, 2 channels AOUT1 Analog output module, 1 channel AOUT4 Analog output module, 4 channels DIO8 Digital input and output module, 8 channels
P	Power supply	D A	DC SUPPLY module AC SUPPLY module
SW	Software	W F C S	Standard Weighing Program Standard Force Program Standard Crane Weighing Program Special Program (see note 1 below)

Example: G6-PM-0-4-4-0-0-0-0-D-C

- *G6 instrument (G6)*
- *Panel mount (PM)*
- *No fieldbus (0)*
- *Slot 1 = WFIN2 (4)*
- *Slot 2 = WFIN2 (4)*
- *Slot 3 = Blank (0)*
- *Slot 4 = Blank (0)*
- *Slot 5 = Blank (0)*
- *Slot 6 = Blank (0)*
- *Power =DC supply (D)*
- *Software = Crane Weighing program (C)*

Note 1: If a special program option is desired, the designation of the special program must be specified when ordering.

Separate modules

Spec.no	Module type	Module name
110964	CPU	CPU unit
111162	HSWF2	High speed dual weight/force input module
111171	WFIN	Single weight/force input module
111174	WFIN2	Dual weight/force input module
111168	AOUT1	Single channel analog output module
111165	AOUT4	Four channel analog output module
111177	DIO8	Digital input/output module
111189	BLANK	Blank panel
111180	DC SUPPLY	DC supply module
111183	AC SUPPLY	AC supply module
110559	PROFIBUS-DP	PROFIBUS DP fieldbus adaptor
110560	DEVICENET	DeviceNet fieldbus adaptor
110858	PROFINET	PROFINET fieldbus adaptor

Module selection rules

Every system needs one power supply module and one CPU module (can be equipped with one fieldbus adaptor).

Limitations on the number of I/O modules that can be used in one instrument:

- maximum six modules;
- maximum four WFIN(2) or four HSWF2 modules;
- HSWF2 and WFIN(2) module types cannot be mixed in the same system;
- maximum one AOUT1 or one AOUT4 module;
- maximum two DIO8 modules.

2. Installation

Mechanical installation

See chapter ‘Introduction – Technical data’ for references to mechanical measures: outer extents, body extents and panel cutout (PM).
Make sure the panel thickness meets the specification and that there is room enough behind the panel for the instrument and the connected cables (minimum 200 mm).
Cut a panel opening according to the specification in section ‘Technical data’.
Insert the instrument through the opening. Hold it in place while attaching brackets and wing-headed bolts to the four nuts, sliding in grooves of the housing.
Tighten the bolts and make sure the integrated gasket of the instrument is compressed against the mounting panel, giving a sealed attachment.

Electrical installation

The field wiring of the instrument shall be suitable to the environment (e.g. chemically) in the end-user application.
Mains cables shall be separated and routed away from SELV field wiring.

Field wiring installation shall comply with any national regulations, hereunder National Electrical Code (NEC) for US and/or Canadian Electrical Code for Canada.

This instrument is classified as permanently connected equipment.

A switch or circuit-breaker shall be included in the building installation. The switch shall be in close proximity to the equipment and within easy reach of the operator. The switch shall be marked as the disconnecting device for the equipment.
The equipment switch or circuit-breaker employed as disconnecting device shall comply with relevant requirements of IEC 60947-1 and IEC 60947-3 and be suitable for the application.

The power supply for the instruments can be an external DC source and an internal ‘DC SUPPLY’ module (for details, see page 2-4) or an external AC mains and an internal ‘AC SUPPLY’ module (for details, see page 2-5).
For all the interfaces, except for the power input, shielded cables must be used.
It is recommended to route all the other cabling away from power cables in order to avoid the risk for electromagnetic interference.

WARNING

Make sure that that the power to the instrument is turned off before:
- any modules are removed from or inserted in the instrument;
- any connections are connected to or disconnected from the instrument.
All modules should be regarded as ESD sensitive. Make sure that an ESD safe environment is maintained when inserting modules, removing modules and when handling modules separately from the instrument. The modules must be kept in metalized ESD bag when not mounted in the instrument.

CPU

The CPU module includes an internal battery of lithium type. It is used as a backup battery to the RTC clock. Replacement of the battery shall only be done by a trained technician. For battery alternatives, see ‘Technical data’.

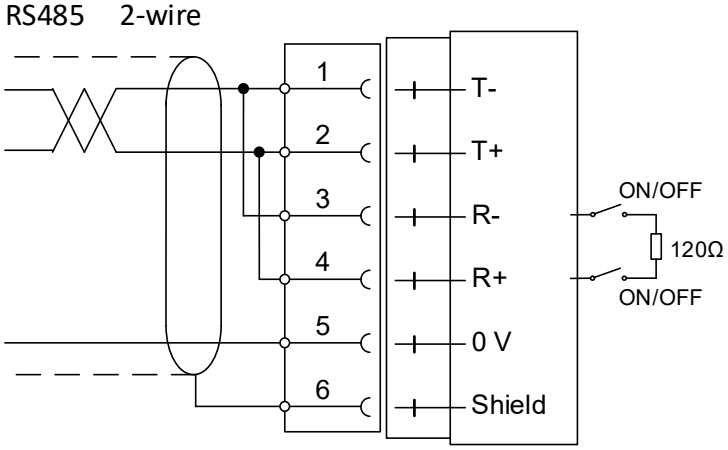
Serial port

RS485 serial communication for 2-wire or 4-wire with common 0 V. This is a SELV circuit.

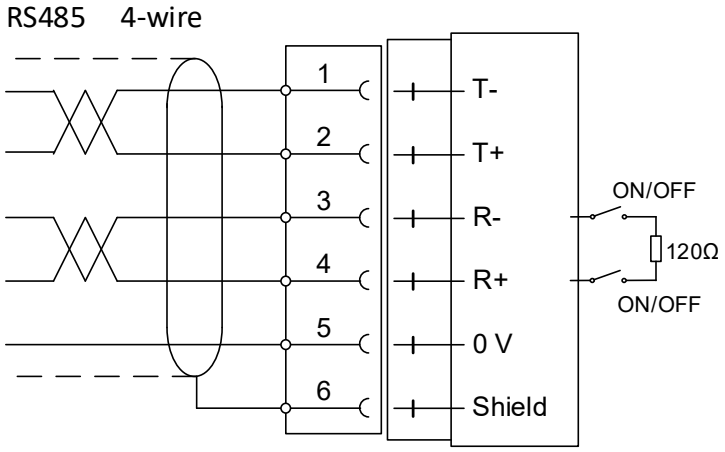
The port can be used for serial communication to computer/PLC (Modbus RTU) or external display. Connections are made to terminals 1 – 5.
Shielded cable must be used. Connect shield to terminal 6.

The communication lines must be terminated in both ends. If G6 is connected at the end of the communication line, termination for the receiver can be set to ‘ON’ for the parameter ‘Receiver termination’ in the menu ‘Serial Com.’. There is no termination for the transmitter in the instrument.

RS485 2-wire



RS485 4-wire



Fieldbus

Slot for optional Fieldbus interface.

PROFIBUS DP-V1, DeviceNet and PROFINET are available. See section on fieldbus adaptors later in this chapter for details.

USB

Connector for USB device(s).

This port has no operational insulation and should be considered as a SELV circuit.
The length of the cable connected to the USB port must not exceed 3 m.
By using a USB Hub, connection of more than one device can be allowed.

Ethernet

This is a SELV circuit. A shielded cable must be used.

The Ethernet cable category is chosen depending on the maximum data rate for the end-user specific installation.

DC SUPPLY

The output of the external DC source must be rated 24 V⎓, ±15% including fluctuations, min. 40W. The DC source must provide Double Insulation between Mains parts and 24V SELV circuit,
and a limited-energy circuit (maximum available current of 8A).
For the US market this energy limit can be achieved with an ANSI/UL248-14 fuse rated 5A.
For other markets an IEC 60127 T type fuse rated 4A may also be used.

24 V DC In

Terminals 1, 2 and 3.

For the G6 instrument powered by the DC SUPPLY module, connect according to the diagram below.

Terminal 3 must be connected to ground. The connection is required to achieve functional grounding.

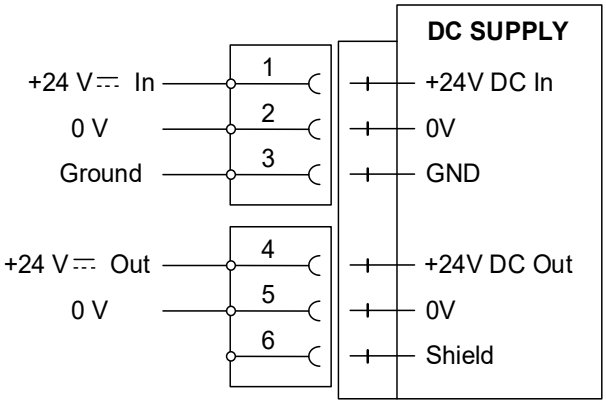
See ‘Technical data’ for input voltage ratings.

24 V DC Out

Terminals 4 and 5 can be used to supply max. 100 mA to digital inputs and outputs.

Connect according to the diagram below.

See ‘Technical data’ for ratings.



AC SUPPLY

Mains supply cable shall be separated and routed away from SELV field wiring.

Make sure the fixation screws on the AC connector are well tightened.

The branch circuit protection in the building installation must be rated maximum 16 A for the instrument, where AC SUPPLY module is mounted.

If the AC SUPPLY module is to be removed, it has to be ensured that Mains power is disconnected from the G6 instrument.

Make sure that the Mains cable is de-energized through external disconnection BEFORE the Mains cable is removed from the G6 instrument.

POWER INPUT 110-240 V~

Terminals 1, 2 and 3.

For G6 instrument powered by the AC SUPPLY module, connect according to the diagram below.

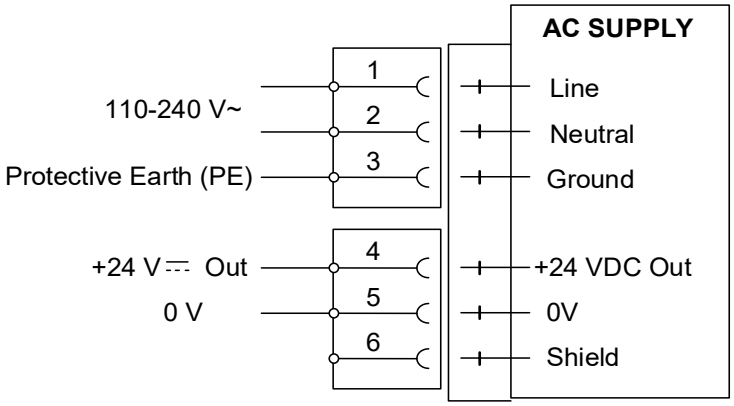
Terminal 3 must be connected to protective earth.

See ‘Technical data’ for input voltage ratings.

24 VDC Out

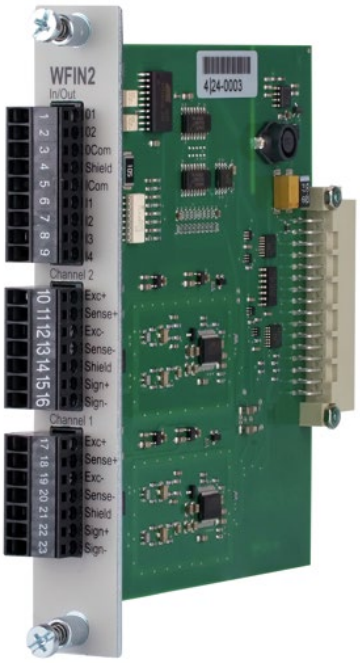
Terminals 4 and 5 can be used to supply max. 100 mA to digital inputs and outputs.

Connect according to the diagram below.
See ‘Technical data’ for ratings.



WFIN, WFIN2 and HSWF2

The voltage levels on connectors of I/O modules shall not exceed voltage levels of 30 Vrms, 42.4 Vpeak or 60 Vdc under normal conditions. In wet locations these voltage levels shall not exceed 16 Vrms, 22.6 Vpeak or 35 Vdc.



Transducer inputs

Terminals 17 – 23 (channel 1),
10 – 16 (channel 2).

Transducer connection should be handled with great care to achieve good measuring data. Transducer integrated cables may not be shortened. Shielded cables must be used. There are no limitations on the cable length as long as it is possible to ensure proper weighing function.

> ***WARNING***
> *Transducer cables must be routed at least 200 mm away from 110-240 V, 50/60 Hz power cables. For power cables carrying other frequencies or high power, an even wider distance is preferable.*

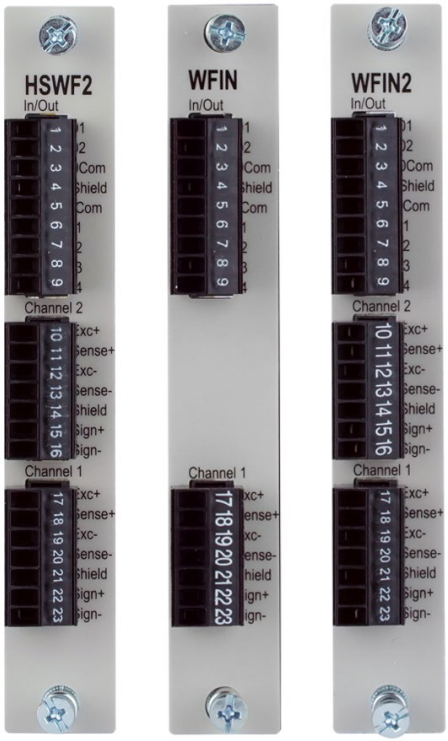
4-wire connection can be used if the transducer integrated cable is long enough to be connected directly to a transducer input. At 4-wire connection, some terminals must be interconnected as shown in figure on the next page.

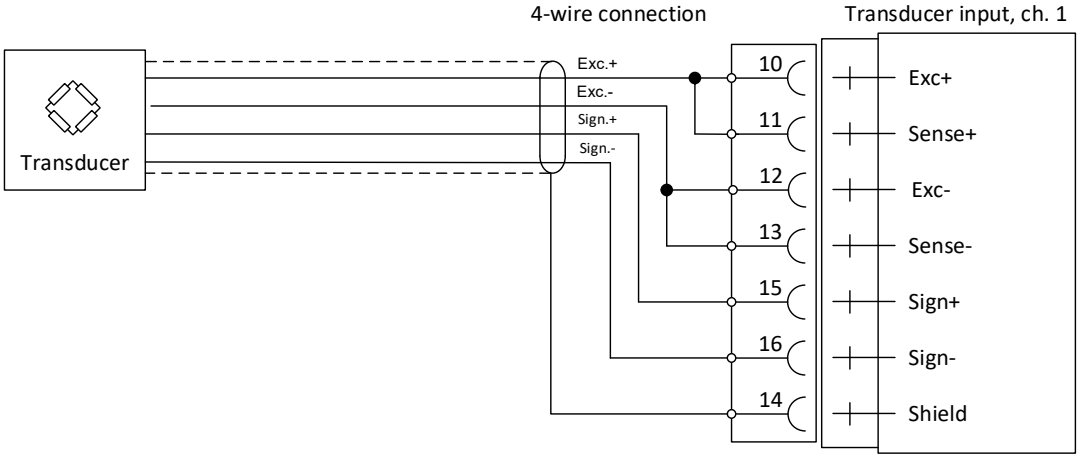
6-wire connection should be used if the integrated cable must be lengthened or if several transducers should be connected to one transducer input.

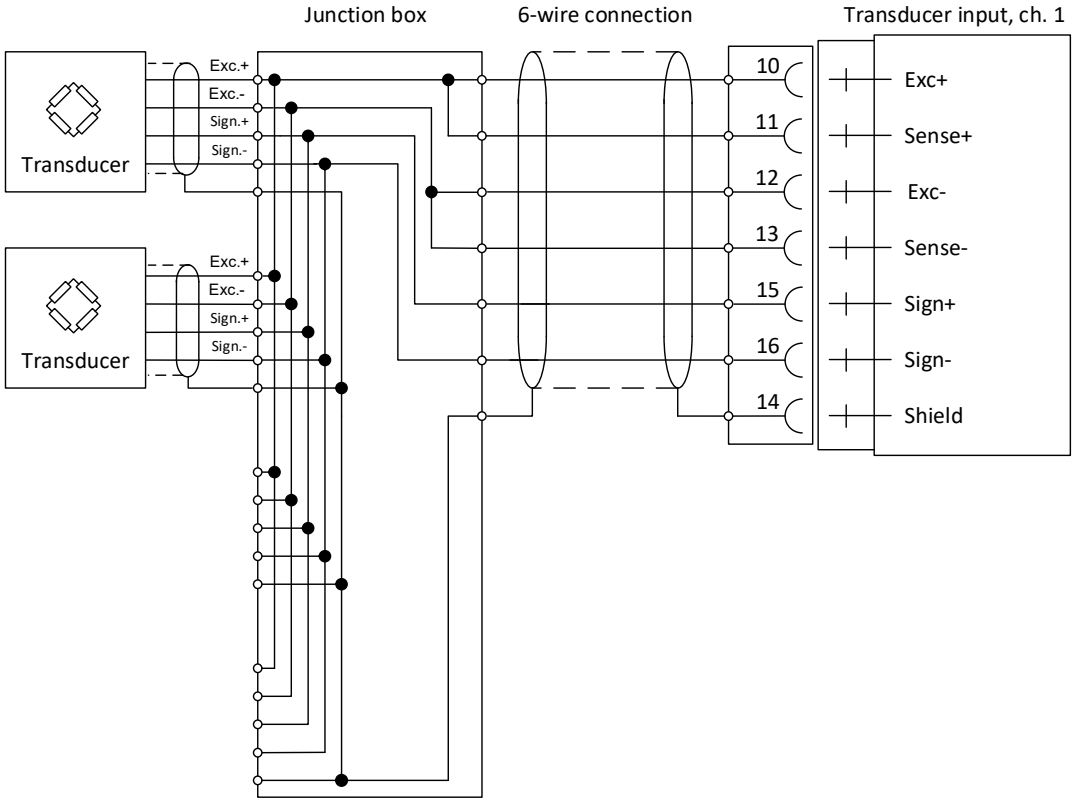
The channel 1 cable shield must be connected to terminal 21 and the channel 2 cable shield must be connected to terminal 14.

In WFIN and WFIN2 the shield terminals are internally connected to the G6 housing, which is internally connected to ground via the power supply connector pin 3. The shield shall not be connected at any other point.

In HSWF2 the transducer input channels are separately isolated by operational insulation and the shields can be connected to the most convenient ground/earth point. This can be the junction box when using multiple transducers or at the barrier ground when using Ex Zener barriers.







A transducer may be connected directly to terminals at the transducer input.

For several transducers or long distance, a junction box and lengthening cable is needed.

For a HSWF2 channel, the shield can be connected to ground/earth at any point

Digital inputs

Terminals 6 – 9 and terminal 5 (ICom) as a common connection.

Four digital inputs are provided, with functions that can be set in the G6 set-up. External sourcing (24 V ⎓) from the instrument power supply (max. 100 mA) or from a separate DC supply must be used. Note that either the positive or the negative pole of the voltage source (24 V ⎓) can be connected to ICom (5).

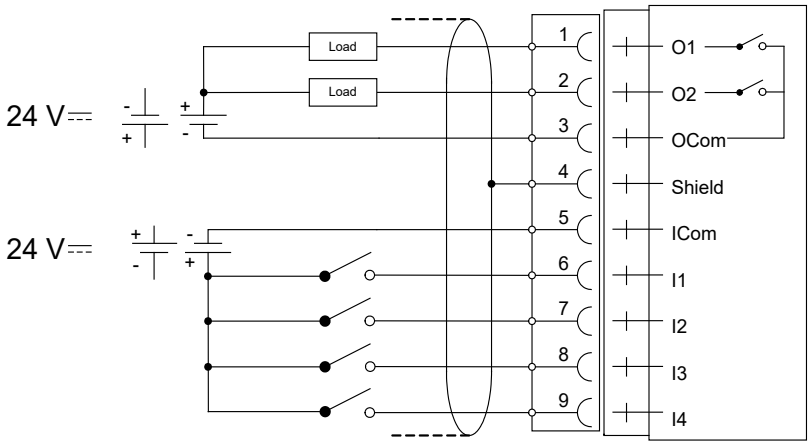
Shielded cable/cables must be used, with the shield connected to terminal 4. There are no limitations on the cable length as long as it is possible to ensure proper function.

Solid state relay outputs

Terminals 1 and 2 with terminal 3 (OCom) as a common connection.

Two digital (relay) outputs are provided with contact rating given in section ‘Technical data’. External sourcing (24 V ⎓) from the instrument power supply (max. 100 mA) or from a separate DC supply should be used. Note that either the positive or the negative pole of the voltage source (24 V ⎓) can be connected to OCom (3).

Shielded cable/cables must be used, with the shield connected to terminal 4. There are no limitations on the cable length as long as it is possible to ensure proper function.



AOUT1 and AOUT4

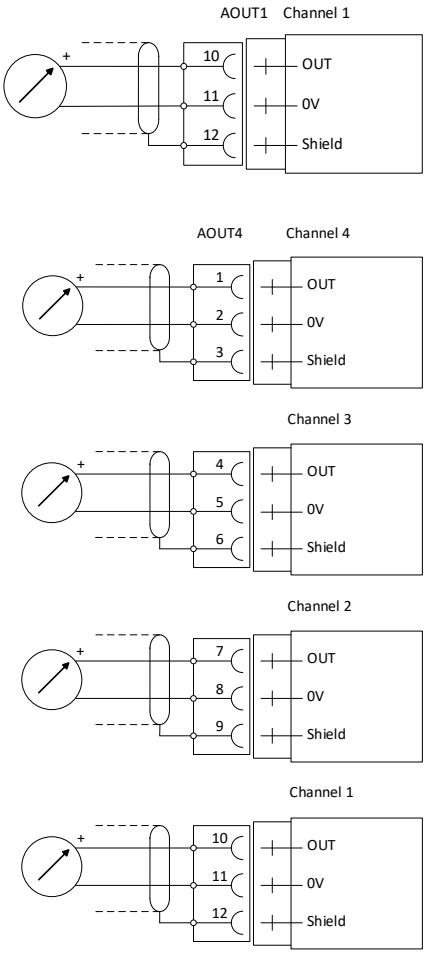
The voltage levels on connectors of I/O modules shall not exceed voltage levels of 30 Vrms, 42.4 Vpeak or 60 Vdc under normal conditions.
In wet locations these voltage levels shall not exceed 16 Vrms, 22.6 Vpeak or 35 Vdc.

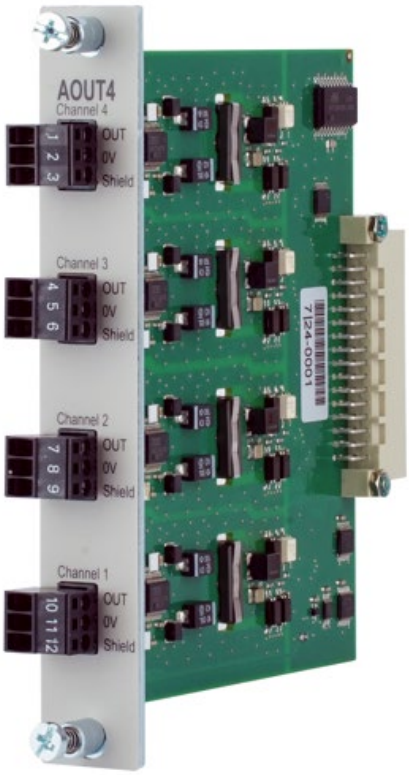
Analog outputs

The AOUT4 unit has four analog output channels, independently isolated by operational insulation.
The AOUT1 has one output channel, isolated by operational insulation.

The analog output signal will be connected to terminals
10, 11 (channel 1)
7, 8 (channel 2)
4, 5 (channel 3)
1, 2 (channel 4).

Shielded cable/cables must be used and the shield(s) must be connected to the shield terminal(s) 12, 9, 6 and 3.
The shields can be connected to the most convenient ground/earth point. There are no limitations on the cable length as long as it is possible to ensure proper function.





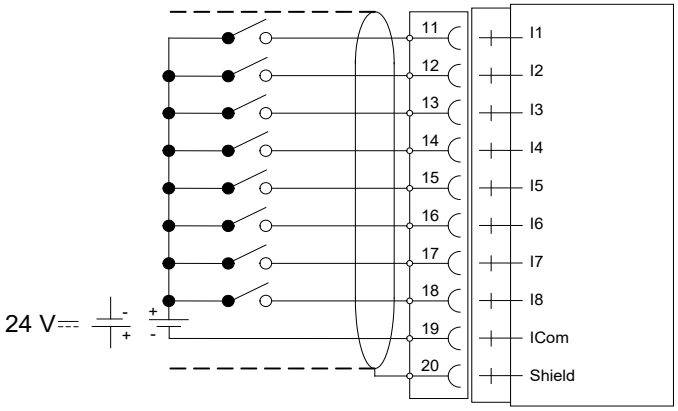
DIO8

The voltage levels on connectors of I/O modules shall not exceed voltage levels of 30 Vrms, 42.4 Vpeak or 60 Vdc under normal conditions. In wet locations these voltage levels shall not exceed 16 Vrms, 22.6 Vpeak or 35 Vdc.

Digital inputs

Terminals 11 – 18 and terminal 19 (ICom) as a common connection.

Eight digital inputs are provided, with functions that can be set in the G6 set-up.
External sourcing (24 V ⎓) from the instrument power supply (max. 100 mA) or from a separate DC supply must be used.
Note that either the positive or the negative pole of the voltage source (24 V ⎓) can be connected to ICom (19).
Shielded cable/cables must be used, with the shield connected to terminal 20. There are no limitations on the cable length as long as it is possible to ensure proper function.

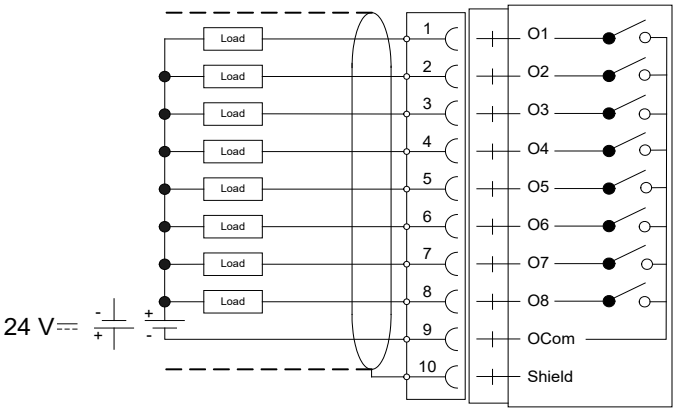


Solid state relay outputs

Terminals 1 - 8 with terminal 9 (OCom) as a common connection.

Eight digital (relay) outputs are provided with contact rating given in section ‘Technical data’. External sourcing (24 V ⎓) from the instrument power supply (max. 100 mA) or from a separate DC supply should be used. Note that either the positive or the negative pole of the voltage source (24 V ⎓) can be connected to OCom (9).

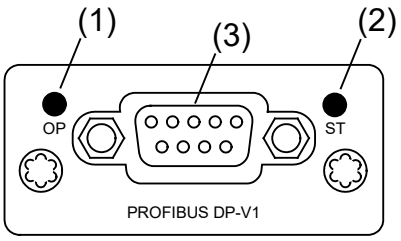
Shielded cable/cables must be used, with the shield connected to terminal 10. There are no limitations on the cable length as long as it is possible to ensure proper function.



PROFIBUS-DP Fieldbus Adaptor

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

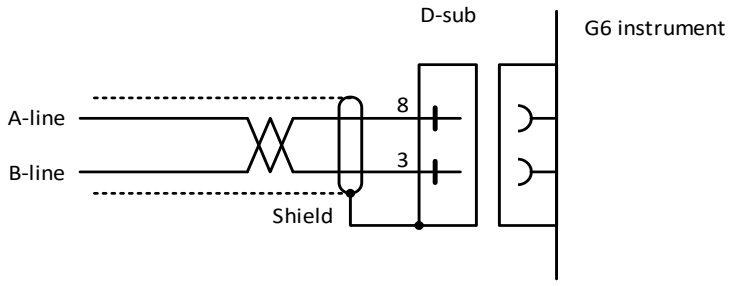
Status LED

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	Internally connected to the Anybus protective earth 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.



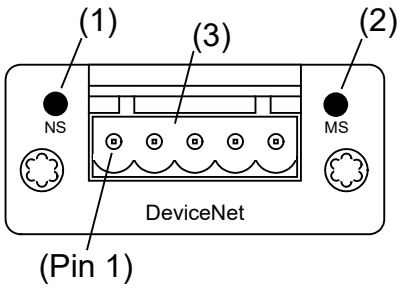
For reliable fieldbus function, line termination must be arranged in both ends of the transmission line. For a G6 instrument, at the end of the cable, a connector with line termination should be used. For all other G6 Instruments connection without line termination should be used.

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

DeviceNet Fieldbus Adaptor

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

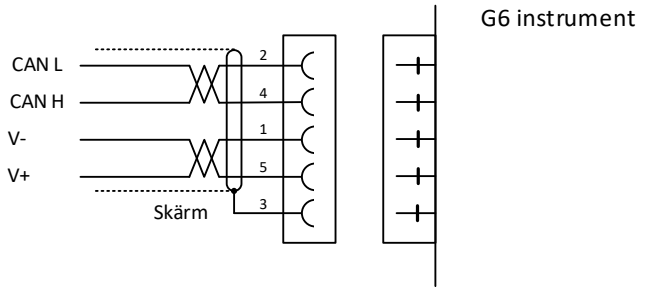
Module Status LED

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
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. Make sure that the cable shield connected to pin 3 of the DeviceNet connector is as short as possible and in no way longer than 25 mm.



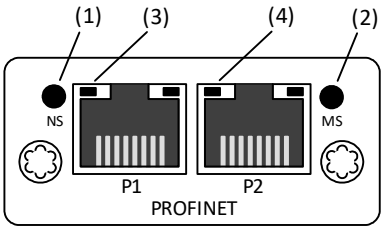
For reliable fieldbus function, line termination must be arranged in both ends of the transmission line. For a G6 Instrument placed at the end of the line, terminate line by placing a 121-Ohm resistor between CAN L (pin 2) and CAN H (pin 4).

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 G6 Instrument or to BLH Nobel.

PROFINET Fieldbus Adaptor

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

A standard Ethernet cable of at least category 5 meeting PROFINET specification (acc. to IEEE 802.3 Ethernet) shall be used.

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

Front panel

Display

At normal operation the instrument displays weight value(s) for the crane or for individual scales.
If an instrument error occurs, the weighing function is stopped and the instrument switches over to Error mode, indicating a code for the error at the display window.

If there is a scale error this is indicated with error information that replace the weight information on the screen for that specific scale only, other scales are not affected. An error will also be displayed in all crane weight displays where the faulty scale is included.

The instrument can also display a Main menu with sub menus for display of actual data and entry of new data.

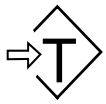
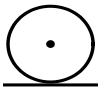
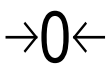
Function keys

Just below the display there are five function keys, F1 to F5, and with the actual key functions indicated at the lower line of the display. When there is no text above a key, that key has no function. To select a function, press the membrane panel button (F1 to F5) below the display or the button symbol on the touch display.

Symbol keys

At the bottom of the front panel there are four keys, marked with the weighing symbols for taring, gross/net, printing and zeroing plus two keys marked start and stop. A brief description of these keys is given in the table below.

Front panel of the G6 instrument with colour touch display, five function keys below the display, six application specific keys, numerical keypad, joystick keypad (arrow keys), Esc, Alt, Backspace, Delete, Tab and ENTER keys.
In addition, there is an Info key that is used to access the instruments menu system

Key	Name	Function
	TARE	Tare the weight.
	GROSS/NET	Toggling between display of gross weight and net weight.
	PRINT	Not used in this program
	ZERO	Setting the gross weight value to zero.
	START	Starts the mean value calculation.
	STOP	Stops the mean value calculation

Digit keys

The digit keys, including keys with minus sign and decimal point, are used for entry and editing of numerical parameter values.

Miscellaneous keys

An ENTER key on the panel is used to open a selected menu, finish the entry of a value, etc.

The four arrow keys are used to navigate in the menu system and to toggle between selections.

The Esc, Alt, Del, Backspace and Tab keys are used for editing values, toggling between selections and so on.

The ‘Info’ key is used to enter the instrument menu system. Note that this key can only be used when the weight display is shown.

3. Set-up

General

All operating functions in the G6 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 colour touch display and keys on the front panel of the instrument or by Remote Access. 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.

> ***WARNING***
>
> *Changes done during editing of set-up parameters will affect the behavior of the instrument immediately. The user must take all necessary precautions to prevent any undesired effects in the process monitored or controlled by the G6 instrument or a connected control system.*
>
> *It is strongly recommended to activate the set-up lock in the instrument to prevent any unauthorized changes of set-up parameters.*

It’s a good practice to make a backup of the set-up after changes have been done. See chapter ‘Maintenance’ for more information on backup and restore.

If the EtherNet/IP Option is used, please refer to the separate EtherNet/IP manual for details on function:

G6 Multi Channel Crane Weighing Instrument
Program version 4.1.x
EtherNet/IP Program option, Technical Manual Supplement

The ‘Parameter Set-up’ menu contain the following sub menus:

General: This parameter group controls the general functionality of the instrument. Such as display language, display mode, security, key functions and so on.

Hardware Configuration: Parameters used for configuring the instrument hardware. Note that when the instrument is starting up it will check that the installed hardware is compatible with the settings. If not an alarm will be issued.

Calibration: Parameters that affect the behavior of the eight possible weighing channels (scales) and the Main Hoist in the instrument. There are parameters for calibration type, calibration values, no of transducers, filter settings, motion detection, zero handling and so on. All weighing channels are individually settable.

Communication: Sub menus are Serial Com, Ethernet and Fieldbus.
Serial Com sub menu content are parameters used to set-up RS485 serial port on the CPU module. Parameters are among others: com. port mode, baud rate and data format. Ethernet sub menu content is parameters for Modbus TCP Slave. Fieldbus sub

menu content is configuration parameters related to fieldbus communication such as address, baud rate and transmitted data setup (depending on active adapter).

Level Supervision: The instrument has 32 level supervisors that are configured from this sub menu. Settings for each level are which scale (measuring channel) that the individual level is to monitor, which signal that shall be monitored from the selected scale, hysteresis, level value, delay up, delay down etc. Signals that can be monitored are gross weight, net weight and so on. The output function e.g. if the output shall be active above or below the set level is configured here.

Inputs: The use of the instruments digital inputs is set in this menu. The inputs are numbered 11 to 68. Inputs 11 to 18 corresponds to inputs on slot 1 I/O module, 21 to 28 correspond to inputs on slot 2 I/O and so on. Note that the actual number of inputs depends on what type of I/O-module that is installed in the respective slots. A DIO8 module has 8 inputs a WFIN2 module has 4 inputs while an AOUT1 or AOUT4 has no inputs.
Input 11 to 14 (slot 1) and input 21 to 23 (slot 2) have predetermined functions and are thus not configurable.
Possible usage for other inputs are tare command, zero command, gross/net toggling and so on. Certain commands like taring are scale oriented and a second parameter for each input is used to set which scale it shall work with.

Outputs: The outputs menu contains the settings controlling the function of each output. Numbering is 11 to 68 for the I/O module outputs. See section ‘Inputs’ above on how individual output numbers correspond to each I/O slot. Each output can be assigned an output function: In process, level output status, net mode, good zero, stable weight. Some functions require a second parameter that sets which level or scale the output is supposed to work with.

Analog Outputs: This menu controls the behavior of an AOUT4 or an AOUT1 Analog output module. The output signal source (scale no and signal type) can be selected. Also output type and range high/low is settable. The Analog Outputs menu is only shown if there is an AOUT1 or AOUT4 used in the system.

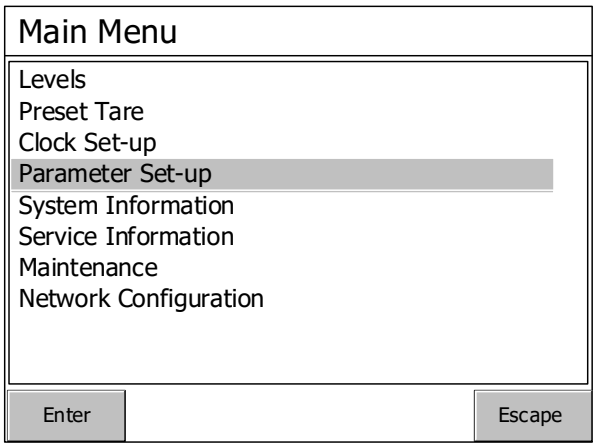
Program Options: This menu contains the options that can be used. Program options are enabled using a purchased option code. Contact your supplier for more information.

Graphical touch display

To reach the main menu, press the 'Info' button (when a weight display is shown) on the instrument front panel.

Navigating in a menu is done with arrow keys or by tapping (touching) on the display on specific choices e.g. 'Parameter Set-up'.

To open a sub menu, e.g. Parameter Set-up, select the desired sub menu with arrow keys. The selected sub menu is highlighted. Then press 'Enter' to open the selected sub menu or just tap on the desired sub-menu to open it.



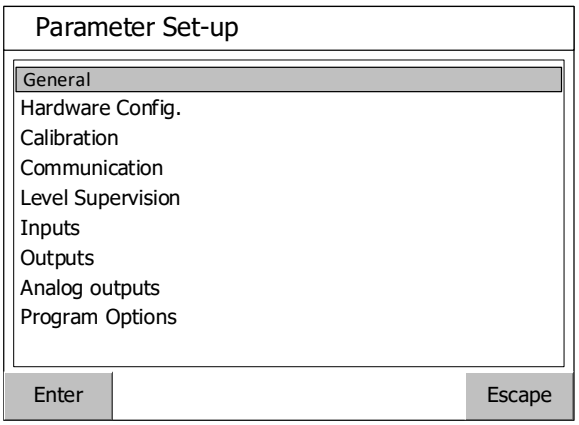
Main menu

Parameter Set-up menu

To enter Parameter Set-up, select this sub menu with up/down arrow keys. The selected sub menu is then highlighted. Press 'Enter' to open the selected sub menu or just tap on the desired sub-menu to open it.

If there isn't room for all parameters on screen, it is possible to scroll through the list with the scroll bar at the right of the screen or by using up/down keys.

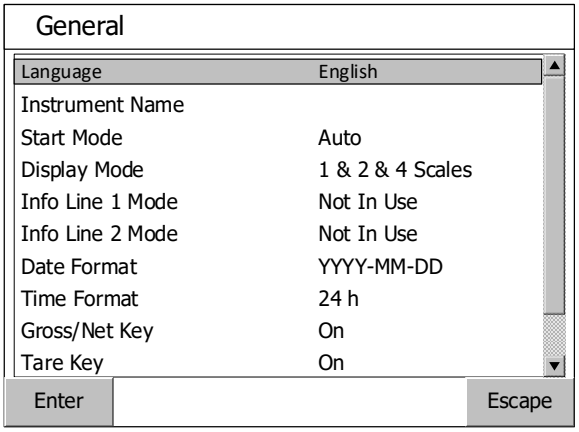
Press the 'Esc' key to return to the main menu. The 'Esc' key is always used to cancel editing or moving backwards in the menu structure.



Parameter set-up menu

Parameter editing

This example shows the ‘General’ parameter menu but editing is done similar throughout the menu system.



General parameters menu

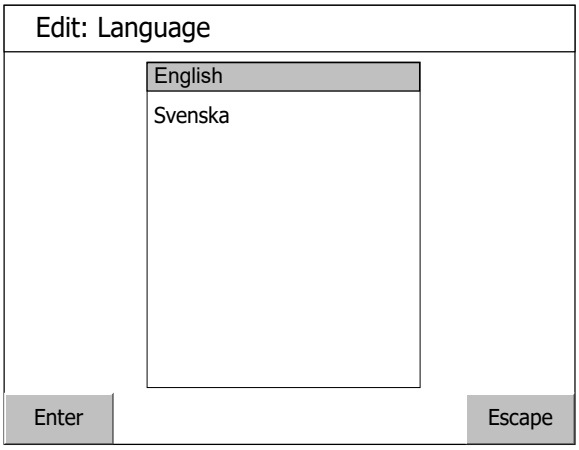
To edit a parameter, select it with the arrow keys to highlight it and then press the ‘Enter’ key on the screen or on the front panel keyboard. Alternatively tap on the desired parameter on the screen to begin editing.

If all items in the menu don’t fit on the screen, it is possible to scroll trough the list of parameters using the scroll bar at the right of the screen or by using the up/down keys. Press the ‘Esc’ key to return to the Parameter set-up menu.

When editing a choice parameter e.g. language as in the figure, a list of available choices is show on screen with the current selection highlighted. To change the selection the up/down arrow keys can be used. It is also possible to directly make a choice by tapping on the desired selection.

To confirm the new selection press the ‘Enter’ key.

To abort editing and keep the previous setting, press the ‘Esc’ key.

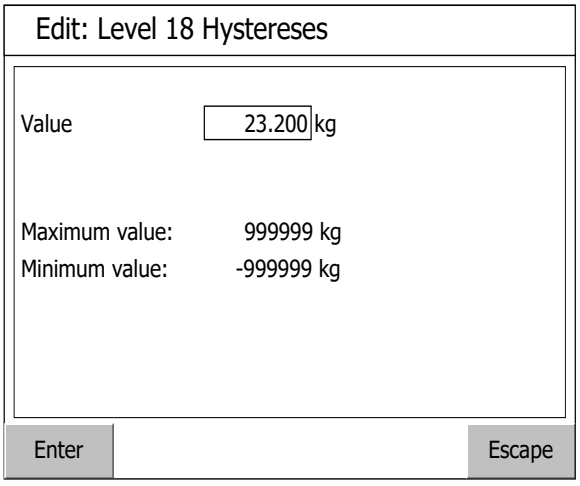


Editing a choice parameter. Note that the languages mentioned are examples, not the actual implementation

When editing a numerical parameter e.g. a level hysteresis setting as in the figure, the new value should be typed with the numerical keys.

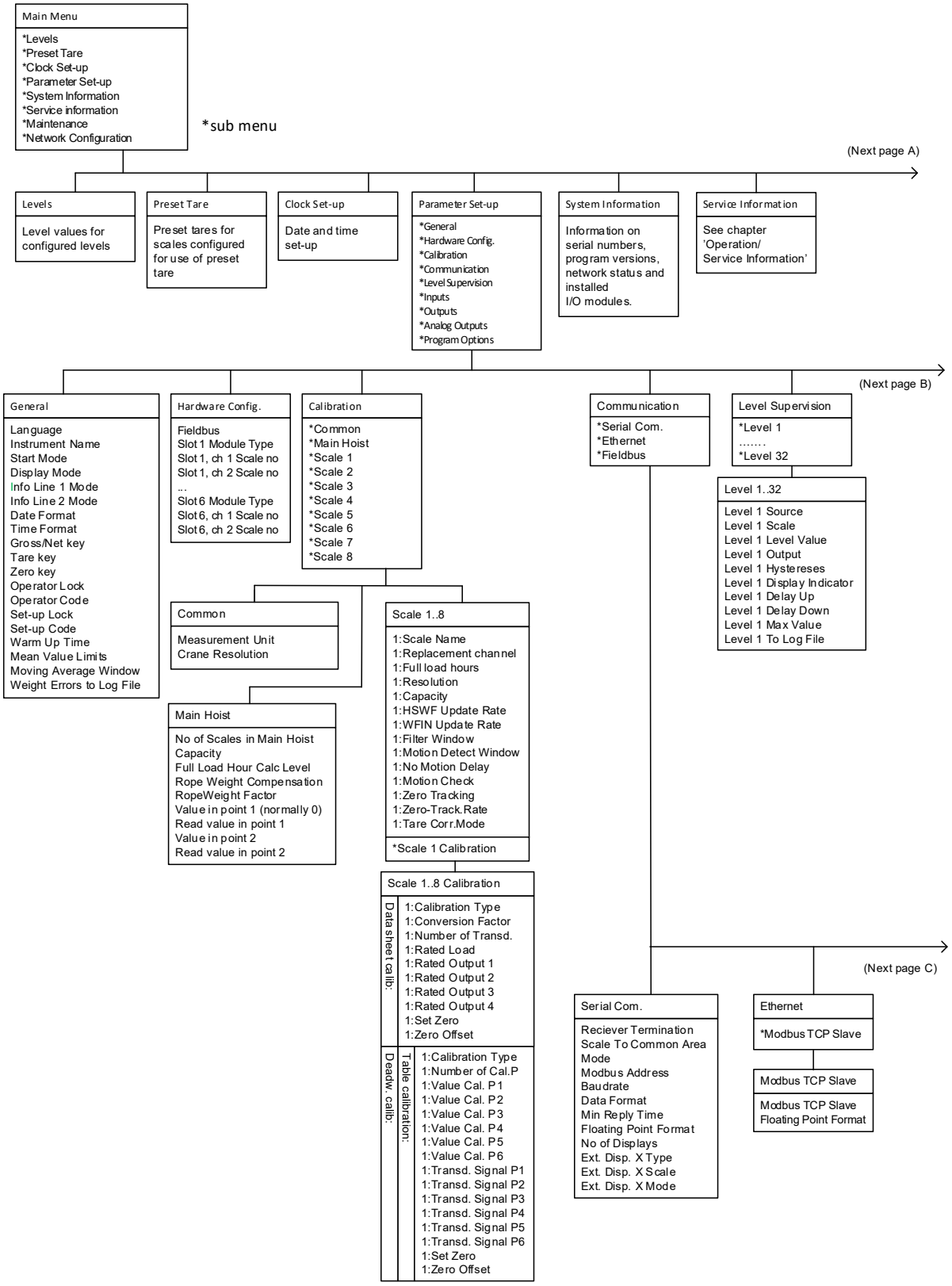
To confirm the new value press the ‘Enter’ key.

To abort editing and keep the previous setting, press the ‘Esc’ key.

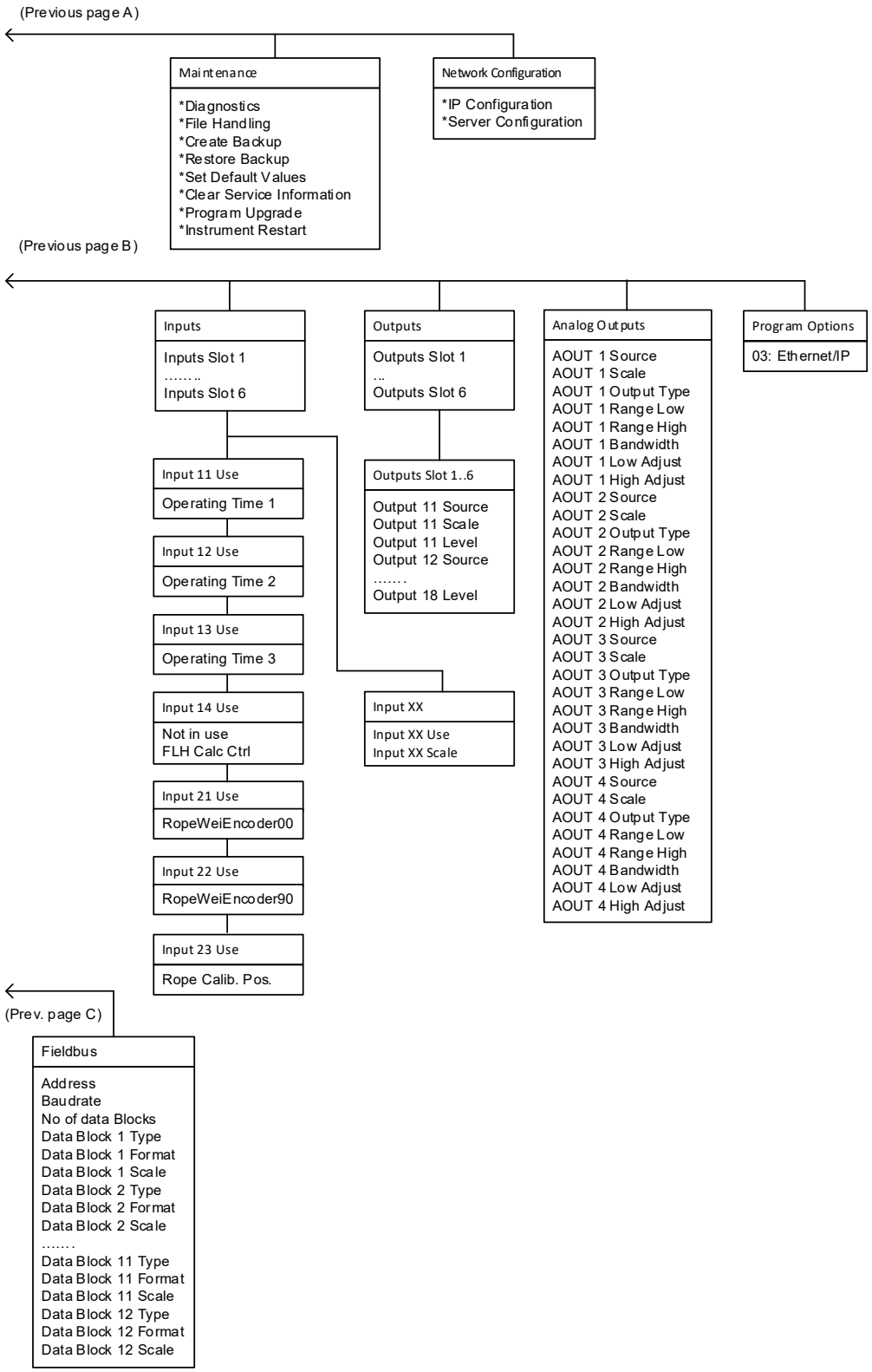


Editing a value parameter

Menu structure



Menu structure



Menu structure (continued)

Parameters

On the following pages a survey of all 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 'General'

Language

English Svenska <English>	Defines the language to be used in menus and messages.

Instrument Name

< >	A 16-character string that appears on the start screen after logging in to web browser and so on.

Start Mode

Command Auto <Auto>	Defines the start mode after power-on or reset. ***Command:*** *A 'start operation' command from control computer or panel key is required for start up.* ***Auto:*** *Automatic start up.*

Display Mode

1 Scale 2 Scales 4 Scales 1 & 2 Scales 1 & 4 Scales 2 & 4 Scales 1 & 2 & 4 Scales <1 & 2 & 4 Scales >	Defines the different weight display screens that can be displayed on the graphical display. ***1* Scale***: Only the 1* Scale *display is shown. Operator can select which scale to display.* ***2* Scales***: Only the 2* Scales *display is shown. Operator can select which scales (consecutive) to display.* ***4* Scales***: Only the 4* Scales *display is shown. Operator can select which scales (consecutive) to display.* ***1 & 2* Scales***: The operator can select between 1 and 2* Scales *screens. Operator can select also which scale(s) to display.* ***1 & 4* Scales***: The operator can select between 1 and 4* Scales *screens. Operator can select also which scale(s) to display.* ***2 & 4* Scales***: The operator can select between 2 and 4* Scales *screens. Operator can select also which scale(s) to display.* ***1 & 2 & 4* Scales***: The operator can select between all three different weight display screens. Operator can select also which scale(s) to display.*

Range/Alternatives <default value>	Explanation and result of alternatives
Info Line 1 Mode	
Not in use Preset Tare Scale Name < Not in use >	Defines the mode of the first information line on the 1 scale screen on the graphical display. ***Not in use:*** *Info line 1 is not used.* ***Preset Tare:*** *The preset tare of the shown scale is viewed.* ***Scale Name:*** *The text entered in parameter Scale Name for Scale x Parameters menu of shown scale is viewed.*
Info Line 2 Mode	
Not in use Preset Tare Scale Name < Not in use >	Defines the mode of the second information line on the 1 scale screen on the graphical display. See parameter 'Info Line 1 Mode' for details
Date Format	
YYYY-MM-DD YYYY-DD-MM DD-MM-YYYY MM/DD/YYYY <YYYY-MM-DD>	Defines the date format. ***YYYY:*** *= year.* ***MM:*** *= month.* ***DD:*** *= day.*
Time Format	
12 h 24 h <24h>	Defines the time format. ***12 h:*** *12 hour time format.* ***24 h:*** *24 hour time format.*
Gross/Net key	
Off On <On>	Disables/enables front panel key Gross/Net ***Off:*** *The Gross/Net key is disabled.* ***On:*** *The Gross/Net key is enabled*
Tare key	
Off On <On>	Disables/enables front panel key Tare ***Off:*** *The Tare key is disabled.* ***On:*** *The Tare key is enabled.*
Zero key	
Off On <On>	Disables/enables front panel key Zero ***Off:*** *The Zero key is disabled.* ***On:*** *The Zero key is enabled.*

Range/Alternatives <default value>	Explanation and result of alternatives
Operator Lock	
Off On <Off>	***Off:** Operator lock is not activated.* ***On:** Operator lock is activated, preventing unauthorized access to the instrument.* *See chapter 'Operation – Security locks'.*
Operator Code	
Range: 1 - 9999 <1937>	Defines the valid code for Operator lock. If 'Set-up lock' (see below) is 'On' this code will not give access to 'Parameter Set-up'. Note: this parameter is only shown if 'Operator Lock' is set to 'On'
Set-up Lock	
Off On <Off>	***Off:** Set-up lock is not activated.* ***On:** Set-up lock is activated, preventing unauthorized access to the instrument.* *See chapter 'Operation – Security locks'.*
Set-up Code	
Range: 1 - 9999 <1937>	Defines the valid code for Set-up lock. If 'Operator lock' (see above) is 'On' this code will still give access to all menus in the Main menu. Note: this parameter is only shown if 'Set-up Lock ' is set to 'On'
Warm Up Time	
Range: 0 - 200 Unit: min <0>	Defines the delay time in minutes from power up until the weight presentation has full accuracy. Indicated in the display with the text 'Warming up!'.
Mean Value Limits	
Range: 0 – 100 % <10>	Defines the limits as a percentage of the channel capacity. If current weight deviates more than this value from the mean value, the mean value calculations are restarted. See chapter 'Operation/Mean value calculations'.
Moving Average Window	
Range: 1 – 10 s <10>	Defines the length/window of the moving average filter, in seconds. See chapter 'Operation/Mean value calculations'.
Weight Errors to Log File	
Off On <Off>	Defines whether Weight Errors should be written to log file. See chapter 'Operation/Event logging to file'.

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

Menu ‘Hardware config.’

Fieldbus

Not In Use Profibus DeviceNet PROFINET <Not In Use>	This parameter defines what type of fieldbus that will be used in the CPU. ***Not In Use:*** *The fieldbus is not used regardless of any installed module.* ***Profibus:*** *Profibus fieldbus module is used.* ***DeviceNet:*** *DeviceNet fieldbus module is used.* ***PROFINET:*** *PROFINET fieldbus module is used.*

Slot 1 Module Type

No module HSWF2 WFIN WFIN2 AOUT1 AOUT4 DIO8 <WFIN2>	This parameter defines what type of I/O-module that will be used in slot 1. ***No module:*** *No module is used in this slot.* ***HSWF2:*** *A 2 channel high speed weight/force module.* ***WFIN:*** *A 1 channel, weight/force measuring module.* ***WFIN2:*** *A 2 channel, weight/force measuring module.* ***AOUT1:*** *A 1 channel analog output module.* ***AOUT4:*** *A 4 channel analog output module.* ***DIO8:*** *A 8/8 digital input/output module.*

Slot 1, ch 1 Scale no

Not in use 1 2 3 4 5 6 7 8 <1>	This parameter defines which scale (1 – 8) that channel 1 in slot 1 will be connected to. Each scale may only be assigned once. ***Not in use****: This slot and channel is not assigned to any scale.* ***1****: This slot and channel is assigned to scale no 1.* ***2****: This slot and channel is assigned to scale no 2.* *….* ***8****: This slot and channel is assigned to scale no 8.* Note: this parameter is only shown if ‘Slot 1 Module type’ is set to ‘WFIN’, ‘WFIN2’ or ‘HSWF2’.

Slot 1, ch 2 Scale no

<2>	This parameter defines which scale (1 – 8) that channel 2 in slot 1 will be connected to. Each scale may only be assigned once. Note: this parameter is only shown if ‘Slot 1 Module type’ is set to ‘WFIN2’ or ‘HSWF2’.

Range/Alternatives <default value>	Explanation and result of alternatives
Slot 2 Module Type	
< No module >	This parameter defines what type of I/O- module is installed in slot 2. See ‘Slot 1 Module type’ for details on parameter values.
Slot 2, ch 1 Scale no	
<Not in use>	This parameter defines which scale (1 – 8) that channel 1 in slot 2 will be connected to. Each scale may only be assigned once. Note: this parameter is only shown if ‘Slot 2 Module type’ is set to ‘WFIN’, ‘WFIN2’ or ‘HSWF2’.
Slot 2, ch 2 Scale no	
<Not in use>	This parameter defines which scale (1 – 8) that channel 2 in slot 2 will be connected to. Each scale may only be assigned once. Note: this parameter is only shown if ‘Slot 2 Module type’ is set to ‘WFIN2’ or ‘HSWF2’.
Slot 3 Module Type	
< No module >	This parameter defines what type of I/O- module is installed in slot 3. See ‘Slot 1 Module type’ for details on parameter values.
Slot 3, ch 1 Scale no	
<Not in use>	This parameter defines which scale (1 – 8) that channel 1 in slot 3 will be connected to. Each scale may only be assigned once. Note: this parameter is only shown if ‘Slot 3 Module type’ is set to ‘WFIN’, ‘WFIN2’ or ‘HSWF2’.
Slot 3, ch 2 Scale no	
<Not in use>	This parameter defines which scale (1 – 8) that channel 2 in slot 3 will be connected to. Each scale may only be assigned once. Note: this parameter is only shown if ‘Slot 3 Module type’ is set to ‘WFIN2’ or ‘HSWF2’.
Slot 4 Module Type	
< No module >	This parameter defines what type of I/O- module is installed in slot 4. See ‘Slot 1 Module type’ for details on parameter values.
Slot 4, ch 1 Scale no	
<Not in use>	This parameter defines which scale (1 – 8) that channel 1 in slot 4 will be connected to. Each scale may only be assigned once. Note: this parameter is only shown if ‘Slot 4 Module type’ is set to ‘WFIN’, ‘WFIN2’ or ‘HSWF2’.

Range/Alternatives <default value>	Explanation and result of alternatives
Slot 4, ch 2 Scale no	
<Not in use>	This parameter defines which scale (1 – 8) that channel 2 in slot 4 will be connected to. Each scale may only be assigned once. Note: this parameter is only shown if 'Slot 4 Module type' is set to 'WFIN2' or 'HSWF2'
Slot 5 Module Type	
< No module >	This parameter defines what type of I/O- module is installed in slot 5. See 'Slot 1 Module type' for details on parameter values.
Slot 5, ch 1 Scale no	
<Not in use>	This parameter defines which scale (1 – 8) that channel 1 in slot 5 will be connected to. Each scale may only be assigned once. Note: this parameter is only shown if 'Slot 5 Module type' is set to 'WFIN', 'WFIN2' or 'HSWF2'.
Slot 5, ch 2 Scale no	
<Not in use>	This parameter defines which scale (1 – 8) that channel 2 in slot 5 will be connected to. Each scale may only be assigned once. Note: this parameter is only shown if 'Slot 5 Module type' is set to 'WFIN2' or 'HSWF2'.
Slot 6 Module Type	
< No module >	This parameter defines what type of I/O- module is installed in slot 6. See 'Slot 1 Module type' for details on parameter values.
Slot 6, ch 1 Scale no	
<Not in use>	This parameter defines which scale (1 – 8) that channel 1 in slot 6 will be connected to. Each scale may only be assigned once. Note: this parameter is only shown if 'Slot 6 Module type' is set to 'WFIN', 'WFIN2' or 'HSWF2'.
Slot 6, ch 2 Scale no	
<Not in use>	This parameter defines which scale (1 – 8) that channel 2 in slot 6 will be connected to. Each scale may only be assigned once. Note: this parameter is only shown if 'Slot 6 Module type' is set to 'WFIN2' or 'HSWF2'.

Menu ‘Calibration’

The Calibration menu contains up to 10 sub menus, one for each installed/used scale and one common and one for the Main Hoist.

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

Menu ‘Calibration/Common’

Common calibration parameters.

Measurement Unit

NONE kg t lb N daN kN mV/V <kg>	Defines the engineering unit that should be used for all measured value (all separate scales and all Crane Weights) and for related set-up parameters.

Crane Resolution

0.001 0.002 0.005 0.01 0.02 0.05 0.1 0.2 0.5 1 2 5 10 20 50 <0.1>	Defines the decimal point position and resolution format for all Crane related weight values (Main Hoist, Side A, Side B, Side A-Side B and Sum All Channels).

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

Menu ‘Calibration/Main hoist’

No of Scales in Main Hoist

Range:
1 – 8
<2>

This parameter defines the number of channels (scales) that should be used for the Main Hoist. Channels that are used starts with channel no. 1 up to channel set in this parameter.
When this is an even number, the first half of the channels are considered to be the ‘Side A’ and the other half to be the ‘Side B’ (when the number is odd, the last channel is included in ‘Side B’).

Capacity

Range:
0.5 to 999999
Unit:
Measurement unit
<500>

Defines the capacity of the Main hoist. This value is important when it is used for calculating the used ‘Full Load Hours’ (see section ‘Full load Hours’ in chapter ‘Operation/Service Information).

Full Load Hour Calc Level

Range:
0 to 999999
Unit:
Measurement unit
<0>

Defines the level that the Main hoist weight must exceed for accumulation of Full Load Hours for the Main hoist.

Rope Weight Compensation

Off
On
<Off>

Defines whether Rope Weight Compensation should be active for the Main Hoist.

Rope Weight Factor

Range:
+/–999999
<999999>

Defines number of pulses/weight unit that is received from the incremental encoder counting the unrolled rope.
NOTE: Value 0 (zero) is not allowed.

Value in point 1 (normally 0)

Range:
+/–999999
Unit:
Measurement unit
<0>

Defines the actual load on the Main Hoist at calibration point 1.
See chapter ‘Calibration/Main Hoist weight adjustment’.

Read value in point 1

Range:
+/–999999
Unit:
Measurement unit
<0>

Defines the read value of the load on the Main Hoist.
This parameter is automatically set by the system, when the value in the previous parameter ‘Value in point 1’ is entered. It may be changed manually.
See chapter ‘Calibration/Main Hoist weight adjustment’.

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

Value in point 2

Range: +/–999999 Unit: Measurement unit <20>	Defines the actual load that is on the Main Hoist at point 2. See chapter ‘Calibration/Main Hoist weight adjustment’.

Read value in point 2

Range: +/–999999 Unit: Measurement unit <20>	Defines the read value of the load on the Main Hoist. This parameter is automatically set by the system, when the value in the previous parameter ‘Value in point 2’ is entered. It may be changed manually. See chapter ‘Calibration/Main Hoist weight adjustment’.

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

Menu ‘Calibration/Scale 1 - Scale 8’

The parameters are the same for all 8 scale menus. Only parameters for scale 1 are shown below.
Note that the scale number is shown as a prefix to the parameter name, here ‘1:’

1:Scale Name

<>	A 16-character string that is used at scale weight display(s) and so on.

1: Replacement Channel

Not in use 1 2 3 4 5 6 7 8 < Not in use >	Defines if the channel shall use the weight of another channel. Normally this parameter should be set in ‘Not in use’. It can be used if e.g., a load cell in the Main Hoist is broken and must temporary be removed. This channel can then use the weight value from another channel by setting this parameter to the channel that shall be used. If these channels normally have the same load, the operation shall continue until the load cell is replaced. The use of this is clearly indicated in the ‘Main Hoist’ window. Note: this parameter is only shown for scales (channels) included in the ‘Main Hoist’.’

1:Full Load Hours

Off On <Off>	Defines whether ‘Full load hours’ should be calculated for this channel or not.

1:Resolution

0.001 0.002 0.005 0.01 0.02 0.05 0.1 0.2 0.5 1 2 5 10 20 50 <0.1>	Defines the decimal point position and resolution format for the displayed value. All set-up parameters using the measurement unit will be written with the decimal point position selected in this menu. If the last digits of the weight value are not stable, a more coarse resolution can be selected to get a stable reading.

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

1:Capacity

Range: 0.5 to 999999 Unit: Measurement unit <500>	Nominal range of scale. Capacity / Resolution = Number of divisions.

1:HSWF Update Rate

12.5 Hz 25 Hz 50 Hz 100 Hz <50 Hz>	Defines the update rate for the measuring channel belonging to scale 1 if the weight conversion module is of HSWF2 type. Note: this parameter is only shown if the weight conversion module belonging to scale 1 is of HSWF2 type. The instrument must be restarted when update rate has been changed.

1:WFIN Update Rate

2.3 Hz 4.6 Hz 9.3 Hz 19 Hz 37 Hz 75 Hz <37 Hz>	Defines the update rate for the measuring channel belonging to scale 1 if the weight conversion module is of WFIN or WFIN2 type. Note: this parameter is only shown if the weight conversion module belonging to scale 1 is of WFIN or WFIN2 type. The instrument must be restarted when update rate has been changed.

1:Filter Window

Range: 0 to 999999 Unit: Measurement unit <10 * Resolution>	The instrument produces unfiltered and filtered weight internally. If the difference between the filtered an unfiltered weight is less than ‘Filter window’ the filtered weight is used. This parameter value has one decimal more than parameter Resolution, to allow ‘Filter window’ to be smaller than the resolution.

1:Motion Detect Window

Range: 0 to 999999 Unit: Measurement unit <1 * Resolution>	Motion status is ‘on’ when the weight value is not stable. It goes off when the weight has been stable for the ‘No motion delay time’. Motion condition exists if the weight change during a certain measuring period is greater than the window ‘Motion Detect Window’. The measuring period is one conversion time (Update Rate) or at least 200 ms. This parameter value has one decimal more than parameter Resolution, to allow ‘Motion detect w.’ to be smaller than the resolution.

1:No Motion Delay

Range: 0 to 10.0 Unit: s <1.0>	Delay in seconds from detection of stable weight until the Motion status goes off.

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

1:Motion Check

Off On <Off>	***Off:*** *Only zero adjustment is inhibited during motion.* ***On:*** *Inhibits zero adjustment and taring during motion.*

1:Zero Tracking

Off On On+AutoZero <Off>	With this parameter automatic zero-tracking can be selected, or a combination of automatic zero-tracking and automatic zero setting. ***Off:*** *No zero tracking.* ***On:*** *Zero tracking active.* ***On+AutoZero:*** *Zero tracking and auto zeroing active.*

1:Zero-Track.Rate

Range: 0 to 1500 Unit: /min <1>	Maximum weight change speed for zero-tracking to be performed. 'Zero-track.rate' must be less than (30 * Resolution). Unit for the Zero-track rate is: Measurement unit/min, expressed as ' /min' to save space. Note: this parameter is only shown if parameter '1: Zero tracking' is set to 'On' or 'On+AutoZero'.

1:Tare Corr.Mode

Auto Preset Auto+Preset <Auto>	The tare value can be calculated in three different ways: Net weight = Gross weight – Tare value ***Auto:*** *Auto tare value is used.* ***Preset:*** *Tare value is entered through the serial communication or keypad.* ***Auto+preset:*** *Tare value is the sum of the preset tare value and auto tare value.*

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

Menu 'Calibration/Scale 1 Calibration'

The Scale 1 Calibration menu is found after the last parameter in menu Scale. Here only scale 1 menu is shown. Note that the scale number is shown as a prefix to the parameter name, here '1:'

1:Calibration Type

Data Sheet Deadweight Table <Data Sheet>	Defines the type of calibration to be performed. A new calibration is initiated as a 'Calibration type' is selected. ***Data Sheet:*** *Data sheet calibration is easy to use and doesn't demand any reference equipment, except data from the transducer data sheets.* ***Deadweight:*** *Deadweight calibration is normally the most accurate calibration type. It requires known weights to at least 2/3 of the wanted measuring range.* ***Table:*** *Table calibration is used to enter recorded values from a previous calibration into a replacement instrument.*

Data sheet calibration related parameters

1:Conversion Factor

Range: 0.01 to 100 <9.80665>	Defines the relationship between a measured value expressed in data sheet unit and expressed in the selected measurement unit.

1:Number of Transducers

Range: 1 to 4 <3>	Defines the number of transducers and fixed support points in the scale installation. All transducers must have equal rated load. If the total number is over 4: enter 1 here!

1:Rated Load

Range: 1 to 999999 Unit: Data sheet unit <2000.00>	Defines the rated load for one transducer, expressed in the data sheet unit. The value is specified in the transducer data sheet. NOTE! If the data sheet value is 5 kN, the parameter should be set to 5000 (N). If the total number of transducers and fixed supports is over 4: multiply that number with the rated load for one transducer and enter the result here!

1:Rated Output 1

Range: 0 to 9.99999 Unit: mV/V <2.03900>	Defines the rated output signal for transducer 1. The value is specified in the transducer data sheet for transducer 1. If the total number of transducers and fixed supports is over 4: add up all rated output values, divide by the number of transducers, and enter the result here!

Range/Alternatives <default value>	Explanation and result of alternatives
1:Rated Output 2	
Range: 0 to 9.99999 Unit: mV/V <2.03900>	Defines the rated output signal for transducer 2. The value is specified in the transducer data sheet for transducer 2.
1:Rated Output 3	
Range: 0 to 9.99999 Unit: mV/V <2.03900>	Defines the rated output signal for transducer 3. The value is specified in the transducer data sheet for transducer 3.
1:Rated Output 4	
Range: 0 to 9.99999 Unit: mV/V <2.03900>	Defines the rated output signal for transducer 4. The value is specified in the transducer data sheet for transducer 4.
1:Set Zero	
Range: +/–999999 Unit: Measurement unit <'Live'>	Live weight is displayed at the bottom of the screen. Enter wanted value for the actual load, usually '0', i.e. unloaded scale. **NOTE! This parameter should be used for zeroing of the instrument.**
1:Zero Offset	
Range: +/–999999 Unit: Measurement unit <0>	This menu shows the offset value acquired by zeroing in 'Set zero'. If this parameter is edited, the zeroing will be influenced.

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

Deadweight calibration related parameters

Used when the scale is calibrated with weights. The instrument automatically reads the corresponding transducer signals.

1:No of Calibration Points

Range:
2 to 6
<2>

Number of calibration points.

1:Value Cal. P1

Range: +/–999999
Unit:
Measurement unit
<0>

This parameter defines the load on the scale in the lowest calibration point, normally 0.

1:Value Cal. P2

Range: +/–999999
Unit:
Measurement unit
<500>

This parameter defines the load on the scale in the second calibration point.

1:Value Cal. P3

Range: +/–999999
Unit:
Measurement unit
<0>

This parameter defines the load on the scale in the third calibration point.

1:Value Cal. P4

Range: +/–999999
Unit:
Measurement unit
<0>

This parameter defines the load on the scale in the fourth calibration point.

1:Value Cal. P5

Range: +/–999999
Unit:
Measurement unit
<0>

This parameter defines the load on the scale in the fifth calibration point.

1:Value Cal. P6

Range: +/–999999
Unit:
Measurement unit
<0>

This parameter defines the load on the scale in the sixth calibration point.

Range/Alternatives <default value>	Explanation and result of alternatives
1:Transd. Signal P1	
Range: +/–9.99999 Unit: mV/V <0.00000>	In this parameter, the transducer signal in the lowest calibration point is displayed, but the value cannot be edited.
1:Transd. Signal P2	
Range: +/–9.99999 Unit: mV/V <1.66631>	In this parameter, the transducer signal in the second calibration point is displayed, but the value cannot be edited.
1:Transd. Signal P3	
Range: +/–9.99999 Unit: mV/V <2.03900>	In this parameter, the transducer signal in the third calibration point is displayed, but the value cannot be edited.
1:Transd. Signal P4	
Range: +/–9.99999 Unit: mV/V <2.03900>	In this parameter, the transducer signal in the fourth calibration point is displayed, but the value cannot be edited.
1:Transd. Signal P5	
Range: +/–9.99999 Unit: mV/V <2.03900>	In this parameter, the transducer signal in the fifth calibration point is displayed, but the value cannot be edited.
1:Transd. Signal P6	
Range: +/–9.99999 Unit: mV/V <2.03900>	In this parameter, the transducer signal in the sixth calibration point is displayed, but the value cannot be edited.
1:Set Zero	
	See ‘1:Set zero ‘ under section ‘Data sheet calibration related parameters’ for explanation of the parameter.
1:Zero Offset	
	See ‘1:Zero offset ‘ under section ‘Data sheet calibration related parameters’ for explanation of the parameter.

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

Table calibration related parameters

Used when the scale is calibrated with recorded values from a previous calibration, normally a deadweight calibration.

1:No of Calibration Points

Range:
2 to 6
<2>

Number of calibration points.

1:Value Cal. P1

Range: +/–999999
Unit:
Measurement unit
<0>

In this parameter, enter the recorded value for the load in the first calibration point.

1:Value Cal. P2

Range: +/–999999
Unit:
Measurement unit
<500>

In this parameter, enter the recorded value for the load in the second calibration point.

1:Value Cal. P3

Range: +/–999999
Unit:
Measurement unit
<0>

In this parameter, enter the recorded value for the load in the third calibration point.

1:Value Cal. P4

Range: +/–999999
Unit:
Measurement unit
<0>

In this parameter, enter the recorded value for the load in the fourth calibration point.

1:Value Cal. P5

Range: +/–999999
Unit:
Measurement unit
<0>

In this parameter, enter the recorded value for the load in the fifth calibration point.

1:Value Cal. P6

Range: +/–999999
Unit:
Measurement unit
<0>

In this parameter, enter the recorded value for the load in the sixth calibration point.

Range/Alternatives <default value>	Explanation and result of alternatives
1:Transd. Signal P1	
Range: +/–9.99999 Unit: mV/V <0.00000>	In this parameter, enter the recorded value for the transducer signal in the first calibration point.
1:Transd. Signal P2	
Range: +/–9.99999 Unit: mV/V <1.66631>	In this parameter, enter the recorded value for the transducer signal in the second calibration point.
1:Transd. Signal P3	
Range: +/–9.99999 Unit: mV/V <2.03900>	In this parameter, enter the recorded value for the transducer signal in the third calibration point.
1:Transd. Signal P4	
Range: +/–9.99999 Unit: mV/V <2.03900>	In this parameter, enter the recorded value for the transducer signal in the fourth calibration point.
1:Transd. Signal P5	
Range: +/–9.99999 Unit: mV/V <2.03900>	In this parameter, enter the recorded value for the transducer signal in the fifth calibration point.
1:Transd. Signal P6	
Range: +/–9.99999 Unit: mV/V <2.03900>	In this parameter, enter the recorded value for the transducer signal in the sixth calibration point.
1:Set Zero	
	See ‘1:Set zero ‘ under section ‘Data sheet calibration related parameters’ for explanation of the parameter.
1:Zero Offset	
	See ‘1:Zero offset ‘ under section ‘Data sheet calibration related parameters’ for explanation of the parameter.

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

Menu 'Serial Com.'

ReceiverTermination

Off
On
<Off>

***Off**: No termination on RS485 input (between pin 3 and 4)*
***On**: 120Ω termination on RS485 input (between pin 3 and 4)*

Scale To Common Area

Not in use
1
2
3
4
5
6
7
8
Main Hoist
Side A
Side B
Side A–Side B
Sum all Chan.
<1>

To make it simpler to communicate for certain equipment's e.g., radio equipment's, a common area is created where any channels weight values can be directed.

In this set-up parameter the channel that should be directed to the common area is selected.
See modbus registers 40146-40160 and 44134-44147 for a description of Selected Channel registers in chapter Communication/Modbus protocol.

***1:** Scale 1 weight data to common area*
***2:** Scale 2 weight data to common area*
….
***8:** Scale 8 weight data to common area*
***Main Hoist:** Main Hoist weight data to common area*
***Side A:** Side A weight data to common area*
***Side B:** Side B weight data to common area*
***Side A–Side B:** Side A-B weight data to common area*
***Sum all Chan.:** Sum of all channels weight data to com. area*

Mode

Not in use
Modbus Slave
External display
<Not in use>

Defines use of serial port.
***Not in use:** The port is not used.*
***Modbus Slave:** The port is used for control unit communication.*
External display: *The port is used for external display.*

Modbus Address

Range: 1 to 247
<1>

Note: This parameter is only shown if 'Modbus Slave' is selected in 'Mode'.

Baudrate

300
600
1200
2400
4800
9600
19200
38400
57600
115200
<9600>

Defines the baudrate for the serial communication.
The parameter must be set to the baudrate of the external equipment.

Note: This parameter is not shown if 'Not in use' is selected in 'Mode'.

Range/Alternatives <default value>	Explanation and result of alternatives
Data Format	
7-none-2 7-even-1 7-even-2 7-odd-1 7-odd-2 8-none-1 8-none-2 8-even-1 8-odd-1 < 8-none-1 >	Defines the bit configuration for the serial communication. The parameter must be set to the same configuration as for the external equipment. Note: This parameter is not shown if 'Not in use' is selected in 'Mode'.
Min Reply Time	
Range: 0 to 1000 Unit: ms <0>	Adds a delay before the response to a command is sent. Used if the instrument sends its response to fast for the master. Note: This parameter is only shown if 'Modbus Slave' is selected in 'Mode'.
Floating Point Format	
Modicon Float Float < Modicon Float >	Sets how the Modbus slave should handle floating point values. ***Modicon Float:*** *Modicon floating point format.* ***Float:*** *IEEE 32 bit floating point format* See chapter 'Communication' for details on floating point values. Note: This parameter is only shown if 'Modbus Slave' is selected in 'Mode'.
No of Displays	
1 2 3 4 5 6 7 8 <1>	Defines the number of external displays connected on the serial port (RS485). Note: that it is possible to have more than one displays on the same communication port, except display type 'RD 10' that is not addressable. This parameter is only shown if 'External display' is selected in 'Mode'.

Range/Alternatives <default value>	Explanation and result of alternatives
Ext. Disp. X Type	
RD 10 LONDON 4 LONDON 5 LONDON 6 LONDON 7 < LONDON 6 >	Adapts the display (1 – 8) to the serial output. ***RD 10:*** *Serial output adapted for display type VTRD 10-S-2-E* **LONDON 4***: Serial output for display type london with 4 digits* **LONDON 5***: Serial output for display type london with 5 digits* **LONDON 6***: Serial output for display type london with 6 digits* **LONDON 7***: Serial output for display type london with 7 digits* Note: that it is possible to have different types of displays on the same communication port, except display type 'RD 10'that is not addressable. This parameter is only shown if 'External Display' is selected in 'Mode'.
Ext. Disp. X Scale	
1 2 3 4 5 6 7 8 Main Hoist Side A Side B Side A–Side B Sum all Chan. <1>	Defines which scale or Crane Weight that will be connected to the display. ***1:*** *The display is connected to scale number 1.* ***2:*** *The display is connected to scale number 2.* *….* ***8:*** *The display is connected to scale number 8.* **/* ***Main Hoist:*** *The display is connected to Main Hoist* **/* ***Side A:*** *The display is connected to Side A* **/* ***Side B:*** *The display is connected to Side B* **/* ***Side A–Side B:*** *The display is connected to Side A–B* **/* ***Sum all Chan.:****The display is connected to Sum all Channels* */ This choice has no function when parameter 'Ext. Disp. X Mode' is 'Display weight'. The output to the display is then always dashes ('------'). This parameter is only shown if 'External display' is selected in 'Mode'.
Ext. Disp. X Mode	
Net Weight Gross Weight Display Weight < Display Weight >	Defines the value to represent on the external display. ***Net Weight:*** *The display represents net weight.* ***Gross Weight:*** *The display represents gross weight.* ***Display Weight:*** *The display represents gross or net weight.*

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

Menu ‘Modbus TCP slave’

Modbus TCP Slave

On Off <On>	Enables/disables the Modbus TCP Slave. ***On:*** *Modbus TCP Slave enabled.* ***Off:*** *Modbus TCP Slave disabled.*

Floating Point Format

Modicon Float Float < Modicon Float >	Sets how the Modbus TCP Slave should handle floating point values. ***Modicon Float:*** *Modicon floating point format.* ***Float:*** *IEEE 32 bit floating point format.* See chapter ‘Communication’ for details on floating point values. Note: This parameter is not shown if parameter ‘Modbus TCP Slave ‘is set to‘ Off’.

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

Menu ‘Fieldbus’

Note: The Fieldbus menu is not shown if parameter ‘Fieldbus‘ (in Hardware Config menu) is set to ‘Not In Use’. See chapter ‘Communication – Fieldbus interface’ for more details on fieldbus configuration and usage.

Address

Range 1 - 125
< 126 >

PROFIBUS address setting.

Note: This parameter is only shown if parameter ‘Fieldbus‘ (in Hardware Config menu) is set to ‘Profibus’.

Address

Range 0 - 63
< 63 >

DeviceNet address setting.

Note: This parameter is only shown if parameter ‘Fieldbus‘ (in Hardware Config menu) is set to ‘DeviceNet’.

Baudrate

125 kbps
250 kbps
500 kbps
Auto
< Auto >

Sets the baudrate 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 Config menu) is set to ‘DeviceNet’.

No of Data Blocks

Range 0 - 12
< 0 >

Sets the no of Data Blocks that should be mapped to the memory available from the fieldbus. Each Data Block is configurable.

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

Data Block 1 Type

Not In Use
Gross Weight
Net Weight
Disp. Weight
Input Signal
Level Status (F)
Input Status
Output Status
Inp./Outp Status
Level Status (I)
AOUT1-4 Value
AOUT1-2 Value
AOUT3-4 Value
< Not In Use >

Sets the data source for Data Block 1.

Not In Use: *The memory area corresponding to this data block is not updated.*
Gross Weight: *The gross weight for the selected scale is transmitted in this Data Block. Floating point or Integer format.*
Net Weight: *The net weight for the selected scale is transmitted in this Data Block. Floating point or Integer format.*
Disp. Weight: *The displayed weight (gross or net) for the selected scale is transmitted in this Data Block. Floating point or Integer format.*
Input Signal: *The input signal from the transducer (the mV/V signal) for the selected scale is transmitted in this Data Block. Floating point or Integer format.*
Level Status (F): *The status of all 32 levels in the instrument is transmitted in this Data Block. Floating-point format.*
Input Status: *The status of all inputs in the instrument is transmitted in this Data Block. Floating-point format.*
Output Status: *The status of all outputs in the instrument is transmitted in this Data Block. Floating-point format.*
Inp./Outp Status: *The status of all inputs and all outputs in the instrument is transmitted in this Data Block. Integer format.*
Level Status (I): *The status of all 32 levels in the instrument are transmitted in this Data Block. Integer format.*
AOUT1-4 Value: *The values of analog outputs 1 to 4 are transmitted in this Data Block. Floating-point format.*
AOUT1-2 Value: *The values of analog outputs 1 and 2 are transmitted in this Data Block. Integer format.*
AOUT3-4 Value: *The values of analog outputs 3 and 4 are transmitted in this Data Block. Integer format.*

Note: This parameter is only shown if parameter ‘No Of Data Blocks‘ is set to 1 or greater.

Data Block 1 Format

Floating Point
Integer
< Floating Point >

Sets the Data Block 1 Format.

Floating Point: *The Data Block data format is floating point.*
Integer: *The Data Block format is integer.*

Note: This parameter is only shown if parameter ‘No Of Data Blocks‘ is set to 1 or greater and parameter ‘Data Block 1 Type‘ is set to ‘Gross Weight’, ‘Net Weight’, ‘Disp. Weight or ‘Input Signal’.

Range/Alternatives <default value>	Explanation and result of alternatives
Data Block 1 Scale	
1 2 3 4 5 6 7 8 Main Hoist Side A Side B Side A–Side B Sum all Chan. < 1 >	Selects the source scale for Data Block 1. ***1**: The Data Block uses data from scale no 1.* ***2**: The Data Block uses data from scale no 2.* …. ***8**: The Data Block uses data from scale no 8.* **/ **Main Hoist:** The Data Block uses data from Main Hoist.* **/ **Side A:** The Data Block uses data from Side A.* **/ **Side B:** The Data Block uses data from Side B.* **/ **Side A–Side B:** The Data Block uses data from Side A-B.* **/ **Sum all Chan.:** The Data Block uses data from Sum all channels.* */ This choice has no function when parameter 'Data Block 1 Type' is 'Disp. Weight' or 'Input Signal'. The error code in the data block will be set to 'Scale not used' and the rest of the data is not valid. Note: This parameter is only shown if parameter 'No Of Data Blocks' is set to 1 or greater and parameter 'Data Block 1 Type' is set to 'Gross Weight', 'Net Weight', 'Disp. Weight' or 'Input Signal'.
Data Block 2 Type	
	Sets the data source for Data Block 2. Note: This parameter is only shown if parameter 'No Of Data Blocks' is set to 2 or greater. See 'Data Block 1 Type' for an explanation of the parameter.
Data Block 2 Format	
	Sets the Data Block 2 Format. Note: This parameter is only shown if parameter 'No Of Data Blocks' is set to 2 or greater. See 'Data Block 1 Format' for an explanation of the parameter.
Data Block 2 Scale	
	Selects the source scale for Data Block 2. Note: This parameter is only shown if parameter 'No Of Data Blocks' is set to 2 or greater. See 'Data Block 1 Scale' for an explanation of the parameter.

For explanation on parameters for Data Blocks 3 to 12 see 'Data Block 1 Type', 'Data Block 1 Format' and 'Data Block 1 Scale'. Note that the parameters are shown only if 'No Of Data Blocks' is set equal to or greater than the Data Block number.

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

Menus ‘Level 1’ – ‘Level 32’

NOTE: There are 32 levels each with the following 10 parameters described below.

See chapter ‘Operation/Level supervision’.

Level 1 Source (- Level 32 Source)

Not in use Net Weight Gross Weight Display Weight Abs.Net Weight Abs.Gross Weight Abs.Disp.Weight < Not in use >	Defines the signal to be supervised by the level. ***Not in use:*** *The level is not used, any outputs set to work with this level will be off.* ***Net Weight:*** *The level operates on the net weight.* ***Gross Weight:*** *The level operates on the gross weight* ***Display Weight:*** *The level operates on gross weight or net weight.* ***Abs.:*** *Stands for Absolute, the level operates on the absolute value of net weight, gross weight or displayed weight.*

Level 1 Scale (- Level 32 Scale)

1 2 3 4 5 6 7 8 Main Hoist Side A Side B Side A–Side B Sum all Chan. <1>	Defines which scale that will be supervised by the level. ***1:*** *The level is supervising scale number 1.* ***2:*** *The level is supervising scale number 2.* *….* ***8:*** *The level is supervising scale number 8.* */ ***Main Hoist:*** *The level is supervising Main Hoist weight value.* */ ***Side A:*** *The level is supervising the Side A weight value.* */ ***Side B:*** *The level is supervising the Side B weight value.* */ ***Side A–Side B:*** *The level is supervising the Side A-B weight value.* */ ***Sum all Chan.:*** *The level is supervising the Sum all channels weight value.* */ This choice has no function when parameter ‘Level 1 Source’ is ‘Display weight’ or ‘Abs.Disp.Weight’. Level status is then always ‘Off’. Note: This parameter is only shown if ‘Level 1 Source’ is not set to ‘Not in use’.

Level 1 Level Value (- Level 32 Level Value)

Range: +/-999999 Unit: Measurem. unit <0>	Defines the level that shall be supervised. This level value can only be set in this set-up. It can be read by communication and in other windows in G6. Note: This parameter is only shown if ‘Level 1 Source’ is not set to ‘Not in use’.

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

Level 1 Output (- Level 32 Output)

Active Above
Active Below
< Active Above >

This parameter defines the conditions for control of a possible used output.
Active Above: *The used output is activated as the supervised signal level is above the set level.*
Active Below: The *used output is activated as the supervised signal level is below the set level.*

Note: This parameter is only shown if 'Level 1 Source' is not set to 'Not in use'.

Level 1 Hystereses (- Level 32 Hystereses)

Range:
+/-999999
Unit:
Measurement unit
< 0 >

Defines the hystereses range for the level. Positive value gives a hystereses range above the switch level, negative value gives a range below the switch level.

Note: Do not use hysteresis if 'Level 1 Delay Up' or 'Level 1 Delay Down' time is used.

Note: This parameter is only shown if 'Level 1 Source' is not set to 'Not in use'.

Level 1 Display Indicator (- Level 32 Display Indicator)

None
Main Hoist
Side A
Side B
Side A-Side B
Sum all Chan.
All Crane Views
<All Crane Views>

Defines if the indicator for level output status shall be displayed in some Crane view window.
None: *The level output status indicator shall not be visible in any of the crane views.*
Main Hoist: *The level output status indicator shall be visible in the Main Hoist view.*
Side A: *The level output status indicator shall be visible in Side A view.*
Side B: *The level output status indicator shall be visible in Side B view.*
Side A–Side B: *The level output status indicator shall be visible in Side A - Side B view.*
Sum all Chan.: *The level output status indicator shall be visible in Sum All Channels view.*
All Crane Views : *The level output status indicator shall be visible in all crane views.*

Note: This parameter is only shown if 'Level 1 Source' is not set to 'Not in use'.

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

Level 1 Delay Up (- Level 32 Delay Up)

Range: 0 – 10000 Unit: ms <0>	Defines the Delay time for increasing signal. Level 1 will be activated when the supervised value has been above 'Level 1 Level Value' longer than 'Level 1 Delay Up' time. This setting allows dynamic overloads without activating the level function. Note: Do not use delay up time if 'Level 1 Hystereses' is used. Note: This parameter is only shown if 'Level 1 Source' is not set to 'Not in use'.

Level 1 Delay Down (- Level 32 Delay Down)

Range: 0 – 10000 Unit: ms <0>	Defines the Delay time for decreasing signal. Level 1 will be deactivated when the supervised value has been below 'Level 1 Level Value' longer than 'Level 1 Delay Down' time. This setting allows dynamic loads without deactivating the level function. Note: Do not use delay down time if 'Level 1 Hystereses' is used. Note: This parameter is only shown if 'Level 1 Source' is not set to 'Not in use'.

Level 1 Max Value (- Level 32 Max Value)

Range: +/-999999 Unit: 'Measurem. Unit' <0>	Defines the Max measured value for the 'Level 1 Delay Up' time parameter to be enabled. If the supervised value exceeds 'Level 1 Max Value', the 'Level 1 Delay Up' time is disabled, and the level is activated immediately. Note: This parameter is not used if parameter 'Level 1 Delay Up' is set to zero (0) or if 'Level 1 Max Value' is less than parameter 'Lev. X Value'. Note: This parameter is only shown if 'Level 1 Source' is not set to 'Not in use'.

Level 1 To Log File (- Level 32 To Log File)

Off On <Off>	Defines if changes of level supervisions status should be written to 'Event Log File'. Note: This parameter is only shown if 'Level 1 Source' is not set to 'Not in use'.

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

Menus ‘Inputs Slot 1’ - ‘Inputs Slot 6’

NOTE: There are six possible sub menus, one for each slot. In each slot sub menu there are up to 8 possible inputs named 11 to 18 for slot 1, 21 to 28 for slot 2 and so on. Each input has the parameters described below. The ‘Inputs Slot X’ is only shown if there is a module with inputs selected for slot X. The number of displayed inputs is the number of inputs of the specific module selected in menu ‘Hardware Configuration’.

Input 11 Use

Operating Time 1

Defines the use of the internal digital input 11.
Pre-defined use of this input (no selections available).

***Operating Time 1**: Operating Time 1 is measured during the time the input is active.*

Input 12 Use

Operating Time 2

Defines the use of the internal digital input 12.
Pre-defined use of this input (no selections available).

***Operating Time 2**: Operating Time 2 is measured during the time the input is active.*

Input 13 Use

Operating Time 3

Defines the use of the internal digital input 13.
Pre-defined use of this input (no selections available).

***Operating Time 3**: Operating Time 3 is measured during the time the input is active.*

Input 14 Use

Not in use
FLH Calc Ctrl
< Not in use >

Defines the use of the internal digital input 14.

***Not in use**: The input is not used.*
***FLH Calc Ctrl:** During the time the input is active, ‘Full load hours’ are calculated for the Main Hoist.*

Input 21 Use

RopeWeiEncoder00

Defines the use of the internal digital input 21.
Pre-defined use of this input (no selections available).

***RopeWeiEncoder00**: The input is used as pulse input from rope weight compensation incremental encoder (encoder 0 °).*

Input 22 Use

RopeWeiEncoder90

Defines the use of the internal digital input 22.
Pre-defined use of this input (no selections available).

***RopeWeiEncoder90**: The input is used as pulse input from rope weight compensation incremental encoder (encoder 90 °).*

Range/Alternatives <default value>	Explanation and result of alternatives
Input 23 Use	
Rope Calib. Pos.	*Defines the use of the internal digital input 23.* *Pre-defined use of this input (no selections available).* ***Rope Calib. Pos**: The input is used zero the rope weight compensation counter.*
Input XX Use	
Not in use Full Load Hours Tare Gross/Net Gross Net Zero Save Statistics Clear Statistics Calc Mean Value < Not in use >	*Defines the use of the internal digital inputs 15-18, 24-28, 31-38, 41-48, 51-58 and 61-68.* ***Not in use**: The input is not used.* ***Full Load Hours**: This will cause 'Full load hours' to be calculated for the scale selected in parameter 'Input XX Scale'. Calculation is done when this input is active. The time the input has been 'active' will also be gathered in the service information window for this channel.* ***Tare**: Input used for taring command.* ***Gross/Net**: Input used for gross/net toggling.* ***Gross**: Input used to switch to gross mode.* ***Net**: Input used to switch to net mode.* ***Zero**: Input used for zero command.* ***Save statistic:** This causes all gathered Service Information data to be saved to a file in the 'ServiceInfo' area of the file system.* ***Clear statistic:** This causes all gathered Service Information data to be saved to a file (as above) and after that cleared.* ***Calc Mean Value:** Starts or stops mean value calculation. Mean value calculation **starts** at rising edge if Mean value calculation is **not** already started (inactive). Mean value calculation **stops** at rising edge if Mean value calculation is **started** (active).*
Input XX Scale	
1 2 3 4 5 6 7 8 Main hoist Side A Side B Side A – Side B Sum all Chan. <1>	*Defines the used scale connected to the internal digital inputs 15-18, 24-28, 31-38, 41-48, 51-58 and 61-68.* ***1:** Scale number 1 uses the input.* ***2:** Scale number 2 uses the input.* *….* ***8:** Scale number 8 uses the input.* ***Main hoist:** Main Hoist uses the input. Only for 'Tare' function.* ***Side A:** No function* ***Side B:** No function* ***Side A – Side B:** No function* ***Sum all Chan.:** No function* Note: this parameter is only shown if parameter 'Input XX Use' is 'Full Load Hours', 'Tare', 'Gross/Net', 'Gross', 'Net' or 'Zero'.

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

Menus 'Outputs Slot 1' - 'Outputs Slot 6'

NOTE: There are six possible sub menus, one for each slot. In each slot sub menu, there are up to 8 possible outputs named 11 to 18 for slot 1, 21 to 28 for slot 2 and so on. Each output has the parameters described below. Note that output numbering below only shows outputs belonging to slot 1. The 'Outputs Slot X' is only shown if there is a module, with outputs, selected for slot X. The number of displayed outputs is the number of outputs of the specific module selected in menu 'Hardware Configuration'.

Output 11 Source (- Output 18 Source)

Not in use In Process Level Net Mode Good Zero Stable Weight < Not in use >	Defines the use of the internal digital outputs in the instrument. ***Not in use:*** *The output is not used.* ***In Process:*** *Active output means active 'In process'.* ***Level:*** *Output activated by the Level.* ***Net Mode:*** *Output active in net mode.* ***Good Zero:*** *Output active by 'good zero'.* ***Stable Weight:*** *Output active by stable weight.*

Output 11 Scale (- Output 18 Scale)

1 2 3 4 5 6 7 8 Main hoist Side A Side B Side A-Side B Sum all Chan.	***1:*** *Scale number 1 uses the output.* ***2:*** *Scale number 2 uses the output.* …. ***8:*** *Scale number 8 uses the output.* */ ***Main hoist:*** *The Main Hoist uses the output.* */ ***Side A:*** *The Side A uses the output.* */ ***Side B:*** *The Side B uses the output.* */ ***Side A–Side B:*** *The Side A – B uses the output.* */ ***Sum all Chan.:*** *The sum of all channels uses the output.* */ This choice has no function when parameter 'Output 11 Source' is 'Good Zero'. The digital output is then always inactive.
<1>	Note: this parameter is only shown if parameter 'Output 11 Source' is 'Good zero', 'Stable Weight' or 'Net mode'.

Output 11 Level (- Output 18 Level)

1 2 3 …. 30 31 32	***1:*** *Level number 1 uses the output.* ***2:*** *Level number 2 uses the output.* ***3:*** *Level number 3 uses the output.* …. ***30:*** *Level number 30 uses the output.* ***31:*** *Level number 31 uses the output.* ***32:*** *Level number 32 uses the output.*
<1>	Note: this parameter is only shown if parameter 'Output 11 Source' is 'Level'.

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

Menu ‘Analog Outputs’

NOTE: There are 4 possible analog outputs each with the 8 parameters described below. If the selected analog output module is AOUT4 there will be parameters for four analog outputs displayed, if the AOUT1 is selected only the parameters for the first analog output (shown below) will be shown. If no AOUT module at all is selected the menu ‘Analog Outputs’ will not be shown.

AOUT 1 Source (- AOUT 4 Source)

Not in use Gross Weight Net Weight Disp. Weight < Not in use >	Defines the value to represent on analog output 1. ***Not in use:*** *The analog output is not used.* ***Gross Weight:*** *The output represents gross weight.* ***Net Weight:*** *The output represents net weight.* ***Disp. Weight:*** *The output represents gross or net weight.*

AOUT 1 Scale (- AOUT 4 Scale)

1 2 3 4 5 6 7 8 Main hoist Side A Side B Side A–Side B Sum all Chan. < 1 >	***1:*** *Scale number 1 uses this analog output.* ***2:*** *Scale number 2 uses this analog output.* *….* ***8:*** *Scale number 8 uses this analog output.* **/* ***Main hoist:*** *The Main Hoist uses this analog output.* **/* ***Side A:*** *The Side A uses this analog output.* **/* ***Side B:*** *The Side B uses this analog output.* **/* ***Side A–Side B:*** *The Side A – B uses this analog output.* **/* ***Sum all Chan.:*** *The sum of all channels uses this analog output.* **/* This choice has no function when parameter ‘AOUT 1 Source’ is ‘Disp. Weight’. Analog output is then always ‘Off’ (0 V or 0 mA). Note: this parameter is not shown if parameter ‘AOUT 1 Source’ is ‘Not in use’.

AOUT 1 Output Type (- AOUT 4 Output Type)

+/– 20 mA –12 – 20 mA 0-20 mA 4-20 mA +/–10 V 0-10 V <4-20 mA>	Defines the type of signal, used to represent the weight value at this Analog output. ***+/–20mA, –12 - 20mA:*** *bipolar current output.* ***0-20mA, 4-20mA:*** *monopolar current output.* ***+/–10V:*** *bipolar voltage output.* ***0-10V:*** *monopolar voltage output.* Note: this parameter is not shown if parameter ‘AOUT 1 Source’ is ‘Not in use’. Note that in most cases some over range is available. +/-20 mA and -12 – 20 mA ranges are limited at -22 and +22 mA. 4 -20 mA range is limited at +4 and +22 mA. 0 -20 mA is limited at 0 and +22 mA. +/-10 V is limited at -11 and +11V. 0–10 V is limited at 0 and +11V.

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

AOUT 1 Range Low (- AOUT 4 Range Low)

Range: +/–999999 Unit: Measurement unit <0>	Defines the weight value that should give the lowest output (0 V / 0 mA / 4 mA) at this Analog output. Note: this parameter is not shown if parameter 'AOUT 1 Source' is 'Not in use'.

AOUT 1 Range High (- AOUT 4 Range High)

Range: +/–999999 Unit: Measurement unit <500>	Defines the weight value that should give the highest output (10 V / 20 mA) at this Analog output. Note: this parameter is not shown if parameter 'AOUT 1 Source' is 'Not in use'.

AOUT 1 Bandwidth (- AOUT 4 Bandwidth)

1.6 Hz 3 Hz 6 Hz 12 Hz 25 Hz 50 Hz 100 Hz <100 Hz>	Sets the analog output bandwidth. Note: this parameter is not shown if parameter 'AOUT 1 Source' is 'Not in use'.

AOUT 1 Low Adjust (- AOUT 4 Low Adjust)

Range: +/-2.000 Unit: % <0.000>	Gives a possibility to adjust the offset of the analog output. This allows for the reading of an external instrument connected to the analog output to be fine-tuned. Full adjustment range corresponds to approximately +/-2% of maximum analog output. The parameter value will be set to zero each time 'AOUT 1 Output Type' is changed. Note: this parameter is not shown if parameter 'AOUT 1 Source' is 'Not in use'.

AOUT 1 High Adjust (- AOUT 4 High Adjust)

Range: +/-2.000 Unit: % <0.000>	Gives a possibility to adjust the gain of the analog output signal. This allows for the reading of an external instrument connected to the analog output to be fine-tuned. Full adjustment range corresponds to approximately +±/-2% of maximum analog output. The parameter value will be set to zero each time 'AOUT 1 Output Type' is changed. Note: this parameter is not shown if parameter 'AOUT 1 Source' is 'Not in use'.

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

Menu ‘Program Options’

This sub menu shows all available program options. In the program described in this manual EtherNet/IP is program option. Program options must be activated with an option code to be functional. The option code can be purchased from your instrument supplier.

To temporarily use the program option, enter the string ‘Demo’ (irrespective of upper/lower case). This will allow to use the option for 14 days e.g. for try out.

Enter a ‘–’ to turn off the program option.

The program option can be used for several short periods but after a total use of 14 days it will be permanently turned off until a valid code is entered.

03: EtherNet/IP

< – >	The option code necessary to activate the EtherNet/IP program option always consists of 10 digits.

Program options

A program option is a program functionality that must be purchased separately. It is not available until a valid option code is entered. An option code can be purchased at the same time as the instrument or separately at a later occasion. The program option code is directly related to the individual S/N of the CPU module. When ordering an option code it must be defined which CPU S/N it should apply to.

There is a possibility to use a program option for a limited time without an option code. This can be of use e.g. if the user would like to try out a program option, if a CPU is replaced and a new option code has not yet been acquired, etc.

Entering the text ‘Demo’ as the option code will give the user access to the program option during 14 days. After this period has expired a valid option code must be entered if the program option should be used. It is possible to disable demo mode if it is not used continuously. Entering a ‘-‘ instead of option code or ‘Demo’ will disable the program option. The 14-day period is only counted when demo mode is enabled. If the 14-day period has expired the text ‘Demo Expired’ is shown which indicates that the demo mode is no longer available.

In the sub menu ‘Program Options’ are all available program options shown.

In the crane weighing program described in this manual is EtherNet/IP available as a program option.

In other standard programs and special program there might be other program options available.

If a program option is **enabled** in demo mode there will be an indication (*DEMO*) in the upper line of the ‘Main Hoist’ weight display and the ‘Channel 1-8’ weight displays.

4. Calibration

General

When measuring with G6 Instrument, the transducer output signal, corresponding to the transducer load, is converted to a weight value. The conversion is controlled by several parameters with values defined during calibration of the instrument.

Some calibration types for the instrument can be performed without any transducers connected.

The G6 Instrument supports three calibration types:

- **Data sheet calibration -** entry of values from transducer data sheet(s).
- **Table calibration -** entry of recorded values from a previous calibration.
- **Deadweight calibration -** storing of measured transducer signals for known weights.

Calibration can only be performed in menu:
'Parameter set-up/Calibration/Scale n.'
A 'Set-up code' may be demanded. Note that the weighing result for the calibrated scale may be temporarily incorrect during calibration.
Calibration starts as one calibration type is selected.

To ensure the best possible weighing results, the mechanical installation must be carried out with great care. Fixed mechanical connections to the scale should be avoided, or made as flexible as possible and perpendicular to the measuring direction. If the scale has several transducers connected in parallel, they must have the same rated load and impedance. If transducers and fixed supports are combined, the load must be evenly distributed on all supports. It is recommended to start with a data sheet calibration, which is easy to perform and gives a fairly good accuracy so the installation can be tested.

Load Cell

Type:	KIS-1R	Rated Load:	50 kN
Serial No:	378210	Over Load Safe:	100% R.L.
Part No:	1157652	Over Load Ultimate:	200% R.L.
		Side Load Safe:	100% R.L.
		Side Load Ultimate:	200% R.L.

Electrical

Electrical Connection SHIELDED 4-CONDUCTOR CABLE

Signal Positive:	WHITE WITH GREEN STRIPE	Excitation Positive:	GREEN WITH RED STRIPE
Signal Negative:	RED WITH WHITE STRIPE	Excitation Negative:	BLACK

Excitation Voltage (Recommended):	10 V AC OR DC
Excitation Voltage (Maximum):	18 V AC OR DC
Input Resistance:	349.55 Ω
Output Resistance:	349.65 Ω

Temperature

Range:	-40 TO +80°C
Compensated Range:	-10 TO +50°C
Effect On Output:	0.0015 % of Output/°C
Effect On Zero Balance:	0.003 % of R.O./°C

Performance

Rated Output (R.O.):	2.0439 mV/V
Non Linearity:	0.0211 % R.O.
Zero Balance:	0.1889 % R.O.
Creep 5 Minutes:	0.0039 % R.O.

Calibration Values (Tolerance 0.1%)

Shunt Resistor Connected Between Excitation Negative And Signal Negative

40 kΩ Corresponds To:	49.942 kN
80 kΩ Corresponds To:	25.039 kN

Each transducer from BLH Nobel is delivered with a detailed data and calibration sheet

If the weight indicator must be replaced, a table calibration of the replacement unit can be performed, with recorded values from an earlier calibration.

To get the best accuracy, a deadweight calibration with known weights to at least 2/3 of the measuring capacity, should be performed.

All calibration parameters are found in the menus under ‘Scale X’ and ‘Scale X Calibration’. The parameters are described in chapter ‘Set-up’.

Note that calibration must be done separately for each scale in the instrument.

Actual gross weight and transducer signal is displayed when in menu ‘Scale X’ or ‘Scale X Calibration’.

Common parameters

Measurement unit
This parameter defines the engineering unit used for all weight values in the instrument.
The same engineering unit will also be used for example in the parameter values ‘Resolution’, ‘Capacity’ and ‘Level’.

Crane Resolution
This parameter defines decimal point position and resolution in Crane Weight values. The decimal point position selected here will be used in the displayed Crane Weight values and in the Crane Weight values sent to a computer.
Resolution is understood to mean the smallest weight change presented.

Common scale parameters

For all calibration types, resolution for the weight value, and the capacity for the scale (channel) must be specified. These parameters, among others, are found in menu ‘Scale X’, see chapter ‘Set-up’. This section deals only with the calibration parameters.

Resolution
This parameter defines decimal point position and resolution in weight display for a scale.
The decimal point position selected here will be used in setting up, in the displayed weight value and in the weight value sent to a computer.
Resolution is understood to mean the smallest weight change presented.

Capacity
This parameter defines the nominal range of the scale. This is the capacity of the scale and should be set to the maximum weight with which the scale is to be loaded. Even if the scale (transducers) have larger capacity, this value should nevertheless be set so that the weighing equipment does not become overloaded if the scale is loaded up to this value. This parameter is used to calculate certain default values in the set-up and in checking the maximum zero value (with ZERO key and zero-tracking).

Data sheet calibration

Data sheet calibration is recommended as first-time calibration for a new installation. In data sheet calibration, values from the transducer data sheets are entered as parameter values, the scale need not be loaded and an accuracy of 0.1 % can be obtained. The accuracy of the G6 Instrument itself is 0.005 % (1-2 years calibration period). It is essential that no external forces influence the scale installation. If fixed support points are included in the scale, the load must be evenly distributed on transducers and fixed supports.

If a transducer for a scale is not loaded directly with the entire load, which is common in a crane application, the parameter ‘Rated load’ must be calculated according to the examples below. The examples below assume that only one transducer is connected to each scale input (channel) and that the parameter ‘Number of transducers’ is set to one (1).

Example 1.

A crane with one rope package and two pulley wheels. Load cell is mounted in fixed rope end. The load cell will take the load in one of the six ropes (1/6 of the total load).

‘Rated load” = Load cell capacity / (1/6) = Load cell capacity * 6

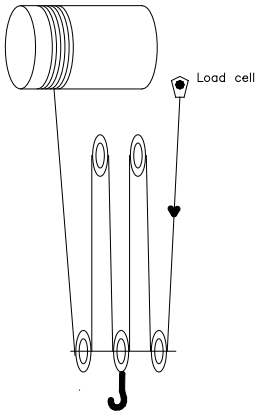


Figure1

Example 2.

A crane with one rope package and two pulley wheels. The load cell is mounted in one of the pulley wheels. The load cell takes the load in two of the six ropes (2/6 of the total load).

‘Rated load” = Load cell capacity / (2/6) = Load cell capacity * 3

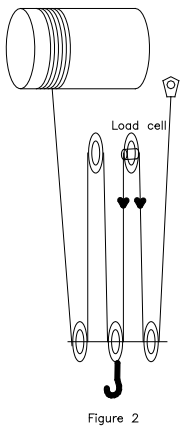


Figure 2

Conversion factor
In transducer data sheets, loads are normally not expressed in the measurement unit, selected for the scale. This parameter defines a constant by which a weight value, expressed in the measurement unit, should be multiplied to be expressed in the data sheet unit.
When using a transducer, calibrated in Newton, in a scale displaying weight values in kg, the 'Conv. factor' shall be the local gravitation constant in m/s^2.
The default value, 9.80665, is an international mean value for the gravitation constant (world-wide range 9.78 – 9.83).
If the data sheet unit is the same as the measurement unit, the conversion factor parameter should be set to 1.0000.

Number of transducers
In weighing applications the load on the scale may be supported by several transducers or fixed supports. This parameter defines the total number of transducers and fixed supports in the scale, up to maximum 4.
If the scale has more than 4 support points, this parameter should be set to '1' and the parameter value for 'Rated load' and 'Rated output' must be calculated.

Rated load
Rated load for a transducer is indicated in the data sheet and should be entered as a parameter value, expressed in the unit of the data sheet.
NOTE! If the data sheet value is 5 kN, this parameter should be set to 5000 (N).
If several transducers are used in a scale, they must all have the same rated load.
If the scale has more than 4 support points, 'Number of transd' should be set to '1' and the value of this parameter should be calculated as:
rated load for one transducer, multiplied by the total number of support points.

Rated Output 1 (2, 3, 4)
Rated output is given in the data sheet for every transducer. Parameters will be available for the number of support points specified in 'Number of transd'.
For fixed support points the rated output value is 0.00000 (mV/V).
If the scale has more than 4 support points, 'Number of transd' should be set to '1' and the parameter value for 'Rated output 1' should be calculated as:
the mean value of rated output for all active transducers.

Set zero
Set zero is useful only when the scale installation is finished. By the digit keys this value can be set to zero, for unloaded scale, or to the weight of the known load, for a scale that is loaded.

Zero offset
For an installed scale this parameter shows the zero offset after zeroing, a value that should not be edited.
For a scale that is not installed it is possible to enter the known weight of fixed equipment on the scale.

Table calibration

Table calibration can be used to copy recorded values from a previous deadweight calibration of the weighing equipment into a replacement instrument.
Table calibration can also be used enter values from transducer data sheets or other calculated values.
It is also possible to change from a current Data sheet or Deadweight calibration to a Table calibration and then adjust the calibration values.

This is performed by entry of recorded weight values and corresponding transducer signal values into the instrument. Calibration can be performed for up to 6 points. The accuracy of the copying procedure is 0.005 %.

No of Calibration Points
Only parameters for the selected number of calibration points will be displayed in the menu. The number of calibration points can be changed during the calibration.

Value Calibration P1, Value Calibration. P2 etc.
These parameters are used for entry of recorded weight values, expressed in the measurement unit, from a previous deadweight calibration.

Transducer Signal P1, Transducer Signal P2 etc.
These parameters are used for entry of recorded transducer signal values for corresponding calibration points.

Set Zero
Set zero is useful only when the scale installation is finished. By the digit keys this value can be set to zero, for unloaded scale, or to the weight of the known load, for a scale that is loaded.

Zero Offset
This parameter is used for entry of the recorded zero offset value from a previous deadweight calibration.
If a zeroing has been performed with parameter ‘Set zero’ above, the value of parameter ‘Zero offset’ need not be changed.

Deadweight calibration

This is normally the most accurate calibration type. The transducer signals are measured and automatically stored when the scale is loaded with known weights. Calibration can be performed in up to six calibration points, starting with the lowest, the highest point, or any other order.
Calibration of the lowest point is normally performed with the scale unloaded.
If calibration in two points is used, the second point should be placed as high as possible, the scale should be loaded with at least 2/3 of the ‘Capacity’.
By calibration in more than two points, the highest calibration point should be placed at, or higher than, the highest load for which the scale is to be used, and the calibration points should be evenly distributed in the measuring range.

No of Calibration Points
This parameter defines the number of calibration points. Up to six points can be selected, and parameters for load value and transducer signal will be displayed only for the selected number of points.
It is possible to change the number of points during the calibration.

Value Calibration P1
This parameter defines the load for the lowest calibration point. Normally the scale should be unloaded and the parameter value set to 0 (zero). This weight value and the corresponding transducer signal value are automatically stored in the instrument.

Value Calibration P2, Value Calibration P3 etc
The scale should be loaded with known weights. These parameters show the load according to the previous calibration and the parameter values should be changed to the value of the known weights. As a parameter value is stored, the instrument will also store the corresponding transducer signal value for that calibration point.

Transducer Signal P1, Transducer Signal P2 etc.
These parameters contain the automatically stored transducer signal values for the calibration points. The values cannot be edited.

Set Zero
Set zero is useful only when the scale installation is finished. By the digit keys this value can be set to zero, for unloaded scale, or to the weight of the known load, for a scale that is loaded.

Zero Offset
For an installed scale this parameter shows the zero offset after zeroing, a value that should not be edited.

Calibration indication
When a new deadweight calibration is started an asterisk character will be shown at the end of ‘Value Cal. P1’, ‘Value Cal. P2’ etc. This indicates that this value is not entered. The asterisk will disappear when the user has entered a value. If the user leaves the calibration menu, i.e. calibration is interrupted, the remaining asterisks will be removed. It will still be possible to continue the calibration later on but without any calibration indications (asterisks).

Note that as long as there are asterisks visible it will not be possible to edit the ‘Set Zero’ or ‘Zero Offset’ parameters. First must the deadweight calibration be finished (no asterisks visible) then should the zero be set.

Main Hoist calibration

Each scale (channel) included in the Main Hoist (1-X) must be individually calibrated. All scales included in the Main Hoist should normally be set up equally with regards to the common parameters (resolution, update rate, filter parameters, motion parameters…), since the 'Crane Weights' (Main Hoist, Side A, Side B, Side A – Side B and Sum All Channels) are calculated from the weights from the separate scales (channels).

Deadweight calibration of the Main Hoist

The best and preferred calibration method is Deadweight calibration using a known load of at least 80% of the scale (channel) capacity.

It is a straightforward process to make a Deadweight calibration if the Main Hoist has one or several transducers connected in parallel to only one scale input (channel) in G6.
The Deadweight calibration is performed as described in section 'Deadweight Calibration' above.

If the Main Hoist has more than one transducer, each connected to its own scale input (channel) in G6, a deadweight calibration of each channel can be done by lifting a known weight so that the load is **spread equally** over all transducers. The known calibration weigh is divided with number of used scales in the Main Hoist and used as 'Value Calibration P2' for deadweight calibration of each scale.
Then do a deadweight calibration on each scale (channel) in two points by lifting the known weight as described in section 'Deadweight Calibration' above. If the weight is not distributed equal, or if the result is not satisfactory, several lifts of a reference weigh can be done, see Table calibration of the Main Hoist below.

Ensure that the amount of rolled out rope is as equal as possible in the two calibration points.

Data sheet calibration of the Main Hoist

Datasheet calibration of each scale (channel) included in the main hoist shall be made as described in section 'Datasheet Calibration' above.

Table calibration of the Main Hoist

To correct for any load imbalances between the sensors, recording of several deadweight lifts might improve the calibration of the Crane. A calculation sheet, '271539 Crane Main hoist calibration' is available for this purpose. In this sheet, measured input signal values (mV/V) for each lift and each channel with load and without load (two calibration points) can be recorded. The sheet is then calculating a result including 'Value Calibration' and 'Transducer Signal' for each calibration point and for each channel to be written in the table calibration parameters.

Care must be taken to ensure that the amount of rolled out rope is as equal as possible in the two calibration points.

A zero shall be set to finalise the calibration.

Main Hoist weight adjustment

If the Main Hoist weight differs from the known weight at the Main Hoist, **after the calibration and zero setting of all scales**, it is possible to adjust the weight with a calibration factor. The adjustment parameters are found in menu 'Calibration/Main hoist'.
The program calculates the calibration factor from two points with known weights as:

$$\text{Calibration factor} = \frac{\text{Value in point 2} - \text{Value in point 1}}{\text{Read value in point 2} - \text{Read value in point 1}}$$

The program is then multiplying the calibration factor with the uncorrected weight to get a Main Hoist weight that is shown in the display.

If the calibration factor is less or equal to 0 (zero) or greater than 2 the program will use calibration factor equal to 1.

When 'Value in point x' is changed, the program automatically write the uncorrected weight in 'Read value in point x'. Make sure that the weight on the Main Hoist is the same as 'Value in point x.'

If the 'Read value in point x' will be taken from the display and manually changed, the calibration factor must be 1 before reading the display. Otherwise, the read values will be corrected in the display. The calibration factor will be 1 if the adjustment parameters are as follows (default values):

'Value in point 1' = 0 kg

'Read value in point 1' = 0 kg

'Value in point 2' = 20 kg

'Read value in point 2' = 20 kg

Example for adjustment:

Point 1 (normally without load at the Main Hoist):

'Value in point 1' (known weight at the Main Hoist) = 0 kg

'Read value in point 1' (uncorrected Main Hoist reading at the instrument) = 0 kg

Point 2:

'Value in point 2' (known weight at the Main Hoist) = 500 kg

'Read value in point 2' (uncorrected Main Hoist reading at the instrument) = 510 kg

The program will calculate the following:

$$\text{Calibration factor} = \frac{\text{Value in point 2} - \text{Value in point 1}}{\text{Read value in point 2} - \text{Read value in point 1}} = \frac{500 - 0}{510 - 0} = 0{,}980$$

Corrected Main Hoist weight in point 2 = 0,98 * 510 kg = 500 kg

Rope Weight Compensation set-up

General

In a crane weighing application where the load cells are mounted so that the rolled-out rope is affecting the weight, this function is used to compensate for the weight of the rolled-out rope at the Main Hoist.

The effect on the weight of the rolled-out rope is linear and can be compensated for if you know the length of the rolled-out rope.
Therefor an incremental pulse encoder should be mounted on the crane that gives a pulse train to digital input 21 and 22 (I1 and I2 in Slot 2), as the rope rolls out or in.
The encoder should be rated for 24 VDC, have HTL outputs and shall be arranged so that the pulse train should give not more than 50 pulses/sec. An example of a suitable type of encoder is Leine & Linde RSI 503 (9-30 VDC, HTL output).

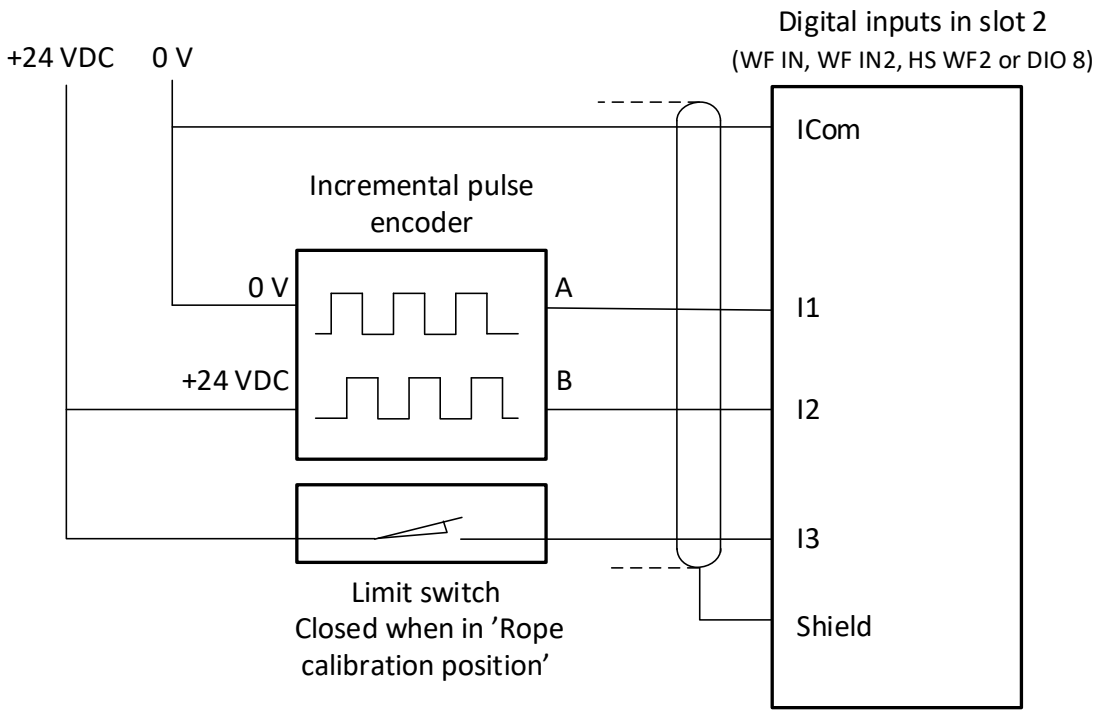
In addition to that the G6 also needs a signal (digital input) when the rope is in a Rope Compensation calibration position (no rope rolled out).

A rope weight factors is configured, and the program uses this to calculate rope weight when the pulse count value is changed compared to the reference point.

Required inputs to G6

The function requires following inputs to G6:

Input 21 (Slot 2, I1)	Pulse output A from incremental encoder
Input 22 (Slot 2, I2)	Pulse output B from incremental encoder
Input 23 (Slot 2, I3)	Limit switch that are active (closed) when in rope calibration position (no rope rolled out). The rope counter will be zeroed when this input is active.



Electrical connections

Set-Up and Calibration of rope weight compensation

The calibration of the Main Hoist weight should be done as described in ‘Main Hoist calibration’ above.

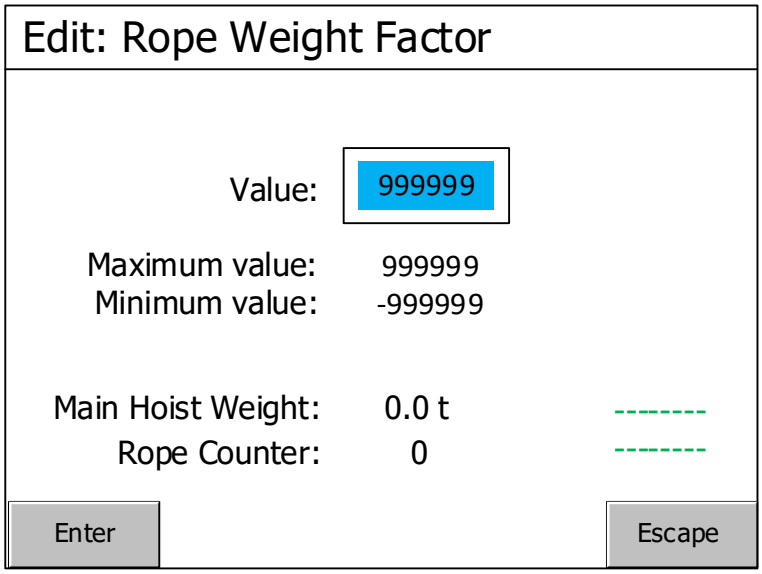
After the weight calibration is ready, the zero should be set for all channels included in the Main Hoist when the crane is in the rope calibration position (no rope rolled-out, digital input 23 active).

The rope weight compensation is turned On with set-up parameter ‘Calibration/Main hoist/Rope Weight Compensation’.

The parameter ‘Calibration/Main hoist/Rope Weight Factor’ is used to set the ‘number of pulses / weight unit’.
The parameter set-up window for the ‘Rope Weight Factor’ has been extended to show also the current main hoist weight, without rope weight compensation, and the current value of the counter that counts the out rolled rope length. There are also a Main Hoist Weight and a Rope Counter value in green to the right. The current Main Hoist Weight and a Rope Counter value is copied to these fields when the Start key is pressed and remains there until the Stop key is pressed.

The ‘Rope Weight Factor’ can be set manually by entering the value from the front panel, or it can be set automatically.

The rope weight compensation function can be tested by reading the weight value in any position, and then move to another position and read the weight value. If the rope weight parameter was set up correctly, then you should read the same weight value at different positions.



Rope Weight Factor parameter set-up

Automatic calculation of Rope weight factor

Automatic setting of this parameter can be done when the window for entering the factor ‘Edit: Rope Weight Factor’ is shown.

1. Position the crane in the ‘rope calibration position’ (digital input 23 active).
   Select set-up parameter ‘Rope Weight Factor’ and press enter
   Press the ‘Start’ key (the key with the green start symbol).
   It is essential that the weight is stable when this is done. The instrument records the Main Hoist weight and the counter value (green text at the right of the window).

2. Position the crane in another position (with much rope rolled-out).
   Press the ‘Stop’ key (the key with the red stop symbol). Also at this time it is essential that the weight is stable. The instrument uses the current and saved weight values and counter values and calculates the ‘Rope weight factor’ which is inserted into the edit field.
3. Press ‘Enter’ to save the new calculated ‘Rope weight factor’.

NOTE. Error! 'Faulty value (Error 105)' is shown if the following occurs:

- When saving a ‘Rope weight factor’ equals to zero.
- If the Stop key is pressed before the Start key.
- If there are no weight change during change of position (rope roll-out).
- If there are no Rope Counter change during change of position (rope roll-out).

5. Operation

General

G6 instrument with strain gauge transducers is designed mainly for weighing purposes. The measurement values are displayed at the front panel, and can also be transmitted to a master computer/PLC.
The measurement values can also be presented as the output signal from an analog output module.
Some functions in the instrument can be controlled by digital input signals, and digital outputs from the instrument can be used to indicate actual status of instrument, scales, levels and so on. The number of inputs and outputs may be expanded by connection of additional I/O modules.

Power supply

The instrument is powered by 24 VDC or 110-240 VAC and should not be turned off during weekends and over-night. Continuous power supply to electronics and transducers prevents moisture condensation in the units.

Power-up sequence

As the G6 instrument is started it enters the Starting up state.

If any error is detected during power-up, the sequence stops and an error code will be displayed. If the error is not fatal it will be possible to enter the menu system to correct possible set-up errors.

If the detected error is fatal, it will only be possible to select restart unless the error is a database file problem. If the start-up error is a database file error it will be possible to select between deleting the database file, entering program upgrade or restart. Deleting the database or upgrading the program (also upgrading to the present program version) will result in a new database to be created which may make the instrument usable again. Note that settings will be default after creating a new database. If the fatal error persists please contact your supplier.

If no errors are detected, the instrument can enter normal operation (automatic start-up), displaying actual weight values, possibly together with other instrument information.

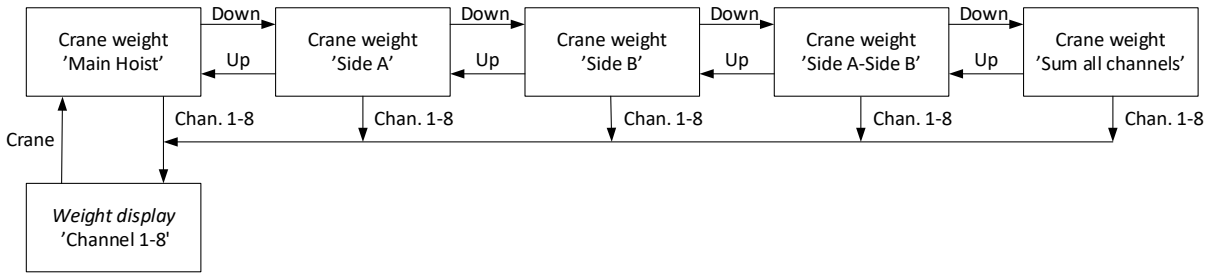
If ‘Manual start-up’ is selected, the instrument enters the ‘Wait for start’ state, displaying a message ‘Waiting for start command. Press START to continue!’. When the operator presses the ‘START’ button on the screen, the instrument will switch over to normal operation unless a warm up time is set and there is still a remaining warm up time. In this case the ‘Warming up’ message will be displayed. See below.

If a warm up time has been set the message ‘Warming up.’ will be displayed together with the remaining time. When the warm up time has expired the instrument will switch over to normal operation automatically.

Display alternatives at normal operation

The instrument will start up showing the ‘Main Hoist’ window, where the sum of channels in the Main Hoist shall is displayed, with both gross and net value.

From here it is possible to navigate between the available Crane weight windows and the weight windows for separate scales (channels) (see figure below).



Navigation between available weight displays

When the ‘START’ or ‘STOP’ key is pressed, while any of the weight windows is displayed, the mean value calculation is started or stopped. See section ‘Mean Value Calculation’ for a description of the mean value function.

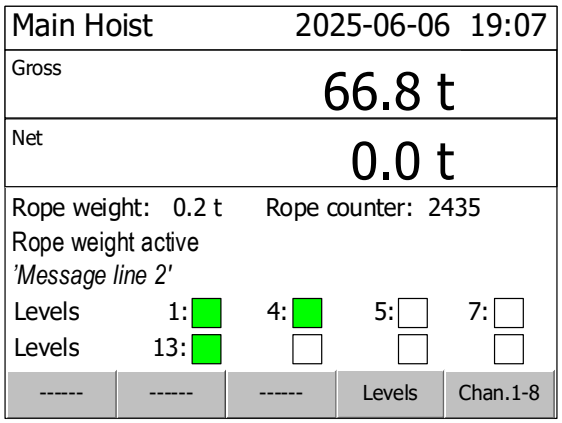
If a program option is **enabled** in demo mode there will be an indication (*DEMO*) in the upper line of the ‘Main Hoist’ weight display and the ‘Channel 1-8’ weight displays.

Crane weight windows

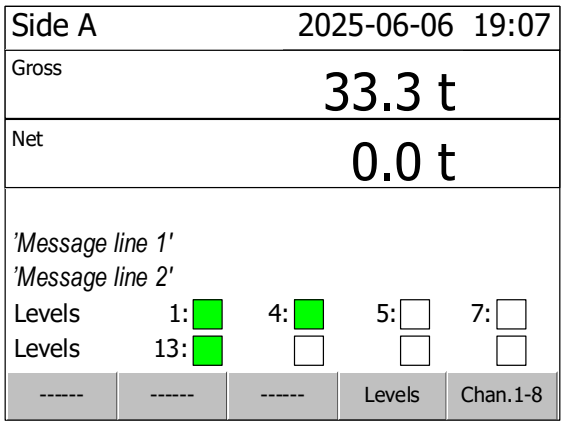
It is possible to use the up and down arrow keys to scroll through the different display options such as displaying ‘Main Hoist, ‘Side A’, ‘Side B’, Side A – Side B’ or displaying ‘Sum All Channels’ (including all channels/scales connected to the instrument and not just to the Main Hoist).

The Main Hoist weight is the sum of all channels (scales) included in the Main Hoist with any corrections. The correction of the Main Hoist weight can be ‘Rope Weight Compensation’ and/or ‘Main Hoist weight adjustment’.

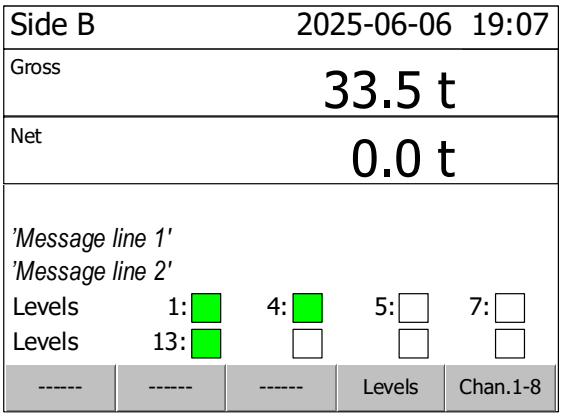
All other crane weights are based on the channels (scales) weights without any corrections.



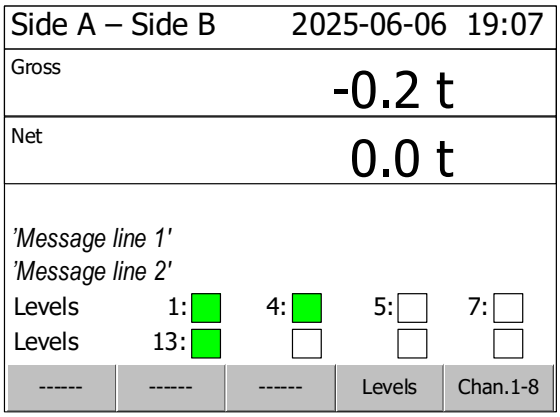
Main Hoist weight display when ‘Rope weight compensation’ is On



Side A weight display



Side B weight display



Side A – Side B weight display

All these windows shows both gross and net value.

For both weight values (gross and net) there are also an indicator for 'Motion'.

When the 'TARE'-key is pressed while the 'Main Hoist' window is displayed, a tare command is sent to all channels included in the Main Hoist. If all channels successfully perform a tare, this is indicated by the net weight going to zero.

Below the weight values, 'Rope weight' and 'Rope counter' are displayed if 'Rope weight compensation' is On.

Then there are two message lines used to display various messages to the operator.

Up to eight level output status indicators may be displayed. Which level indicators are to be displayed in each window is selected with the 'Level X Display Indicator' parameter for each level function.
The indicators show the level number and the level output status of a possible configured digital output. A green square indicates an active digital output.

Function keys:

Levels (F4): Shows the level values of the level supervisors for all scales.

Chan. 1-8 (F5): Switch to the 'Channel 1-8' weight display.

Weight display Channel 1-8

In the weight display for Channel 1-8 it is possible to view weight information from one or more scales. It is also possible to select which scales that shall be displayed on the color touch display. With parameter 'Display modes' it is possible to select what combinations of the three weight display modes that can be selected by the operator. The display modes are single scale display, two scales display and four scales display.

Dedicated keys on the front panel are used to zero and tare the scale, to toggle between gross and net weight display for the selected scale.

Using the zero or tare keys for a scale will issue a warning text that the summarized weights (crane weights) will be affected and gives the operator a choice to continue or cancel the function.

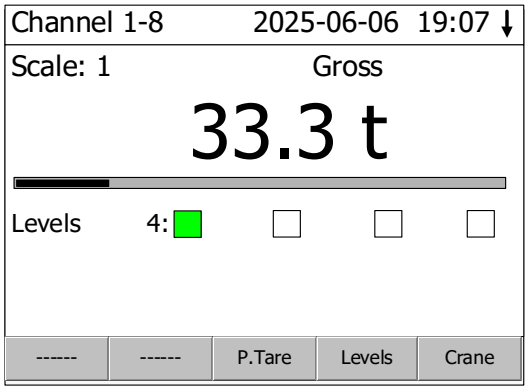
If the selected channel (scale) is included in the Main Hoist with rope compensation active, the crane must be in the 'Rope Calibration Position' (digital input 23 active) to use the zero function.

Keys on the front panel like 'ZERO', 'TARE', GROSS/NET' etc. and soft keys (F1 - F5) are mostly dedicated to the selected scale ('PRINT' key has no function in this program). In general, when the expression 'selected scale' is used in this manual, it

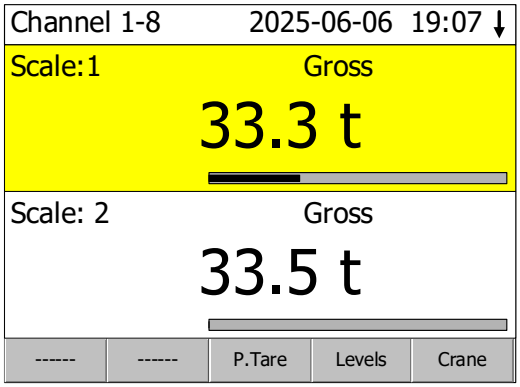
means the scale shown on a single scale weight display or the scale marked with a yellow background on a two or four scale operating display.

Note that information displayed varies between the weight display modes and that the information displayed may be different depending on actual settings.

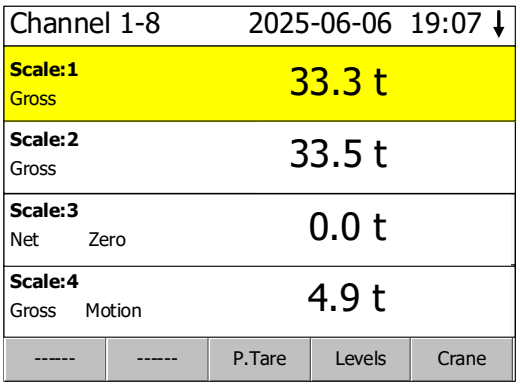
If a name has been entered in parameter ‘X:Scale Name’ it will be shown instead of the text ‘Scale: X’ in the weight display. Note that the character size may vary depending on the length of the scale name entered. A scale name may be truncated if it doesn’t fit in the available space.



Single scale weight display mode



Two scales weight display mode



Four scales weight display mode

In the single scale weight display level output status indicators for the first four configured level functions for the scale is displayed. They show the level number and the level output status of a possible configured digital output. A green square indicates an active digital output.

It is also possible to show selected information below the level output indicators. See set-up parameter ‘Info Line X Mode’.

Using the right/left arrow keys will scroll through the three different weight display modes unless limitations are set with parameter ‘Display mode’.
To scroll between the available scales the up/down arrows on the instrument front panel are used.

Function keys:

P. Tare (F3): Shows and setting the (manual) preset tare for the selected scale.

Levels (F4): Shows the level values of the level supervisors for selected scale.

Crane (F5): Switch to the ‘Main Hoist’ weight display.

Security locks

In the G6 instrument two security locks are included to prevent unauthorized access to the instrument via the panel keys. The locks can be activated by parameters in menu ‘Main menu/Parameter set-up/General’.

The following requires a login password if the corresponding lock is on.

Changing instrument clock:	Operator lock
Changing Preset Tare:	Operator lock
Service Information, Save and Reset:	Operator lock
Clear Service Information:	Set-up lock (Operator lock)
Changing set-up parameters:	Set-up lock (Operator lock)
Entering/using Backup Menu:	Set-up lock (Operator lock)
Entering/using Restore Menu:	Set-up lock (Operator lock)
Entering/using Default Menu:	Set-up lock (Operator lock)
Entering/using Program Upgrade Menu:	Set-up lock (Operator lock)
Entering/using File handling Menu:	Set-up lock (Operator lock)
Changing Network Config:	Set-up lock (Operator lock)
Changing output status in diagnostics:	Set-up lock (Operator lock)

Entering set-up code gives access also to operator locked functions. If only operator lock is on, the operator code is required where set-up lock is specified above.

Unlocking of ‘P.Tare’ editing from the main picture, is valid until you return to the main picture.

Unlocking of any function under the Main Menu is valid until you leave the Main Menu.

There is also a protection from local and remote users both changing parameters. See chapter ‘Remote Access’ section ‘Remote / Local Access’ for more information.

Codes for the security locks

When a security lock is activated the operator must enter a four digit code to get access to the protected area. By default the valid code for both locks is ‘1 9 3 7’ , but the locks are not activated.
In menu ‘Parameter Set-up’, sub menu ‘General’, parameters are available to activate the locks and to change the default code to any four-digit code.

The code for the Operator lock can only open the Operator lock.

The code for the Set-up lock will open both Set-up lock and Operator lock.

Taring

Taring means storing of a tare value and that the G6 instrument switches over to display of net weight. The net weight being the gross weight minus the tare value. In the instrument two tare values can be stored, Auto tare and Preset tare.

'Auto' tare value is the actual gross weight, stored as tare value when the TARE key is pressed.

'Preset' tare is a tare value that can be entered only if the instrument is set to use Preset tare. The value of Preset tares, for any of the 'configured' scales, can be entered in sub menu 'Preset tare' under the instrument Main menu. Preset tare for the selected (shown) scale can be set in sub menu 'Preset tare' reached with button 'P.Tare' directly on the operations menu for Channel 1-8. 'Preset tare' can also be entered from a master unit by communication.

Calibration parameter 'Tare Corr.Mode' defines the use of 'Auto', 'Preset', or the sum 'Auto+Preset' by taring.

- Auto: Only 'Auto tare' is used. 'Preset tare' value cannot be entered or edited.
- Preset: Only 'Preset tare' is used.
- Auto+Preset: The sum of the 'Auto tare' and 'Preset tare' values is used. When the TARE key is pressed, the actual gross weight is stored as Auto tare value and the instrument will display net weight = '– Preset tare'.

With default setting, taring can be performed, even if the weight is not stable. But if parameter 'Motion check' in 'Parameter Set-up / Calibration' for the scale is set to 'On', taring will be allowed only when the weight value is stable.

Gross/Net operation

At normal operation the G6 instrument presents a numerical weight value at the display, either gross weight or net weight. When net weight is displayed the text ‘Net’ is shown on screen.

Toggling between display of gross weight and net weight can be performed by pressing the GROSS/NET key. Note that toggling is done only for the selected scale in case of more than one scale displayed on screen the selected one is indicated with a yellow background on the display.
Gross weight is continuously shown in form of a graphic bar on one and two scale displays. Maximum length of the bar corresponds to the set Capacity of the scale.
Net weight is the difference between gross weight and a tare value. For calculation of net weight, the instrument can use either ‘Preset’ tare, ‘Auto’ tare, or the sum of them.

Zero setting

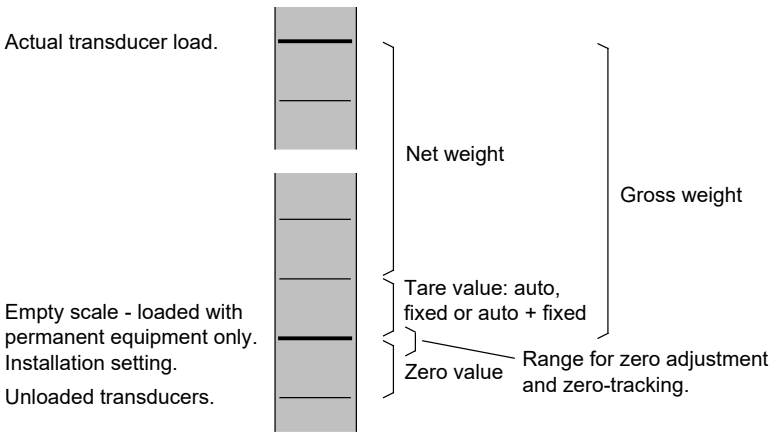
A basic zero setting of the gross weight is performed as part of the calibration for the scale. If changes to the weighing equipment are made later a renewed calibration, or at least the zero setting of a calibration, should be performed.

Minor correction of the zero value may be needed and can rapidly be performed:
When a gross weight close to zero is displayed, pressing the ZERO key will make the gross weight zero.
Pressing the ZERO key will also set the value of ‘Auto tare’ to zero.

Zero setting with the ZERO key is permitted only if:

- The weight is stable (the text ‘Motion’ not shown), and
- The accumulated zero correction since last calibration is between -10 % and +10 % of the ‘Capacity’, over and above the zero offset obtained when the instrument was calibrated last time.

The text ‘Zero’ will be shown on the display when the displayed weight is a ’good zero’, meaning that the weight deviates from zero with less than one quarter of the set ‘Resolution’.



Correlation between gross weight, net weight, and tare value for a scale

Zero-tracking/ Automatic zero setting

In the instrument the functions zero-tracking and automatic zero setting can be enabled. Zero-tracking gives a continuous zero setting by slow changes in zero weight. The automatic zero setting performs zeroing of small negative gross weights. For both functions the following requirement should be met:

- The zero point stays within the permissible range, deviation from calibrated zero less than -10 % to +10 % of Capacity.

Zero-tracking

Zero-tracking is active when, in addition to the common requirements above, the following requirements are met:

- Calibration parameter ‘Zero-tracking’ is set to On or On+AutoZero.
- The gross weight is ‘good zero’ (deviation from zero less than one quarter of Resolution).
- The weight is stable (the text Motion not shown).
- The rate of weight change is lower than the ‘zero-track.rate’, see below.

The set-up parameter ‘Zero-track.rate’ determines the maximum permissible weight change per minute for the zero-tracking. If parameter ‘Resolution’ is changed, the value of ‘Zero-track rate’ will change correspondingly.

Automatic zero setting

Automatic zero setting is active when, in addition to the common requirements above, the following requirements are met:

- Calibration parameter ‘Zero-tracking’ is set to On+AutoZero.
- The gross weight is negative.
- The actual scale is in gross mode.
- The weight has been stable (the text Motion not shown) for 5 seconds.

Motion

The text ‘Motion’ may be shown in the display. Motion condition exists if the weight change during a certain measurement period is greater than the window ‘Motion Detect Window’. The measuring period is one conversion time (‘Update Rate’) or at least 200 ms.
After the weight becomes stable, the text ‘Motion’ will still be shown for a short time, specified in parameter ‘No-motion delay’, instrument will regard the weight as unstable until the text ‘Motion’ has disappeared.

When the text ‘Motion’ is shown, the following activities are affected:

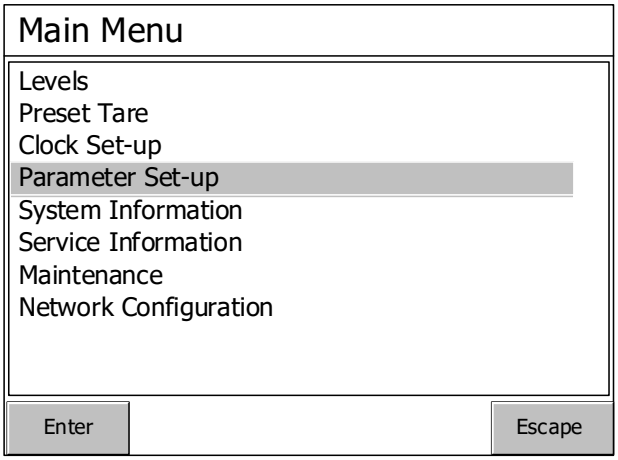
- Zero setting cannot be performed.
- Zero-tracking cannot be performed.
- Taring cannot be obtained (applies if ‘Motion check’ is ‘On’).

Main menu

To reach the main menu, press the 'Info' button on the instrument front panel. Note that the 'Info' button is only functional from the weight display.

Navigating in a menu is done with arrow keys or by tapping on the display on specific choices e.g. 'Parameter set-up'.

To open a sub menu, e.g. Parameter set-up, select the sub menu with arrow keys followed by pressing the 'Enter key', or by tapping on the name.



Main menu

The instrument Main menu can be opened without interrupting the weighing operation.

In the Main menu it is possible to select between the following sub menus:
Levels: Viewing of level value for each configured Level Supervision function. Note that configuration of Level Supervision functionality is done in the 'Parameter Set-up' menu.
Preset Tare: Viewing and editing of preset tares values for scales with tare correction mode set to Preset or Auto + Preset. Set-up of Scale 'Tare Corr. Mode' parameter is done in the 'Parameter Set-up' menu.

Clock Set-up: Used to set the instrument clock and date. Time and Date formats are set-up with parameters trough ‘Parameter set-up’ menu.

Parameter Set-up: Access to the G6 instrument parameter set-up menu system. See chapter ‘3. Set-up’ for more details on setup.

System Information: Displaying system information for hardware and software in the instrument. Program versions, database version, serial numbers and software versions for all electronic modules can be read here. Info about the Ethernet connection is also available.
Program version description according to X.Y.Z.
X: Program number (2: Standard weighing, 3: Standard force, 4: Crane weighing etc. 100 and above are special applications)
Y: Program major version
Z: Program minor version

Service Information: The menu ‘Service Information’ gives access to Service Information of the system in multiple views. See chapter ‘Operation/Service Information’ for a detailed description.

Maintenance: Includes a number of functions for maintenance purposes. The available functions are Diagnostics, File Handling, Create Backup, Restore Backup, Set Default Values, Clear Service Information, Program Upgrade and Instrument Restart.
See chapter ‘Maintenance’ for a detailed description of the functions.

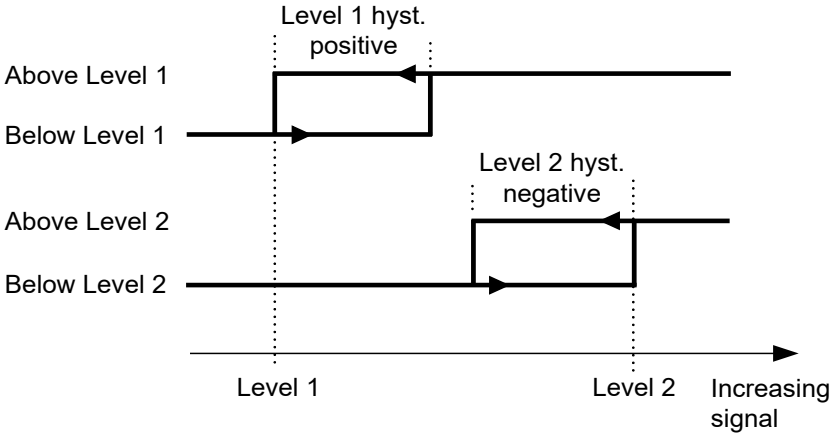
Network Configuration: The Network Configuration menu consists of the IP Configuration and the Server Configuration menus. The IP Configuration menu is used to set, manual/auto IP address assignment, IP address etc. The Server Configuration menu is used to enable/disable the FTP Server and the WEB Server of the instrument. In this menu is also the password for the servers set.
Note that Ethernet configuration is not done with set-up parameters and is for that reason not saved with the instrument back-up function.

To return to the weight display press the ‘Esc’ key on the front panel or the ‘Esc’ button on screen.

Level supervision

The G6 instrument contains 32 supervision Levels that can be used to supervise defined signals in the instrument. Digital outputs can be connected as outputs for the Levels. For each Level, supervised scale, level value, hysteresis etc. is controlled by set-up parameters.

Functions for Level supervision is defined in menu ‘Parameter Set-up’ by parameters in the sub menus ‘Level Supervision’ and ‘Outputs’. See chapter ‘Parameter Set-up’.



Influence on the level supervision from positive hysteresis, for Level 1, and negative hysteresis, for Level 2 (Delay Up and Delay Down for the levels is set to zero (0))

‘Level X Source’
Defines the signal to be supervised by the level.

‘Level X Scale’
Defines the scale number (1 – 8) or a crane weight that the level shall supervise.

‘Level X Level Value’
The weight level value that shall be supervised.

‘Level X Output’
Defines how a digital output, if connected to the Level, should operate.
The parameter can be set to make an output active when the signal is above the Level Value, or when it is below the Level Value.

‘Level X Hystereses’
Defines the width of a hystereses range for the Level. See figure above.
It is recommended to set Delay Up and Delay Down time to zero (0) if Hystereses is used (≠0).

‘Level X Display Indicator’
Defines if the indicator for level output status shall be displayed in certain Crane view windows.

‘Level X Delay Up’
Delay time for increasing signal. See description below.
It is recommended to set Hystereses to zero (0) if the Delay Up time is used (≠0).

‘Level X Delay Down’
Delay time for decreasing signal. See description below.
It is recommended to set Hystereses to zero (0) if the Delay Down time is used (≠0).

‘Level X Max Value’
Defines the Max measured value for the ‘Level X Delay Up’ parameter to be enabled. See description below.
Note: This parameter is not used if parameter ‘Level 1 Delay Up’ is set to zero (0) or if ‘Level 1 Max Value’ is less than parameter 'Lev. X Value'.

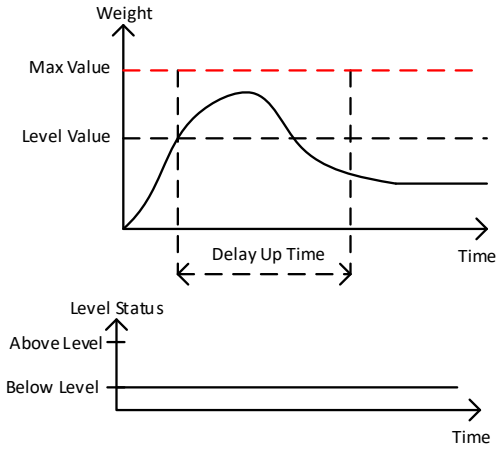
‘Level X To Log File’
Defines if changes of level status should be written to log file.

Using Delay Up and Delay Down

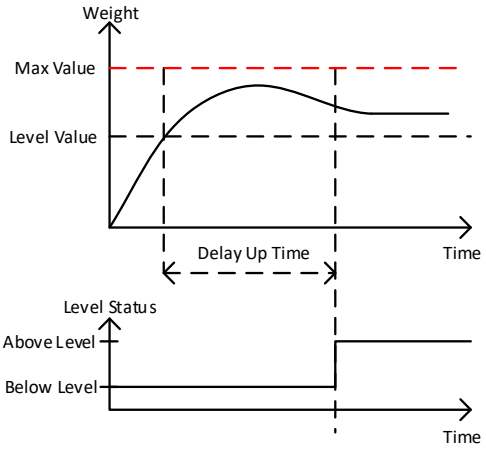
It is possible to configure Up and Down delay time between 0 and 10.0 second. This is useful when the application has temporary dynamic loads.

It is also possible to set a Max Value, where the Delay up time is disabled and the level status is acted on immediately.

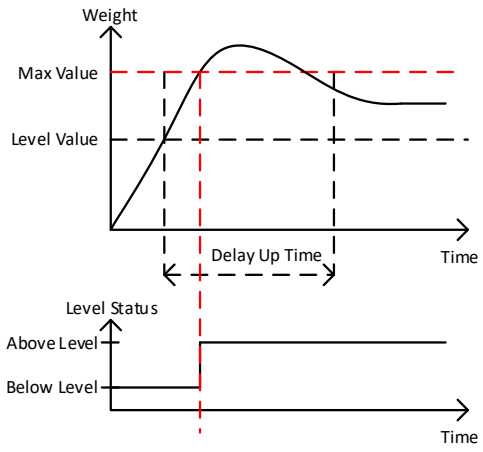
When Up and Down delay time are used, it is recommended to set Hystereses to zero.



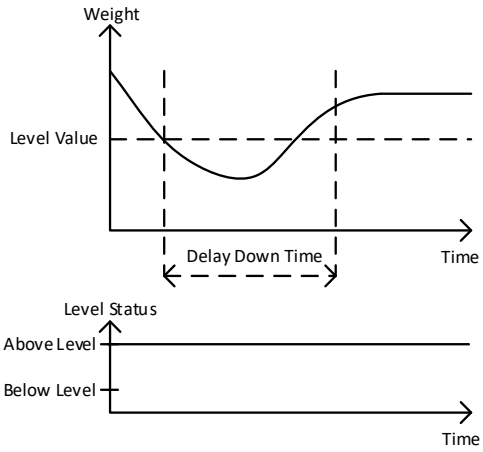
Level status will not change-due to delay.



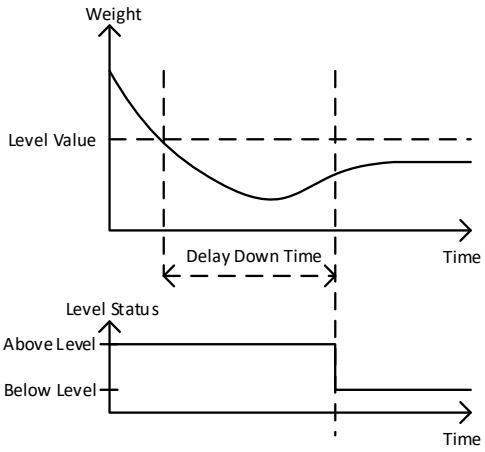
Level status will change.



Level status will change due to Max Value.



Level status will not change-due to delay.



Level status will change.

Level status

Actual status of the Levels (weight above or below Level) can be read via communication. The level status does not show the status of any digital outputs, connected to the Levels.

Use of inputs and outputs

Internal I/O's are included on some of the I/O-modules that the G6 instrument can be equipped with. Different module types have different number of inputs and outputs. A DIO8 module have 8 inputs and 8 outputs while the weight conversion modules HSWF2, WFIN and WFIN2 each have 4 inputs and 2 outputs.
All input and output functions are configured by set-up parameters in the instrument.

Digital inputs

The digital inputs can be used for remote operation of the instrument. Input 11-14 (slot 1) and input 21-23 (slot 2) are dedicated to certain functionality.

Digital outputs

The digital outputs can be used for control of external equipment and for indication of instrument status.

Analog outputs

To produce analog outputs from the G6 instrument, a one channel AOUT1 or a four channel AOUT4 module is used.

The analog output signal will represent a selected signal in the instrument in form of an analog current or voltage signal.
All analog output functions are defined by parameters in sub menu 'Analog outputs', see chapter 'Parameter Set-up'.

Filter function

In the instrument the weight value is produced in two forms, unfiltered and filtered. The 'unfiltered' weight is actually also filtered but with a faster filter than the 'filtered' weight value but for simplicity it is called unfiltered.
The unfiltered weight value represents the transducer load with the smallest delay. This means that the instrument will respond rapidly to changing load, but the weight display will be unstable if the load is fluctuating. The filtered weight value will give a smoother weight display, but the response on changing load will be delayed. Weight values are produced within the instrument at the selected 'Update Rate'.

Switching between filtered and unfiltered weight

The instrument automatically switch between unfiltered and filtered weight in order to make the weight display fast when the load on the scale changes, but stable for constant load. The parameter 'Filter window' controls the switching between filtered and unfiltered weight.

The scale will switch to filtered weight when the difference between the filtered weight and unfiltered weight values is smaller than 'Filter window'.

The scale will switch to unfiltered weight if the difference between the filtered weight and unfiltered weight values is larger than 4 times 'Filter window'.

Filter characteristics

The parameter 'HSWF Update Rate' / 'WFIN Update Rate' selects the update rate and filter characteristics of the weight conversion. The two different types of weight conversion modules have different ranges of settings.

The filter of the G6 Multi Channel Weighing Instrument will very effectively suppress any disturbances at frequencies above the –90 dB frequency.

WFIN / WFIN2 module filter bandwidth

Update rate	- 3 dB frequency		- 90 dB frequency	
	Filtered	Unfiltered	Filtered	Unfiltered
75 Hz	3.9 Hz	7.6 Hz	19 Hz	37 Hz
37 Hz	2.0 Hz	3.9 Hz	9 Hz	19 Hz
19 Hz	1.0 Hz	2.0 Hz	4.5 Hz	9 Hz
9.3 Hz	0.5 Hz	1.0 Hz	2.3 Hz	4.6 Hz
4.6 Hz	0.25 Hz	0.5 Hz	1.2 Hz	2.3 Hz
2.3 Hz	0.12 Hz	0.25 Hz	0.6 Hz	1.2 Hz

HSWF2 module filter bandwidth

Update rate	- 3 dB frequency		- 90 dB frequency	
	Filtered	Unfiltered	Filtered	Unfiltered
100 Hz	5.2 Hz	10 Hz	25 Hz	50 Hz
50 Hz	2.6 Hz	5.2 Hz	12 Hz	25 Hz
25 Hz	1.3 Hz	2.6 Hz	6 Hz	12 Hz
12.5 Hz	0.75 Hz	1.3 Hz	3 Hz	6 Hz

WFIN / WFIN2 Filter rise time

Update rate	Rise time	
	Filtered	Unfiltered
75 Hz	0.30 s	0.16 s
37 Hz	0.60 s	0.32 s
19 Hz	1.2 s	0.64 s
9.3 Hz	2.4 s	1.3 s
4.6 Hz	4.7 s	2.6 s
2.3 Hz	9.4 s	5.1 s

HSWF2 Filter rise time

Update rate	Rise time	
	Filtered	Unfiltered
100 Hz	0.22 s	0.12 s
50 Hz	0.44 s	0.24 s
25 Hz	0.88 s	0.48 s
12.5 Hz	1.8 s	0.96 s

Rise time is defined as the time from an ideal step input to output reaches 99 % of the input step. Note that in reality no input changes will be an ideal step. Input signals are affected by mechanical time constants and how the weight is applied to the scale.
The instrument must be restarted when update rate has been changed.

Mean Value Calculations

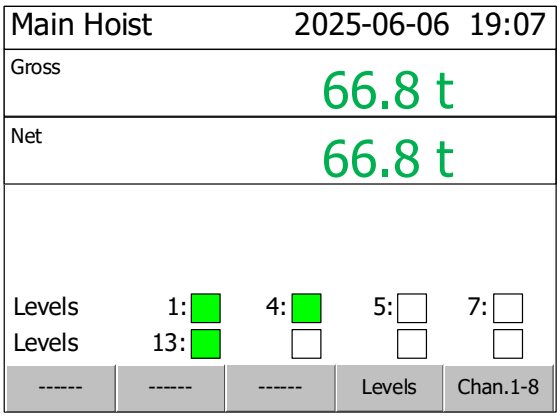
The mean value function can be used to get a stable value (on all channels) even if load is swinging. This is useful when weighing in crane and requires that the change in load (due to swinging) is less than a configurable deviation from mean value.

Mean value calculation is started by pressing the ‘Start’-button on the instrument. It is stopped by pressing the ‘Stop’-button. It is also possible to start/stop by setting up a digital input or via command (242 for start and 243 for stop). When the mean value calculations are active, the weight values in the display are displayed with green color.

The mean values are calculated as a moving average filter of all weight values from the time that the mean value calculation starts, until it stops. The moving average filter length (window) is set by the parameter ‘Moving Average Window’, available in the ‘General’ menu.
The calculations will restart if the raw weight value deviates more than 10 % from the mean value (default). The weight deviation can be change between 0 – 100 % with the parameter ‘Mean Value Limits’, found in the ‘General’ menu. Mean value calculations will also restart if a tare, zero or any changes to the mean value set-up parameters is performed.
Motion indication is still based on the original weight values and not the average.

A bit in the ‘Scale X: Status’ register indicates whether mean value calculations are active or not.

The function does not affect the level supervision functionality or the life cycle measurement functionality, these are still based on the raw weight values.



Main Hoist weight display when ‘Mean Value Calculations’ is active

Operation with rope weight compensation active

The Rope Counter (rope length) is zeroed when the crane is positioned in the ‘rope calibration position’ (no rope rolled-out). The G6 hereafter counts the pulses and compensates the Main Hoist weight value with the calculated weight of the rolled-out rope (wire).

When normal operation and rope weight compensation is active the ‘Rope weight’ and the ‘Rope weight counter’ and a ‘Rope weight active’ message is displayed in all ‘Crane Weight’ windows.

When the G6 is powered up after a power fail G6 remembers the last position of the rolled-out rope and the compensation may be correct. The position of the rolled-out rope may have been changed during the power loss and therefore the message ‘Rope counter not zeroed’ will be displayed in all ‘Crane weight’ windows and indicated in the Instrument Status register until the rope comes to the ‘rope calibration position’, where the rope counter is zeroed.

Rope Weight and Rope Counter are also available via Modbus RTU, Modbus TCP, EtherNet/IP and Fieldbus.

Service Information

The Service Information includes functionality to gather operational data of the system.

The service information can be used to monitoring the usage of the crane (Full Load Hour calculation, operating time, overload,….).

It includes supervision of the following parameters:

- Full Load Hours for Main Hoist
- Full Load Hours for individual scales
- Max Load on the Main Hoist
- Max Load on Side A of the Main Hoist
- Max Load on Side B of the Main Hoist
- Max Load (difference) between Side A and Side B of the Main Hoist
- Max. Load on each separate channel
- Max. Load Sum all channels (sum Main Hoist and all other configured channels).
- Operating time for general purposes (three timers).
- Operating time activated for each separate channel.
- Number of activations (overload) for each of the 32 level functions.
- Total time activated (overloaded) for each of the 32 level functions.

The menu ‘Service Information’ gives access to all Service Information data of the system in multiple views. Navigation between the views is done with the left and right arrow keys on the instrument.

The information in each Service Information view can be reset. When data is reset, the parameter ‘Last reset’ will be updated with the current date and time. It is also possible to save and then reset **all** Service Information with a digital input or by sending a command via any communication interface.
Another way to clear **all** Service Information, including the parameter ‘Last reset’, is to use ‘Clear Service Information’ in menu ‘Maintenance’.

Note that if the instrument is restarted and a timer is controlled by a level or digital input, it will continue to accumulate provided that the conditions are the same as prior to the restart. If the timer has been activated by a command, it needs to be resent after restart.

Save Service Information

When pressing the ‘Save’-button in any service information view, **all** Service Information will be saved to a new text file in the ’ServiceInfo’ area of the file system. This file is named ‘InstrumentName_YYYYMMDD_hhmmss.txt’ where ‘InstrumentName’ is the Instrument Name entered in menu ‘Parameter Set-up/General’, ‘YYYYMMDD’ is the current date and ‘hhmmss’ is the current time.

The service information file is a plain text file with the same information as shown in all Service Information views described below.

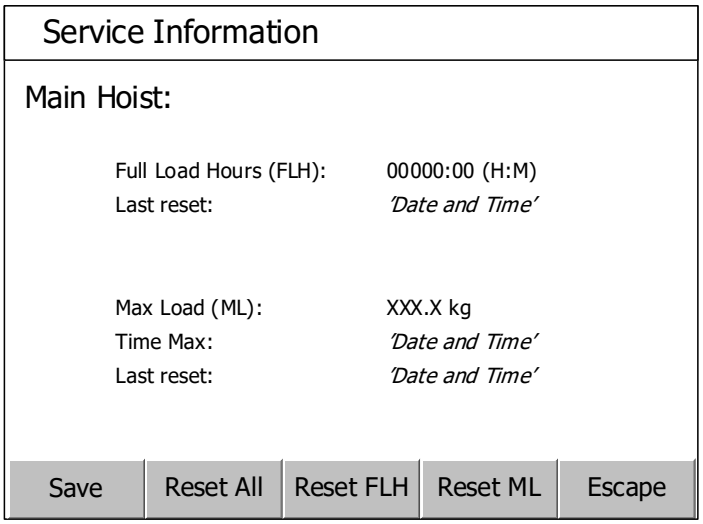
It is also possible to save the Service Information by activating a configured digital input or by sending a command via any communication interface.

'Service Information' Main Hoist window

Entering the 'Service information' menu will open the first window, where data for the Main Hoist is shown.

Full load hours show a calculated time, reflecting how long and to what extent the Main Hoist has been under load. See chapter 'Full Load Hours' below for a description on how this value is calculated.

It is possible to reset 'Full Load Hours' (Reset FLH), 'Max Load' (Reset ML) or both values (Reset All).



To enable accumulation of time to 'Full load hours' for the 'Main Hoist', there are three alternatives:

- Controlled by digital input.
  - Accumulation will only occur while digital input 14 is 'active' (high) and current weight is above zero (0). This requires that parameter 'Inputs/Inputs Slot 1/Input 14 Use' is set to 'FLH Calc Ctrl' and the parameter 'Calibration/Main hoist/Full Load Hour Calc Level' is set to '0'.
- Accumulation above a level.
  - Accumulation will only occur while the weight is higher than 'Full Load Hour Calc Level' parameter in menu 'Calibration/Main hoist'. This requires that parameter 'Inputs/Inputs Slot 1/Input 14 Use' is set to 'Not in use'.
- Accumulation above a level and active digital input.
  - Accumulation will only occur while the weight is higher than 'Full Load Hour Calc Level' parameter in menu 'Calibration/Main hoist' and the digital input 14 is 'active' (high). This requires that parameter 'Inputs/Inputs Slot 1/Input 14 Use' is set to 'FLH Calc Ctrl'.

Sending a command via any communication interface can be used as an alternative to digital input 14. Command 216 is used for Start and command 217 for Stop.

This requires that parameter 'Inputs/Inputs Slot 1/Input 14 Use' is set to 'FLH Calc Ctrl' and that input 14 is deactivated (low), otherwise it will override a stop command.

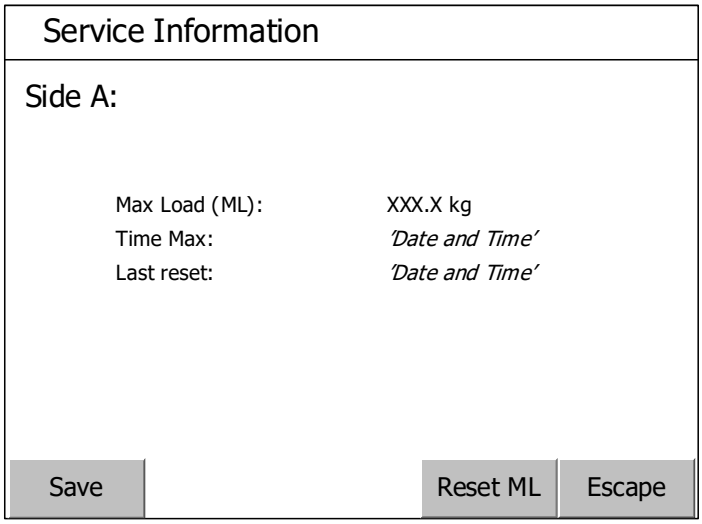
Rope compensated weight will be used for Main Hoist if Rope Weight Compensation is 'On'.

'Service Information' Side window and Sum All Channels

The 'Side A', 'Side B', 'Side A – Side B' and 'Sum all Channels' shows the max load for each load including Date and Time when the max load occurred.

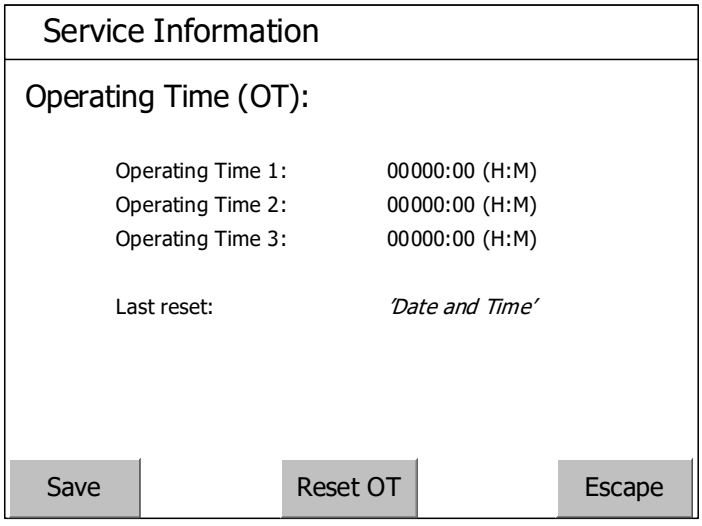
NOTE! Max Load for 'Side A – Side B' is the maximal difference, positive or negative.

It is possible to Reset the 'Max Load' for each view with the 'Reset ML' button.



'Service Information' Operating Time

Operating time shows the value of the three general purposes timers. The three timers can be reset with the 'Reset OT' button.



Accumulation of operating time for the three general timers 'Operating Time 1', 'Operating Time 2' and 'Operating Time 3' can be enabled and disabled using predefined digital inputs or by sending a command via any communication interface. These general operating timers allows to accumulate time for general purposes, such as measuring the time the hoisting motor or any of the other driving motors on a crane is active.

Digital input 11 is dedicated to start and stop accumulation of 'Operating time 1'. Digital input 12 is dedicated for 'Operating time 2' and digital input 13 for 'Operating time 3'.

The timer is counting if the corresponding input is active (high).

As an alternative, command 210-215 via any communication interface can be used to Start/Stop these timers. Note that an active digital input (high) will override a stop command.

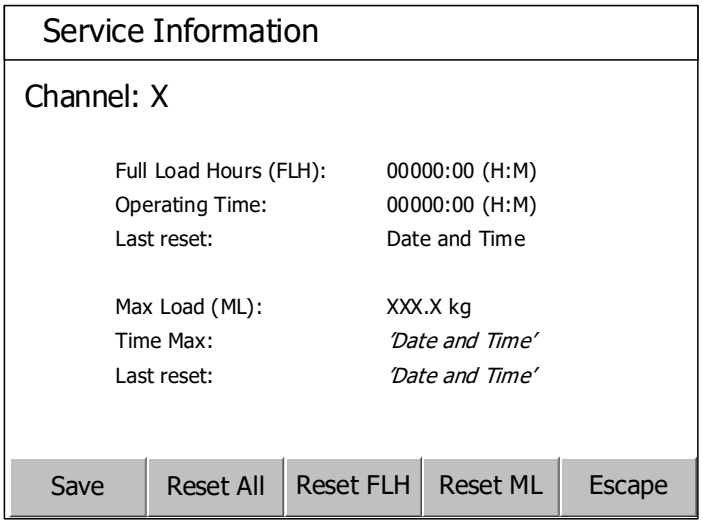
'Service Information' Channel X

Each channel has its own service information window.

For each channel, 'Full Load Hours', 'Operation Time', 'Max Load' and 'Time Max' is shown.

Full load hours show a calculated time, reflecting how long and to what extent the Channel (scale) has been under load. See chapter 'Full Load Hours' below for a description on how this value is calculated.

'Reset FLH' will reset both 'Full Load Hours' and 'Operating Time'. 'Reset ML' will reset 'Max Load' and 'Time Max'. 'Reset all' will reset all data in this view.



To enable accumulation of 'Operating Time' for a channel (scale), the following conditions needs to be fulfilled:

- A digital input can be configured to activate accumulation of 'Operating Time' for the channel (scale). This is done by setting set-up parameter 'Inputs/Inputs Slot X/Input XX Use' to 'Full Load Hours' and parameter 'Input XX Scale' to the wanted scale (channel).
- Operating Time is accumulated as the configured input is active (high).

As an alternative to digital input, command 224-239 via any communication interface can be used to Start and Stop the accumulation of 'Operating Time'.

Note that an active digital input (high) will override a Stop command via communication and if more than one digital input is setup to enable the accumulation of 'Operating Time' for a channel (scale), accumulation will be active if one of them are active (high).

To enable accumulation of time to 'Full Load Hours' for a channel (scale), the following conditions needs to be fulfilled:

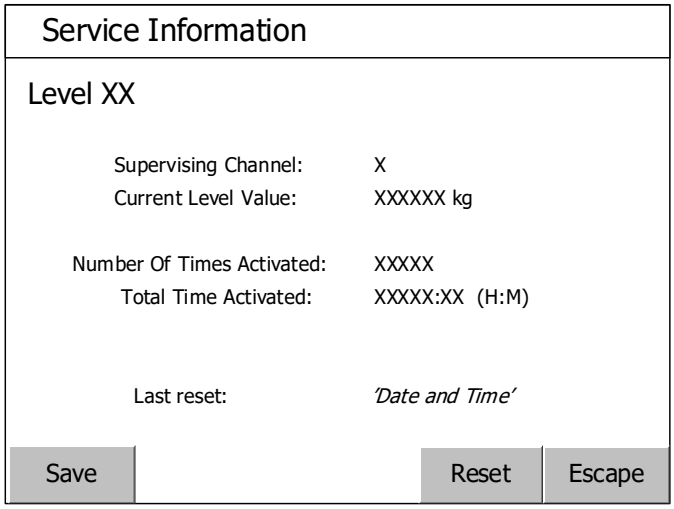
- The parameter 'Calibration/Scale X/X: Full Load Hours' must be set to 'On'.
- Full Load Hours is accumulated as current gross weight for the channel (scale) is above Zero (0) and the condition for accumulation of 'Operating Time' is fulfilled.

'Service Information' Level XX

Each of the 32 available levels has its own service information view. This view shows the supervising channel and current level value.

This view also shows the number of times and total time that the level has been activated.
Note that if the supervising channel or Level Value is changed, no automatic reset is performed. This must be done manually to avoid any reset by mistake.

'Number Of Times Activated' and 'Total Time Activated' for shown level can be reset with the 'Reset' button.



Full load Hours

Full load Hours is available for the Main Hoist and the individual scales. The purpose of full load hours is to accumulate a time which is equivalent of hours with full load (as long as there are no errors present for the included scales). For instance, if the crane is setup with a maximum capacity of 10t and the load is 10t for 1 hours, it will result in an additional 1 hour to the full load hours. However, if the load is 5t for 1 hours, it will result in less than an hour (in this case 7.5 min). The formula for calculating the 'Full load hours' is as follows:

$$S = \sum k_m * t$$

Where:

S = 'Full load hours'

$$k_m = \left(\frac{current\ weight}{Capacity} \right)^3$$

t = actual conversion time

current weight = Actual gross weight value

Capacity = Capacity for the actual Scale (parameter 'Calibration/Scale x/x:Capacity' or for the Main Hoist ('Calibration/Main hoist/Capacity')

Note that **no** automatic reset of 'Full Load Hours' for the Main Hoist or a Channel (Scale) is performed if the Capacity for the Main Hoist or a Channel is changed. This must be done manually to avoid any reset by mistake.

Event logging to file

With this function activated, the instrument logs changes in weight errors code and changes in level status to file with time and date. The log of weight errors can be used to see if you have problems with any of the configured channels. Log of levels can be used to see if the crane has been overloaded.

To activate logging of weight errors for all scales the set-up parameter ‘General/Weight Errors to Log File’ must be set to ‘On’. In this case every change in the ‘Weight Error will be logged. In addition to logging of weight errors there are an instrument power up message written to the file and a message if a Replacement Scale setting is changed.

To activate logging of changes in level status the set-up parameter ‘Level Supervision/Level X/Level X To Log File’ must be set to ‘On’ for each level. In this case every change in level status, ‘Active’ or ‘NotActive’ will be logged for selected levels.

In case of a lots of events in a short time there may be an internal buffer overrun and some events may be lost. In this case a buffer overrun message will be written to the log file.

The log file is named ‘LogFile.txt. and is saved in folder ‘LogFiles’ in the instrument. The file can be accessed with 'File Handling' in the 'Maintenance’ menu or with an FTP client, see ‘Ftp server and file handling’. The file can be copied to a USB memory or a computer for storage and analysis etc.

If the file size of the log file gets larger than about 2 MB (approximately 30 000 events) the file ‘LogFile.txt’ is copied to ‘LogFileBackUp.txt’. After that all data in ‘LogFile.txt’ will be deleted and new log data will be added to ‘LogFile.txt’ when new log events occur. If the file’LogFileBackUp.txt’ exists, the file will be overwritten.

The data in the log file is tab separated that makes it easy to copy and paste log data with columns in Microsoft Excel.

If free memory (disk space) in the instrument gets low, log data will not be added to the log file. The instrument will also show warning information for low free memory (disk) space in the instrument status register and in all Crane Weight views. Log data will still be written to the queue when events occur until the queue is full. If the memory (disk) space is freed by deleting files before the queue is full no information are lost.

Log file description

	A	B	C	D	E
1	2025-09-11	11:30:38	InstrumentPoweredUp		
2	2025-09-11	11:31:10	Scale:2	ErrCode:11	
3	2025-09-11	11:31:28	Scale:2	ErrCode:0	
4	2025-09-11	11:31:48	Scale:1	ErrCode:11	
5	2025-09-11	11:31:54	Scale:1	ErrCode:0	
6	2025-09-11	11:32:13	Scale:1	LevelStatus:NotActive	LevelNo:1
7	2025-09-11	11:32:30	Scale:1	LevelStatus:Active	LevelNo:1
8	2025-09-11	11:32:44	Scale:1	LevelStatus:NotActive	LevelNo:1
9	2025-09-11	11:32:52	Scale:1	LevelStatus:Active	LevelNo:1
10	2025-09-11	11:33:06	Scale:1	LevelStatus:NotActive	LevelNo:1
11	2025-09-11	11:33:28	Scale:1	Replacement:2	
12	2025-09-11	11:33:55	Scale:1	Replacement:0	
13	2025-09-11	11:34:14	Scale:2	ErrCode:11	
14	2025-09-11	11:34:21	Scale:2	ErrCode:0	

Example of log file opened in MS Excel

This description refers to the example above. Note that the column denomination is only in Excel. There are no column names in the file itself.

Column A:

- Date of the event.

Column B:

- Time of the event.

Column C:

- Current scale number of the events described in column D.
- 'InstrumentPoweredUp' is written in this column on a separate line at the start of the instrument if logging of weight errors is On.
- ‘BufferOverRun' is written on a separate line if the internal buffer in the instrument is full.

Column D:

- Error code for the scale (Note that 'ErrCode 0' is written when the error disappears).
- Replacement channel ('Replacement: 0' is written when the replacement channel is reset).
- Status of the level in column E.

Column E:

- Level number for the level status in column D. This column exists only if logging of any level is activated.

Replacement channel function

If a channel (scale) used in the Main Hoist detects an error, the weight values (gross and net) in the ‘Main Hoist’ window and in other Crane Weight windows will be replaced with an error text (‘Error 15’, ‘One or more channels reports an error’). In this case the erroneous channel can be replaced with the weight from another channel, by setting the calibration set-up parameter ‘Replacement Channel’ for the faulty channel (scale) to another valid channel. This will be indicated with the text ‘WARNING: Replacement Channel Used!’ in the display for all Crane Weights. The replacement function should only be used temporary. Bit 9 in the communication status register for ‘Crane Weights’ and for the channel (scale) that use the replacement channel, indicates if Replacement channel is used or not.

6. Communication

General

The G6 Instrument has one serial communication port, one Ethernet port and an optional fieldbus module.

The serial communication port can be used for communication with a control unit. It is also possible to connect one or more external displays to the port.

The Ethernet port can be used for communication with a control unit, for file transfer to and from an external computer, using ftp (File Transfer Protocol) and for Remote Access. These functions can be used simultaneously.

The optional fieldbus interface module is used for communication with a control unit.

Serial interface

The instrument is equipped with a RS485 serial communication port for 2-wire or 4-wire. RS485 is an interface working with differential voltages, giving a noise resistant transmission in a network with several units and long distances. The host computer (master) must have an asynchronous communication port for RS485, or use a converter for RS232 to RS485 conversion or USB to RS485.

If 2-wire transmission is used, the control unit must be capable of data flow direction control or utilize a converter for automatic data flow direction control. When 4-wire transmission is used, no data flow direction control is needed.

Modbus RTU slave

General

All the G6 units connected to the network can listen to what is transmitted in the network, but only one unit at a time may transmit. A time-sharing principle is needed to allow communication in both directions (half duplex).

All communication in the network must be initiated by the control unit (master). When the instrument is working together with a master the instrument units are all slaves, only allowed to reply to master commands. As the master has addressed a command message to a specific slave unit, it listens for the reply during a specified time, before sending next command message.

If the reply from a slave unit fails it may be due to:

- Mismatch in communication parameters. (baud rate, address, . .)
- More than one slave unit has been transmitting at the same time. This can distort the reply message and make it impossible to decode.

See chapter ‘Communication – Modbus protocol’ section for detailed information of register numbering, register content definition, commands etc.

Setup of Modbus RTU communication

- The instrument will as default be given the address 1. If more than one instrument is used in a network, each G6 instrument must be given a unique address. This can be done only if the serial port is configured as a Modbus Slave. This is done by setting parameter ‘Mode’ to ‘Modbus Slave’ in menu ‘Parameter set-up’, ‘Communication’, ‘Serial Com.’. Then the parameter ‘Modbus Address’ can be changed.
- Select correct baud rate and data format in parameter ‘Baudrate’ and ‘Data Format’.
- Select wanted type of float values in parameter ‘Floating Point Format’.
- When longer response times are needed, set ‘Min Reply Time’ to a suitable value.

Modbus TCP slave

General

The Ethernet communication port can be used to communicate with the instrument using the Modbus TCP protocol. The instrument is a Modbus TCP slave and will only respond to incoming messages from a master.

See chapter ‘Communication – Modbus protocol’ section for detailed information of register numbering, register content definition, commands etc.

Setup of Modbus TCP slave communication

- Network configuration (IP-address, netmask,….) must be done from menu ‘Network Configuration’.
- Enable the Modbus TCP Slave by setting parameter ‘Modbus TCP Slave’ to ‘On’ in menu ‘Parameter Set-up / Communication / Ethernet / Modbus TCP Slave’.
- Select wanted type of float values in parameter ‘Floating Point Format’ (also in menu ‘Modbus TCP Slave’).

EtherNet/IP

The optional EtherNet/IP interface is intended for accessing weight data, scale status, input and output status, level status etc. Commands for e.g. taring, zeroing etc. 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 the web interface for Parameter Set-up and calibration.

See the separate EtherNet/IP manual 601908 for a complete description on the EtherNet/IP interface.

Ftp server and file handling

The G6 instrument contains an ftp server that can be used to transfer files between the instrument and an external computer using an ftp client. We recommend using a dedicated FTP client application like FileZilla or similar.

To connect to the instrument the ftp client must login to the instrument with the user ID ‘G6User’ and the password ‘1937’ (default password). Note that the password for the ftp server and the web server can be set in the menu ‘Server Configuration’. In this menu there are also settings for turning on or off the ftp server and web server. By default, both ftp server and web server are turned on.

The ftp handling can be automatic, e.g. to collect log files once every 24 hours or manual.

The ftp client (on an external computer) can access the user area of the instrument flash file system. The user area consists of (by default) the ‘InstrBackup’, ‘LogFiles’, ‘Misc’, ‘Recipes’ and ‘ServiceInfo’ folders.

The ‘InstrBackup’ folder is used by default when creating backup files. The ‘LogFiles’ folder is used for storing event log files and ‘Service Info’ is used for storing service information files.

Modbus protocol

For communication with a master computer (PLC) the Modbus protocol is used in the instrument. The Modbus protocol is a standard protocol, used for master/slave communication in the industry.

Information is transmitted in blocks of data to minimize polling and response time delays. For example the error register, status register and weight register could be read with one command to the instrument.

When a command that cannot be performed is sent, the instrument responds with an exception code. For a better explanation of the error, a special command error register could be read.

Depending on the type of the communicating equipment (the master), the commands in the application program (PLC program, or pc program) may be different from type to type. However, if the master is not a Modicon PLC system, then the Modbus implementation in the master must have some cross-reference function to transfer the Modbus register and I/O bit numbering to the masters own register and I/O bit numbering. All registers and coils described in this manual use the standard Modbus (Modicon) register and I/O numbering.
See the master's own Modbus driver documentation for how the commands should be activated in the master's application program.

Most manufacturers of PLC systems and HMI and SCADA software can provide Modbus drivers. Various Modbus drivers for development of Windows programs are also available on the market.

General registers

The G6 instrument has a number of Modicon 'Holding Registers' (registers 4XXXX ...). The Modbus function 03 'Read Holding Registers' should be used to read these registers and the Modbus function 05 'Preset Single Register' or 16 'Preset Multiple Registers' should be used to write to the registers.
See section '**Data representation'** for a description of the different data formats used.

Hint: To find out which of the float formats that should be used, read the 'Instrument type' register (44000), which equals '6001' for the instrument.

Register 'Program number' shall equal '4' for crane weighing application.

Data type: Integer	**Data type: float (2 reg./value)**	**Explanation**	**R/W**
40001 (1 reg)	44000	Instrument type	R
40002 (1 reg)	44002	Program number	R
40003 (1 reg)	44004	Program major version	R
40004 (1 reg)	44006	Program minor version	R
40006 (3 reg)	44010	Serial number	R
40030 (1 reg)	44030	Command error	R
40031 (1 reg)	44032	Instrument state	R
40032 (1 reg)	44034	Instrument error	R
40033 (1 reg)	44036	Instrument status	R
40034 (1 reg)	44038	Scale 1: Error code	R
40035 (1 reg)	44040	Scale 1: Status	R
40036 (3 reg)	44042	Scale 1: Gross weight	R
40039 (3 reg)	44044	Scale 1: Net weight	R
40042 (3 reg)	44046	Not used	R
40045 (3 reg)	44048	Scale 1: Input signal (mV/V)	R
40048 (1 reg)	44050	Scale 2: Error code	R
40049 (1 reg)	44052	Scale 2: Status	R
40050 (3 reg)	44054	Scale 2: Gross weight	R
40053 (3 reg)	44056	Scale 2: Net weight	R
40056 (3 reg)	44058	Not used	R
40059 (3 reg)	44060	Scale 2: Input signal (mV/V)	R
40062 (1 reg)	44062	Scale 3: Error code	R

Data type: Integer	**Data type: float (2 reg./value)**	**Explanation**	**R/W**
40063 (1 reg)	44064	Scale 3: Status	R
40064 (3 reg)	44066	Scale 3: Gross weight	R
40067 (3 reg)	44068	Scale 3: Net weight	R
40070 (3 reg)	44070	Not used	R
40073 (3 reg)	44072	Scale 3: Input signal (mV/V)	R
40076 (1 reg)	44074	Scale 4: Error code	R
40077 (1 reg)	44076	Scale 4: Status	R
40078 (3 reg)	44078	Scale 4: Gross weight	R
40081 (3 reg)	44080	Scale 4: Net weight	R
40084 (3 reg)	44082	Not used	R
40087 (3 reg)	44084	Scale 4: Input signal (mV/V)	R
40090 (1 reg)	44086	Scale 5: Error code	R
40091 (1 reg)	44088	Scale 5: Status	R
40092 (3 reg)	44090	Scale 5: Gross weight	R
40095 (3 reg)	44092	Scale 5: Net weight	R
40098 (3 reg)	44094	Not used	R
40101 (3 reg)	44096	Scale 5: Input signal (mV/V)	R
40104 (1 reg)	44098	Scale 6: Error code	R
40105 (1 reg)	44100	Scale 6: Status	R
40106 (3 reg)	44102	Scale 6: Gross weight	R
40109 (3 reg)	44104	Scale 6: Net weight	R
40112 (3 reg)	44106	Not used	R
40115 (3 reg)	44108	Scale 6: Input signal (mV/V)	R
40118 (1 reg)	44110	Scale 7: Error code	R
40119 (1 reg)	44112	Scale 7: Status	R
40120 (3 reg)	44114	Scale 7: Gross weight	R
40123 (3 reg)	44116	Scale 7: Net weight	R
40126 (3 reg)	44118	Not used	R
40129 (3 reg)	44120	Scale 7: Input signal (mV/V)	R

Data type: Integer	**Data type: float (2 reg./value)**	**Explanation**	**R/W**
40132 (1 reg)	44122	Scale 8: Error code	R
40133 (1 reg)	44124	Scale 8: Status	R
40134 (3 reg)	44126	Scale 8: Gross weight	R
40137 (3 reg)	44128	Scale 8: Net weight	R
40140 (3 reg)	44130	Not used	R
40143 (3 reg)	44132	Scale 8: Input signal (mV/V)	R
40146 (1 reg)	44134	Selected channel: Error code[1)]	R
40147 (1 reg)	44136	Selected channel: Status[1)]	R
40148 (3 reg)	44138	Selected channel: Gross weight[1)]	R
40151 (3 reg)	44140	Selected channel: Net weight[1)]	R
40154 (3 reg)	44142	Selected channel: Not used[1)]	R
40157 (3 reg)	44144	Selected channel: Input signal (mV/V) [1)]	R
40160 (1 reg)	44146	Selected channel: Scale number (1-13)[1)]	R
40170 (3 reg)	44150	Analog output value 1	R
40173 (3 reg)	44152	Analog output value 2	R
40176 (3 reg)	44154	Analog output value 3	R
40179 (3 reg)	44156	Analog output value 4	R
40182 (1 reg)	44158	Status of inputs 11 - 18, 21 - 28	R
40183 (1 reg)	44160	Status of inputs 31 - 38, 41 - 48	R
40184 (1 reg)	44162	Status of inputs 51 - 58, 61 - 68	R
40185 (1 reg)	44164	Status of outputs 11 - 18, 21 - 28	R
40186 (1 reg)	44166	Status of outputs 31 - 38, 41 - 48	R
40187 (1 reg)	44168	Status of outputs 51 - 58, 61 - 68	R
40188 (1 reg)	44170	Level status 1 – 16	R
40189 (1 reg)	44172	Level status 17 – 32	R
40230 (1 reg)	44200	Clock: Year	R
40231 (1 reg)	44202	Clock: Month	R
40232 (1 reg)	44204	Clock: Day	R

Data type: Integer	**Data type: float (2 reg./value)**	**Explanation**	**R/W**
40233 (1 reg)	44206	Clock: Hour	R
40234 (1 reg)	44208	Clock: Minute	R
41800 (1 reg)	45800	Main Hoist: Error code	R
41801 (1 reg)	45802	Main Hoist: Status	R
41802 (3 reg)	45804	Main Hoist: Gross weigh	R
41805 (3 reg)	45806	Main Hoist: Net weight	R
41808 (1 reg)	45808	Side A: Error code	R
41809 (1 reg)	45810	Side A: Status	R
41810 (3 reg)	45812	Side A: Gross weight	R
41813 (3 reg)	45814	Side A: Net weight	R
41816 (1 reg)	45816	Side B: Error code	R
41817 (1 reg)	45818	Side B: Status	R
41818 (3 reg)	45820	Side B: Gross weight	R
41821 (3 reg)	45822	Side B: Net weight	R
41824 (1 reg)	45824	Side A - Side B: Error code	R
41825 (1 reg)	45826	Side A - Side B Status	R
41826 (3 reg)	45828	Side A - Side B: Gross weight	R
41829 (3 reg)	45830	Side A - Side B: Net weight	R
41832 (1 reg)	45832	Sum all channels: Error code	R
41833 (1 reg)	45834	Sum all channels: Status	R
41834 (3 reg)	45836	Sum all channels: Gross weight	R
41837 (3 reg)	45838	Sum all channels: Net weight	R
41840 (3 reg)	45840	‘Full Load Hours’ Main Hoist (minutes)	R
41843 (3 reg)	45842	‘Full Load Hours’ Channel 1 (minutes)	R
41846 (3 reg)	45844	‘Full Load Hours’ Channel 2 (minutes)	R
41849 (3 reg)	45846	‘Full Load Hours’ Channel 3 (minutes)	R
41852 (3 reg)	45848	‘Full Load Hours’ Channel 4 (minutes)	R
41855 (3 reg)	45850	‘Full Load Hours’ Channel 5 (minutes)	R

Data type: Integer	**Data type: float (2 reg./value)**	**Explanation**	**R/W**
41858 (3 reg)	45852	'Full Load Hours' Channel 6 (minutes)	R
41861 (3 reg)	45854	'Full Load Hours' Channel 7 (minutes)	R
41864 (3 reg)	45856	'Full Load Hours' Channel 8 (minutes)	R
41867 (3 reg)	45858	'Rope Weight'	R
41870 (3 reg)	45860	'Rope Counter'	R
42000 (1 reg)	46000	Command register	R/W *
42010 (3 reg)	46010	Scale 1: Preset tare value	R/W
42013 (3 reg)	46012	Scale 2: Preset tare value	R/W
42016 (3 reg)	46014	Scale 3: Preset tare value	R/W
42019 (3 reg)	46016	Scale 4: Preset tare value	R/W
42022 (3 reg)	46018	Scale 5: Preset tare value	R/W
42025 (3 reg)	46020	Scale 6: Preset tare value	R/W
42028 (3 reg)	46022	Scale 7: Preset tare value	R/W
42031 (3 reg)	46024	Scale 8: Preset tare value	R/W
42034 (3 reg)	46026	Level 1 value	R
42037 (3 reg)	46028	Level 2 value	R
42040 (3 reg)	46030	Level 3 value	R
42043 (3 reg)	46032	Level 4 value	R
42046 (3 reg)	46034	Level 5 value	R
42049 (3 reg)	46036	Level 6 value	R
42052 (3 reg)	46038	Level 7 value	R
42055 (3 reg)	46040	Level 8 value	R
42058 (3 reg)	46042	Level 9 value	R
42061 (3 reg)	46044	Level 10 value	R
42064 (3 reg)	46046	Level 11 value	R
42067 (3 reg)	46048	Level 12 value	R
42070 (3 reg)	46050	Level 13 value	R
42073 (3 reg)	46052	Level 14 value	R
42076 (3 reg)	46054	Level 15 value	R
42079 (3 reg)	46056	Level 16 value	R

Data type: Integer	Data type: float (2 reg./value)	Explanation	R/W
42082 (3 reg)	46058	Level 17 value	R
42085 (3 reg)	46060	Level 18 value	R
42088 (3 reg)	46062	Level 19 value	R
42091 (3 reg)	46064	Level 20 value	R
42094 (3 reg)	46066	Level 21 value	R
42097 (3 reg)	46068	Level 22 value	R
42100 (3 reg)	46070	Level 23 value	R
42103 (3 reg)	46072	Level 24 value	R
42106 (3 reg)	46074	Level 25 value	R
42109 (3 reg)	46076	Level 26 value	R
42112 (3 reg)	46078	Level 27 value	R
42115 (3 reg)	46080	Level 28 value	R
42118 (3 reg)	46082	Level 29 value	R
42121 (3 reg)	46084	Level 30 value	R
42124 (3 reg)	46086	Level 31 value	R
42127 (3 reg)	46088	Level 32 value	R

1) Selected channel is determined by parameter ‘Scale To Common Area’.

*/ The read value is always ‘zero’.

Important:

‘Net weight’ and ‘Gross weight’ registers for a scale are only valid when corresponding ‘Scale X error code’ register equals 0. Therefore it’s recommended to read the ‘Scale X error’ register together with these registers.

Instrument type

This register holds the type of the instrument. For G6 Multi Channel Crane Instrument this value is 6001.

Program number

This register holds the number of the program.

Program major and minor version

These registers holds the major and minor version for the program.

Serial number

This register holds the serial number of the instrument. The value 241000 means 24-1000. This can be used by the master to be sure that an instrument with a specific serial number is used for a special process.

Command error

This register holds the error code when a command has been sent to the instrument. A command that gives 03 as exception will have an error code with a better description of the problem in this register. Normally this register should contain ‘00’ which means no error. Error codes 0 to 255 are valid in this register.

Instrument state

This register contains the state of the G6 instrument unit.

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 start up of the instrument.
05	**'Fatal error' state** An error has been detected during start up 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.

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 or EtherNet/IP 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	Free memory (disk) space is low	It is not possible to save any more files in the instrument.
3	Rope not zeroed	Rope not zeroed after power on.
4-15	Not used	

Note: If this register (bits) is read as float value, see description of Data representation.

Scale X: Error code

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

Scale X: Status

Status for a scale.

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

Bit no	Function	Comment
0	Net weight > INT size	The net weight in ‘scaled integer’ format does not fit in one register. (See description of data representation.)
1	Gross weight > INT size	The gross weight in ‘scaled integer’ format does not fit in one register. (See description of data representation.)
2	Not used	
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	Rope weight compensation	Rope weight compensation for Main Hoist is On.
9	Replacement channel	This channel is using a Replacement channel for calculation of Crane weights.
10	Mean value calculation	Mean value calculations are running.
11	Not used	
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	

Note: If this register (bits) is read as float value,
see description of Data representation.

Scale X: Gross weight

This register holds the gross weight for a scale. 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 X:Error code' equals 00.

Scale X: Net weight

This register holds the net weight for a scale. 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 X:Error code' equals 00.

Scale X: Input signal (mV/V)

This register holds the current input signal in mV/V for a scale. This register could be used for fault finding in the system.

Selected channel registers:

These registers are a copy of the registers for one of the channels (scale 1-8) or the registers for a crane weight (scale 9-13). The crane weights have no data in the 'Input signal' register.
There is also an additional register that shows the scale number from where the data is copied from. Scale number 1-8 corresponds to scale (channel) 1-8 while
scale 9 = 'Main Hoist', scale 10 = 'Side A', scale 11 = 'Side B',
scale 12 = 'Side A - Side B' and scale 13 = 'Sum all channels'.
The channel (scale) to be copied to these registers is selected by parameter 'Scale To Common Area' (set-up menu 'Communication/Serial Com.').

Analog output value 1, 2, 3, 4

These registers holds the values sent to the analog outputs. The registers can be used for fault finding in the system.
Note: The value is rounded to 3 decimals.

Status of inputs 11-18, 21-28

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

Bit no	Function	Bit no	Function
0	Digital input 11 activated.	**8**	Digital input 21 activated.
1	Digital input 12 activated.	**9**	Digital input 22 activated.
2	Digital input 13 activated.	**10**	Digital input 23 activated.
3	Digital input 14 activated.	**11**	Digital input 24 activated.
4	Digital input 15 activated.	**12**	Digital input 25 activated.
5	Digital input 16 activated.	**13**	Digital input 26 activated.
6	Digital input 17 activated.	**14**	Digital input 27 activated.
7	Digital input 18 activated.	**15**	Digital input 28 activated.

Note: If this register (bits) is read as float value,
see description of Data representation.

Status of inputs 31-38, 41-48

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

Bit no	Function	Bit no	Function
0	Digital input 31 activated.	**8**	Digital input 41 activated.
1	Digital input 32 activated.	**9**	Digital input 42 activated.
2	Digital input 33 activated.	**10**	Digital input 43 activated.
3	Digital input 34 activated.	**11**	Digital input 44 activated.
4	Digital input 35 activated.	**12**	Digital input 45 activated.
5	Digital input 36 activated.	**13**	Digital input 46 activated.
6	Digital input 37 activated.	**14**	Digital input 47 activated.
7	Digital input 38 activated.	**15**	Digital input 48 activated.

Note: If this register (bits) is read as float value, see description of Data representation.

Status of inputs 51-58, 61-68

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

Bit no	Function	Bit no	Function
0	Digital input 51 activated.	**8**	Digital input 61 activated.
1	Digital input 52 activated.	**9**	Digital input 62 activated.
2	Digital input 53 activated.	**10**	Digital input 63 activated.
3	Digital input 54 activated.	**11**	Digital input 64 activated.
4	Digital input 55 activated.	**12**	Digital input 65 activated.
5	Digital input 56 activated.	**13**	Digital input 66 activated.
6	Digital input 57 activated.	**14**	Digital input 67 activated.
7	Digital input 58 activated.	**15**	Digital input 68 activated.

Note: If this register (bits) is read as float value, see description of Data representation.

Status of outputs 11-18, 21-28

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

Bit no	Function	Bit no	Function
0	Digital output 11 activated.	**8**	Digital output 21 activated.
1	Digital output 12 activated.	**9**	Digital output 22 activated.
2	Digital output 13 activated.	**10**	Digital output 23 activated.
3	Digital output 14 activated.	**11**	Digital output 24 activated.
4	Digital output 15 activated.	**12**	Digital output 25 activated.
5	Digital output 16 activated.	**13**	Digital output 26 activated.
6	Digital output 17 activated.	**14**	Digital output 27 activated.
7	Digital output 18 activated.	**15**	Digital output 28 activated

Note: If this register (bits) is read as float value,
see description of Data representation.

Status of outputs 31-38, 41-48

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

Bit no	Function	Bit no	Function
0	Digital output 31 activated.	**8**	Digital output 41 activated.
1	Digital output 32 activated.	**9**	Digital output 42 activated.
2	Digital output 33 activated.	**10**	Digital output 43 activated.
3	Digital output 34 activated.	**11**	Digital output 44 activated.
4	Digital output 35 activated.	**12**	Digital output 45 activated.
5	Digital output 36 activated.	**13**	Digital output 46 activated.
6	Digital output 37 activated.	**14**	Digital output 47 activated.
7	Digital output 38 activated.	**15**	Digital output 48 activated

Note: If this register (bits) is read as float value,
see description of Data representation.

Status of outputs 51-58, 61-68

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

Bit no	Function	Bit no	Function
0	Digital output 51 activated.	**8**	Digital output 61 activated.
1	Digital output 52 activated.	**9**	Digital output 62 activated.
2	Digital output 53 activated.	**10**	Digital output 63 activated.
3	Digital output 54 activated.	**11**	Digital output 64 activated.
4	Digital output 55 activated.	**12**	Digital output 65 activated.
5	Digital output 56 activated.	**13**	Digital output 66 activated.
6	Digital output 57 activated.	**14**	Digital output 67 activated.
7	Digital output 58 activated.	**15**	Digital output 68 activated

Note: If this register (bits) is read as float value, see description of Data representation.

Level status 1-16

Bits set to 1 in this register 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.
4	Above level 5	The weight is above Level 5.
5	Above level 6	The weight is above Level 6.
6	Above level 7	The weight is above Level 7.
7	Above level 8	The weight is above Level 8.
8	Above level 9	The weight is above Level 9.
9	Above level 10	The weight is above Level 10.
10	Above level 11	The weight is above Level 11.
11	Above level 12	The weight is above Level 12.
12	Above level 13	The weight is above Level 13.
13	Above level 14	The weight is above Level 14.
14	Above level 15	The weight is above Level 15.
15	Above level 16	The weight is above Level 16.

Note: If this register (bits) is read as float value, see description of Data representation.

Level status 17-32

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

Bit no	Function	Comment
0	Above level 17	The weight is above Level 17.
1	Above level 18	The weight is above Level 18.
2	Above level 19	The weight is above Level 19.
3	Above level 20	The weight is above Level 20.
4	Above level 21	The weight is above Level 21.
5	Above level 22	The weight is above Level 22.
6	Above level 23	The weight is above Level 23.
7	Above level 24	The weight is above Level 24.
8	Above level 25	The weight is above Level 25.
9	Above level 26	The weight is above Level 26.
10	Above level 27	The weight is above Level 27.
11	Above level 28	The weight is above Level 28.
12	Above level 29	The weight is above Level 29.
13	Above level 30	The weight is above Level 30.
14	Above level 31	The weight is above Level 31.
15	Above level 32	The weight is above Level 32.

Note: If this register (bits) is read as float value,
see description of Data representation.

Clock

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

Crane Weight registers

Crane weights include weight information for ‘Main Hoist’, ‘Side A’, ‘Side B’, ‘Side A - Side B’ and ‘Sum all channels’ (channel 9 – 13).

The Main Hoist weight is the sum of all channels (scales) included in the Main Hoist with any corrections. The correction of the Main Hoist weight can be ‘Rope Weight Compensation’ and/or ‘Main Hoist weight adjustment’.

All other crane weights are based on the channels (Scales) weights without any corrections.

Status for Crane Weights

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

Bit no	Function	Comment
0	Net weight > INT size	The net weight in ‘scaled integer’ format does not fit in one register. (See description of data representation.)
1	Gross weight > INT size	The gross weight in ‘scaled integer’ format does not fit in one register. (See description of data representation.)
2	Not used	
3	Not used	
4	Not used	
5	Not used	
6	Net Mode	'1' = Net mode ‘0' = Gross mode Net mode is only active if ALL channels (scales) included in the crane weight is in Net mode.
7	Motion	Unstable weight
8	Rope weight compensation	Rope weight compensation for Main Hoist is On.
9	Replacement channel	Some channel is using Replacement channel for calculation of Crane weights.
10	Mean value calculation	Mean value calculations are running.
11	Not used	
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	

Note: If this register (bits) is read as float value, see description of Data representation.

See ‘Scale X Error code’, ‘Scale X Gross weight’ and ‘Scale X Net weight’ for a description of other Crane Weight registers.

Full Load Hours registers

Current full load hours for Main Hoist and Channel 1 to Channel 8.

Rope Weight

Current rope weight (if rope weight compensation is used).

Rope Counter

Current rope counter (if rope weight compensation is used).

Command register

As this register is read, the answer will always contain only zeros.

There are a number of actions that can be activated in the instrument. The value of this register (when different from zero) will activate one of these actions, as described in below.

When an action can not be performed for some reason (wrong state etc.) an exception is given as reply. When an exception with code 03 is received the command error register could be read to get a better error explanation.

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.
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	Scale 1: Auto tare	
11	Scale 1: Set to zero	Used to set the gross weight to zero.
12	Scale 1: Select gross mode	
13	Scale 1: Select net mode	
20	Scale 2: Auto tare	
21	Scale 2: Set to zero	Used to set the gross weight to zero.
22	Scale 2: Select gross mode	
23	Scale 2: Select net mode	
30	Scale 3: Auto tare	
31	Scale 3: Set to zero	Used to set the gross weight to zero.
32	Scale 3: Select gross mode	
33	Scale 3: Select net mode	
40	Scale 4: Auto tare	
41	Scale 4: Set to zero	Used to set the gross weight to zero.
42	Scale 4: Select gross mode	
43	Scale 4: Select net mode	

Cmd	Action activated in instrument	Description
50	Scale 5: Auto tare	
51	Scale 5: Set to zero	Used to set the gross weight to zero.
52	Scale 5: Select gross mode	
53	Scale 5: Select net mode	
60	Scale 6: Auto tare	
61	Scale 6: Set to zero	Used to set the gross weight to zero.
62	Scale 6: Select gross mode	
63	Scale 6: Select net mode	
70	Scale 7: Auto tare	
71	Scale 7: Set to zero	Used to set the gross weight to zero.
72	Scale 7: Select gross mode	
73	Scale 7: Select net mode	
80	Scale 8: Auto tare	
81	Scale 8: Set to zero	Used to set the gross weight to zero.
82	Scale 8: Select gross mode	
83	Scale 8: Select net mode	
90	Main Hoist: Auto Tare	Tares all channels in the Main Hoist separately
210	Start Operating Time 1	Same as input 11 activated
211	Stop Operating Time 1	Same as input 11 deactivated
212	Start Operating Time 2	Same as input 12 activated
213	Stop Operating Time 2	Same as input 12 deactivated
214	Start Operating Time 3	Same as input 13 activated
215	Stop Operating Time 3	Same as input 13 deactivated
216	Start ‘Full Load Hours’ Main Hoist	Same as input 14 activated Note: Command is working only if parameter ‘Input 14 Use’ is set to ‘FLH Calc Ctrl’.

Cmd	Action activated in instrument	Description
217	Stop ‘Full Load Hours’ Main Hoist	Same as input 14 deactivated Note: Command is working only if parameter ‘Input 14 Use’ is set to ‘FLH Calc Ctrl’.
224	Start ‘Full Load Hours’ Ch. 1	Same as input for Chan. 1 activated. Also starts Operating time for Channel 1, even if parameter ‘1:Full Load Hours’ is Off.
225	Stop ‘Full Load Hours’ Ch. 1	Same as input for Chan. 1 deactivated. Also stops Operating time for Channel 1.
226	Start ‘Full Load Hours’ Ch. 2	Same as input for Chan. 2 activated. Also starts Operating time for Channel 2, even if parameter ‘2:Full Load Hours’ is Off.
227	Stop ‘Full Load Hours’ Ch. 2	Same as input for Chan. 2 deactivated. Also stops Operating time for Channel 2.
228	Start ‘Full Load Hours’ Ch. 3	Same as input for Chan. 3 activated. Also starts Operating time for Channel 3, even if parameter ‘3:Full Load Hours’ is Off.
229	Stop ‘Full Load Hours’ Ch. 3	Same as input for Chan. 3 deactivated. Also stops Operating time for Channel 3.
230	Start ‘Full Load Hours’ Ch. 4	Same as input for Chan. 4 activated. Also starts Operating time for Channel 4, even if parameter ‘4:Full Load Hours’ is Off.
231	Stop ‘Full Load Hours’ Ch. 4	Same as input for Chan. 4 deactivated. Also stops Operating time for Channel 4.
232	Start ‘Full Load Hours’ Ch. 5	Same as input for Chan. 5 activated. Also starts Operating time for Channel 5, even if parameter ‘5:Full Load Hours’ is Off.
233	Stop ‘Full Load Hours’ Ch. 5	Same as input for Chan. 5 deactivated. Also stops Operating time for Channel 5.
234	Start ‘Full Load Hours’ Ch. 6	Same as input for Chan. 6 activated. Also starts Operating time for Channel 6, even if parameter ‘6:Full Load Hours’ is Off.
235	Stop ‘Full Load Hours’ Ch. 6	Same as input for Chan. 6 deactivated. Also stops Operating time for Channel 6.
236	Start ‘Full Load Hours’ Ch. 7	Same as input for Chan. 7 activated. Also starts Operating time for Channel 7, even if parameter ‘7:Full Load Hours’ is Off.
237	Stop ‘Full Load Hours’ Ch. 7	Same as input for Chan. 7 deactivated. Also stops Operating time for Channel 7.

Cmd	Action activated in instrument	Description
238	Start ‘Full Load Hours’ Ch. 8	Same as input for Chan. 8 activated. Also starts Operating time for Channel 8, even if parameter ‘8:Full Load Hours’ is Off.
239	Stop ‘Full Load Hours’ Ch. 8	Same as input for Chan. 8 deactivated. Also stops Operating time for Channel 8.
241	Clear Service Information command	Used to save and clear all gathered Service Information data
242	Start Mean value calculation	Starts the ‘Mean value calculations’
243	Stop Mean value calculation	Stops the ‘Mean value calculations’
244	Save Service Information command	Used to save all gathered Service Information data to a file in the ‘ServiceInfo’ area in the file system

Scale X: Preset tare value

This register is used to read and write a new preset tare for a scale.

Level X value

These registers are used to read levels that are supervised by the instrument.

I/O bits (Coils)

The instrument has a number of I/O bits that the master can write to using Modbus function 05 or 15.

Each of these I/O bits are linked to a command in the instrument, which is described previously in this manual.

Set the I/O bit with the same number as the command that should be executed.

The action is activated if the master sets the I/O bit to 'ON'.

If the master sets the I/O bit to 'OFF', this is accepted, but no action is activated.

All I/O bits are WRITE ONLY. This means the master cannot read the I/O bits but only write to them.

Note: If the master tries to write to more than one I/O bit (Modbus function 15) the instrument will act on the lowest I/O bit number only.

Data representation

Data sent to and from the instrument uses 16 bit holding registers (40XXX) and can use different formats for flexibility.

Integer

Unsigned integer (1 modbus register)

Values stored in one modbus register as an unsigned integer (16-bit number without decimals).

Scaled integer (2 modbus registers + 1 modbus register = 3 modbus registers)

Values stored in a special 3 register format. The first two registers are used as a 32 bit long integer value (with sign) and the third register is holding the number of decimals in the value.

Example: 12345678 (32 bit number) in the two first registers and 3 in the third register give the value: 12345.678.

Register	Hex	Decimal	Description
1	00BC	188	The 16 most significant bits in the value.
2	614E	24910	The 16 least significant bits in the value.
3	0003	3	The number of decimals.

Calculations in decimal numbers:

First multiply the most significant register with 2^{16} (65536) and add the least significant register to the value.

$188 * 2^{16} + 24910 = 12345678$

Now divide the number to get the right number of decimals. The decimal register was set to 3 in this example, which gives the value $10^3 = 1000$ to divide with.

12345678 / 1000 = 12345.678

Note: If you want to read weight values and your PLC system can't handle 32 bit values, the second register can be used as a 16 bit register with the number of decimals that is indicated in the third register. This will limit the value range to -32768 to +32767. Flags in Status register for corresponding scale indicates when the weights are bigger than a 16 bit integer. These flags must be checked to be sure that the weight value fits in just one register.

Float values

The type of float values used in the communication is selected in the set-up for the different communication interfaces.
Values stored as standard IEEE 32 bit float values. Each value has two registers assigned to it. To read/write a float value an even number of Modbus registers, starting at an even address, must be read/written each time. The float values are stored in two different register orders.

Some devices may transfer the values with the high order bits in the first register and the low order bits in the second register. Other devices may invert the register order.

Modicon float: For true Modicon PLC's.

Float: Many third party controllers that support Modicon protocol use the float format where all bytes are written out in order to one 32 bit register, as opposed to Modicon float which uses 2 consecutive 16 bit registers.

When float registers representing bits are read, the bits set are returned as a float value.

For example if bit 4 is set the value 16.0 is returned as a float value, and if both bit 0 and bit 4 are set the value 17.0 is returned as a float value.
To use the value it's a good choice to convert it to an unsigned integer where the bits can be compared.

Exception responses

When the master sends a query to a slave it expects a normal response (as described earlier). One of the following three events occurs after a query from the master.

1. Normal response.
The slave has received the query without communication error and can handle the query normally. The slave returns a normal response.

2. Communication error.
If the slave does not receive the query due to a communication error, or detects some communication error (parity error or checksum error), **no** response is returned. The master should process a time-out for the query.

3. Command error.
If the slave receives the query without any communication error, but cannot handle the query, e.g. if the command was not valid, the requested register number not valid or instrument in a mode where the command was not allowed, then the slave will return an exception response informing the master of the nature of the error.

The following exception codes are possible.

Code	Name	Description
01	Illegal function	Not a valid function code. Valid function codes are 01, 02, 03, 05, 06, 08, 15, 16.
02	Illegal data address	Not a valid data address. See 'Register description' for a list of allowed registers.
03	Illegal data value	Value in data query field not valid. This code is also used if the instrument has received the query but cannot perform it. To get a better explanation of the error, the 'command error' register could be read.

Supported Modbus functions

Function	Description
01 Read Coil Status	Reads the state of discrete outputs (0X references, coils). Only implemented because some 'masters' use this function to initiate communication. Coil range: 1 – 16 (Max number of points to read: 16). Response: Zero (OFF) for all requested points.
02 Read Input Status	Reads the state of discrete inputs (1X references). This function is implemented only because some 'masters' use this function to initiate communication. Input range: 1 – 16 (Max number of points to read: 16). Response: Zero (OFF) for all requested points.
03 Read Holding Reg.	Reads the binary contents of holding registers (4X references). Max number of registers to read: 125
05 Force Single Coil	Forces a single coil (0X references) to either ON or OFF. This function is used to activate commands in the instrument.
06 Preset Single Reg.	Presets a value into a single holding register (4X references).
08 Diagnostics	This function can provide a series of different communication tests, depending on a sub function code. The instrument supports only sub function code 00, which is a 'loop-back' test. The same data as received will be sent back to the master. The diagnostics function will always return 6 bytes of data regardless of how many are sent.
15 Force Multiple Coils	Forces each coil (0X references) in a sequence of coils to either ON or OFF. This function is used to activate commands in the instrument. Max. number of points: 16 (only the first is used).
16 Preset Multiple reg.	Presets values into a sequence of holding registers (4X references). Max number of registers to preset: 125

Note: No broadcast messages are allowed.

It is possible to send or fetch any number of registers (max 125) or I/O bits (max. 16). If the master tries to read more registers than there are available, the instrument will send dummy values for those registers not available.

Fieldbus interface

The optional fieldbus interface is based on a network communication module from HMS Industrial Networks. Available fieldbuses are PROFIBUS, DeviceNet and PROFINET. With setup parameters the fieldbus interface is configured for the specific needs of an installation. It is possible in some cases to setup address, baud rate (depending on the actual fieldbus type) and mapping of the memory area in the fieldbus module that is available to the network.

The mapping is divided in one base block for data from the master to the instrument, one base block for data to the master from the instrument and 0 – 12 (selected with a setup parameter) configurable data blocks. The base blocks are mandatory. The data blocks are configurable regarding the content and in some cases also format (floating-point or integer).

The registers mentioned below are Modbus registers as defined in section Communication – Modbus Protocol. Each Modbus register is two bytes wide. This section also describes commands.

The size of the base blocks is 16 bytes from master to instrument and 32 bytes from the instrument to the master. The base blocks contain Instrument Error and Instrument Status. Besides instrument error and status information are the base blocks used for general purpose reading and writing of data and also for issuing commands to the instrument.

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 (this is not valid for PROFINET-module). Address is setup in menu ‘Communication – Fieldbus’. Note that the address range is depending on type of fieldbus.
- Select baudrate (this is not valid for PROFINET-module), if applicable, according to the used baudrate in the network. Some fieldbuses may support automatic baud rate setting. Use fixed baudrate setting if there are difficulties to connect to the network or if the network baudrate is known.
- Select the number of data blocks that is needed for the installation. It is possible to use only the ‘base block’ mapping if there is room for all necessary data within the 12 consecutive modbus registers that are defined within the base block (data from the instrument). The starting address of the read area is settable.
- Configure the desired number of data blocks. Note that the data blocks may still be configured as ‘Not In Use’ in which case the data within the block will be undefined.
- Check that the configuration of the master is compatible with the actual configuration of the instrument.
- Connect to the network.

Additional information for PROFINET

There are two ways to communicate with G6 via PROFINET, Cyclic Process data and/or Acyclic data. It is recommended to only use one of them.

Cyclic Process Data

The G6 instrument will be automatically set up with following Cyclic Process data:

- Slot 0 = Device Access Point.
- Slot 1 = Output data, ‘modul_out_1’ (Fixed)
    - Type = Byte array according to Chapter ‘Data from the network (Outputs in the master)’
    - No of bytes = 16 (fixed)
- Slot 2 = Input data, ‘modul_in_0’ to ‘modul_in_12’
    - Type = byte array according to Chapter ‘Data to the network (Inputs in the master)’
    - No of bytes = 32 to 224 depending on number of optional data blocks. If no data blocks are setup in the instrument, ‘modul_in_0’ shall be used. If 1 data block is setup, ‘modul_in_1’ and so on.

Each data in the byte array shall be converted to suitable data type in the PLC, according to Chapter ‘Fieldbus Data Definitions’.

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 G6 instrument.

Acyclic data

G6 has following slots for acyclic communication:

- Slot 0 = Device Access Point.
- Slot 1 = Output data, ‘modul_out_1’ (Fixed)
    - Type = Byte array according to Chapter ‘Data from the network (Outputs in the master)’
    - No of bytes = 16 (fixed)
- Slot 2 = Input data, ‘modul_in_0’ to ‘modul_in_12’
    - Type = byte array according to Chapter ‘Data to the network (Inputs in the master)’
    - No of bytes = 32 to 224 depending on number of optional data blocks. If no data blocks are setup in the instrument, ‘modul_in_0’ shall be used. If 1 data block is setup, ‘modul_in_1’ and so on.

Each data in the byte array shall be converted to suitable data type in the PLC, according to Chapter ‘Fieldbus Data Definitions’.

Note:

Data type can be selected as Integer or Floating Point in the G6 instrument.

Notes for slot 1

Slot 1 is Output data according to chapter ‘Data from the network (Outputs in the master)’ and supports read and write.

Data length has to be 16 bytes at read and write.

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

If data size is not equal to 16 bytes when writing to slot 1 the command will be invalid, but the received data will be saved at acyclic Output data anyway.

Notes for slot 2

Slot 2 is Input data according to chapter ‘Data to the network (Inputs in the master)’ and support only read.

Data length has to be 32-224 bytes at read, this is dependent on the setup of data blocks. If one data blocks is used, 32 + 16 bytes shall be 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 (not supported)
- Station name

IP address for the PROFINET Fieldbus adaptor can be seen in G6 instrument:

Main Menu->Maintenance->Diagnostics->Fieldbus

PROFINET IO Object Information

Vendor ID: 03FF (Hex)

Device ID: 0003 (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 Fieldbus adaptor supports Media Redundancy Protocol (MRP).
- It is possible to use a Web browser to configure the network settings of the Fieldbus adaptor and see status and acyclic data. The IP address for the PROFINET Fieldbus adaptor shall be used.

Fieldbus data definitions

Data from the network (Outputs in the master)

General

This 16 bytes block is mandatory, i.e. it is always mapped to the network in the instrument.

Byte	Contents
00	Command
01	Number of registers to write
02	Start address, Read/Write MSB
03	Start address, Read/Write
04	Write register 1 MSB
05	Write register 1
06	Write register 2 MSB
07	Write register 2
08	Write register 3 MSB
09	Write register 3
10	Write register 4 MSB
11	Write register 4
12	Write register 5 MSB
13	Write register 5
14	Write register 6 MSB
15	Write register 6

Byte 0:

The command byte is used when setting the read window starting address, writing data to the instrument and to issue various scale related commands such as taring, zeroing etc.

Commands:

0	No action
250 (hex FA)	Change read window
251 (hex FB)	Write data
252 (hex FC)	Clear the Program reset bit in the Instrument Status register.

Plus commands according to the manual, chapter ‘ Communication – Modbus protocol – Command register’.

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 that are described below in section ‘Data to the network’.

Byte 1:
Used to define the number of registers to write.
Bytes 2 and 3:
Define from which register number to read or write.
Bytes 4 to 15:
Contains the data when writing to the instrument.

Data to the network (Inputs in the master)

General

Data to the network are divided into two categories, one is the mandatory 'base block' which contains general data and the 12 modbus register used for reading from the instrument. The second part is the up to twelve configurable data blocks.

Byte	Contents
00	Instrument error MSB
01	Instrument error
02	Instrument Status MSB
03	Instrument Status
04	Command acknowledge
05	Command error
06	Start address, Read MSB
07	Start address, Read
08	Read register 1 MSB
09	Read register 1
10	Read register 2 MSB
11	Read register 2
12	Read register 3 MSB
13	Read register 3
14	Read register 4 MSB
15	Read register 4

Byte	Contents
16	Read register 5 MSB
17	Read register 5
18	Read register 6 MSB
19	Read register 6
20	Read register 7 MSB
21	Read register 7
22	Read register 8 MSB
23	Read register 8
24	Read register 9 MSB
25	Read register 9
26	Read register 10 MSB
27	Read register 10
28	Read register 11 MSB
29	Read register 11
30	Read register 12 MSB
31	Read register 12

The first 32 bytes of data from the instrument to the network are mandatory.

Bytes 0 and 1:

Contains the actual instrument error information (the value 0 means no error). See chapter ‘Communication – Modbus protocol – Instrument error’.

Bytes 2 and 3:

The actual status information for the instrument, see chapter ‘Communication – Modbus protocol – Instrument status’.

Byte 4:

The ‘Command acknowledge’. It will be equal to the command number if the command was successfully executed. If the command failed byte 4 will have the value 240 (hex F0).

Byte 5:

The possible ‘Command error’ code. The error code is explained in chapter ‘Troubleshooting – Error codes’. This byte will be zero if a command is correctly executed.

Bytes 6 and 7:

These two bytes is the starting address of the reading area following in bytes 8 to 31. The address defines the first of the 12 consecutive modbus registers in the read area. See chapter ‘Communication – Modbus protocol’ for details on modbus register address definitions.

Bytes 8 to 31:

These 24 bytes is the area used when the user wants to read any data that is accessible through modbus registers. The address (number) of the first register is defined in bytes 6 and 7 and the instrument will keep the 24 bytes (12 registers) updated.

Configurable data blocks

Byte	Contents
32	Start of data block 1
48	Start of data block 2
64	Start of data block 3
80	Start of data block 4
96	Start of data block 5
112	Start of data block 6
128	Start of data block 7
144	Start of data block 8
160	Start of data block 9
176	Start of data block 10
192	Start of data block 11
208	Start of data block 12

Data Blocks is used to transfer data from the instrument to the master. Up to 12 data blocks can be used. Each block consists of 16 bytes. The data blocks have fixed positions in memory, see list below.

Last byte is no. 223. A total of 224 bytes data can be mapped from the instrument to the master. Of the maximum 224 bytes are 32 bytes the mandatory base block.

Type of data blocks

- Gross Weight data, floating point or integer format
- Net Weight data, floating point or integer format
- Displayed Weight data, floating point or integer format
- Input Signal (transducer mV/V) data, floating point or integer format
- Level status (F), floating point format
- Input status, floating point format
- Output status, floating point format
- Input and output status, integer format
- Level status (I), integer format
- Analog output value 1 to 4, floating point format
- Analog output value 1 and 2, integer format
- Analog output value 3 and 4, integer format

The offset in the left column, in the following descriptions of the data block types, is the starting byte number (see table above) for the actual data block number.

The Weight data blocks (floating-point and integer formats) below are a common description of the four different types that can be selected: Gross Weight, Net Weight, Disp. Weight and Input Signal.

See chapter ‘Communication – Modbus protocol’ for a description of the contents of the different data blocks and the integer and floating-point data formats.

Weight data block *(Floating-point format)*

Byte	Contents
Offset + 0	Scale x: Error code MSB
Offset + 1	Scale x: Error code
Offset + 2	Scale x: Error code
Offset + 3	Scale x: Error code
Offset + 4	Scale x: Status MSB
Offset + 5	Scale x: Status
Offset + 6	Scale x: Status
Offset + 7	Scale x: Status
Offset + 8	Scale x: Data MSB
Offset + 9	Scale x: Data
Offset + 10	Scale x: Data
Offset + 11	Scale x: Data
Offset + 12	Not used
Offset + 13	Not used
Offset + 14	Not used
Offset + 15	Not used

Note: Scale Data can be (selected by parameter) Gross Weight, Net Weight, Displayed Weight value or Input Signal. X is the selected (by parameter) scale number for the data block.

The table above describes the data block format if the parameter ‘Data Block N Format’ is set to ‘Floating point’ where ‘N’ stands for the index of the Data Block (1 – 12).

Weight data block *(Integer format)*

Byte	Content
Offset + 0	Scale x: Error code MSB
Offset + 1	Scale x: Error code
Offset + 2	Scale x: Status MSB
Offset + 3	Scale x: Status
Offset + 4	Scale x: Data, int MSB
Offset + 5	Scale x: Data, int
Offset + 6	Scale x: Data, int
Offset + 7	Scale x: Data, int
Offset + 8	Scale x: Data, dec MSB
Offset + 9	Scale x: Data, dec
Offset + 10	Not used
Offset + 11	Not used
Offset + 12	Not used
Offset + 13	Not used
Offset + 14	Not used
Offset + 15	Not used

Note: Scale Data can be (selected by parameter) Gross Weight, Net Weight, Displayed Weight Value or Input Signal. X is the selected (by parameter) scale number for the data block.

The table above describes the data block format if the parameter ‘Data Block N Format’ is set to ‘Integer’ where ‘N’ stands for the index of the Data Block (1 – 12).

Level status (F) ***(Floating-point format)***

Byte	Content
Offset + 0	Level status 1 – 16 MSB
Offset + 1	Level status 1 – 16
Offset + 2	Level status 1 – 16
Offset + 3	Level status 1 – 16
Offset + 4	Level status 17 – 32 MSB
Offset + 5	Level status 17 – 32
Offset + 6	Level status 17 – 32
Offset + 7	Level status 17 – 32
Offset + 8	Not used
Offset + 9	Not used
Offset + 10	Not used
Offset + 11	Not used
Offset + 12	Not used
Offset + 13	Not used
Offset + 14	Not used
Offset + 15	Not used

Input Status *(Floating-point format)*

Byte	Content
Offset + 0	Status of inputs 11 – 18, 21 – 28 MSB
Offset + 1	Status of inputs 11 – 18, 21 – 28
Offset + 2	Status of inputs 11 – 18, 21 – 28
Offset + 3	Status of inputs 11 – 18, 21 – 28
Offset + 4	Status of inputs 31 – 38, 41 – 48 MSB
Offset + 5	Status of inputs 31 – 38, 41 – 48
Offset + 6	Status of inputs 31 – 38, 41 – 48
Offset + 7	Status of inputs 31 – 38, 41 – 48
Offset + 8	Status of inputs 51 – 58, 61 – 68 MSB
Offset + 9	Status of inputs 51 – 58, 61 – 68
Offset + 10	Status of inputs 51 – 58, 61 – 68
Offset + 11	Status of inputs 51 – 58, 61 – 68
Offset + 12	Not used
Offset + 13	Not used
Offset + 14	Not used
Offset + 15	Not used

Output Status *(Floating-point format)*

Byte	Content
Offset + 0	Status of outputs 11 – 18, 21 – 28 MSB
Offset + 1	Status of outputs 11 – 18, 21 – 28
Offset + 2	Status of outputs 11 – 18, 21 – 28
Offset + 3	Status of outputs 11 – 18, 21 – 28
Offset + 4	Status of outputs 31 – 38, 41 – 48 MSB
Offset + 5	Status of outputs 31 – 38, 41 – 48
Offset + 6	Status of outputs 31 – 38, 41 – 48
Offset + 7	Status of outputs 31 – 38, 41 – 48
Offset + 8	Status of outputs 51 – 58, 61 – 68 MSB
Offset + 9	Status of outputs 51 – 58, 61 – 68
Offset + 10	Status of outputs 51 – 58, 61 – 68
Offset + 11	Status of outputs 51 – 58, 61 – 68
Offset + 12	Not used
Offset + 13	Not used
Offset + 14	Not used
Offset + 15	Not used

Inp./Outp Stat *(Integer format)*

Byte	Content
Offset + 0	Status of inputs 11 – 18, 21 – 28 MSB
Offset + 1	Status of inputs 11 – 18, 21 – 28
Offset + 2	Status of inputs 31 – 38, 41 – 48 MSB
Offset + 3	Status of inputs 31 – 38, 41 – 48
Offset + 4	Status of inputs 51 – 58, 61 – 68 MSB
Offset + 5	Status of inputs 51 – 58, 61 – 68
Offset + 6	Not used
Offset + 7	Not used
Offset + 8	Status of outputs 11 – 18, 21 – 28 MSB
Offset + 9	Status of outputs 11 – 18, 21 – 28
Offset + 10	Status of outputs 31 – 38, 41 – 48 MSB
Offset + 11	Status of outputs 31 – 38, 41 – 48
Offset + 12	Status of outputs 51 – 58, 61 – 68 MSB
Offset + 13	Status of outputs 51 – 58, 61 – 68
Offset + 14	Not used
Offset + 15	Not used

Level status (I) *(Integer format)*

Byte	Content
Offset + 0	Level status 1 – 16 MSB
Offset + 1	Level status 1 – 16
Offset + 2	Level status 17 – 32 MSB
Offset + 3	Level status 17 – 32
Offset + 4	Not used
Offset + 5	Not used
Offset + 6	Not used
Offset + 7	Not used
Offset + 8	Not used
Offset + 9	Not used
Offset + 10	Not used
Offset + 11	Not used
Offset + 12	Not used
Offset + 13	Not used
Offset + 14	Not used
Offset + 15	Not used

AOUT1-4 Value *(Floating-point format)*

Byte	Content
Offset + 0	Analog output value 1 MSB
Offset + 1	Analog output value 1
Offset + 2	Analog output value 1
Offset + 3	Analog output value 1
Offset + 4	Analog output value 2 MSB
Offset + 5	Analog output value 2
Offset + 6	Analog output value 2
Offset + 7	Analog output value 2
Offset + 8	Analog output value 3 MSB
Offset + 9	Analog output value 3
Offset + 10	Analog output value 3
Offset + 11	Analog output value 3
Offset + 12	Analog output value 4 MSB
Offset + 13	Analog output value 4
Offset + 14	Analog output value 4
Offset + 15	Analog output value 4

AOUT1-2 Value *(Integer format)*

Byte	Content
Offset + 0	Analog output value 1, int MSB
Offset + 1	Analog output value 1, int
Offset + 2	Analog output value 1, int
Offset + 3	Analog output value 1, int
Offset + 4	Analog output value 1, dec MSB
Offset + 5	Analog output value 1, dec
Offset + 6	Not used
Offset + 7	Not used
Offset + 8	Analog output value 2, int MSB
Offset + 9	Analog output value 2, int
Offset + 10	Analog output value 2, int
Offset + 11	Analog output value 2, int
Offset + 12	Analog output value 2, dec MSB
Offset + 13	Analog output value 2, dec
Offset + 14	Not used
Offset + 15	Not used

AOUT3-4 Value *(Integer format)*

Byte	Content
Offset + 0	Analog output value 3, int MSB
Offset + 1	Analog output value 3, int
Offset + 2	Analog output value 3, int
Offset + 3	Analog output value 3, int
Offset + 4	Analog output value 3, dec MSB
Offset + 5	Analog output value 3, dec
Offset + 6	Not used
Offset + 7	Not used
Offset + 8	Analog output value 4, int MSB
Offset + 9	Analog output value 4, int
Offset + 10	Analog output value 4, int
Offset + 11	Analog output value 4, int
Offset + 12	Analog output value 4, dec MSB
Offset + 13	Analog output value 4, dec
Offset + 14	Not used
Offset + 15	Not used

Examples

Example 1: Setting ‘Scale 1:Preset tare value’ to 123.5 (Writing to float value register).

1. Make sure that the previous command was not 251.
   Set command byte (00) to 0 if previous command was 251.
2. Set number of registers (2) to write in byte 01.
3. Set start address (46010) in bytes 02 and 03.
   See chapter ‘Communication – Modbus protocol – General registers’.
4. Set the following four bytes (04 – 07) to the value to write (123.5).
5. Enter the command (251) in byte 00.

Byte	Description	Dec	Hex
00	Command	251	FB
01	Number of registers to write	2	02
02 – 03	Start address	46010	B3 BA
04 – 07	Value to write in register 1 and 2	123.5	42 F7 00 00
08 – 15	Write registers 3 – 6.	—	—

Example 2: Setting ‘Scale 1:Preset tare value’ to 123.5 (Write to integer value register).

1. Make sure that the previous command was not 251.
   Set command byte (00) to 0 if previous command was 251.
2. Set number of registers (3) to write in byte 01.
3. Set start address (42010) in bytes 02 and 03.
   See chapter ‘Communication – Modbus protocol – General registers’.
4. Set the following four bytes (04 – 07) to the value to write 123.50,
   i.e. 12350 and two decimals.
5. Set bytes 08 and 09 to number of decimals. In this example is 2 decimals used.
6. Enter the command (251) in byte 00.

Byte	Description	Dec	Hex
00	Command	251	FB
01	Number of registers to write	3	03
02 – 03	Start address	42010	A4 1A
04 – 07	Value to write in register 1 and 2	12350	00 00 30 3E
08 – 09	Value to write to register 3	2	00 02
10 – 15	Write registers 4 – 6.	—	—

Example 3: Set read window to read from Scale 4 floating point data (registers 44074 to 44085). Note that the number of registers read is always 12.

1. Make sure that the previous command was not 250.
   Set command byte (00) to 0 if previous command was 250.
2. Set start address (44074) in bytes 02 and 03.
   See chapter 'Communication – Modbus protocol – General registers'.
3. Enter the command (250) in byte 00.

Byte	Description	Dec	Hex
00	Command	250	FA
01	Number of registers to write	—	—
02 – 03	Start address	44074	AC 2A
04 – 15	Write registers 1 – 6.	—	—

Example 4: Reset the 'Program reset' bit in 'Instrument status'.

1. Make sure that the previous command was not 252.
2. Enter the command (252) in byte 00.

Byte	Description	Dec	Hex
00	Command	252	FC
01	Number of registers to write	—	—
02 – 03	Start address	—	—
04 – 15	Write registers 1 – 6.	—	—

Example 5: Other commands like Taring, Zeroing etc.
See chapter 'Communication – Modbus protocol – Command register' for a list of available commands.

1. Make sure that the previous command was not the desired command.
2. Enter the desired command in byte 00.

Byte	Description	Dec	Hex
00	Command	XXX	XX
01	Number of registers to write	—	—
02 – 03	Start address	—	—
04 – 15	Write registers 1 – 6.	—	—

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

External display

General

Up to 8 addressable displays can be controlled from the Serial port of a G6 instrument. To enable the functionality for external display the set-up parameter 'Mode' under 'Serial Com.' shall be set to 'External Display'. Note that the RD-10 display is not addressable and therefore can only one RD-10 be used.

Communication format RD-10

The serial output for display type RD-10 can be configured to show gross weight, net weight or displayed weight but under the following conditions only 'dashes' (------) are displayed:

- The number of digits in the transmitted weight value is outside the display range.
- The instrument is not in normal state or there is a weight error.

Definition of weight value to external display type RD-10' with 6 digits:

Character No.	**Value Alphanumeric**	**Value Hex**	**Function**
1	1, 2	31, 32	Always 1 unless the weight value is negative and includes NO decimal point in which case the value is 2.
2 to 8	0 – 9, . , -,space	30 – 39, 2E, 2D,20	Weight value */ 7 characters with the weight value incl. polarity and decimal point. Polarity occupies a position in the display, while the decimal point do not occupy any position. This means that positive numbers can be displayed with 6 digits (with or without decimal point), while negative numbers can be displayed with 5 digits. If there is an error the follow string will be sent: '␣ – – – – – –', a space + 6 dashes
Last		0D	End character (CR).

Note: */ Leading zeros will be added to fill up to the selected number of digits.
The decimal point does not occupy any digit position.

Communication format LONDON 4 to LONDON 7

The serial output for display type LONDON can be configured to show gross weight, net weight or displayed weight but under the following conditions only 'dashes' (------) are displayed.

- The number of digits in the transmitted weight value is outside the display range.
- The instrument is not in normal state or there is a weight error.

Note. Appropriate time out value should be set to the external display(s).

Definition of weight value to external display LONDON with 4, 5, 6, 7 digits:

Character No.	**Value alphanumeric.**	**Value Hex**	**Function**
1		03	End of text character (ETX).
2		02	Start character (STX).
3 – 4	1 - 8	31 - 38	Address (2 signs) Extern Display 1 gets address 01. Extern Display 2 gets address 02. … Extern Display 8 gets address 08.
5 to 8 – 12	0 – 9, . , -, space	30 – 39,2E, 2D, 20	Weight value */ 4 to 7 digits and a possible decimal point. (The first digit may be a minus sign). To show dashes the following strings are sent: LONDON 4: '␣ – – ␣' LONDON 5: '␣ – – – ␣' LONDON 6: '␣ – – – – ␣' LONDON 7: '␣ – – – – – ␣'
		0D	End character (CR).
Last		03	End of text character (ETX).

Note: */ Leading zeros will be added to fill up to the selected number of digits.
The decimal point does not occupy any digit position.

Important settings for LONDON Easy Reader Model ER2S

Function	Setting
Time-out	t.o.3
EJECT data	EJ.00
DISPLAY	DSP.4
Termination character	C.r.0d
Address	01 to 08

Important settings for London S17xx

Function	Setting
Configuration	CFg 2
Idle time	IdL 10
Address	01 to 08

Important settings for LONDON FUSION-S6 digit version, and INTUTIVE-S Mk.2

Function	Setting
Displayed data length	D.LEN.00
Decimal point position	0
End Character setting	E.CHR.03
Start Character setting	S.CHR.02
Termination Character	T.CHR.00
Timeout setting	TO.03
Address	01 to 08

Note: In some cases, the displays can be somewhat slow which could result in a timeout which results in the display showing '----'. This can usually be solved by added a 2.2kΩ resistor between the 'T-' and '0V' in the RS485 connector.

7. Remote Access

General

Using a PC with a Web Browser, like Microsoft Edge, it is possible to get access to the instrument set-up and maintenance functions. It is also possible to see a Live View of the instrument display with limited functionality. The PC can be connected to the same network as the instrument, or directly with an Ethernet cable.

Before connecting any instrument to an existing network it should be configured according to the network requirements. Note that the ‘Network Configuration’ menu is only available with the local user interface on the instrument and not via remote access. The ‘Network Configuration’ menu is found in ‘Main Menu’. Under ‘Network Configuration’ menu is the ‘Server Configuration’ menu found where the Web Server can be enabled (default) or disabled. Also the password can be set here.

The remote access interface of the G6 instrument is intended to facilitate the set-up and maintenance work with the instrument. During e.g. commissioning, it will make it possible to have the PC close to the equipment when the instrument is placed away from the equipment. It is possible to access several instruments that are connected to the same network from one location for set-up, diagnostics etc. It is also possible to access instruments over Internet for e.g. remote diagnostics provided that the network allows remote access e.g. using VPN (Virtual Private Network). This requires specific security measures that is the responsibility of the user/network administrator.

Note that the remote access is not intended as an operator interface although it is possible to enter Live View (see section ‘Live View’). If a remote operator interface is desired, the Modbus TCP (Ethernet), Modbus RTU (serial com.), EtherNet/IP (Ethernet) and the Fieldbus interfaces are recommended.

Browser requirements

The Remote Access interface has been tested primarily with Microsoft Edge and Google Chrome browsers. It will probably work with many other browsers but browsers tend to behave differently and some functionality may work or look differently in other browsers. If any problems are encountered please try Microsoft Edge.

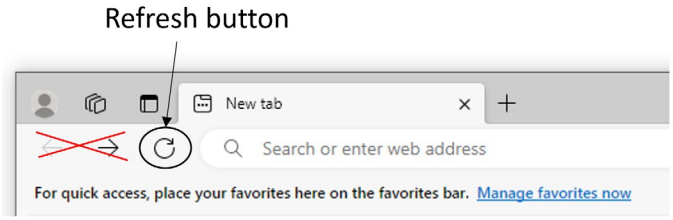
Using the Remote Access

To navigate in the menu system a mouse, touch pad, pointing stick etc. must be used. The keyboard cannot be used for navigation. Hovering with the mouse pointer over a selection in a menu will highlight the item and clicking will open the next menu level or allow for a parameter to be edited. The keyboard is only used when entering values like numbers or texts. The mouse is used to select between parameter choices during set-up.

When moving back (up) in the menu system use the ‘Escape’ button on the screen and not the back button of the browser. This is because browsers commonly caches pages in the PC. Since the pages from the Instrument are dynamic i.e. have a content that is depending on the actual settings a cached page cannot be used. The instrument also keeps track of the currently displayed page (current state) of the menu system and does not allow for multiple pages being displayed simultaneously on different browsers or tabs. If there is any problem with a page or a page is suspected to be cached and

not fresh from the instrument just refresh the page by clicking the refresh button or F5. This will refresh the entire page.

Browser also needs to be refresh after a restart of the instrument. The G6 instrument restarts after a hardware configuration exit, when default values are set, a backup is restored or if it is forced to restart from menu system. A restart takes approximately 20 seconds and reconnects after a refresh of web browser. It is also possible to close the web browser and reconnect when it has restarted.



Refresh button, back and forward buttons not used

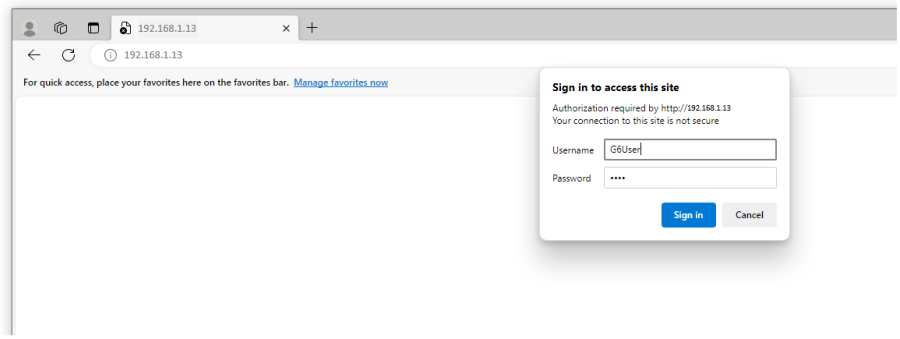
Security

The internal Web Server and Ftp Server use basic authentication that will keep the user ID and password hidden from the average computer user. It will however not provide a secure connection, no encryption etc. It is possible with some simple equipment and knowledge to find out the user ID and password. It is therefore strongly suggested that the set-up and operator locks, in the instrument, are used. It is also recommended to use the login protection on the used PC and also log out while not in use.

Using the instrument connected to the Internet will require specific security measures that are the responsibility of the user/network administrator.

Remote Access Login and Logout

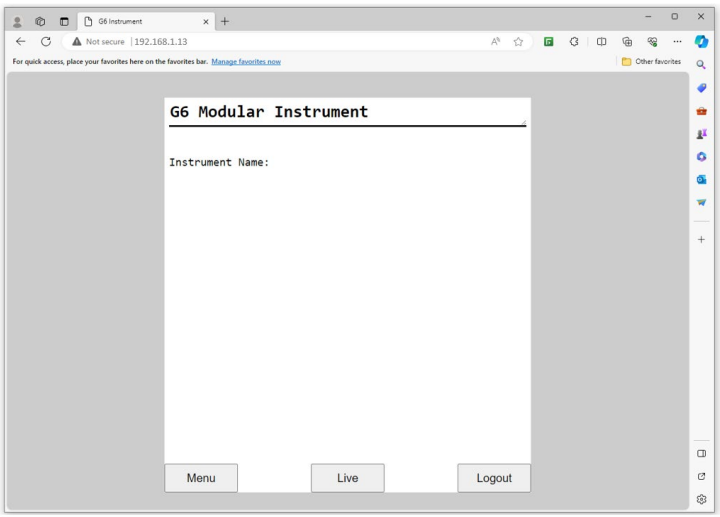
Entering the IP Address of the desired instrument in the address field of the browser will have the instrument Web Server presenting the login form, see the picture below.



Login form

The user ID is always ‘G6User’ (case sensitive) and the password is by default ‘1937’. It is possible to change the password in the ‘Main Menu / Network Configuration / Server Configuration’ menu. Note that the same password (and user ID) also applies to the Ftp Server.

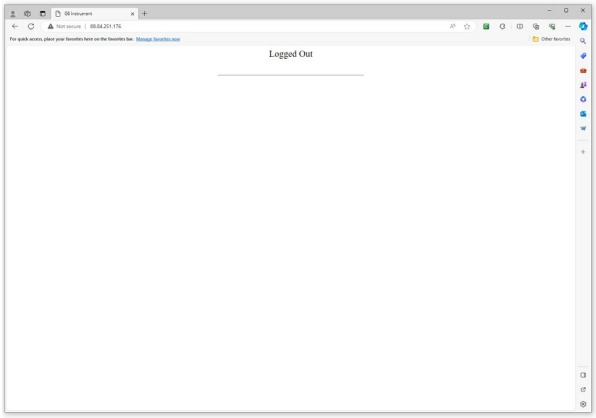
When the correct login credentials are entered the entry screen will be displayed. This picture will show the Instrument Name (if set) or possible start up errors (serious and fatal errors). Any errors shown here must normally be corrected from the instrument and not through remote access. If the start mode of the instrument is ‘Command’ this will be shown on the entry screen. Note that the start command must be given from the instrument front panel or by communication, not from the Remote Access. It is possible to access the menu system even if the instrument is waiting for a manual start command.



Entry screen

Three buttons are available on the Entry Screen. One is the ‘Menu’ button, which will give access to the menu system of the instrument. Clicking the ‘Menu’ button is equivalent to pressing the ‘Info’ button on the instrument front panel. The second button gives access to a live view of the instrument.

The last button on the Entry Screen is the ‘Logout’ button. Clicking the ‘Logout’ button will logout the user and display the picture shown below.

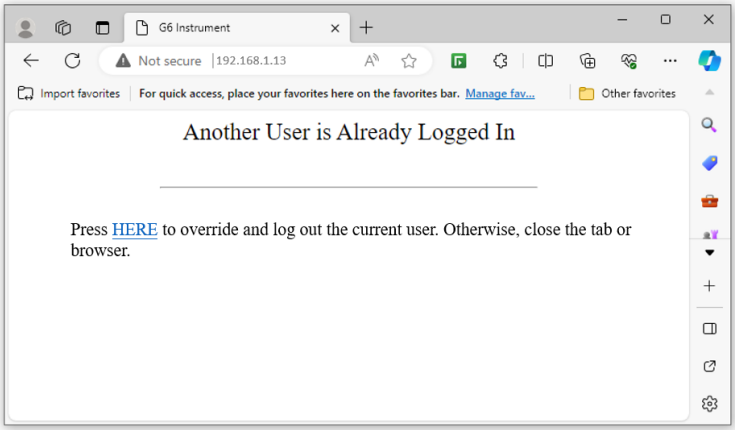


Logged out screen

Note that the browser may save the login credentials which then are proposed as default next time the user tries to login to the same unit.

When a remote access session is finished the user should log out from the entry screen before closing the browser. Also see ‘Remote / Local Access’ below.

If one user is using the Remote Access when another user tries to login he will be presented an override page provided login is accepted. To continue and logout the current user click the ‘HERE’ text (link). The overriding user will continue at the same position in the menu system as the old user was. The override function is intended to give a new user a warning not to interfere with another Remote Access user unconscious. Note that if a user has been idle for 30 min he will be logged out automatically. Next user to log in will continue from the same position in the menu system. Note that if a new user is login in from the same IP-address, an override will occur without an override page.



Override screen

Remote / Local Access

It is possible to access the menu system both locally and remotely simultaneously. It is however not possible to edit from more than one interface at a time. The first to start edit any parameter will get exclusive access to parameter editing. This also applies to e.g. maintenance functions. To release the exclusive access the user must navigate out of the menu system i.e. exit the ‘Main Menu’ level.

When a remote access session is finished the user should log out from the entry screen before closing the browser, unless intending to continue, to avoid holding the exclusive access rights, which will block a local user from editing parameters or using some maintenance functions. Note that the blocking also will occur in the opposite direction.

To resolve such a blocking situation without being able to access the blocking interface it is possible to restart the instrument using the ‘Instrument Restart’ function that can be found in the ‘Maintenance’ menu. This function must be used with caution since it will interrupt all instrument functions while restarting the instrument. Also note that if the ‘Start Mode’ is set to ‘Command’ the instrument will wait at start-up for a start command from the instrument front panel or via communication.

There are a few differences between local and remote access. From the Remote Access Interface it is not possible to do Program Upgrade (Maintenance) or Network Configuration (Main Menu). All other functionality is available.

Remote Set-up

All operating functions in the G6 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 from a browser when connected and logged in to 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.

WARNING

Changes done during editing of set-up parameters will affect the behavior of the instrument immediately. The user must take all necessary precautions to prevent any undesired effects in the process monitored or controlled by the G6 instrument or a connected control system.

It is strongly recommended to activate the set-up lock in the instrument to prevent any unauthorized changes of set-up parameters.

It’s a good practice to make a backup of the set-up after changes have been done. See section ‘Maintenance’ in this chapter for more information on backup and restore.

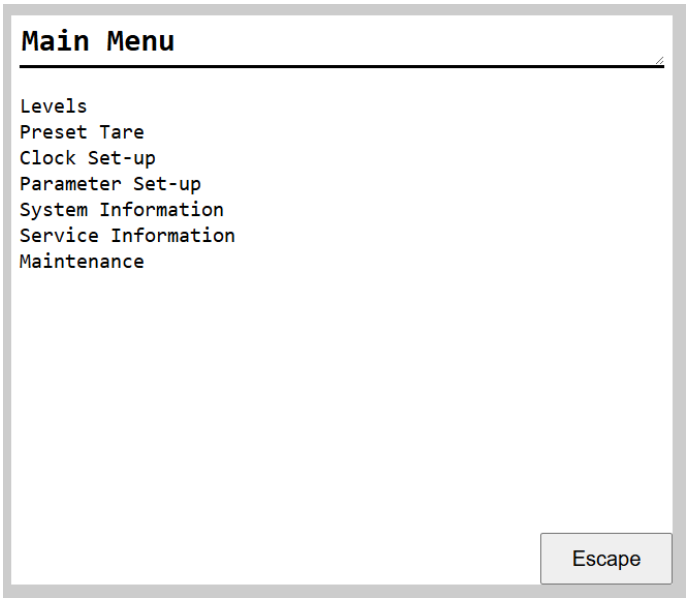
Set-up Parameters

For a description of the menu structure and the set-up parameters available with the Remote Access Interface as well as locally on the instrument see chapters ’Set-up/Menu Structure’ and ‘Set-up/Parameters’ in this manual.

Main Menu

To reach the main menu the user first has to connect to the instrument by entering the IP Address and then (if required) entering the login user ID (G6User) and the password (default 1937, possible to change). This will display the Entry Screen and by clicking the ‘Menu’ button the Main Menu will be displayed.

To open a menu, e.g. Parameter Set-up, simply click on the desired menu.

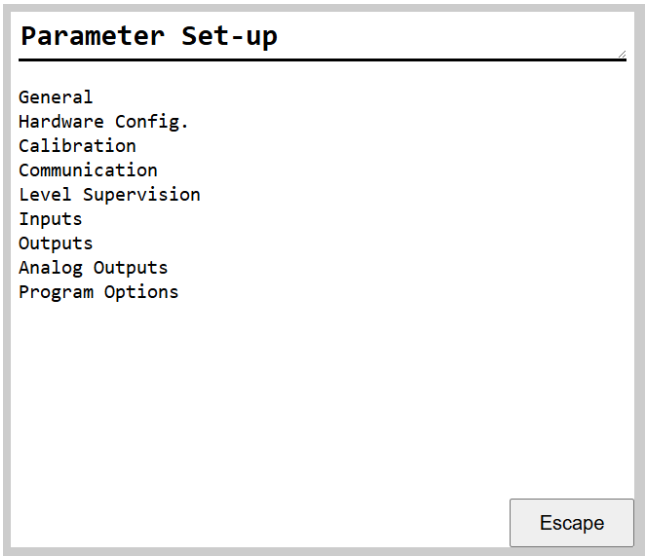


Main menu screen

Parameter Set-up menu

If there isn't room for all parameters on screen, it is possible to scroll through the list with the scroll bar at the right of the screen.

Click the 'Escape' button (on the screen) to return to the Main Menu. The 'Escape' button is always used to cancel editing or moving backwards in the menu structure.



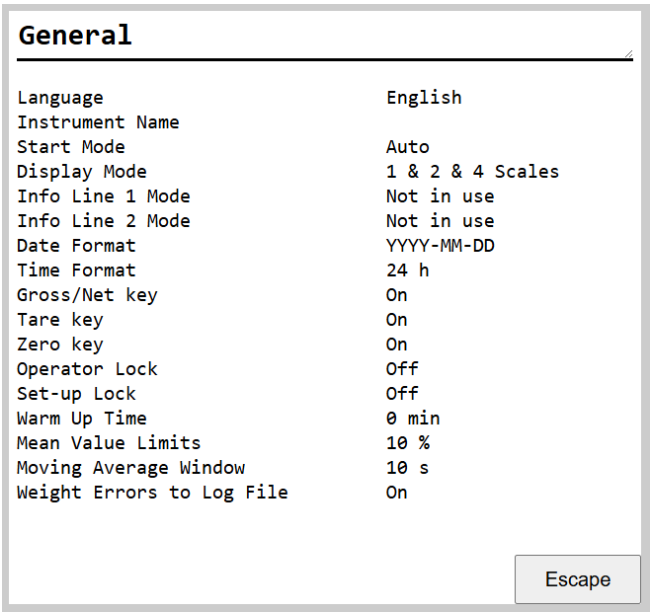
Parameter set-up screen

Parameter editing

This example shows the 'General' parameter menu but editing is done similar throughout the menu system.

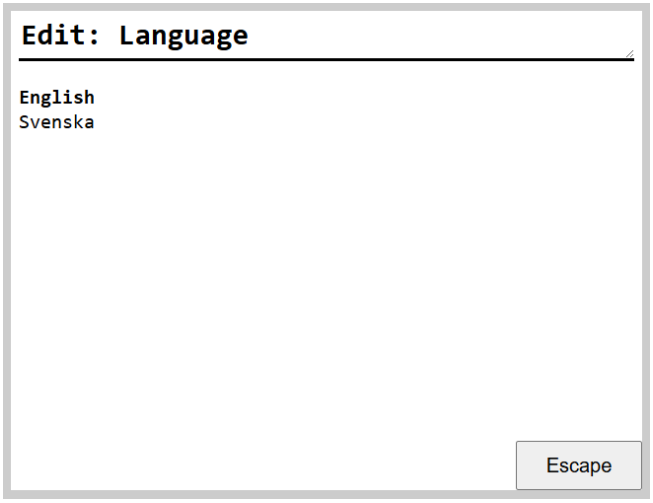
To edit a parameter, simply click on it.

If all items in the menu don't fit on the screen, it is possible to scroll through the list of parameters using the scroll bar at the right of the screen. Click the 'Escape' key to return to the Parameter set-up menu.



General parameters screen

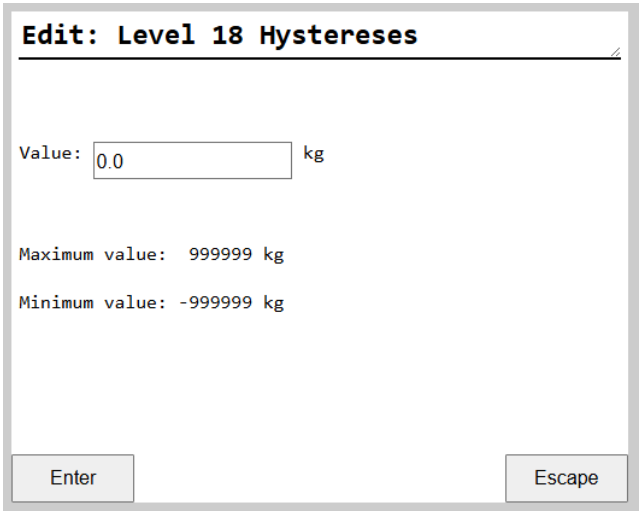
When editing a choice parameter e.g. language as in the figure, a list of available choices is show on screen with the current selection is shown in bold. To change the current selection click on the desired selection. To abort editing and keep the previous setting, click the ‘Escape’ button on the screen. When a selection is made in the editing (new or current) the editing screen is closed and the previous menu is shown.



Editing a choice parameter

When editing a numerical parameter e.g. a level hysteresis setting as in the figure, the new value should be typed with the keyboard numerical keys. To confirm the new value click the ‘Enter’ button on the screen.

To abort editing and keep the previous setting, click the ‘Escape’ button.



Editing a value parameter

Remote Access Maintenance

General

The Maintenance menu includes several functions used for diagnostics and maintenance purposes. The Maintenance menu is found under the Main menu.

All maintenance functions of the instrument are available from the Remote Access Interface except the ‘Program Upgrade’ and ‘File Handling’. Upgrading the program in the instrument must be done directly on the instrument itself. For file handling, it is recommended to use FTP, see chapter ‘Communication – Ftp Server and file handling’. The diagnostics communication screen only shows actual settings of the communication interfaces and not indicating active communication as the display on the instrument.

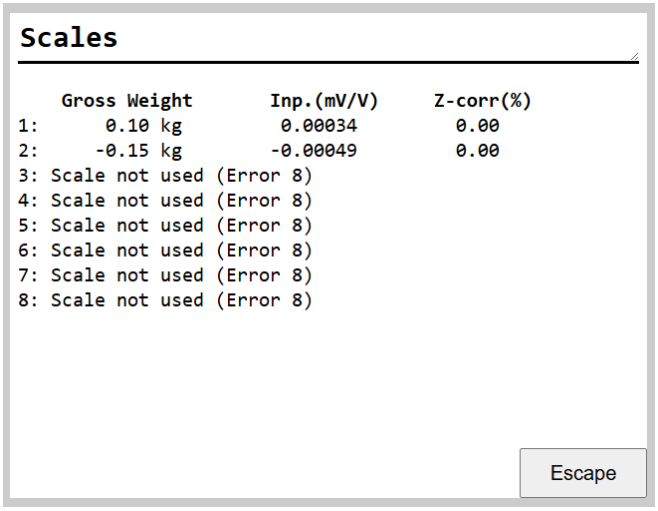
Diagnostics

The diagnostics functions cover Scales, Communication, Fieldbus, EtherNet/IP, Digital Inputs, Digital Outputs and Analog Outputs. It is possible to read data and status for the different functions and also in some cases (Digital and Analog outputs) change the output data. If the normal operation has been interrupted (a value or output changed) in a diagnostics menu then the operator will be asked if the diagnostics mode shall be reset when the menu is left. Outputs are always set to normal mode after instrument restart and power up.

Scales

Shows detailed information about all Scales. For each scale is the live gross weight, the live input signal and the current zero correction value displayed.

Note that the live gross weight is shown with one decimal more than selected in the set-up of the scale. At least one decimal is always shown. The input signal is always shown with 5 decimals and the zero correction value is shown as percent of scale capacity with 2 decimals.



Scales diagnostics

The zero correction is set when the scale is zeroed using the front panel zero button or with zeroing command on communication. The zero tracking and the Auto Zero functions also work on the zero correction value. The zero correction value is reset (set to 0) when starting a new calibration or when selecting default set-up.

Unused scales and scales with an error will display an error message instead of the gross weight, input signal and zero correction value.

The values on screen are automatically updated every 2 seconds.

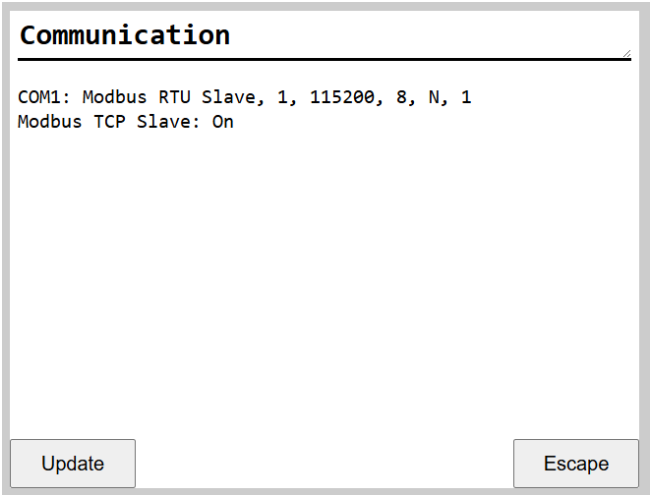
Communication

Shows status for the serial port and the Modbus TCP Slave.

The serial port can be ‘Not In Use’, ‘Modbus RTU Slave’ or ‘External Display’. In the example below it is in Modbus RTU Slave mode with address 1, 115200 baud, 8 data bits, no parity and 1 stop bit.

The Modbus TCP Slave is either On or Off.

The communications screen is not updated automatically. Click the ‘Update’ button to refresh the page.



Communication diagnostics

Fieldbus

Shows the fieldbus type, address and status of the optional Fieldbus interface.

It also gives the possibility to study the contents in selected parts of the instrument memory (data to and from the fieldbus master). The function is very useful for advanced fault finding in case of problems with the fieldbus communication.

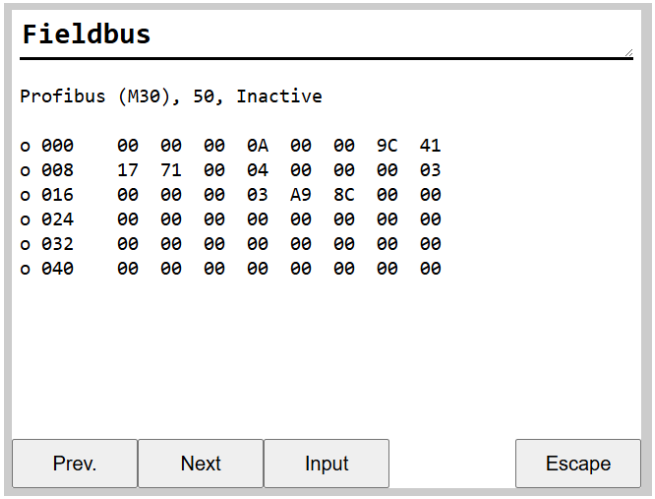
The contents of the output memory (data **to** the fieldbus master) are displayed in hexadecimal form at the six lines of the display. On each line eight byte values are displayed, preceded by 'o' for output and the address of the first byte.

The contents of the input memory (data **from** the fieldbus master) are displayed in hexadecimal form at the six lines of the display. On each line eight byte values are displayed, preceded by 'i' for input and the address of the first byte.

Buttons ‘Prev.’ and ‘Next’ are used to step in the memory.

Use button ‘Input’/’Output’ to change between display of output and input memory.

See chapter ‘Communication’ section ‘Fieldbus interface’ for details on fieldbus data mapping. Data on the screen is updated automatically every 2 seconds.



Fieldbus diagnostics

EtherNet/IP

This screen gives the possibility to study the contents in used instances (data to or from the scanner). The function is very useful for advanced fault finding in case of problems with the communication. For more details, see ‘EtherNet/IP Program Option’ ‘Technical Manual Supplement’.

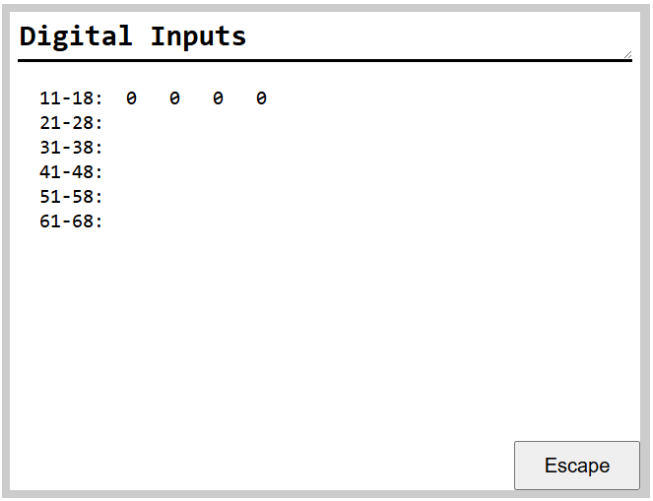
Digital Inputs

Shows the status of all installed digital inputs.

Digital inputs are numbered 11 – 68. Each row corresponds to a slot. Only the currently available inputs in each slot are shown.

The first field on each line is the input numbers for the line and the following digits indicates status of the inputs. A ‘0’ indicates that the input is passive and a ‘1’ means that the input is active.

The screen is automatically updated every 2 seconds.



Digital Inputs diagnostics

Digital Outputs

Shows the status of all installed digital outputs. It is also possible to change the status of the digital outputs.

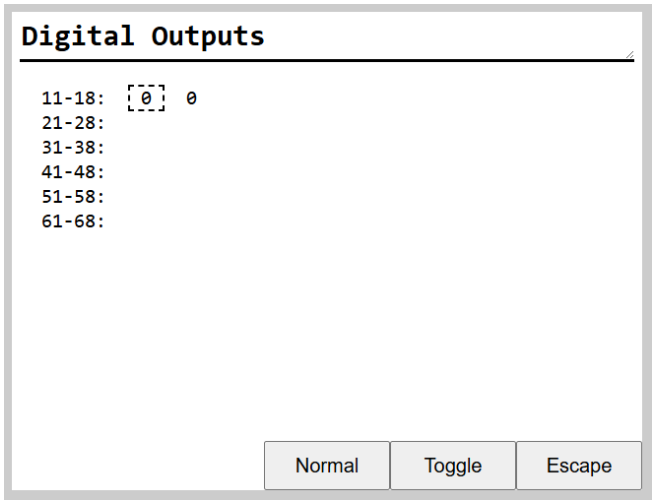
Digital outputs are numbered 11 – 68. Each row corresponds to a slot. Only the currently available outputs in each slot are shown.

The first field on each line is the outputs numbers for the line and the following digits indicates status of the outputs. A ‘0’ indicates that the output is passive and a ‘1’ means that the output is active.

An output is selected by clicking with the mouse on the desired output. A dashed frame around the digit in the symbol indicates a selected output.

Press ’Toggle’ to force the selected output. The first time the button is clicked will set the output in diagnostics mode keeping the current state. Each time the ’Toggle’ button is clicked while in diagnostics mode will toggle the output. To restore the output to normal operation click ‘Normal’ button. An output in diagnostics mode (manually forced to a state) is marked with a grey background.

The screen is automatically updated every 2 seconds.



Digital Outputs diagnostics

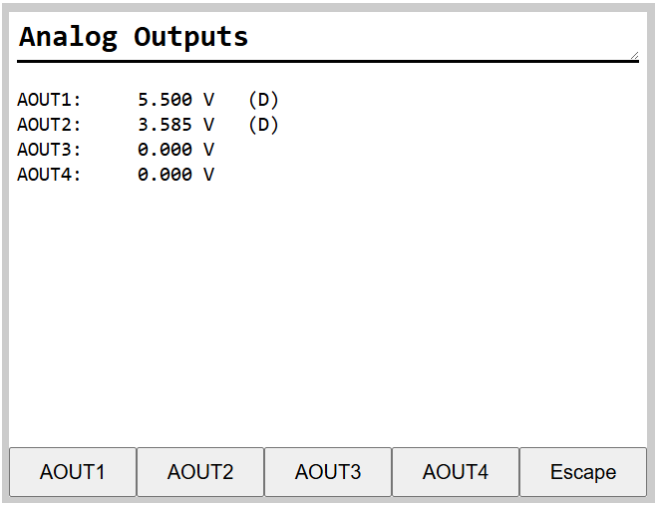
Analog Outputs

Shows the output value or a possible error message for installed analog outputs.

It is also possible to override the normal operation and set the output value for each analog output. To change an output value click the button marked with the output number and enter wanted value. To restore an output to normal operation, click the corresponding button ‘AOUT1’ – ‘AOUT4’ and then click the button ‘Normal’.

A ’(D)’ at the end of a line indicates that the output is manually set (in diagnose mode).

The screen is automatically updated every 2 seconds.



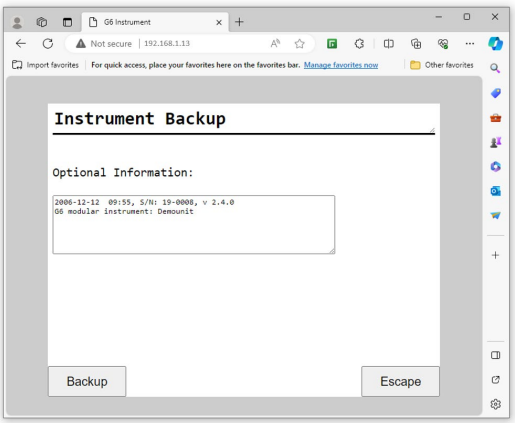
Analog Outputs diagnostics

Create Backup

Parameter values are stored in a file that can be used to restore to same or other instruments of the same type. The back-up file will be saved on the PC. The file name can be edited. Note that additional information, which is saved in the backup file, can be added before the backup file is created.

Using the Create backup requires either a Set-up Code or an Operator Code if a lock is activated.

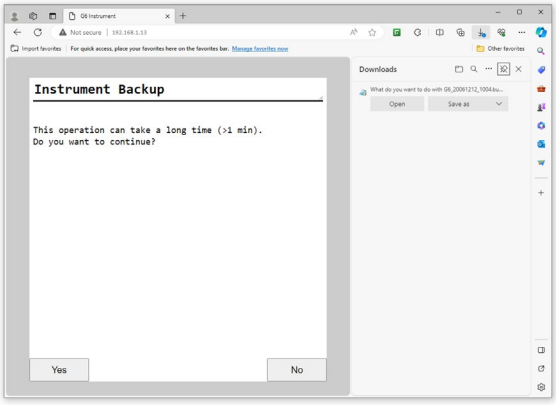
After entering a possible Code the Optional Information screen is displayed. Here it is possible to add more and/or change the default information in the text box.



Optional Information screen

When satisfied with the Optional Information the user should click the ‘Backup’ button to continue. The user will then be shown a warning message that says that the backup procedure can take more than a minute to perform.

Clicking the ‘Yes’ button will start the backup procedure and when the backup is done, it is possible to open/save the file. How to download or open the file will vary depending on the browser and its settings and the image below shows one example.



Open/Store file screen (example)

When the file has been opened or saved, click the ‘No’ button to leave the backup screen.

Restore Backup

Restoring a previously stored parameter backup to the instrument. Any additional information in the backup file is displayed before a backup file is restored. Backup files are fetched from the PC. Using the Restore Backup requires either a Set-up Code or an Operator Code if a lock is activated.

After entering a possible Code a file selection screen is displayed. Clicking the 'Browse…' button will display a file selection popup window. Chose the desired backup file and click the 'Open' button. The chosen file name is shown on the screen. Click 'Next' button to continue the restore procedure.

After a short delay the optional information for the selected backup file is displayed. Verify that the backup file is the desired and click the 'Restore' button. The user will then be shown a warning message that says that the restore procedure will take a long time to perform. Click the 'Yes' button to perform the restore. The connection with the instrument will be lost. When the restore is finished within the instrument it will automatically restart. Thereafter it will be possible to reconnect to the instrument e.g. by refreshing the page.

Set Default Values

Restore of the instrument settings to the default values that can be found in the Technical manual. Note that default values may differ from the setting that where in the instrument at delivery.

All Zero correction values and Tare values will be set to zero when executing a default set-up, but the Service Information will not be affected.

After entering a possible Code a warning message is displayed. Click the 'Yes' button to perform the default set-up. The default set-up procedure will take some time and the connection with the instrument will be lost. When the default set-up is finished the instrument it will automatically restart. Thereafter it will be possible to reconnect to the instrument e.g. by refreshing the page.

Clear Service Information

Save and then clear (delete) all service information in the instrument.

Instrument Restart

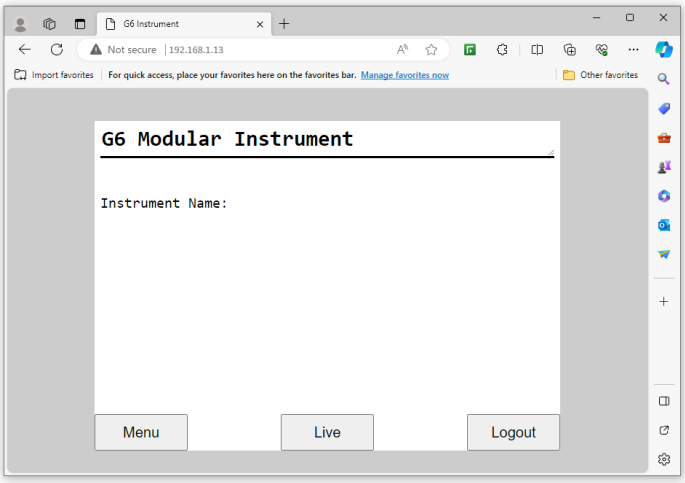
With the Instrument Restart function it is possible to force the instrument to make complete restart (corresponding to a power down – power up cycle). This must be used with great caution especially if done from a remote position. The user must make sure that no hazardous situation will occur.

To use the Instrument Restart function requires either a Set-up Code or an Operator Code if a lock is activated.

Note that the Instrument Restart function can be used even if a local user has exclusive access to parameter editing or maintenance functions. The purpose of this is to be able to resolve a blocking between local and remote user.
When the user have selected the Instrument Restart function and entered a possible Code he will be asked: 'Restart Instrument?' If clicking Yes a warning message is displayed. Clicking Yes will make the instrument restart. When the instrument is restarting, the browser will lose the connection with the instrument. The browser will display an error message that the connection has failed.
A restart will normally take about 20 seconds. When the instrument has restarted, it will be possible to reconnect to the instrument e.g. by refreshing the page.

Live View

On the entry screen, the button ‘Live’ will give access to a Live View of the instrument.



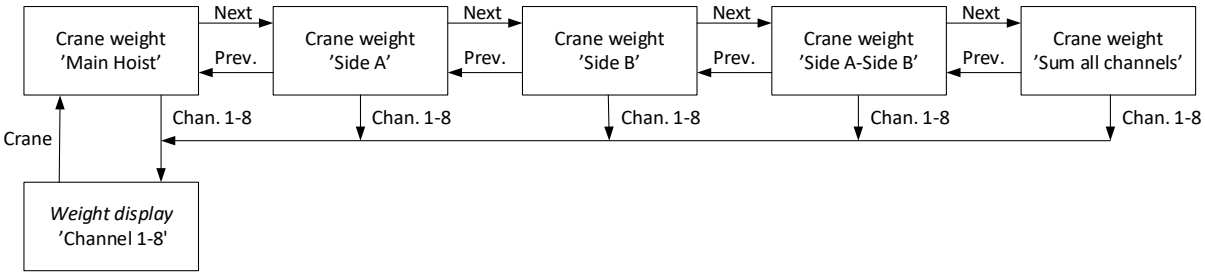
Entry screen with the Live button

Display alternatives at Remote Access

The Live View will start up showing the ‘Main Hoist’ window, where the sum of channels in the Main Hoist is displayed, with both gross and net value.

From here it is possible to navigate between the available Crane weight windows and the weight windows for separate scales (channels).

See figure below.



Navigation between available weight displays

When the ‘StartMean’ or ‘StopMean’ button is pressed, while any of the weight windows is displayed, the mean value calculation is started or stopped. See section ‘Mean Value Calculation’ for a description of the mean value function.

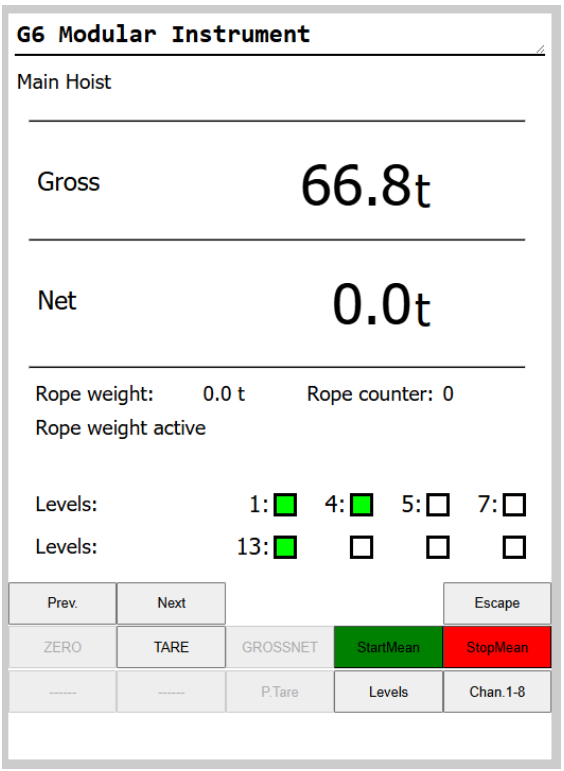
If a program option is **enabled** in demo mode there will be an indication (*DEMO*) in the upper line of the ‘Main Hoist’ weight display and the ‘Channel 1-8’ weight display.

Crane weight windows

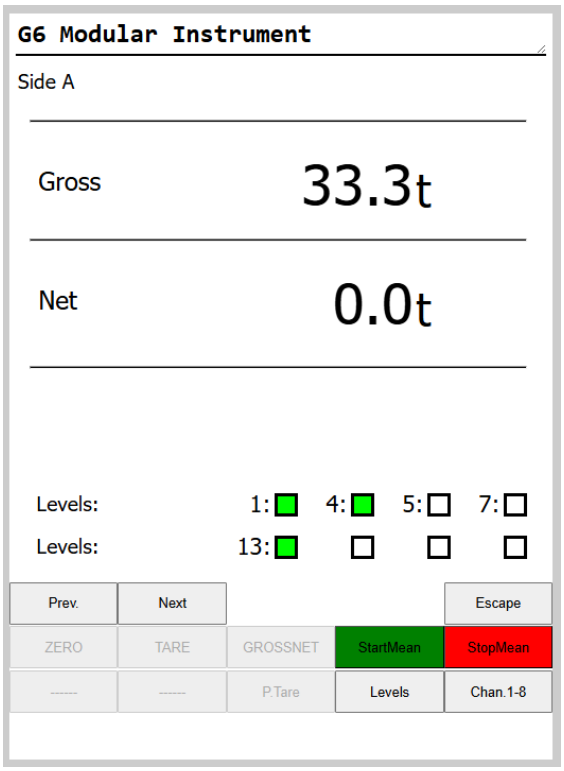
It is possible to use the Prev and Next buttons to scroll through the different display options such as displaying ‘Main Hoist, ‘Side A’, ‘Side B’, Side A – Side B’ or displaying ‘Sum All Channels’ (including all channels/scales connected to the instrument and not just to the Main Hoist).

The Main Hoist weight is the sum of all channels (scales) included in the Main Hoist with any corrections. The correction of the Main Hoist weight can be ‘Rope Weight Compensation’ and/or ‘Main Hoist weight adjustment’.

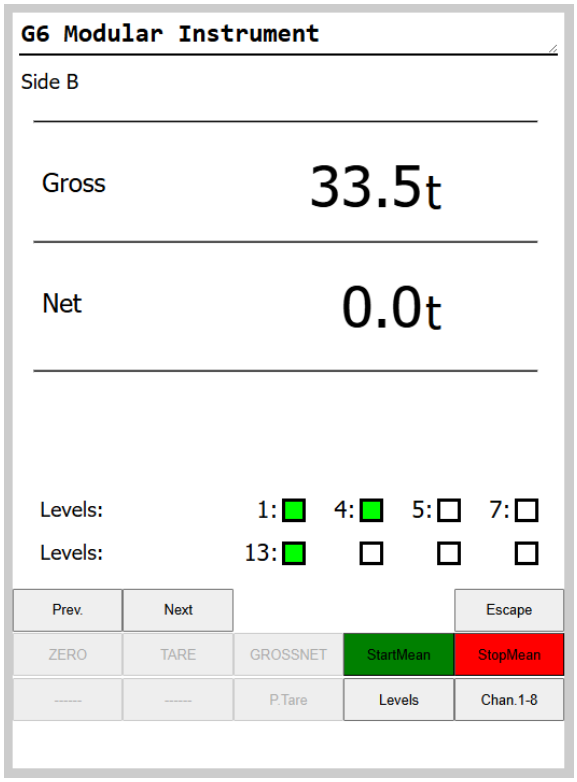
All other crane weights are based on the channels (scales) weights without any corrections.



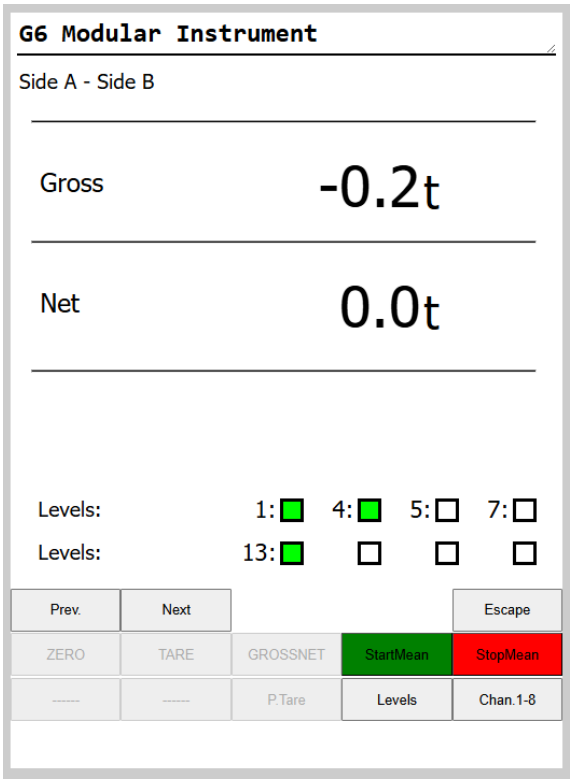
Main Hoist weight display when ‘Rope weight compensation’ is On



Side A weight display



Side B weight display



Side A – Side B weight display

All these windows shows both gross and net value.

For both weight values (gross and net) there are also an indicator for 'Motion'.

When the 'TARE' button is pressed while the 'Main Hoist' window is displayed, a tare command is sent to all channels included in the Main Hoist. If all channels successfully perform a tare, this is indicated by the net weight going to zero.

Below the weight values, 'Rope weight' and 'Rope counter' are displayed if 'Rope weight compensation' is On.

Then there are two message lines used to display various messages to the operator.

Up to eight level output status indicators may be displayed. Which level indicators are to be displayed in each window are selected with the 'Level X Display Indicator' parameter for each level function.
The indicators show the level number and the level output status of a possible configured digital output. A green square indicates an active digital output.

Button functions:

Prev.: Show previous crane weight.

Next: Show next crane weight.

Escape: Leave 'Live View'.

TARE: Tare the Main Hoist (only if Main Hoist is shown)

Levels: Shows the level values of the level supervisors for all scales.

Chan 1-8: Switch to the 'Channel 1-8' weight display.

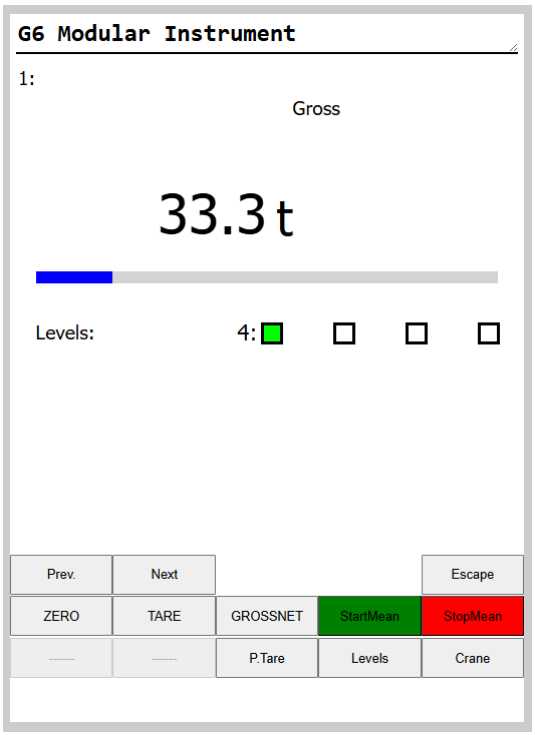
Weight display Channel 1-8

In the weight display for Channel 1-8 it is possible to view weight information for one scale at the time.

Using the Zero or Tare button will issue a warning text that the summarized weights (crane weights) will be affected and gives the operator a choice to continue or cancel the function.

If the selected channel (scale) is included in the Main Hoist with rope compensation active, the crane must be in the 'Rope Calibration Position' (digital input 23 active) to use the zero function.

If a name has been entered in parameter 'X:Scale Name' it will be shown instead of the text '1:' in the weight display.



Weight display Channel 1-8

Gross weight is continuously shown in form of a graphic bar below the weight. Maximum length of the bar corresponds to the set Capacity of the scale.

Below the gross weight bar there are level output status indicators for the first four configured level functions for the scale. They show the level number and the level output status of a possible configured digital output. A green square indicates an active digital output.

It is also possible to show selected information below the level output indicators. See set-up parameter 'Info Line X Mode'.

Button functions:

Prev.: Show previous scale.

Next: Show next scale.

Escape: Leave 'Live View'.

ZERO: Zero the scale.

TARE: Tare the scale.
GROSSNET: Toggling between display of Gross weight and net weight for the scale.
P. Tare: Shows and setting the (manual) preset tare for the scale.
Levels: Shows the level values of the level supervisors for scale.
Crane: Switch to the ‘Main Hoist’ weight display.

8. Maintenance

General

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

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

Diagnostics

The diagnostics functions cover Scales, Communication, Fieldbus, EtherNet/IP, Digital Inputs, Digital Outputs and Analog Outputs. It is possible to read data and status for the different functions and also in some cases (Digital and Analog outputs) change the output data. If the normal operation has been interrupted (a value or output changed) in a diagnostics menu then the operator will be asked if the diagnostics mode shall be reset when the menu is left. Outputs are always set to normal mode after instrument restart and power up.

Scales

Shows detailed information about all Scales. For each scale is the live gross weight, the live input signal and the current zero correction value displayed.

Note that the live gross weight is shown with one decimal more than selected in the set-up of the scale. At least one decimal is always shown. The input signal is always shown with 5 decimals and the zero correction value is shown as percent of scale capacity with 2 decimals.

The zero correction is set when the scale is zeroed using the front panel zero button or with zeroing command on communication. The zero tracking and the Auto Zero functions also work on the zero correction value. The zero correction value is reset (set to 0) when starting a new calibration or when selecting default set-up.

selecting default set-up or when upgrading (changing) the program.

Unused scales and scales with an error will display an error message instead of the gross weight, input signal and zero correction value.

Scales

	Gross Weight	Inp.(mV/V)	Z-corr(%)
1:	000.23 kg	0.00043	0.07
2:	098.23 kg	0.70406	1.22
3:	134.01 kg	2.00302	-0.77
4:	00.701 kg	0.05401	0.82
5:	876.23 kg	1.94329	0.61
6:	Scale not used (Error 8)		
7:	Scale not used (Error 8)		
8:	Scale not used (Error 8)		

Escape

Scales diagnostics

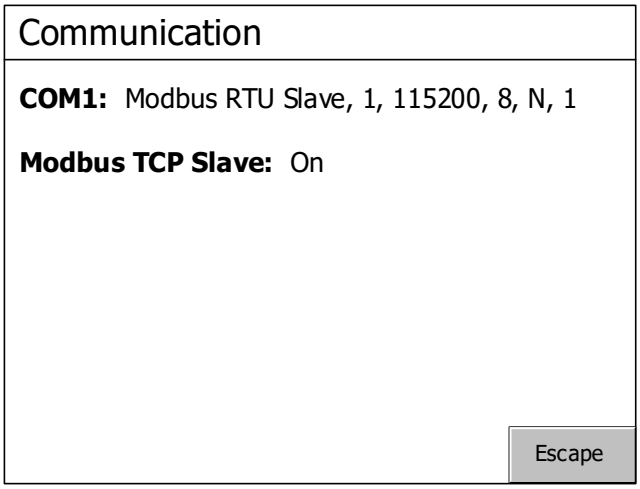
Communication

Shows status for the serial port and the Modbus TCP Slave.

When a correct message is received the corresponding header text will blink.

The serial port COM1 can be ‘Not In Use’, ‘Modbus RTU Slave’ or ‘External Display’. In the example below ‘COM1:’ is in Modbus RTU Slave mode with address 1, 115200 baud, 8 data bits, no parity and 1 stop bit.

The Modbus TCP Slave is either On or Off.



Communication diagnostics

Fieldbus

Shows the fieldbus type, address, and status of the optional Fieldbus interface.

It also gives the possibility to study the contents in selected parts of the instrument memory (data to and from the fieldbus master). The function is very useful for advanced fault finding in case of problems with the fieldbus communication.

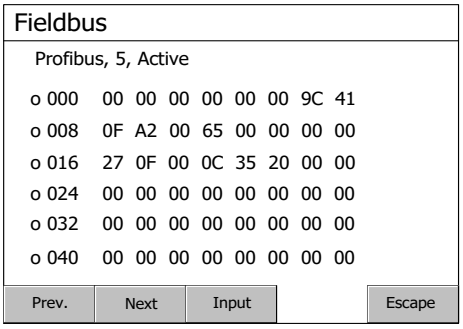
The contents of the output memory (data **to** the fieldbus master) are displayed in hexadecimal form at the six lines of the display. On each line eight byte values are displayed, preceded by 'o' for output and the address of the first byte.

The contents of the input memory (data **from** the fieldbus master) are displayed in hexadecimal form at the six lines of the display. On each line eight byte values are displayed, preceded by 'i' for input and the address of the first byte.

Keys F1 (Prev.) and F2 (Next) are used to step in the memory.

Use key F3 (Input/Output) to change between display of output and input memory.

See chapter ‘Communication’ section ‘Fieldbus Data Definitions’ for details on fieldbus data mapping.



Fieldbus diagnostics

EtherNet/IP

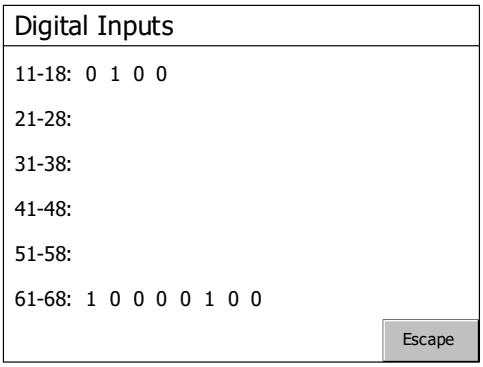
Shows the contents in used instances (data to or from the scanner). The function is very useful for advanced fault finding in case of problems with the communication. For more details, see ‘EtherNet/IP Program Option’ ‘Technical Manual Supplement’.

Digital Inputs

Shows the status of all installed digital inputs.

Digital inputs are numbered 11 – 68. Each row corresponds to a slot. Only the currently available inputs in each slot are shown.

The first field on each line is the input numbers for the line and the following digits indicates status of the inputs. A ‘0’ indicates that the input is passive and a ‘1’ means that the input is active.



Digital Inputs diagnostics

Digital Outputs

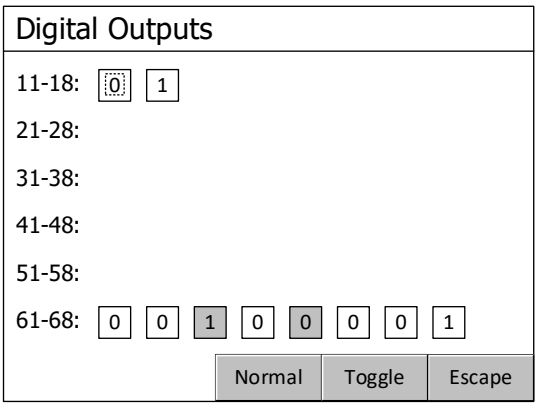
Shows the status of all installed digital outputs. It is also possible to change the status of the digital outputs.

Digital outputs are numbered 11 – 68. Each row corresponds to a slot. Only the currently available outputs in each slot are shown.

The first field on each line is the outputs numbers for the line and the following digits indicates status of the outputs. A ‘0’ indicates that the output is passive and a ‘1’ means that the output is active.

An output is selected by tapping on the wanted symbol on the screen or using the arrow keys. A dotted frame around the digit in the symbol indicates a selected output.

Press F4 (’Toggle’) to force the selected output. The first time the button is pressed will set the output in diagnostics mode keeping the current state. Each time the F4 (’Toggle’) button is pressed while in diagnostics mode will toggle the output. To restore the output to normal operation press F3 (‘Normal’). An output in diagnostics mode (manually forced to a state) is marked grey.



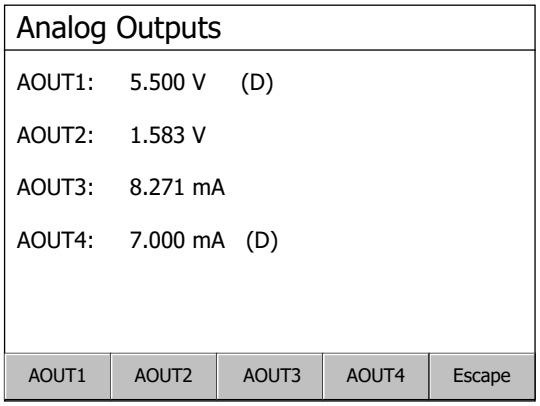
Digital Outputs diagnostics

Analog Outputs

Shows the output value or a possible error message for installed analog outputs.

It is also possible to override the normal operation and set the output value for each analog output. To change an output value press the function key marked with the output number and enter wanted value. To restore an output to normal operation, press the proper function key and then select the function key F3 (Normal).

A ’(D)’ at the end of a line indicates that the output is manually set (in diagnose mode).



Analog Outputs diagnostics

File Handling

File handling is used for copying, moving (renaming) and deleting files.

Files can be copied and moved between folders in the instrument and between a USB memory and the instrument (both to and from the USB memory). File can be renamed while coping or moving.

It is possible to delete files stored in the instrument and on a USB memory.

The File Handling can access the user area of the instrument flash file system. The user area consists of (by default) the ‘InstrBackup’, ‘LogFiles’, ‘Misc’, ‘Recipes’ and ‘ServiceInfo’ folders.

The ‘InstrBackup’ folder is used by default when creating backup files. The ‘LogFiles’ folder is used for storing event log files and ‘Service Info’ is used for storing service information files.

If there are problems with file copy or file move it might be because of insufficient memory. Try removing unnecessary files in the user tree.

Create Backup

Parameter values are stored in a file with extension ‘.bup’ that can be used to restore to same or other instruments of the same type. The data is also stored in a more readable file with extension ‘.bup.txt’.
The user can select to save the back-up files either in the instrument or on a connected USB memory. The file name can be edited. Note that additional information, which is saved in the backup file, can be given before the backup file is created.

At the same time the current Service Information is saved in folder ‘ServiceInfo’ in G6.

Restore Backup

Restoring a previously stored parameter backup to the instrument. Any additional information in the backup file is displayed before a backup file is restored. Backup files can be fetched from internal memory or from a USB memory.

Set Default

Restore of the instrument settings to the default values that can be found in the Technical manual. Note that default values may differs from the setting that where in the instrument at delivery.

All Zero correction values and Tare values will be set to zero when executing a default set-up, but the Service Information will not be affected.

Clear Service Information

Save and then clear (delete) all service information in the instrument.

Program Upgrade

Upgrading the program with a different version.

Upgrading is normally done from a USB memory. When upgrading the user is asked to select the version to upgrade to by selecting a file (Upgrade.txt) that is situated within the folder containing all files and folders necessary for program upgrade. When upgrading is done (a success message is displayed) the instrument will be restarted.

In case of failure when upgrading an error message will be displayed and the user will be given a possibility to recover from the failed upgrade. Corrupt files or malfunctioning USB memory are possible causes of upgrade failure.

Note that the folder containing the program upgrade must not be tampered with but always handled as a whole. Any changes are likely to make the upgrade worthless and making the instrument defective.

All data stored in non-volatile memory (service information, zero correction values, tare values, etc.) will retain their information during a program upgrade. If necessary, all data in the non-volatile memory can be erased by performing ‘Set Default’ and ‘Clear Service Information’ after the program upgrade.

Note that several MB of free internal flash disc memory is required to be able to perform a program upgrade. If the upgrade fails, due to file copy error, try to free some space in the ‘user tree’ area by using the ‘File Handling’ maintenance function to remove unnecessary files. It is also possible to use an ftp (File Transfer Protocol) client to access the user area from an external computer over an Ethernet connection. See chapter ‘Communication – Ftp Server and file handling’.

Instrument Restart

With the Instrument Restart function it is possible to force the instrument to make complete restart (corresponding to a power down – power up cycle). This must be used with great caution. The user must make sure that no hazardous situation will occur.

To use the Instrument Restart function requires either a Set-up Code or an Operator Code if a lock is activated.

Note that the Instrument Restart function can be used even if a remote user has exclusive access to parameter editing or maintenance functions. The purpose of this is to be able to resolve a blocking between local and remote user.

When the user have selected the Instrument Restart function and entered a possible Code he will be asked: ‘Restart the Instrument?’ If pressing the Yes button a warning message is displayed. Clicking Yes will make the instrument restart.

After some time, approximately 20 seconds, the instrument will be in operation again.

9. Troubleshooting

General

During installation and maintenance of the G6 Instrument, the sub menus ‘System Information’ and ‘Maintenance / Diagnostics’ can be useful for solving possible problems related to I/O modules, Ethernet, Serial Communication etc.

The instrument reports detected errors on the display. Error codes can also be read via communication.

When an error is detected for a scale, all digital outputs are set passive and the analog outputs are set to 0 V or 0 mA for outputs configured for that scale.

The output signal ‘In Process’ is set passive if an error is detected.

The optional fieldbus interface adapters have LED’s for indication of status.

Error codes

This part provides explanations of the error codes.

Some errors are displayed on the instrument display, containing a description of the error and the error code.

Reading error codes is done by Modbus, by EtherNet/IP and by the optional Fieldbus. Error code registers are ‘Instrument error’, ‘Command error’,
‘Scale 1: Error code’ to ‘Scale 8: Error code’,
‘Main Hoist: Error code’, ‘Side A: Error code’, ‘Side B: Error code’,
‘Side A-Side B: Error code’ and ‘Sum All Channels: Error code’ (see chapter ‘Communication’).

The error codes are divided in four groups, depending on their origin:

- **Weight errors** occur when transducer signals or weight values go out of given ranges.
- **Start-up errors** occur only during start-up.
- **General errors** usually occur due to faulty entries from the front panel, alternatively invalid data or not allowed commands from the control unit.
- **Set-up errors** can only occur during instrument set-up.

On the following pages a summary of all error codes is given
(note that code 000 always means ‘no error’).

Note that there are some error codes of internal type not described below. If an error code is displayed that is not listed below try restarting the instrument and if the error persists please contact your supplier.

Weight errors

The indication is either temporary or stays on until the cause is cured.

Error code	Explanation
000	**No error** The instrument is in ‘normal state’ and no error is detected.
003	**Instrument not in normal state** Weight is not valid.
005	**Over range** Overrange means that the input signal from the transducer exceeds the operating range.
007	**Under range** Underrange means that the input signal from the transducer is below the operation range.
010	**Excitation short-circuit** Either a short-circuit in the excitation circuit or too many transducers connected. (A fault in a transducer or inside the instrument is also possible.) Check transducer connections. See chapter 'Installation'.
011	**Sense voltage error** The sense voltage is out of range. Check transducer connections. See chapter 'Installation'.
012	**Transducer signal error** The input signal is out of range, for example due to a faulty or missing transducer connection. (A fault in a transducer or inside the instrument is also possible.) Check transducer connections. See chapter 'Installation'.
014	**Invalid input signal** Invalid input signal is reported while the instrument is waiting for sufficient conversion data to calculate a valid weight value. This indication is reported during power-up and after changing the HSWF / WFIN Update Rate settings since input value might be momentarily unreliable.
015	**One or more channels reports an error** This error is used to inform the user that one or more of the channels that are included in the Crane weight have an error. The user must check registers for individual channels to find the root cause.
020, 191	**Too many digits** The actual weight value with the configured number of decimals is exceeding 6 digits.

Start-up errors

These error codes can only appear during start-up.

Error code	Explanation
081	**Set-up data error** Indicates faulty set-up. Enter set-up mode, perform the necessary editing and save the new parameter settings or use the 'Set Default values' function (Maintenance menu).
082	**Set-up and installed I/O modules do not match** The I/O-modules in the instrument doesn't correspond to the set-up. Correct the set-up or change modules.
083	**Wrong type of Fieldbus Module** The fieldbus module in the instrument doesn't correspond to the set-up. Correct the set-up or change module.
084	**No Fieldbus Module** There is no fieldbus module installed in the instrument but the set-up indicates there should be a fieldbus module. Correct the set-up or install the desired module.
085	**Fieldbus Module Error** There is some kind of error when configuring the fieldbus module. Check the status LED's on the module, check that the set-up corresponds to the network configuration, baud rate, addresses etc.
090	**Failed to start the real time system** Some error occurred when the real time dll was accessed during start up. Restart the instrument and if the error persists contact your supplier.
091	**Database error** An error occurred when the program tried to access the internal parameter database. To correct the problem first restart the instrument. If the error persists the database file can be deleted. The instrument will create a new database with default settings during restart. Upgrading the program (also reinstalling the present version) will also force a new database with default settings to be created. If the error persists, contact your supplier.
092	**Non-volatile memory error** An error occurred when the program tried to open, create or map the file for Non-volatile memory. To correct the problem, restart the instrument. If the error persists the file for Non-volatile memory can be cleared. The instrument will create a new file for Non-volatile memory with default settings during restart. If the error persists, contact your supplier.
093	**Non-Volatile Version Error** The Non-volatile memory is not compatible with current program version. It is possible to upgrade the program to a newer or older version or clear the memory ('Clr.NVM'). Clearing the memory will force a new file for Non-volatile memory with default settings to be created. If the error persists, contact your supplier.

General errors

These errors generally occur due to faulty entries from the front panel, alternatively invalid data or not allowed commands from the control unit.

Error code	Explanation
008	**Scale not used** The scale is not configured (used) in the instrument. If all scales have error code 8, the start-up may have failed, restart the instrument.
060 - 063	**AOUT ch X termination error** There is a termination error on an analog output channel. Too low impedance on a voltage output or too high impedance on a current output may cause this error.
070	**I/O module communication error** There is an internal error in the communication between the CPU module and one or more of the I/O modules. Restart the instrument and contact the supplier if the error persists.
071 - 074	**I/O module reset** There has been an internal reset within an I/O module. Restart the instrument and contact the supplier if the error persists.
076	**Power Fail detected** The instrument have detected that the supply voltage is too low and enters a power fail state. Weight values etc. are invalid in this state. Power fail state last a short moment until power is completely lost. If this state continues more than a moment it might be due to a low input voltage (below specifications).
100	**Instrument in wrong state** The transmitted command is not applicable to the present instrument mode.
101	**Too high value!** Value over allowed range. Compare with restrictions for the parameter.
102	**Too low value!** Value under allowed range. Compare with restrictions for the parameter.
103	**Illegal start address** Illegal modbus start address, when writing data to the G6 instrument.
104	**Illegal number of registers** Illegal number of modbus registers, when writing data to G6 instrument.
105	**Faulty value** Value not accepted when entering a parameter from front panel or illegal data in modbus registers, when writing data to the G6 instrument.
106	**Previous command not ready** The previous command is not finished. Wait until pending command is finished and send the command again. This error code will only be given via communication.
110	**Unstable weight** Zero setting always requires a stable weight on the scale. If motion check is set to ON, also taring require a stable weight on the scale. Consequently, if you try to transmit a command for zero setting or taring without awaiting a stable weight you will receive this error code.

Error code	Explanation
112	**Instrument in net mode** Zero setting requires that the instrument is in gross mode. However, if you try to transmit a zero setting command while the scale is in net mode you'll receive this error code.
113	**Outside zero setting limits** Adjustment of the zero setting during operation is only possible if the accumulated correction required is within -10% to +10% of the capacity set-up. Consequently, if you transmit a zero setting command while the required adjustment is outside allowed range you will receive this error code.
118	**Zero setting not allowed** Zero setting is not allowed when the calibration menu is displayed for the actual scale. Zero setting is not allowed for a scale included in the Main Hoist that uses Rope Weight Compensation, unless the crane is in the 'Rope Calibration Position' (digital input 23 active).
124	**Program option not enabled** A command that applies to a program option that is not enabled, was given. The command is not executed.
240	**Fieldbus command error** Command error response on fieldbus connection. Indicates that the command sent to the G6 instrument via the fieldbus connection could not be executed.
249	**Internal Timeout** A timeout occurred when the program tried to access some internal resources. If this error occurs when a command is sent to the instrument, try the command again. Restart the instrument or contact the supplier if the error persists.

Set-up errors

These errors occur only during instrument set-up from the front panel or by Remote Set-up.

Certain errors depend on more than one set-up parameter and it is the operator's responsibility to locate and correct all faulty set-up parameters.

Error code	Explanation
151	**Weight error** The weight is not valid during calibration. Check the live weight and input signal at the bottom of the display in calibration menus.
152	**Unstable transducer signal used** This is not an error but only a warning. The weight was not stable during calibration which might reduce the accuracy of the calibration. Wait a little longer and try again. If the problem persists, check the mechanical and electrical stability of the installation, check the live weight and input signal at the bottom of the display in calibration menus.
153	**Capacity/Resolution > 6 digits** The Capacity value has more than the permitted 6 digits. Select a combination of Resolution and Capacity that will result in max. 6 digits plus decimal point.
155	**Illegal calibration direction** All weights with corresponding mV/V values must be increasing for increasing calibration point number.
156	**Calibration not finished (all calibration points not stored)** This warning is given if the user is leaving the calibration menu when a dead weight calibration is started but not all calibration points are stored. The user will have the possibility to continue calibration, leave the menu and discard all calibration changes or leave the calibration menu and keep the calibration changes done so far. Note that leaving an unfinished calibration might give a faulty calibration of the scale.
158	**Wrong program option code** The entered program option code is not valid. Check that the code is correctly entered, that the code is intended for the used CPU S/N (See menu System Info) and that the used program version is correct (i.e. a program that includes the program option desired, see menu System Info).
159	**Not allowed to turn the program option Off** It is not allowed to turn off the program option in the current situation.
160	**Not allowed to change set-up parameter** It is not allowed to change this parameter in the current situation. This may be due to e.g. that calibration is in progress, due to some settings etc. Check the description of the current parameter.
190	**Zero track rate too high** The zero-track rate is too high. Select a lower zero track rate.
192	**Too high transducer signal in calibration point 2** The mV/V signal in calibration point two is too high (often due to a previous, strange data sheet calibration).

Error code	Explanation
193	**Too high transducer signal in calibration point 2** The mV/V signal in calibration point 2 is too high, due to strange data sheet calibration. The conversion factor, rated load etc. does not correspond to each other.
194	**Illegal calibration direction** All weights with corresponding mV/V values must be increasing for increasing calibration point number.
195	**Illegal I/O module configuration** The I/O-module set-up (Hardware Configuration menu) is not consistent with the allowed number of modules of the different types or the allowed combinations of modules.
196	**Illegal scale number configuration** Each scale number must only be used once. I.e. each measuring input must have a unique scale number. See menu ‘Hardware Configuration’.

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