

G4 PROGRAM DESCRIPTION

Program: G4MI_1.2.116.0



Special program for Crane Weighing
with added sequence functionality

This description is valid for:

G4 Weighing Instrument with application program **1.2.116.0**

See also the following descriptions

G4 Weighing Instrument Program version 1.2.0.0

Technical Manual PM/DT/HE (www.vishaypg.com/doc?35160)

G4 Weighing Instrument Program version 1.2.0.0

Operating instructions, Quick installation PM/DT/HE (www.vishaypg.com/doc?35196)

or

G4 Weighing Instrument Program version 1.2.0.0

Technical Manual RM (www.vishaypg.com/doc?35131)

G4 Weighing Instrument Program version 1.2.0.0

Operating instructions, Quick installation RM (www.vishaypg.com/doc?35134)

If these descriptions in any case are contradictory, this description is valid.

Special Program options:

To get the functionality described below two 'Program options' has to be activated.

Special Program Option 1: Enable the crane weighing and weighing sequence functions.

Special Program Option 2: Enable the life cycle measurement functions.

See a detailed description of 'Program options' below.

Function

This special program has functions, special for crane weighing, overload supervising and life cycle measurement for SWP analysis. Statistical data over the use of the crane is gathered and can be written to file for further analysis.

The program also has added functions for a defined weighing sequence where current weight is stored in one register area when a digital input is activated. This causes a digital output to be activated for 10 sec. A second register area, input and output has identical functionality (see chapter 'Weighing sequence' below).

The program can be used in all versions of G4 weighing instrument (both with graphical display (PM/HE/DT) and with Viewpan service display (RM)).

General

Added functions in this program are

Crane weighing functions and weighing sequence function (Option 1):

- Connect each load cell in the main hoist and auxiliary hoist's to a separate weighing channel in the G4, and supervise the load on each channel with one or more of the 32 available level functions.
- Configure a 'Main Hoist' by defining how many load cells (1 – 8) are used in the main hoist. The 'Main hoist' window displays the sum of these channels with gross and net weight, as well as indicators of the status for the first eight configured level functions.

Level supervision can be configured for the sum of all channels in the 'Main hoist', as well as for the sum of each side of the 'Main hoist' and also for the difference between the sides of the 'Main hoist', using any of the 32 available level functions.

- The 'Total crane' window displays the sum of all configured channels (main hoist + all other channels) with gross and net weight, as well as indicators of the status for the first eight configured level functions.
Level supervision can be configured for the sum of all channels, using any of the 32 available level functions.
- Set a delay on any of the level functions between 0 - 10000 ms to allow for temporary dynamic overloads. Set also a 'Max load' on any of the level functions, where the delay is disabled and the level is acted on immediately.
- Level status and indicators now follow the status of a configured output for the level
- Allow for any channel to 'simulate' the weight from another channel (use for temporary disconnection of a channel, and still be operable).

- Communicate the four 'Main hoist' values (sum of all load cells in main hoist, left side, right side, and difference between left and right side) as well as the sum of all channels (main hoist + all other channels) via serial communication (modbus rtu, modbus tcp or fieldbus) or output them on any of the four analog outputs.
- If channel name is set, this name is displayed in the channel displays instead of only channel number (scale number)
- Weighing sequence for storing current weight in one of two register areas. For each register area, one digital inputs, will cause weight data to be stored and will activate a digital output to be activated for 10 sec.

Life cycle measurement functions (Option 2):

- Added functionality for gathering operational data over time, for SWP analysis. These data are displayed in a new menu called 'Service information'
- 'Full load hours' calculation is done on the sum for the 'Main hoist' and each channel (1 – 8) can be configured to do its own 'Full load hours' calculation.
- Statistical data is gathered and displayed in 41 windows under the menu 'Service information' (32 windows for the 32 level functions, 8 windows for the 8 separate channels, and one window for the 'Main hoist').
- All statistical data can be saved in a log file.
- All nine 'Full load hours' values can be read via serial communication (modbus rtu, modbus tcp, or fieldbus).

Operation

The G4 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. Here is also displayed status for the first eight configured level functions, indicating the level number, and the status for the levels.

Main hoist window (for PM/HE/DT versions of G4)

Main hoist		2006-09-24 19:07						
Gross		102.8 t						
Net		000.0 t						
Zero								
Levels	1:	<input checked="" type="checkbox"/>	2:	<input checked="" type="checkbox"/>	3:	<input type="checkbox"/>	4:	<input type="checkbox"/>
Levels	21:	<input checked="" type="checkbox"/>	22:	<input type="checkbox"/>	23:	<input type="checkbox"/>	32:	<input type="checkbox"/>
-----	-----	-----	Levels	Chan.1-8				

For both weights, there are also indicators for 'Motion' and good 'Zero'.

Pressing the 'TARE' button in this window causes a tare command to all channels used for the main hoist. If all channels were able to perform a tare, the result of the command is indicated in the net value that should change to zero.

Pressing the 'ZERO' button in this window causes a zero command to all channels used for the main hoist. If all channels were able to zero (the gross weight) this is indicated in the gross value that should change to zero.

By pressing the soft key 'Levels' (F4) a window opens where all the configured levels are shown.

By pressing the soft key 'Chan.1-8' (F5) a window opens where all the separate channels are shown in the same way as in a normal weight indicator. Here all channels that are used for the main hoist is shown, as well as other configured channels (e.g. auxiliary hoists etc.).

Chan. 1-8		2006-09-24 19:07			
North side		052.8 t			
Gross					
South side		050.0 t			
Gross					
Aux 1		000.0 t			
Gross Zero					
Aux 2		004.9 t			
Gross					
M. hoist	Total w.	P.Tare	Levels	-----	

In the opened window there is a soft key 'Main hoist' (F1) that return the display to the 'Main hoist' window. There is also a soft key 'Total w.' that opens a window similar to the 'Main hoist' window but instead displaying the sum of all channels configured for the crane (main hoist + all other channels).

Total crane		2006-09-24 19:07	
Gross		107.7 t	
Net		000.0 t	
	Zero		
Levels	1: <input checked="" type="checkbox"/>	2: <input checked="" type="checkbox"/>	3: <input type="checkbox"/> 4: <input type="checkbox"/>
Levels	21: <input checked="" type="checkbox"/>	22: <input type="checkbox"/>	23: <input type="checkbox"/> 32: <input type="checkbox"/>
-----	-----	-----	Levels Chan.1-8

For RM version of G4 the gross and net weight of the 'Main Hoist' can be displayed by selecting scale 9 (in the same way as for channels 1-8).

Weighing sequence

The weighing sequence uses two defined digital inputs, two defined digital outputs and two register areas where each is storing the current 'Main hoist' weight data (Error code, Gross/Net mode, Gross weight, and Net weight).

The defined inputs are: input 21 (terminal I1 in slot 2)
 input 22 (terminal I2 in slot 2)

The defined outputs are: output 21 (terminal O1 in slot 2)
 output 22 (terminal O2 in slot 2)

The defined register areas are (see also chapter 'New Modbus registers' below)

Register area 1: Register 41780 – 40787 (45780 - 45787)

Register area 2: Register 41788 – 41795 (45788 – 45795)

There are two independent identical sequences. The first one uses input 21, output 21 and register area 1, and the second one uses input 22, output 22 and register area 2.

The sequence starts when the input is activated (can also be activated via communication, see 'Command register' below).

When an input is activated, weight data for the main hoist is stored in the corresponding register area, and the corresponding output is activated for 10 seconds. The stored data remains in the register during the time the output is activated and until the input is activated the next time after that. (Data is lost if power to the instrument is lost).

If set-up parameter for 'Motion check' for the main hoist channels is set to 'off' the weight data is stored directly the input is activated, otherwise the instrument will wait for stable weight before the storing of weight data takes place.

Communication

The weight data as well as the status of the outputs, can be read via serial communication (Modbus RTU, ModbusTCP, or via fielbus port)

The activation of the sequences can be sent via serial communication as two new commands (see 'Command register' below).

The system is configured at delivery as follows:

(only differences from default set-up listed)

Hardware config: Slot 2: WFIN2 (defined as scale no 3 and 4)

Calibration/Main hoist/No of LC: 4

Communication/Ethernet: Modbus TCP slave ON

(for slack rope)

Level Superv./Level1/Source: Gross weight

Level Superv./Level1/Scale: Main hoist

Level Superv./Level1/Value: 10 kg (should be set to wanted value)

Level Superv./Level1/Output: Active above

(for difference between sides)

Level Superv./Level2/Source: Gross weight

Level Superv./Level2/Scale: Left – Right (difference between sides)

Level Superv./Level2/Value: 100 kg (should be set to wanted value)

Level Superv./Level2/Output: Active below

(for slack rope)

Outputs/Slot 1/Output 11 Source Level

Outputs/Slot 1/Output 11 Level 1

(for difference between sides)

Outputs/Slot 1/Output 12 Source Level

Outputs/Slot 1/Output 12 Level 2

Calibration

The separate channels NOT used in the 'Main Hoist' should be calibrated as described in the standard manual for G4.

It is **important** that all channels used should be set up equally with regards to the common parameters (update rate, filter parameters), when synchronised weights are needed in order to correctly calculate 'Full load hours'.

Main Hoist calibration

The channels used for the 'Main Hoist' (1-X) should normally be set up equally with regards to the common parameters (unit, resolution, update rate, filter parameters, motion parameters...), when the 'Main Hoist' values (total, left, right and difference weights of main hoist) are calculated from the weights from the separate channels.

Each channel in the main hoist should then be calibrated using the '**Data sheet**' calibration method (recommended for most applications where the 'Load value' can be calculated, see below), or by the '**dead weight**' calibration method.

When each channel is calibrated and zero is set, the calibration for the main hoist can be adjusted if necessary in two points setting the correction parameters for the main hoist (see below).

If any load cell or channel used in the main hoist detects an error, the weight values (gross and net) in the main hoist window will be replaced with an error text 'Error', unless the parameter 'Replacement channel' is set to a valid channel (see below).

Data sheet calibration of the Main Hoist

Every channel used by the Main Hoist should normally be calibrated using the '**data sheet**' method. See the G4 standard manuals on how this is done.

If each separate load cell in the Main Hoist is connected to an own channel in G4, then some values has to be calculated, and the value for 'Rated load' be adjusted according to the formula below, in order to have a correct data sheet calibration.

The values that has to be calculated is as follows:

Display value: How much of the total load on the Main Hoist that should be displayed by the separate load cell/channel.

Load value: How much of the total load on the Main Hoist that acts on the separate load cell.

When these values are calculated, the value for 'Rated load' that is entered in the data sheet calibration, should be adjusted as follows

$$\text{Rated load} = \text{Display value} / \text{Load value} * \text{load cell capacity}$$

In the parameter 'Rated output 1' the value for rated output in the data sheet for the load cell should be entered.

Below are three examples on how these values are calculated and used.

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, and shall display the total load in the hoist.

Display value: 100 % (1/1) The load cell shall display the total load

Load value: 16.67% (1/6) The load cell takes the load in 1 of 6 ropes

Rated load that should be entered into the data sheet calibration:

Rated load = $(1/1) / (1/6) * \text{Load cell capacity} \Rightarrow 6 * \text{Load cell capacity}$

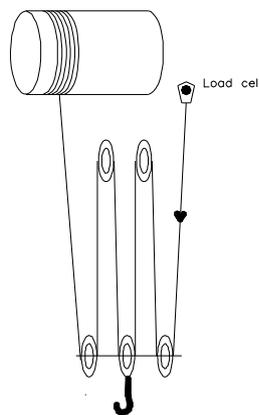


Figure 1

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, and shall display the total load in the hoist.

Display value: 100 % (1/1) The load cell shall display the total load

Load value: 33,3 % (2/6) The load cell takes the load in 2 of 6 ropes

Rated load that should be entered into the data sheet calibration:

Rated load = $(1/1) / (2/6) * \text{Load cell capacity} \Rightarrow 3 * \text{Load cell capacity}$

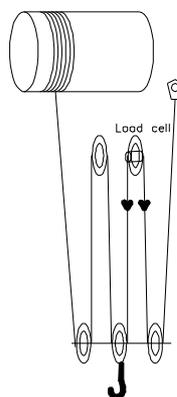


Figure 2

Example 3.

A crane with two rope packages with two pulley wheels each. Two load cells are mounted in one of the pulley wheels on each side. Each load cell is connected to its own channel in G4.

For each channel is:

Display value: 50 % (1/2) The load cell shall display half of the total load

Load value: 16.67% (2/12) The load cell takes the load in 2 of 12 ropes

Rated load that should be entered into the data sheet calibration:

Rated load = $(1/2) / (2/12) * \text{Load cell capacity} \Rightarrow 3 * \text{Load cell capacity}$

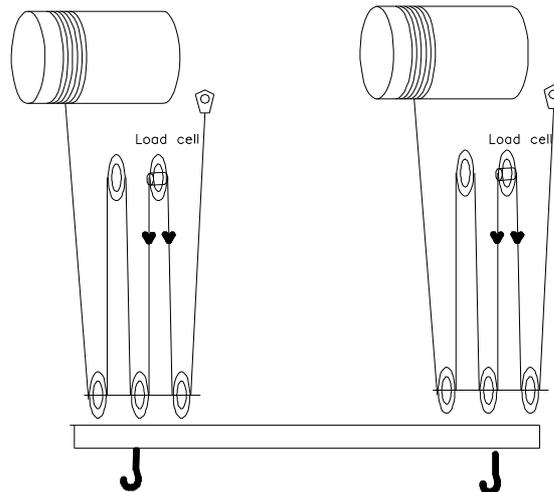


Figure 3

Dead weight calibration of the Main Hoist

In some cases a dead weight calibration is preferred instead of data sheet calibration. That is for example if all load cells in the Main Hoist is connected in parallel to one channel in G4, or if the 'Load value' is not possible to calculate.

If the Main Hoist has more than one load cell, each connected to its own channel in G4, a dead weight calibration of each channel can be done by lifting a known weight so that the load is spread equally over all load cells, e.g. if in figure 3 a 10 ton weight is lifted, it is important the each hook is loaded with 5 ton.

Then do a dead weight calibration on each channel in two points (0 and 5ton) by lifting the 10-ton weight in a similar way for the separate channels.

Adjusting the calibration for the Main Hoist

When each channel is calibrated and zero is set, the calibration for the Main Hoist can be adjusted in two points. See the parameters for the Main Hoist (menu 'Calibration' below).

Parameters

The menu system is reached with the 'Info' button when the indicator displays the separate channels (not in 'Main hoist' or 'Total Crane' window).
From 'Main hoist' window, press key 'Chan.1-8' and then key 'Info' (or key F11 on a connected USB keyboard).

Added or changed menus and parameters.

Menu 'Calibration'

This menu has been extended with a new sub menu 'Main hoist'

This sub menu consists of six new parameters.

No of load cells in Main Hoist

Range: 0 – 8 <2>	Defines the number of channels 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 'left side' and the other half to be the 'right side' (when the number is odd, the last channel will be included in the right side).
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Capacity

Range: -999999 999999 <500>	Defines the capacity of the main hoist. This value is important when it is used for calculating the used 'Full Load Hours' (see 'Service information chapter')
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The following four set-up parameters, makes it possible to adjust the calibration for the main hoist. This is done by entering weight values in two different points.

Value in point 1 (normally 0)

Range: -999999 999999 <0>	Defines the actual load that is on the main hoist
------------------------------------	--

Read value in point 1

Range: -999999 999999 <0>	Defines the read value of the load that is 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 (by pressing the enter key) It may be changed manually.
------------------------------------	--

Value in point 2

Range: -999999 999999 <20>	Defines the actual load that is on the main hoist in the second point.
-------------------------------------	---

Read value in point 2

Range: -999999 999999 <20>	Defines the read value of the load that is on the main hoist in the second point. This parameter is automatically set by the system, when the value in the previous parameter 'Value in point 2' is entered (by pressing the enter key) It may be changed manually.
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The configured channels (Scale 1 to Scale 8) in the menu 'Calibration' has been extended with two more parameter each.

Replacement channel

Choices: Not in use 1 2 3 4 5 6 7 8 <Not in use>	Defines if the channel should 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 should be used. If these channels normally had the same load, the operation can continue until the load cell is replaced. The use of this is clearly indicated in the 'Main hoist' window, with the message 'WARNING, load cell simulated'
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Full load hours

Choices:: Off On <Off>	Defines whether 'Full load hours' should be calculated for this channel or not.
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For the configured channels (Scale 1 to Scale 8) in the menu 'Calibration', the parameter 'Overload' has been removed (this parameter is not relevant in crane applications, when overload levels are controlled with the level functions, see 'Level supervision')

Note. The choices for 'WFIN Update rate' have been limited to 75 Hz and the choices for parameter 'HSWF Update rate' has been limited to 100 Hz.

Menu ‘Communication’

The sub menu (‘Serial Com.’ has been extended with one new parameter.

Scale To Common Area

Choices:	To make it simpler to communicate for certain
Not in use	equipments e.g. radio equipments, a common area has
1	been created where any channels weight values can be
2	directed.
3	In this set-up parameter the channel that should be
4	directed to the common area is selected. See modbus
5	registers 40146-40160 and 44134- 44147 below.
6	
7	
8	
Main hoist (9)	
Left side (10)	
Right side (11)	
Left – Right (12)	
Sum all chan. (13)	
<1>	

Menu ‘Level supervision’

The sub menus (‘Level 1’ to ‘Level 32’) have been extended with three new parameters each.

Level ‘X’ Level Value

Range:	Defines the level that is supervised. This level value can
-999999 - 999999	only be set in this set-up. It can be read by
<0>	communication and in other windows in G4.

Level ‘X’ Delay

Range:	Defines the delay in ms before the level is activated
0 – 10000 ms	when the weight has gone above the set level value.
<0>	Allows for temporary dynamic overloads.

Level ‘X’ Max Value

Range:	Defines the max value for the ‘Level X Delay’ parameter
-999999 - 999999	to be enabled. If the load exceeds the value, the delay is
<500>	disabled, and the level is acted on immediately.

The parameter ‘Level X Scale’ has been extended with five new choices.

Level 'X' Scale

Choices:	Five new choices:
Not in use	Main hoist: The level is compared with the main hoist weight value.
1	
2	
3	Left side: The level is compared with the left side weight value.
4	
5	Right side: The level is compared with the right side weight value.
6	
7	
8	Left – Right: The level is compared with the difference between the left side and the right side.
Main hoist	
Left side	
Right side	
Left – Right	Sum all chan.: The level is compared with the sum of all channels, that is 'Main hoist' + all other channels.
Sum all chan.	
<1>	

Note. Entering level value for the different levels is now done in this set-up menu, and under the 'set-up' password (if configured)

Menu 'Inputs'

The parameters for 'Inputs Slot 1' has been completely removed, when these inputs (input 11 to input 14) has been dedicated for 'Service Information' data for the 'Main hoist'. See chapter 'Service Information' below.

The parameters for input 21 and input 22 (inputs in slot2) has been removed, when these inputs has been dedicated for the defined 'Weighing sequence' (see above).

For all other inputs, the parameter 'Input XX Use' three new choices has been added

Input 'XX' Use

Choices:	Three new choices:
Not in use	
Full load hours	Full load hours: This will cause 'Full load hours' to be calculated for the channel (configured in the following set-up parameter). Calculation is done when this input is active. The input 'active' time will also be gathered in the service information window for this channel.
Tare	
Gross/Net	
Gross	
Net	
Zero	Save statistic: This will cause all gathered statistic data to be saved to a file in the 'User' area of the file system.
Flow/Weight	
Flow Rate	
Weight	Clear statistic: This will cause all gathered statistic data to be saved to a file (as above) and after that cleared.
Save statistic	
Clear statistic	
<Not in use>	

Menu 'Analog outputs'

The sub menus ('Analog 1 Source' to 'Analog 4 Source') have a parameter 'AOUT 'X' Scale' that has been extended with four new choices.

AOUT 'X' Scale

Choices:	Four new choices:
Not in use	Main hoist: The analog output uses the main hoist weight value.
1	
2	
3	Left side: The analog output uses the left side weight value.
4	
5	Right side: The analog output uses the right side weight value.
6	
7	
8	Left – Right: The analog output uses the difference between the left side and the right side.
Main hoist	
Left side	Sum all chan.: The analog output uses sum of all channels, that is 'Main hoist' + all other channels.
Right side	
Left – Right	
Sum all chan.	
<1>	

Menu 'Program options'

This menu has two sub menus 'Special Prog. Option 1' and 'Special Prog. Option 2'.

Program options must be activated with an option code to be functional. The option code is included or can be purchased from your instrument supplier.

13: Special Prog. Option 1

< - >	<p>The option code necessary to activate the 'Crane weighing functions' and 'Weighing sequence' functions. The code always consists of 10 digits.</p> <p>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.</p> <p>Enter a '-' to turn off the program option.</p> <p>The 'demo' 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.</p>
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14: Special Prog. Option 2

< - >	<p>The option code necessary to activate the 'Life cycle measurement functions' (similar to Special Prog. Option 1)</p>
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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 and the program number 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, or 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 special program described in this manual is 'Crane weighing', 'weighing sequence' and 'Life cycle measurement' are available as a program options.

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 in the weight display. See below.

Chan. 1-8		*DEMO*	2006-09-24 19:07	
North side		052.8 t		
Gross				
South side		050.0 t		
Gross				
Aux 1		000.0 t		
Gross Zero				
Aux 2		004.9 t		
Gross				
M. hoist	Total w.	P.Tare	Levels	-----

Demo mode indication

New Modbus registers

Modbus registers for the common area

Data type: Integer	Data type: float (2 reg./value)	Explanation	R/W
40146 (1 reg)	44134	Selected channel: Error	R
40147 (1 reg)	44136	Selected channel: Status	R
40148 (3 reg)	44138	Selected channel: Gross weight	R
40151 (3 reg)	44140	Selected channel: Net weight	R
40154 (3 reg)	44142	Selected channel: Flow	R
40157 (3 reg)	44144	Selected channel: In signal (mV/V)	R
40160 (1 reg)	44146	Selected channel: Scale number (1-13)	R

Modbus registers for the stored register in the weighing sequence

Data type: Integer	Data type: float (2 reg./value)	Explanation	R/W
41780 (1 reg)	45780	Register 1: Error	R
41781 (1 reg)	45782	Register 1: Gross/Net mode	R
41782 (3 reg)	45784	Register 1: Gross weight	R
41785 (3 reg)	45786	Register 1: Net weight	R
41788 (1 reg)	45788	Register 2: Error	R
41789 (1 reg)	45790	Register 2: Gross/Net mode	R
41790 (3 reg)	45792	Register 2: Gross weight	R
41793 (3 reg)	45794	Register 2: Net weight	R

Registers for the hoist values

Data type: Integer	Data type: float (2 reg./value)	Explanation	R/W
41800 (1 reg)	45800	Main hoist: Error	R
41801 (1 reg)	45802	Main hoist: Status	R
41802 (3 reg)	45804	Main hoist: Gross weight	R
41805 (3 reg)	45806	Main hoist: Net weight	R
41808 (1 reg)	45808	Left side: Error	R

Data type: Integer	Data type: float (2 reg./value)	Explanation	R/W
41809 (1 reg)	45810	Left side: Status	R
41810 (3 reg)	45812	Left side: Gross weight	R
41813 (3 reg)	45814	Left side: Net weight	R
41816 (1 reg)	45816	Right side: Error	R
41817 (1 reg)	45818	Right side: Status	R
41818 (3 reg)	45820	Right side: Gross weight	R
41821 (3 reg)	45822	Right side: Net weight	R
41824 (1 reg)	45824	Left side - Right side: Error	R
41825 (1 reg)	45826	Left side - Right side: Status	R
41826 (3 reg)	45828	Left side - Right side: Gross weight	R
41829 (3 reg)	45830	Left side - Right side: Net weight	R
41832 (1 reg)	45832	Sum all channels: Error	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

Registers for 'Full Load Hours'

Data type: Integer	Data type: float (2 reg./value)	Explanation	R/W
41840 (3 reg)	45840	'Full Load Hours' Main hoist	R
41843 (3 reg)	45842	'Full Load Hours' Channel 1	R
41846 (3 reg)	45844	'Full Load Hours' Channel 2	R
41849 (3 reg)	45846	'Full Load Hours' Channel 3	R
41852 (3 reg)	45848	'Full Load Hours' Channel 4	R
41855 (3 reg)	45850	'Full Load Hours' Channel 5	R
41858 (3 reg)	45852	'Full Load Hours' Channel 6	R
41861 (3 reg)	45854	'Full Load Hours' Channel 7	R
41864 (3 reg)	45856	'Full Load Hours' Channel 8	R

Command register

Four new commands has been added to the command register (42000 or 46000)

Cmd	Action activated in instrument	Description
240	Save statistic command	<i>Used to save all gathered statistic data to a file in the 'User' area in the file system</i>
241	Clear statistic command	<i>Used to save and clear all gathered statistic data</i>
242	Activate weighing sequence 1	<i>Activate weighing sequence 1 (same as activating digital input 21)</i>
243	Activate weighing sequence 2	<i>Activate weighing sequence 2 (same as activating digital input 22)</i>

Service Information

General

This program adds functionality for gathering operational data. This includes supervising:

- Max. load on main hoist weights
 - max load on complete Main hoist
 - max load on left side of Main hoist
 - max load on right side of Main hoist
 - max difference in load between left and right side of Main hoist
 - Max. load on each separate channel
 - Max. load on sum of all channels (Main hoist + all other channels)
 - Total time activated for three different drives for the main hoist (digital input activated)
 - Total time activated for one drive (digital input 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
- Further to that also the 'Full Load Hours' are calculated, as described below.

Main Menu	
Levels	
Setpoints	
Preset Tares	
Clock Set-up	
Parameter Set-up	
Service Information	
System Information	
Maintenance	
Network Configuration	
Enter	Escape

The 'Service information' menu is reached from the 'Main' menu (on PM/HE/DT versions only). The menu contains a number of windows containing the gathered data. Moving around the different windows is done with the buttons 'Next' and 'Previous' and escaping the 'Service information' menu is done with the 'Escape' button.

The information on each window can be resetted (zero'ed) with the 'Reset' button. A question will pop up asking if resetting is wanted. When resetted, the parameter 'Last resetted' will be updated with the current date and time.

In each window the button 'Save' will write all gathered data in all windows to a text file in the User area of the file system in G4. This file is named with the G4 instrument name and the current date and time.

For RM versions of G4 only the saved text file information is available. This file is created by activating a configured digital input or by sending a command via any serial communication.

'General' information window

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

Service Information	
General	Full Load Hours: XXXXXX:XX (h:m)
	Operating Time 1: XXXXX:XX (h:m)
	Operating Time 2: XXXXX:XX (h:m)
	Operating Time 3: XXXXX:XX (h:m)
	Max Load Main Hoist: XXXXX,X kg
	Max Load Left: XXXXX,X kg
	Max Load Right: XXXXX,X kg
	Max difference: XXXXX,X kg
	Max Load All Channels: XXXXX,X kg
	Last Resetted: YY-MM-DD HH:MM
Prev.	Next
Save	Reset
Escape	

In this window several data is displayed:

Full load hours:

This data is the accumulated calculated value of 'Full load hours'. See the chapter 'Full load hours' below for a description on how this value is calculated and under what conditions. 'Full load hours' for main hoist are calculated when digital input 14 is activated

Operating Time X:

There are three digital inputs that can be used for measuring time purposes (e.g. measuring the time the hoisting motor is active or any of the other driving motors on a crane). The 'Operating Time 1', 'Operating Time 2', and 'Operating Time 3' timer is running when the corresponding digital input 11, 12, and 13 is active. The timer starts to run when the input gets activated, and the saved time is updated every minute until the input is deactivated.

Max load values:

There are four max weight values for the main hoist. This value is the maximum value that has been measured since this window was last resetted. The values are:

Max load total:	Max load on the total main hoist
Max load left side:	Max load on the left side of the main hoist
Max load right side:	Max load on the right side of the main hoist
Max difference (left-right):	Max difference between left and right side

There is also a max weight value for all channels, that is Main hoist + all other channels.

Max load all channels:	Max load on Main hoist + all other channels.
------------------------	--

'Channel X' information windows

On the next eight windows each separate channel info is displayed.

Service Information				
Channel X Information				
Channel Name :	XXX...X			
Full Load Hours:	XXXXXX:XX (h:m)			
Operating Time:	XXXXXX:XX (h:m)			
Max Load:	XXXXX,X kg			
Last Resetted:	YY-MM-DD HH:MM			
Prev.	Next	Save	Reset	Escape

For each of the possible 8 channels the following data is displayed.

Full load hours:

This data is the accumulated calculated value of 'Full load hours'. See the chapter 'Full load hours' below for a description on how this value is calculated. The 'Full load hours' are only calculated if the channel is configured for this and only when the configured input is activated.

Operating time:

This is the accumulated time the configured input has been activated.

Max load value:

This is the Max load value for this channel since last resetted.

'Level XX' information windows

For each of the available 32 levels, one window is showing information on respective level.

Service information	
Level XX	
Supervising Channel:	XXXXXX
Current Level Value:	XXXXXX kg
Number Of Times Activated:	XXXXX
Total Time Activated:	XXXX:XX (h:m)
Last resetted:	YY-MM-DD HH:MM

Previous	Next	Save	Reset	Escape
----------	------	------	-------	--------

The information shown is:

Supervising channel: This can be channel 1 – 8 or one of the main hoist channels ('Main hoist', 'Left side', 'Right side', or 'Difference')

Current level value: The current level value that is set for this level

Number of times activated: The no. of time this level has been above set level

Total time activated: The total time this level has been above set level

Full load hours

Full load hours are a calculated value that is calculated each weight sample and added to the corresponding value of 'full load hours'.

The 'Full load hours' value for the 'Main hoist' is calculated while the digital input 14 is activated, and the 'Full load hours' for the separate channels are calculated while the corresponding digital input configured for the channel is activated.

The formula for calculating the 'full load hours' is as follows

$$S = \sum k_m * t$$

Where:

S = 'full load hours'

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

t = actual conversion time

current weight = actual current weight value

Capacity = Capacity for the actual channel (Main hoist or channel 1-8)
set as a set-up parameter

File handling

Two types of log files (text files) are created in the instrument.

The log files are stored in the instrument public memory (the "User" folder). This folder can hold roughly 5 Mbyte of data.

Every time the 'Save' button is pressed in 'Service Information' menu, or an instrument backup is taken, a new log file is created, and the available space for new data gets smaller.

The log files must be moved from the instrument memory to some external memory (e.g. a USB memory stick or an external PC memory), before the available space is too small. This is especially important when G4 type RM is used when log files can be lost if memory is overfilled.

For G4 type PM/HE/DT, the available space is checked on two levels by the program. If the available space is less than 1 Mbyte, a warning message is raised every 10th time a logging is done, telling the operator that the available space is small and he should consider moving files.

If the available space is less than 100 kByte, a warning message is raised every time a logging is activated, telling the operator the logging will not be done, since the available space is too small, and tells him to free up space by removing files.

Files can be handled either by the instrument internal file handling functions in menu 'Maintenance/file handling' where files can be copied, moved between folders or to a USB memory, or deleted

Files can also be handled with an ftp-session through the Ethernet port. Connect the ftp client (PC) to the IP-address of the G4 instrument and log in with user name 'G4User' and the password '1937' and you will open up the 'User' area of the memory in the instrument.

Backup files.

When a backup of the parameters in the instrument is done (in menu Maintenance/create backup), a text file is created together with the original xml file that is storing the parameters and used when restoring a complete setup. The new text file is named equal to the original file with an additional '.txt' extension. (Ex. Original backup name is 'G4_20090122_1545.bup' and the text file name 'G4_20090122_1545.bup.txt')

This text file lists all the set-up parameters and their values in the instrument in a more readable way than possible in the original xml file.

Service Information files.

These files contain all gathered statistical data from the 'Service Information' windows.

Example of a log file:

Crane 1067_20080211_081205.txt

```
Full Load Hours:      00006:29   (H:M)
Operating Time 1:    00001:01   (H:M)
Operating Time 2:    00000:00   (H:M)
Operating Time 3:    00000:00   (H:M)
Max Load Total:      1998.5     kg
Max Load Left:       1095.0     kg
Max Load Right:      903.5      kg
Max Difference:      903.5      kg
Max Load All Channels: 2008,5     kg
Last resetted:       2008-02-08 08:45:53 □
```

```
Channel No: 1
Channel Name:
Full Load Hours:     00000:00 (H:M)
Operating Time:      00000:00 (H:M)
Max Load:            0.0 kg
Last resetted:       2008-12-11 13:46:21
```

Channel No: 2
Channel Name:
Full Load Hours: 0000:00 (H:M)
Operating Time: 0000:00 (H:M)
Max Load: 0.0 kg
Last resetted: 2008-12-11 13:46:21

Channel No: 3
Channel Name:
Full Load Hours: 0000:00 (H:M)
Operating Time: 0000:00 (H:M)
Max Load: 0.0 kg
Last resetted: 2008-12-11 13:46:21

Channel No: 4
Channel Name:
Full Load Hours: 0000:00 (H:M)
Operating Time: 0000:00 (H:M)
Max Load: 0.0 kg
Last resetted: 2008-12-11 13:46:21

Channel No: 5
Channel Name:
Full Load Hours: 0000:00 (H:M)
Operating Time: 0000:00 (H:M)
Max Load: 0.0 kg
Last resetted: 2008-12-11 13:46:21

Channel No: 6
Channel Name:
Full Load Hours: 0000:00 (H:M)
Operating Time: 0000:00 (H:M)
Max Load: 0.0 kg
Last resetted: 2008-12-11 13:46:21

Channel No: 7
Channel Name:
Full Load Hours: 0000:00 (H:M)
Operating Time: 0000:00 (H:M)
Max Load: 0.0 kg
Last resetted: 2008-12-11 13:46:21

Channel No: 8
Channel Name:
Full Load Hours: 0000:00 (H:M)
Operating Time: 0000:00 (H:M)
Max Load: 0.0 kg
Last resetted: 2008-12-11 13:46:21

Level 1
Supervising Channel: 1
Current Level Value: 0 kg
Number Of Times Activated: 18
Total Time Activated: 00000:01 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 2
Supervising Channel: 2
Current Level Value: 0 kg
Number Of Times Activated: 22
Total Time Activated: 00001:09 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 3
Supervising Channel: 3
Current Level Value: 0 kg
Number Of Times Activated: 19
Total Time Activated: 00000:02 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 4
Supervising Channel: 4
Current Level Value: 0 kg
Number Of Times Activated: 19
Total Time Activated: 00000:02 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 5
Supervising Channel: Left side
Current Level Value: 0 kg
Number Of Times Activated: 21
Total Time Activated: 00001:05 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 6
Supervising Channel: Right side
Current Level Value: 0 kg
Number Of Times Activated: 19
Total Time Activated: 00000:02 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 7
Supervising Channel: Left-Right
Current Level Value: 0 kg
Number Of Times Activated: 21
Total Time Activated: 00001:07 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 8
Supervising Channel: Main hoist
Current Level Value: 0 kg
Number Of Times Activated: 24
Total Time Activated: 00001:05 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 9
Supervising Channel: 1
Current Level Value: 0 kg
Number Of Times Activated: 0
Total Time Activated: 00000:00 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 10
Supervising Channel: 1
Current Level Value: 0 kg
Number Of Times Activated: 0
Total Time Activated: 00000:00 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 11
Supervising Channel: 1
Current Level Value: 0 kg
Number Of Times Activated: 0
Total Time Activated: 00000:00 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 12
Supervising Channel: 4
Current Level Value: 0 kg
Number Of Times Activated: 19
Total Time Activated: 00000:02 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 13
Supervising Channel: 1
Current Level Value: 0 kg
Number Of Times Activated: 0
Total Time Activated: 00000:00 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 14
Supervising Channel: 1
Current Level Value: 0 kg
Number Of Times Activated: 0
Total Time Activated: 00000:00 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 15
Supervising Channel: 1
Current Level Value: 0 kg
Number Of Times Activated: 0
Total Time Activated: 00000:00 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 16
Supervising Channel: 1
Current Level Value: 0 kg
Number Of Times Activated: 0
Total Time Activated: 00000:00 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 17
Supervising Channel: 1
Current Level Value: 0 kg
Number Of Times Activated: 0
Total Time Activated: 00000:00 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 18
Supervising Channel: 1
Current Level Value: 0 kg
Number Of Times Activated: 0
Total Time Activated: 00000:00 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 19
Supervising Channel: 1
Current Level Value: 0 kg
Number Of Times Activated: 0
Total Time Activated: 00000:00 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 20
Supervising Channel: 1
Current Level Value: 0 kg
Number Of Times Activated: 0
Total Time Activated: 00000:00 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 21
Supervising Channel: 1
Current Level Value: 0 kg
Number Of Times Activated: 0
Total Time Activated: 00000:00 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 22
Supervising Channel: 1
Current Level Value: 0 kg
Number Of Times Activated: 0
Total Time Activated: 00000:00 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 23
Supervising Channel: 1
Current Level Value: 0 kg
Number Of Times Activated: 0
Total Time Activated: 00000:00 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 24
Supervising Channel: 1
Current Level Value: 0 kg
Number Of Times Activated: 0
Total Time Activated: 00000:00 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 25
Supervising Channel: 1
Current Level Value: 0 kg
Number Of Times Activated: 0
Total Time Activated: 00000:00 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 26
Supervising Channel: 1
Current Level Value: 0 kg
Number Of Times Activated: 0
Total Time Activated: 00000:00 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 27
Supervising Channel: 1
Current Level Value: 0 kg
Number Of Times Activated: 0
Total Time Activated: 00000:00 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 28
Supervising Channel: 1
Current Level Value: 0 kg
Number Of Times Activated: 0
Total Time Activated: 00000:00 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 29
Supervising Channel: 1
Current Level Value: 0 kg
Number Of Times Activated: 0
Total Time Activated: 00000:00 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 30
Supervising Channel: 1
Current Level Value: 0 kg
Number Of Times Activated: 0
Total Time Activated: 00000:00 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 31
Supervising Channel: 1
Current Level Value: 0 kg
Number Of Times Activated: 0
Total Time Activated: 00000:00 (H:M)
Last resetted: 2008-02-07 12:28:30

Level 32
Supervising Channel: 1
Current Level Value: 20 kg
Number Of Times Activated: 29
Total Time Activated: 00001:09 (H:M)
Last resetted: 2008-02-07 12:28:30

Upgrading software

This program is accumulating and saving data for 'Service Information' over long time. Data is saved in a power safe memory that keeps the data even if power to the G4 instrument is lost.

It is highly recommended to do a backup of the instrument and to save data in a file before starting the upgrade.

It might be of great importance that data is intact, even after a software upgrade. Because of that, the program is done in the way that when upgraded, a check is done to see if the structure of the saved data has been changed (the saved data cannot be used), and in that case a question is popped up asking the operator if saved data should be erased completely, or if he wants to try starting the instrument without erasing the data and eventually be able to use part of it (this is valid for G4 type PM/HE/DT). For G4 type RM, the memory is erased if the data structure has been changed.

Normally it is necessary to erase the memory when the data structure might have been changed.

After a software upgrade, it is necessary to do a 'default set-up' before setting up the instrument or restoring an earlier backup. This is done in the 'Maintenance' menu by selecting the 'Set default values' command.

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Vishay Nobel AB

Box 423, SE-691 27 Karlskoga, Sweden
Phone +46 586 63000 · Fax +46 586 63099
pw.eur@vishaypg.com
www.weighingsolutions.com