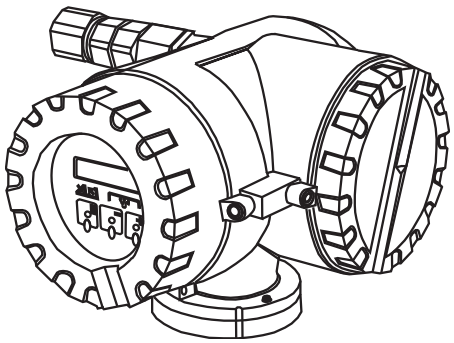
4560 Servo Gauge Monitor
Installation and Operations Manual

For tank side control and monitoring of the
6000 Series Servo Tank Gauge

Valid as of Software Version v1.94



Varec, Inc.
5834 Peachtree Corners East, Norcross (Atlanta), GA 30092 USA
Tel: +1 (770) 447-9202 Fax: +1 (770) 662-8939

Copyright

Varec, Inc.
5834 Peachtree Corners East
Norcross (Atlanta), Georgia 30092
Phone: (770) 447-9202
Fax: (770) 662-8939

Trademarks Acknowledged

Varec, Inc. recognizes all other trademarks. Trademarks of other products mentioned in this document are held by the companies producing them.

FuelsManager®, TankView®, TacFuels®, Varec®, and FuelsManager IntoPlane® are registered trademarks of Varec, Inc.

All other product and service names mentioned are the trademarks of their respective companies.

HART®
Registered trademark of HART® Communication Foundation, Austin, Texas, USA

Product Approvals

This document and the information provided within are controlled by the approvals agency(s) listed below. All changes to this document must be submitted to and approved by the agency(s) before public release.

- FM Approvals (FM)

CE marks, Declaration of Conformity
The instrument is designed to meet state-of-the-art safety requirements, has been tested and left the factory in a condition in which it is safe to operate. The instrument complies with the applicable standards and regulations in accordance with EN 60079-0:2009 "Electrical apparatus for potentially explosive atmospheres-General requirements". The instrument described in this manual thus complies with the statutory requirements of the EG directives. Varec confirms the successful testing of the instrument by affixing to it the CE mark.

Disclaimer of Warranties

The contract between the Seller and the Buyer states the entire obligation of the Seller. The contents of this instruction manual shall not become part of or modify any prior or existing agreement, commitment, or relationship between the Seller and Buyer. There are no express or implied warranties set out in this instruction manual. The only warranties that apply are those in the existing contract between the Seller and Buyer.

The 4560 Servo Gauge Monitor (SGM) has not been tested by Varec under all possible operational conditions, and Varec may not have all the data relative to your application. The information in this instruction manual is not all inclusive and does not and cannot take into account all unique situations. Consequently, the user should review this product literature in view of his or her application. If you have any further questions, please contact Varec for assistance.

Limitations of Seller's Liability

In the event that a court holds that this instruction manual created some new warranties, Seller's liability shall be limited to repair or replacement under the standard warranty clause. In no case shall the Seller's liability exceed that stated as Limitations of Remedy in the contract between the Seller and Buyer.

Use of parts that are not manufactured or supplied by Varec voids any warranty and relieves Varec of any obligation to service the product under warranty. Varec recommends the use of only Varec manufactured or supplied parts to maintain or service Varec 4560 Servo Gauge Monitors (SGM).

Terms of Use

The information provided in this document is provided “as is” without warranty of any kind. Varec, Inc. disclaim all warranties, either express or implied, including the warranties of merchantability and fitness for a particular purpose. In no event shall Varec, Inc. or its suppliers be liable for any damages whatsoever including direct, indirect, incidental, consequential, loss of business profits or special damages, even if Varec, Inc. or its suppliers have been advised of the possibility of such damages.

This manual is solely intended to describe product installation and functions and should not be used for any other purpose. It is subject to change without prior notice. This manual was prepared with the highest degree of care. However, should you find any errors or have any questions, contact one of our service offices or your local sales agent.

Safety Precautions

Read this manual carefully and make sure its contents are understood before using this product. Follow all instructions and safety guidelines presented in this manual when using this product. If the user does not follow these instructions properly, Varec cannot guarantee the safety of the system.

Comply with all applicable regulations, codes, and standards. For safety precautions, the user shall refer to the appropriate industry or military standards.

Caution! **Electrical Hazard!** Read and understand static and lightning electrical protection and grounding described in API 2003. Make certain that the 4560 Servo Gauge Monitor (SGM) installation, operation, and maintenance conforms with the practice set forth therein. Make sure the power is turned off at the main circuit breaker or switch. The power switch should be in the OFF position, locked, and labeled to prevent other personnel from turning the power on during installation.

Contents

1 System Configuration and Requirements

1.1 Configuration

The 4560 Servo Gauge Monitor (SGM) is a tank side monitor and control station for the 6000 Servo Tank Gauges. It is a simple, low-cost, tank-side monitor for displaying interface level, tank bottom level, and temperature.

The 4560 SGM can be operated to measure the level, interface level, or bottom level, or to hoist the displacer. The tank gauge is operated by touch through three visual touch controls in the display. For the transmission between the 6000 Servo Tank Gauge and the 4560 SGM, a two-wire HART® protocol is used. Figure 1-1 shows an example of a 4560 SGM application.

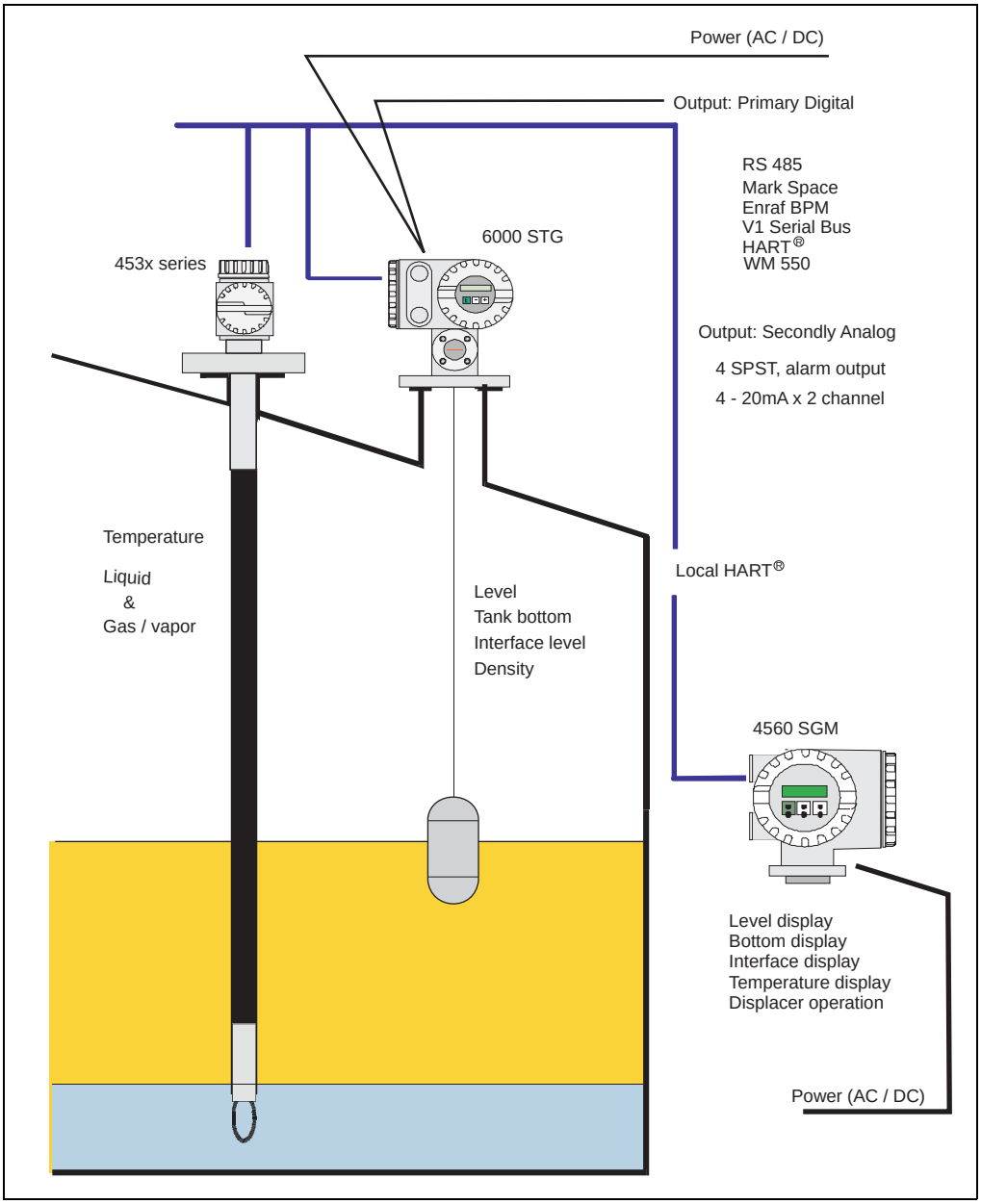


Figure 1-1: Example of a 4560 SGM application

1.2 Requirements

The following requirements are critical for the accurate and safe operation of the 4560 SGM.

1.2.1 Power source

Check the voltage of the power supply before connecting it to the product. It should be the exact voltage required for proper operation of the product.

1.2.2 Use in hazardous areas

When using the product in the first or second-class hazard location (Zone 1 or Zone 2) be sure to use an intrinsically safe or a pressure-and-explosion proof apparatus. Take the utmost care during the installation, wiring, and piping of such apparatus to ensure the safety of the system. For safety reasons, maintenance or repairs on the product while it is being used with such apparatus should only be performed by qualified personnel.

1.2.3 External connection

When an external connection is required, the product should be protectively grounded before it is connected to a measurement object or an external control circuit.

1.3 Safety Instructions

Read and understand all material in this section of the manual before mounting and installing the 4560 SGM.

Read and understand static and lightning electrical protection and grounding described in API 2003. Make certain that the tank installation, operation, and maintenance conforms with the practice set forth therein.

Comply with all applicable regulations, codes, and standards. For safety precautions, the user should refer to the appropriate industry or military standards.

Heed the following Warnings and Cautions.

Warning! **Striking the monitor with a metal object could cause a spark to occur.** When working in flammable or hazardous liquid storage areas, take necessary measures to protect the hardware from impact.

Warning! **Volatile fumes may be present!** Make certain that the tank is empty and not in service. Ensure that the tank has been leak and pressure tested as appropriate for the liquid to be stored. Observe appropriate safety precautions in flammable or hazardous liquid storage areas. Do not enter a tank that has contained hydrocarbons, vapors, or toxic materials, until a gas-free environment is certified. Carry breathing equipment when entering a tank where oxygen may be displaced by carbon dioxide, nitrogen, or other gases. Wear safety glasses as appropriate. Use a hard hat.

Warning! **Sparks or static charge could cause fire or explosion!** The mechanical connections between the guide cables, the float, the tape, and the gaugehead provide a resistance to ground that is adequate for the safe electrical drain of electrostatic charges that may accumulate in the tank and the product. Worker activity and worker clothing may accumulate electrostatic charges on the body of a worker. Care should be used in flammable environments to avoid the hazard.

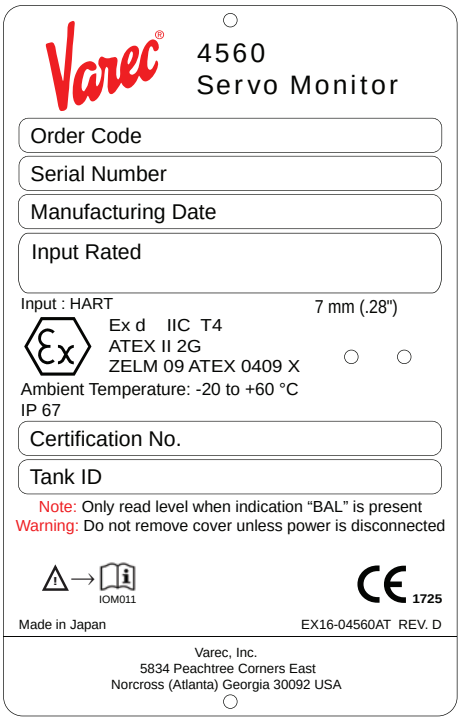
Caution! **Explosion Hazard!** Although the 4560 SGM is certified for use in explosion hazardous areas, always follow these guidelines:

- Keep the unit clean.
- Use care to not damage the unit.
- Tighten the bolts.
- Use a cable of the required size for wiring.
- Use the appropriate cable gland and tighten it firmly.

1.4 Identification

1.4.1 Device Designation

The following example shows the technical data on the instrument nameplate.



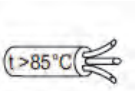
1.5 Notes on Safety Conventions and Symbols

In order to highlight safety-relevant or alternative operating procedures in the manual, the following conventions have been used, each indicated by a corresponding symbol in the margin.

Symbol	Meaning
	**Warning!** A warning highlights actions or procedures which, if not performed correctly, will lead to personal injury, a safety hazard, or destruction of the instrument.
	**Caution!** Caution highlights actions or procedures which, if not performed correctly, may lead to personal injury or incorrect functioning of the instrument.
	**Note!** A note highlights actions or procedures which, if not performed correctly, may indirectly affect operation or may lead to an instrument response which is not planned.

	**Device certified for use in explosion hazardous area** If the device has this symbol embossed on its name plate it can be installed in an explosion hazardous area.
	**Explosion hazardous area** Symbol used in drawings to indicate explosion hazardous areas. Devices located in and wiring entering areas with the designation “explosion hazardous areas” must conform with the stated type of protection.
	**Safe area (non-explosion hazardous area)** Symbol used in drawings to indicate, if necessary, non-explosion hazardous areas. Devices located in safe areas still require a certificate if their outputs run into explosion hazardous areas.

	**Direct voltage** A terminal to which or from which a direct current or voltage may be applied or supplied.
	**Alternating voltage** A terminal to which or from which an alternating (sine-wave) current or voltage may be applied or supplied.

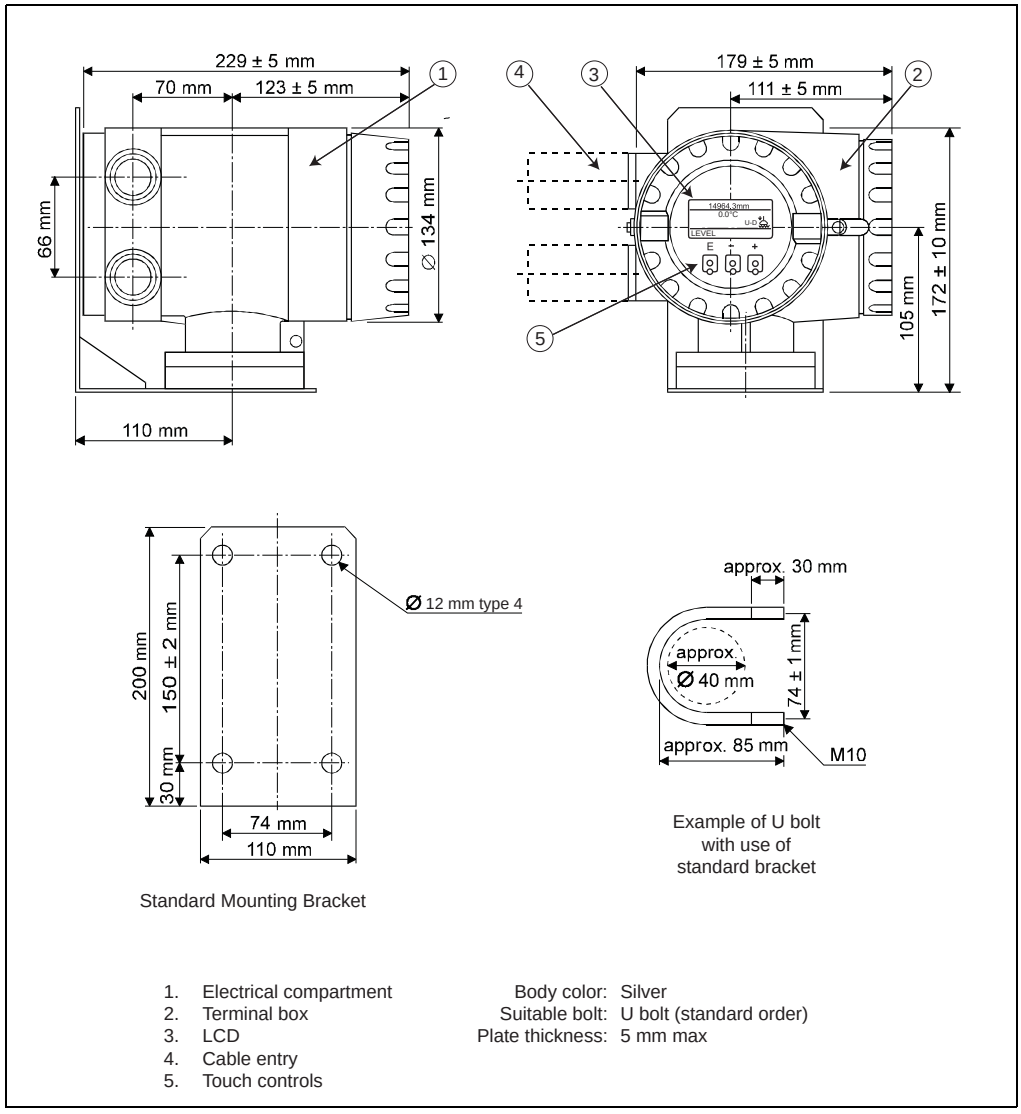
	**Grounded terminal** A grounded terminal, which as far as the operator is concerned, is already grounded by means of an earth grounding system.
	**Protective grounding (earth) terminal** A terminal which must be connected to earth ground prior to making any other connection to the equipment.
	**Equipotential connection (earth bonding)** A connection made to the plant grounding system which may be of type e.g. neutral star or equipotential line according to national or company practice.
	**Temperature resistance of the connection cables** States, that the connection cables must be resistant to temperature of at lease 85° C (185° F).

2 Specifications and Dimensions

2.1 Specifications

Input	Multidrop local HART®
Display (LCD)	4 lines. 128 x 64 pixels, illuminated Language selection: English, Chinese, and Japanese.
Programming	3 visual operating elements for selection of matrix functions (“touch control”)
Power supply	High Voltage: AC 85 – 264V 50/60Hz Low Voltage: AC 20 – 55V 50/60Hz, DC 20 – 60V Caution! Allowable voltage supply is specifically stated depending on each Ex approval. Refer to the designated certification.
Power consumption	Maximum 25 VA or 25 W
Lightning Arrester	Standard equipment
Range of ambient temperature	-20°C through +60°C (-4° through 140° F) (standard) Note: The LCD does not function at temperatures below -10°C (14°F).
Storage Temperature Range	-20°C through +60°C (-4° through 140° F)
Weight	Approx. 6.5kg.
Housing material	Aluminum, coated with rust inhibitor paint
Ex Certification	FM, XP Class 1.1, Dev.1, Gr.A-D CSA, Class 1.1, Dev.1, Gr.A-D ATEX, II 2G Ex d IIC T4 ATEX, II 2G Ex d IIC T4, NMi
Protection	IP67 (NEMA 4X) with closed housing and cable glands of same protection type.
Cable Entry	G 1/2, NPT 1/2, M 20
EMC Directive	2004/108/EC
Electromagnetic compatibility	Immunity and emission to EN 50081-1, EN 50082-2

2.2 Dimension



Standard Mounting Bracket

Example of U bolt with use of standard bracket

1. Electrical compartment
2. Terminal box
3. LCD
4. Cable entry
5. Touch controls

Body color: Silver
Suitable bolt: U bolt (standard order)
Plate thickness: 5 mm max

Figure 2-1: Dimensions of the 4560 SGM

2.3 Scope of Delivery

Caution! It is essential to follow the instructions concerning the unpacking, transport, and storage of measuring instruments given in the chapter "Incoming acceptance, transport, storage", and so on.

The scope of delivery consists of:

- Assembled instrument
- Mounting bracket

Accompanying documentation:

- Operating manual (this manual)
- Safety instructions

3 Mounting

3.1 Types of Mounting

Note! For safe and accurate operation of the 4560 SGM, select a mounting location where the ambient temperature does not exceed the limits.

Use one of the following installation methods to mount the 4560 SGM with a standard mounting bracket:

- Mounting on the wall (Figure 3-1)
- Mounting on a 2" (50mm) pipe (Figure 3-2)

You can mount the 4560 SGM in a similar way without using the mounting bracket.

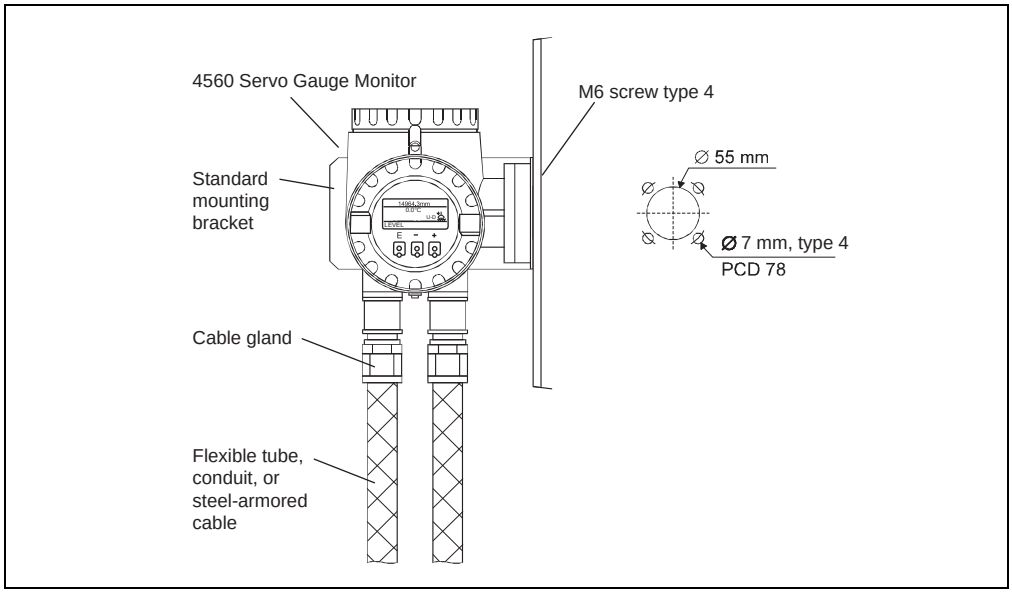


Figure 3-1: Mounting on the wall

When attaching and bending the flexible tube, the radius of curvature must be at least 300 mm (11.8") at any bend portion.

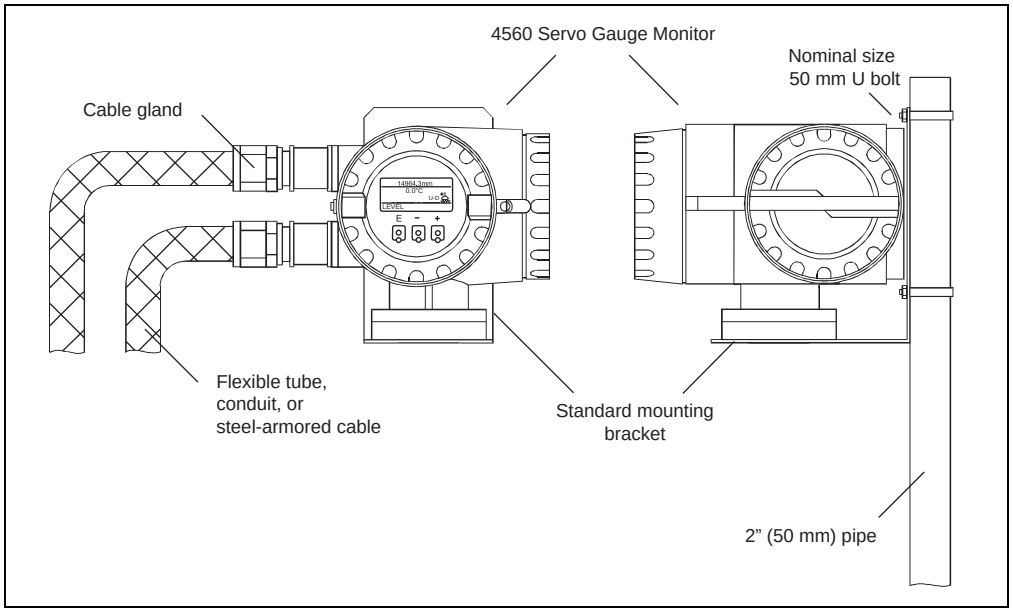


Figure 3-2: Mounting on a 2" (50 mm) pipe

To access and remove the display and operating elements, unscrew the cover. Turn the display module 90° counterclockwise to remove it. To replace the display module, engage the module with the mounting slots, and turn it 90° clockwise. Make sure the display is oriented correctly (see Figure 3-3).

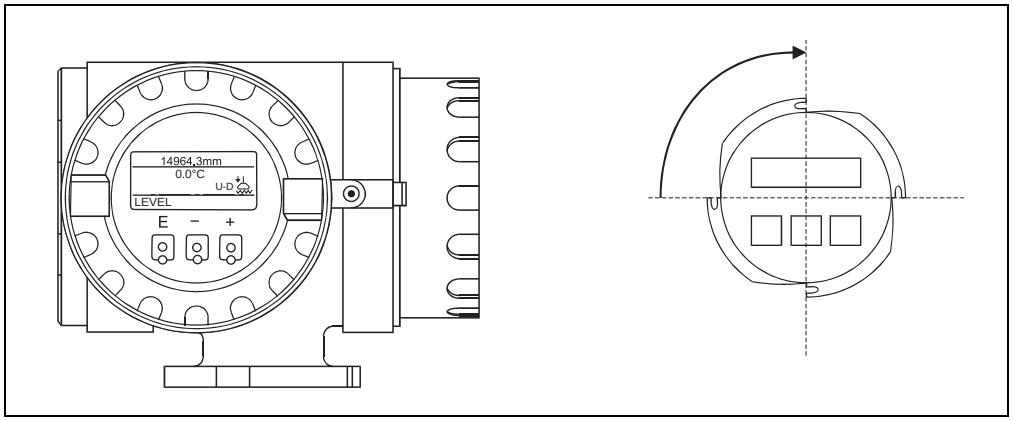


Figure 3-3: Removing or mounting the display and operating elements

4 Wiring

Caution!

Shut off the power supply before mounting the 4560 SGM or changing a wire.

Check that voltage and frequency of the local power supply tally with the data written on the name plate of the 4560 SGM.

Inspect and verify the grounding of the 4560 SGM before turning the power on.

4.1 Connection Procedure

The electrical connection of the 4560 SGM is shown in Figure 4.4.

1. Check that the power supply of the 4560 SGM is turned off.
2. Insert AC power supply and signal cable from each side of the cable entries. Establish a grounding for the signal cable screen.
3. Connect cables to each terminal. We recommend a crimped connection.
4. After completing all electric connections, screw the terminal cover and hook its lock (shroud).
5. During installation take care of mounting the conductor in such a way that self lossening and corrosive effects will be prevented

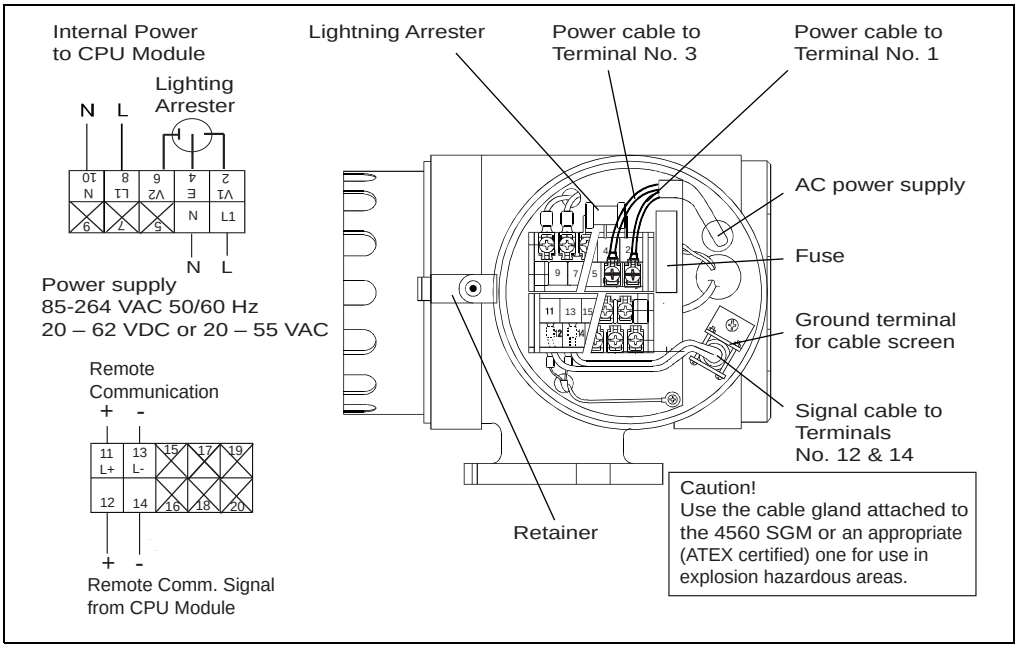


Figure 4-1: Electrical connection of the 4560 SGM

The local HART® communications allow establishing a data connection to and from the 6000 Servo Tank Gauge.

Caution! **Improper cable shielding can result in damage to the equipment or inaccurate performance!** The input cable must be shielded and thicker than 24 A.W.G. (diameter of 0.51 mm), or use a steel-armored cable designed for measurement

equipment. For local HART® communications cable, use a shielded, twisted-paired cable.

For power supply, use two conductor cables.
For the local Hart signal, use one twisted-pair cable.

4.2 Cable Gland

Warning! **Open cable entries can present the risk of explosion.** If any cable entries (inlets) are not used, remove the unnecessary cable glands and plug the openings.

4.3 Connection Procedure

The electrical connection of the 4560 SGM is shown in Figure 4.4. Note the warnings in the section above, and then follow these steps. During installation, use care in selecting a location and use methods to prevent self-loosening and corrosive effects.

1. Check that the power supply of the 4560 SGM is turned off.
2. Feed the signal cable through one of the two cable entries.
3. Establish a grounding for the signal cable screen.
4. Connect a signal cable to screw Terminal 12 and one to Terminal 14.
5. Feed the AC power supply cable through the other cable entry.
6. Connect the power supply cables to Terminals 1 and 3.
7. Screw the terminal cover in place.
8. Hook the cover retainer in place and tighten its set screw.

4.4 Input

The local HART® communications allow establishing a data connection to and from the 4560 SGM.

Caution! The input cable must be shield and thicker than 24 A.W.G. (diameter of 0.51), or use a steel-armored cable designed for measurement equipment. For local HART® communications, use a shielded twisted-pair cable.

The number of cable cores is 2C for power supply and IP for local HART® communications.

4.5 Cable Gland

Caution!

- If not all the cables entries (inlets) are needed, remove the unnecessary gable glands and plug the openings.

5 Operation

5.1 Display and Operating Elements

5.1.1 Display

The 4560 SGM has an illuminated LCD that consists of two lines with 16 characters each. During normal operation, the Home position shows the level, temperature, and the status of the device on the “HOME” position. For the display of the other data and the programming of the parameters for operation, the 4560 SGM uses a programming matrix.

5.1.2 Operating elements

The 4560 SGM is operated by three keys, labelled E, –, and +. The keys are activated by touching the appropriate area on the glass cover. Even in explosion hazardous areas, the explosion-proof housing of the touch control ensures safe access to the data.

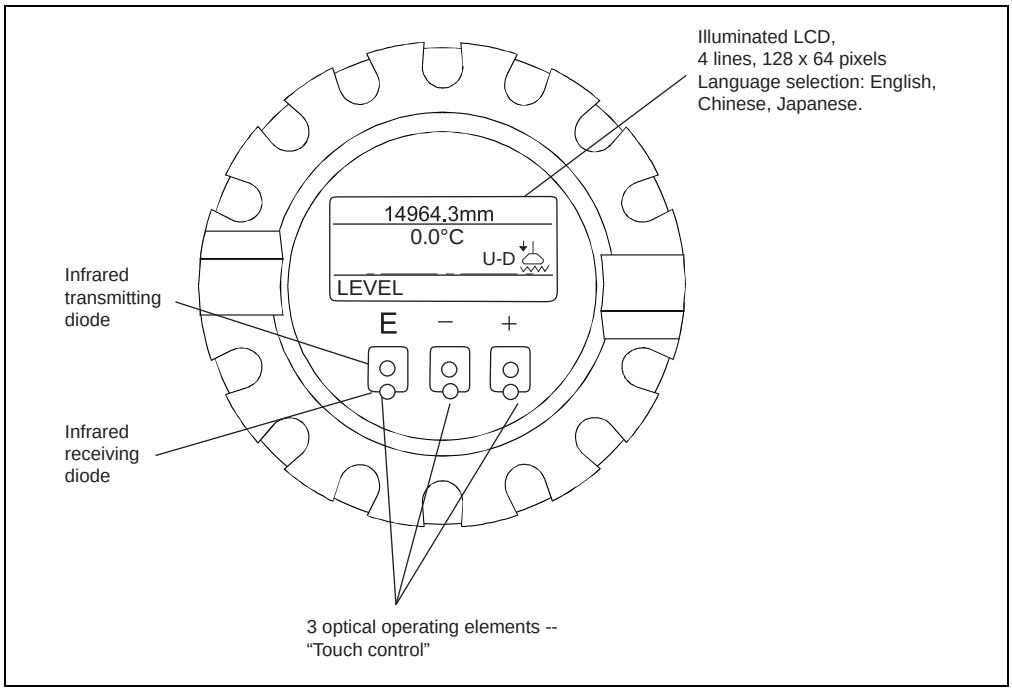


Figure 5-1: Display and operating elements

5.2 Functions of the Operating Elements

The LCD display and the touch keys are illustrated and explained in Figure 5-2 and Table 5-1.

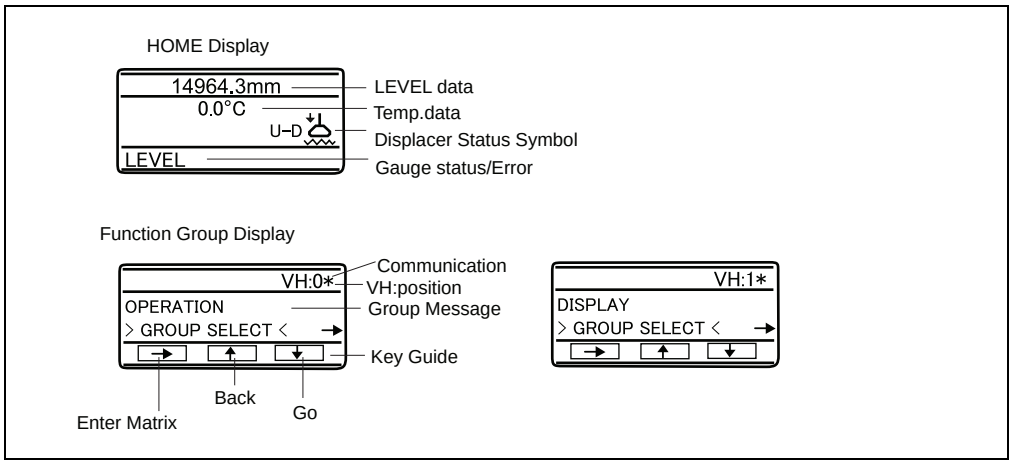


Figure 5-2: LCD display functions

Key	Functions
E	• Access to the programming matrix (touch the key for more than 3 seconds). • Return to the HOME position (touch the key for more than 3 seconds). • Move horizontally within a function group to select functions. • Save parameters or access code.
− +	• Move vertically to select function groups. • Select or set parameters. • Set access code.

Table 5-1: Touch Key functions

If you do not touch any keys for 10 minutes, the LCD display will switch back to the HOME screen. Use the + and - keys to shift the number.

- When you touch and hold + or -, the right (one's place) digit changes first.
- After one cycle of the right digit, the middle (ten's place) digit changes.
- After one cycle of the middle digit, the left (hundred's place) digit changes.

When you release the key, you will go back to the right most digit.

5.3 Programming Matrix

From the 4560 SGM, you can operate the 6000 STG. The following 6000 STG operations are available from the 4560 SGM:

- Level measurement
- Displacer hoist
- Interface level measurement
- Tank bottom measurement

Figure Figure 5-3 illustrates how the keys are used to move through the programming matrix.

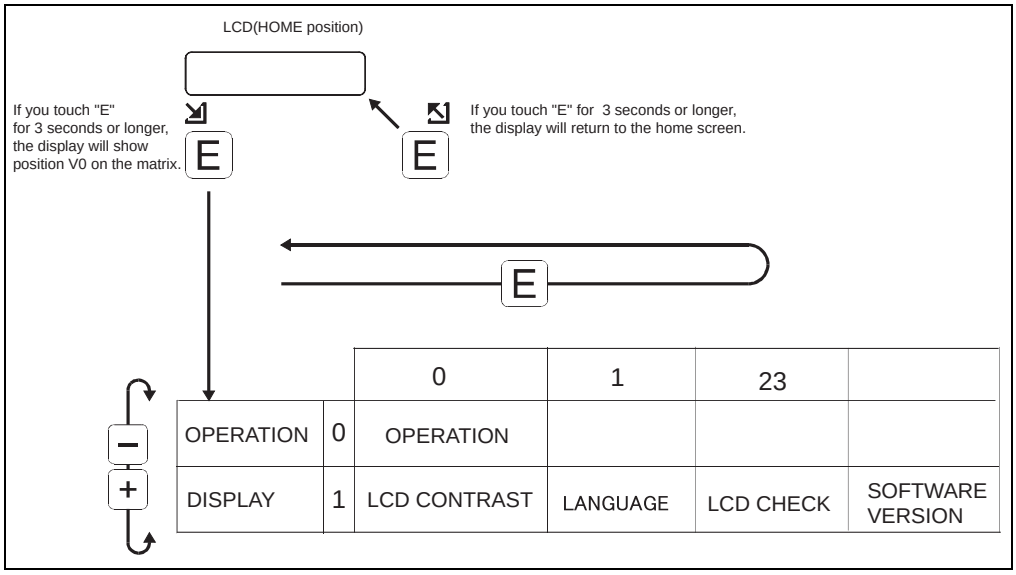


Figure 5-3: Selecting functions within the programming matrix

5.4 Access Code Setting

The access code ensures the confidentiality of the set-up data (see Table 5-2). The 4560 SGM has only one access code and security level.

Note! The only access code for the 4560 SGM is 50.

6000 STG Access Level and Codes		
Security Level		**Access Code**
0		none
1	For Operator	50
2	For Engineer	51
4560 SGM Access Level and Codes		
Security Level		**Access Code**
0		none
1	For Operator and Engineer	50

Table 5-2: Access Levels and Codes

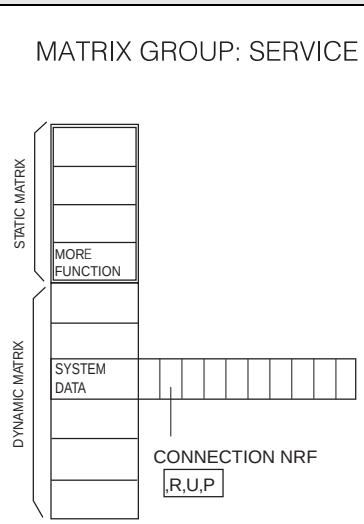
The 6000 STG allows two security levels, with an access code for each level. The higher security levels include the lower ones. For example, if access code 50 is specified for a function, then code 51 also enables editing. A function that requires access code 51, on the contrary, cannot be edited by code 50. An exception to this rule is code 777, which is only used to change the intrinsically safe (I.S.) terminal configuration.

Note! An access no. included all the functions of any access no. of lesser value. Selecting code 51 means selecting code 50 as well: functions the selection of 50 offers are also available. Inversely, if you select code 50, the available functions are limited.

5.5 Setting the 6000 STG to access a connected 4560 SGM

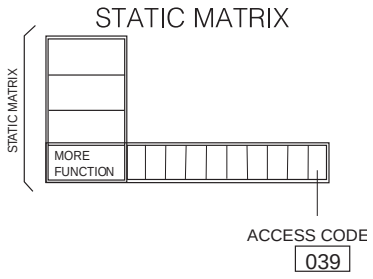
The following settings are required to display 4560 SGM data on 6000 STG screens.

Note! If you touch “E” when any code except 0, 50, or 51 is in the display, “EDITING LOCKED” appears. You must first enter a valid access code.

Item	Procedure	Remarks
	1. In the static matrix “Switch and error/alarm”, select G0V3H0 "MATRIX OF" and select “SERVICE.” 2. In the dynamic matrix, select GOV6H2 "CONNECTION NRF". 3. Select "CONTACT1" or "CONTACT2" by touching "+" or "–". 4. Setting complete.	**Note!** 1. Ser 50 for an access code. 2. CONTACT1 for: NRF software is 1.81 or earlier (software version cannot be displayed. CONTACT2 for: NRF software is 1.82 or later (software version cannot be dispalyed.

5.6 Entering an Access Code

Note! If you touch “E” when any code except 50 is in the display, “EDITING LOCKED” appears. You must first enter a valid access code.

Item	Procedure	Remarks
	1. At the static matrix “Switch and error alarm”, select G0V3H9 “ACCESS CODE. 2. The default value is “0”. Keep touching “+” until you get to “50” or “51”. 3. The first digit increases to 9, then the second digit increases. Stop touching “+” when you reach “50”. 4. “50” is blinking. Gently touch "+" again to increase the second digit from 0 to 1. Now you have 51. 5. Here touch "E"; “EDITING ENABLED” will be displayed.	**Note!** 1. When you touch "E" while displaying an access code 0, 50 or 51, "EDITING LOCKED" will appear. 2. If an access code has not been selected before performing any setting, the screen will automatically change to show "EDITING ENABLED." Select "50" or "51", according to the matrix table.

5.7 HOME Position

When the 4560 SGM is first powered ON, the LCD shows the current data on the HOME position, as illustrated in Figure 5-4.

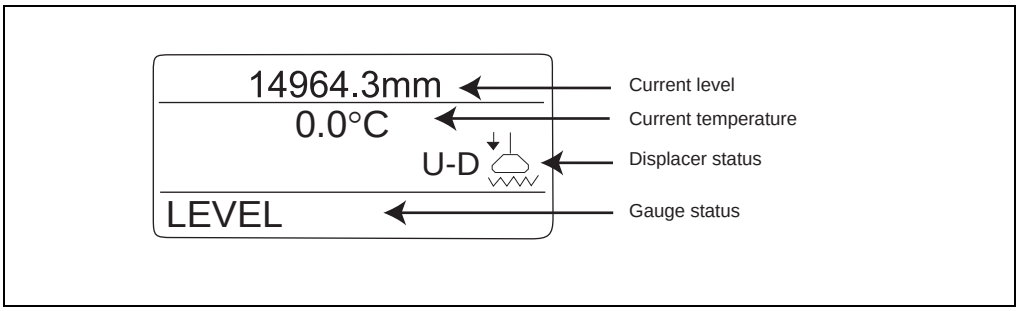


Figure 5-4: 4560 SGM Power-ON display

The definition of the each gauge sign is listed in Table 5-3:

Gauge Sign	Meaning
G-RE	displacer is resting at the reference position.
UP	UP command has been given.
STOP	STOP command has been given.
LIQU	6000 STG is measuring the surface level.
U-IF	6000 STG is measuring the upper interface level.
LIF	6000 STG is measuring the lower interface level.
BOTM	6000 STG is measuring the tank bottom level.
U-DE	6000 STG is measuring the upper liquid density.
M-DE	6000 STG is measuring the middle liquid density.
B-DE	6000 STG is measuring the bottom liquid density.
CAN	RELE.OVER TENS command has been given.
TEAC	6000 STG is carrying out calibration.
Blank	6000 STG cannot detect any level.

Table 5-3: 4560 SGM Gauge Sign definitions

The definition of the each Displacer 3-digit status is listed in Table 5-4:

Displacer		Meaning
BAL		**Balance** The displacer is resting on the liquid surface or interface and in balanced status.
T-B		**Temporary Balance** Automatic weight calibration is being carried out.
U-U		**Balance Up** The displacer is being hoisted and in unbalanced status.
U-D		**Balance Down** The displacer is being lowered and in unbalanced status.
R-U		**Balance Up** The displacer is being hoisted and in correction of balance.
R-D		**Balance Down** The displacer is being lowered and in correction of balance.
LOW		The displacer is resting at the lower stop.

Table 5-4: 4560 SGM Displacer Status definitions

Note! If no LCD operation, the 4560 SGM will turn off the backlighting of the LCD 12 hours later. Touching the LCD again after this time will turn on the backlighting.

6 6000 STG Programming Matrix

The 6000 STG must be programmed to operate the 4560 SGM. The following two tables show the Static Matrix Table for the 6000 STG. In the following two tables, H stands for horizontal (row) and V for vertical (column).

NMS5 Programming Matrix (Static Matrix)

GROUP MESSAGE	V \ H	0	1	2	3	4	5	6	7	8	9
		16000.00mm	0.0 mm	0.0 mm	0.0 mm	0.0 mm	1.000 g/ml	1.000 g/ml	1.000 g/ml	0.0 mm	
MEASURED VALUE 1	0	MEASURED LEVEL	ULLAGE LEVEL	UPPER INTERF. LEV.	MIDD. INTERF. LEV	BOTTOM LEVEL	UPPER DENSITY 0.000 - 3.000	MIDDLE DENSITY 0.000 - 3.000	DENSITY BOTTOM 0.000 - 3.000	LEVEL DATA	
		Display	Display	Display	Display	Display	Display/Set (50)	Display/Set (50)	Display/Set (50)	Display	
		0.0°C	0.0 mm	0.0 mm	0.0°C	0.0 mm			0 mm	16000.0 mm	mm
MEASURED VALUE 2	1	LIQUID TEMP.	DEV(1)	DEV(2)	GAS TEMPERATURE	WATER BOTTOM			ZERO POINT	SPAN	LENGTH UNIT
		Display	Display	Display	Display	Display			Display	Display	Display
		STOP	STOP	UNBALANCED		LEVEL	LEVEL			0	8424
OPERATION	2	OPERATION 16000 See operation commands	OPERATING STATUS See status table	BALANCING STATUS		OPERAT.BY NRF	OPERAT. BY HOST			DEVICE ID	SOFTWARE VERSION
		Select (50)	Display	Display		Display	Display				
		CALIBRATION			98 627 8:21:00	NO ALARM	NO ALARM	NO ERROR	MPU:START ACT	OFF	0
MORE FUNCTION	3	MATRIX OF 0 - 8			CALENDER Currect data	ALARM CONTACT 0 Currect data	LA 0 0 0 0 Currect data	DIAGNOSTIC CO 0 Currect data	98 627 752 0 0 Currect data	RESET ALM. DIAGNO.	ACCESS CODE 0, 50, 51, 777
		Select			Display	Display	Display	Display	Display		Set

Default Data
Display Text
Parameters, unit, etc
Mode (Code)

Table 6–1: 6000 STG Programming Matrix 1

NMS5 Programming Matrix (Dynamic Matrix, Service: G3)

GROUP MESSAGE	V \ H	0	1	2	3	4	5	6	7	8	9
MEAS. WIRE & DRUM	4	300.00 mm WIRE DRUM CIRC. 0 - 999.9 Set (51)	1.4g / 10m WIRE WEIGHT 0 - 999.9 Set (51)	255.0 g DISPLACER WEIGH 0 - 999.9 Set (51)	145.0 ml DISPLACER VOLUM 0 - 999.9 Set (51)	60 ml BALANCE VOLUME 0 - 999.9 Set (51)	1.0 ml VOLUME TOLERANCE 0 - 99.9 Set (51)		20 X 100 mS DELAY 0 - 99 Set (51)	0.00 mm/m DRUM CORRECTION 0 - 99.00 Set (51)	0 count DISPL. HUNT.COUNT 0 - 99 Set (51)
GAUGE DATA	5	0.0 mm ACTUAL LEVEL Display (530)	0 Count ENCODER COUNT Display (530)	OFF NON HYSTER. MODE ON Select (51)	OFF H1.ACCURACY MODE ON Select (51)	0 s HI. ACCR. OPE. TIME 0 - 600 Set (51)	50 mm HI. ACC. DISP. UP 0 - 300 Set (51)	999 °C GAUGE TEMP. Display (51)			
SYSTEM DATA	6	LOCAL : MASTER SENSOR DATA REMOTED COM. ON SOFTWARE =04.24 HARDWARE = TGB 04 GEAR 1:36 NOT OVERSPILL	OFF CONNECTION NRF CONTACT 1 CONTACT 2 Select (51)	OFF CONNECTION NMT SPOT TEMP. AVERAGE TEMP. Select (51)						IF_LEVEL SELECT UP_IF_LEVEL WATER BOTTOM WATER BOTTOM 2 Select (51)	OFF SOFT RESET Select (51)
SERVICE	7	0.0 g MEASURED WEIGHT Display	OFF RELE. OVER TENS ON Select (51)	OFF DRUM SETTING ON Select (51)	OFF WEIGHT CALIBR. ON Select (51)					70 mm DISPL. REFERENCE Set (51)	0.0 g ZERO ADJ. WEIGHT Set (51)
SENSOR VALUE	8	Sa=21000 : A=21000 Sb=11000 : B=11000 Display (51)									
SENSOR DATA	9					0 0 0.0 g WT. COUNT CAL A Display (51)	0 0 0.0 g WT. COUNT CAL B Display (51)				

Table 6–2: 6000 STG Programming Matrix 2

7 4560 SGM Programming Matrix

The Programming Matrix lists the messages that appear in the 4560 SGM's LCD screen. When access code 50 is selected, all the matrix functions are available. In the table, H stands for horizontal (row), and V for vertical (column).

Display Text Parameters, unit, etc Mode (code)

4560 SGM Programming Matrix (Static Matrix)

GROUP MESSAGE	H / V	0	1	2	3	4	5	6	7	8	9
OPERATION	0	OPERATION Display(50)									
DISPLAY	1	LCD CONTRAST Display(50)	LANGUAGE Select (50)	LCD CHECK Display(50)	SOFTWARE VERSION Display(50)						ACCESS CODE Set (50)
	2										
	3										

Table 7-1: 4560 SGM Programming Matrix

The following table gives a description of the programming matrix of the 4560 SGM.

Matrix group	Function group	Item	Access code	Short description	Default value	Set Select Display	Possible settings, selection, or display	Index No, GVH
STATIC MATRIX (This word is not shown)	OPERATION	OPERATION	50	Selection of an operation of the 6005 STG's displacer; you may select an option from those listed in the column of "possible settings, selections, or displays" on the right hand side of this table, and store the selection by pressing "E" (Enter)	LEVEL	Select	LEVEL UP STOP BOTTOM LEVEL MIDD. INTERF. LEVEL UPPER DENSITY MIDDLE DENSITY DENSITY BOTTOM REPEATABILITY WATER DIP	000
	Display	LCD CONTRAST	50	Varies the display contrast in 16 steps	Phase16	Set	(The contrast can be adjusted with the "+","-" keys)	010
		LANGUAGE	50	Checks if the LCD display is in good order.	English	Select	English Japanese Chinese	011
		LCD CHECK	50	Checks if the LCD display is in good order; if it is, it blackens for 3 seconds when selecting ON, and whitens for the same length of time when selecting OFF.	OFF	Select	ON OFF	012
		SOFTWARE VERSION	50	Shows the 4560 Servo Gauge Monitor's control software version.	V.1.94	Display		013
		ACCESS CODE	50	Set access code to view and change to matrix data.	0	Set	0, 50	019

Table 7-2: Description of the Programming Matrix of the 4560 SGM

8 Maintenance and Troubleshooting

8.1 Maintenance

The following sub-sections cover maintenance and repairs that may be necessary.

8.1.1 Exterior cleaning

When cleaning the exterior, always use cleaning agents that do not damage the surface of the housing or the seals.

8.1.2 Replacing seals

The seals of the sensors must be replaced periodically, particularly if molded seals (aseptic construction) are used. The period between changes depends on the frequency of cleaning and on the temperature of the measured substance and the cleaning temperature.

8.1.3 Repairs

The Varec repair concept assumes that the measuring devices have a modular design and that customers are able to undertake repairs themselves.

Spare parts are contained in suitable kits. They contain the related replacement instructions. For more information on service and spare parts, contact the Service Department at Varec.

8.1.4 Repairs to Ex-approved devices

When carrying out repairs to Ex-approved devices, please note the following:

- Repairs to Ex-approved devices may only be carried out by trained personnel or by Varec Service.
- Comply with the prevailing standards, national Ex-area regulations, safety instructions and certificates.
- Use only original spare parts from Varec.
- When ordering a spare part, please note the device designation on the nameplate. Replace parts only with identical parts.
- Carry out repairs according to the instructions. On completion of repairs, carry out the specified routine test on the device.
- Only Varec Service may convert a certified device into a different certified variant.
- Document all repair work and conversions.

8.1.5 Returns

Contact Varec and request a return authorization. All documentation and instructions will be provided at that time for preparing the product to be shipped to Varec.

8.2 Spare Parts and Accessories

8.2.1 Spare Parts

Spare parts for the 4560 SGM are contained in kits. Available spare parts are shown with their order numbers in the diagram below. For more information on service and spare parts, contact Varec

.

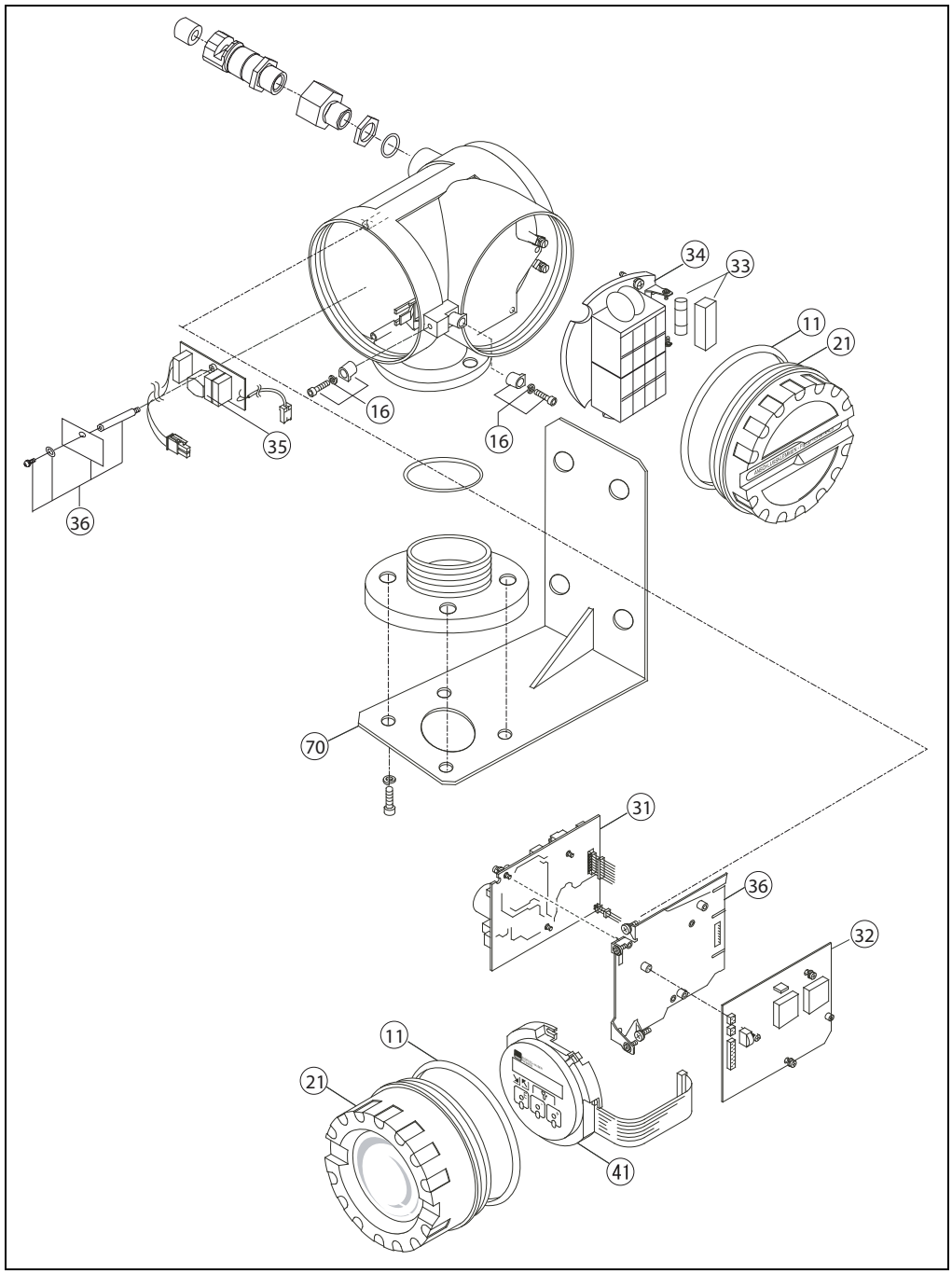


Figure 8-1: 4560 SGM Assembly Diagram

8.2.2 Spare Parts List

Number	Part Number	Description
11	017803-0030	O-ring, display cover, NBR
16	56004435	Set NRF screw part
21	017800-0111	Cover display module, Alu
21	017801-0133	Cover terminal compartment, Alu, NRF
31	70103940	POW-6 HV non Ex i
31	70103941	POW-6 LV non Ex i
32	017801-0001	Comm. board FCB1 v1.92, 2 line disp.
32	701091104	Comm. board FCB v1.94, graphic disp.
33	017801-0105	Fuse 250VAC T2A50, 10 pcs.
33	017801-0107	Barrier, fuse cover, 10 pcs.
34	017801-0030	Terminal board (Exd)
35	017801-0020	Filter board + spacer 85 - 260VAC
36	71070911	Chassis+EMC filter cover, 4560 SGM
41	017801-0010	Display module, 3x key optical
41	70103938	Display module, 4 line, 3 key optical
70	017801-0111	Assembly bracket 90deg, Alu

Table 8-1: 4560 SGM Spare Parts List

8.2.3 Accessories

A U bolt is not included with the mounting bracket. If you need a U bolt, please contact Varec.

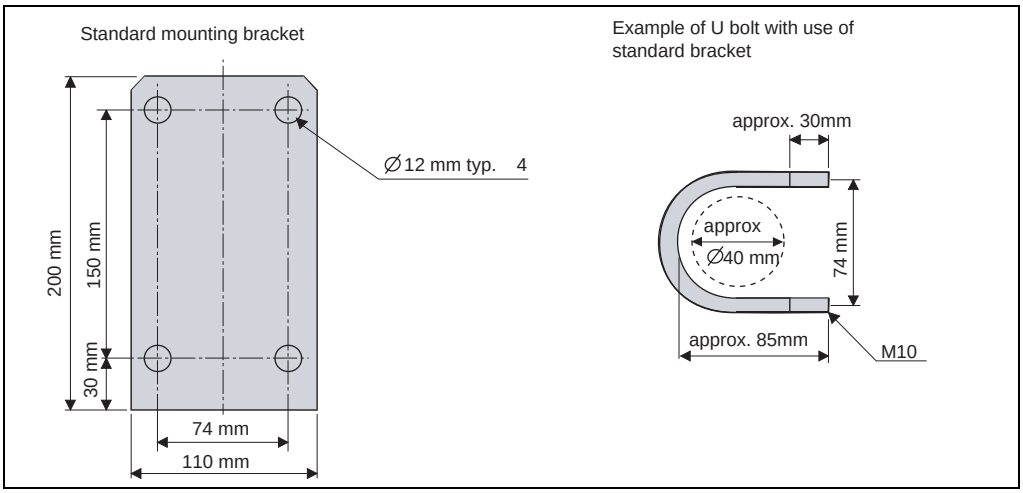


Figure 8-2: U Bolt

8.3 Troubleshooting

If an error occurs in the 6000 STG, or the 4560 SGM, your current matrix and error message will blink alternately in the 4560 SGM's LDC screen. Controls relevant to the display are operative even while an error message is displayed.

Message	Cause	Remedy
NMS COMM ERR	No communication with the HART® device.	Check the connection and setting of the 6000 STG to the 4560 SGM.
LOCAL ERROR: NMT	No communication with the 4560 SGM, or the 4532/4539 ATC.	Check the connection and setting of the 4532/4539 ATC.
LOCAL ERROR: DEV1 (or 2)	No communication with the HART® device 1 (or 2).	Check the connection and setting of the HART® device 1 (or 2). Check the HART® device 1 (or 2).
DEVICE ERROR: NMS	The 6000 STG gives an error signal.	Check the diagnosis of the 6000 STG.
DEVICE ERROR: NMT	The 4532/4539 ATC gives an error signal.	Check the diagnosis of the 4532/4539 ATC.
DEVICE ERROR: DEV 1 (or 2)	The HART® device 1 (or 2) gives an error signal.	Check the HART® device 1 (or 2).
OVER TENSION	The 6000 STG gives "over tension" error.	Check if the displacer motion is blocked by clogging or sticking
UNDER WEIGHT	The 6000 STG gives "under tension" error.	Check if the measuring wire is cut or the displacer is lost.
Z PHASE NO INPUT	The 6000 STG gives "Z phase no input" error.	Check the 6000 STG. Replace the detector unit of the 6000 STG.
SIFA ERROR	The 6000 STG gives "SIFA" error.	Check the 6000 STG. Replace the CPU board of the 6000 STG.
ROM ERROR	Check data of EEPROM.	Consult Varec Service.
POWER FAILURE	The supply voltage has dropped.	Check the power supply. (Tax & Weight spec. only)
RAM FAILURE	The data of the RAM are illegal.	Consult Varec Service.

Table 8-2: Error Messages, Causes, and Remedies for the 6000 STG or 4560 STG

8.4 Returns

The following procedures must be carried out before a transmitter is sent to Varec e.g.for repair or calibration:

- Remove all residue which may be present. Pay special attention to the gasket grooves and crevices where fluid may be present. This is especially important if the fluid is dangerous to health, e.g. corrosive, poisonous, carcinogenic, radioactive, etc.

- Always enclose a duly completed "Declaration of contamination" form (a copy of the "Declaration of contamination" is included at the end of this operating manual). Only then can Varec transport, examine, and repair a returned device.
- Enclose special handling instructions if necessary, for example a safety data sheet as per EN 91/155/EEC.

Additionally specify:

- An exact description of the application.
- The chemical and physical characteristics of the product.
- A short description of the error that occurred (specify error code if possible)
- Operating time of the device.

In case of disposal, please separate the different components according to their material consistency.

8.5 Software History

Software version/Date	Software Changes
V.1.82/09.1997	Original software
V.1.92/09.2002	Add density profile operation
V.1.94/01.2005	Change graphic LCD

9 Order Codes

010	**Approval**						
	0	Weather proof; IP67, NEMA 4X					
	4	FM XP C1.I, Div.1, Gr.A-D					
	5	CSA C1.I, Div.1, Gr.A-D					
	6	ATEX II 2G Ex d IIC T4					
	8	ATEX II 2G Ex d IIC T4, NMi					
	9	Special version, TSP-no, to be spec.					
20		**Cable entry**					
		B	Two NPT1/2” thread				
		D	Two thread M20				
30			**Power supply**				
			3	Power supply: 85 - 264 VAC, 50/60 Hz			
			4	Power supply: 20 - 62 VDC, 20-55 VAC, 50/60Hz			
40					**Mounting bracket**		
					0	Mounting bracket not selected	
					1	Mounting bracket included	
					9	Special version, TSP-no, to be spec.	
50						**Painting**	
						0	Silver
						9	Special version, TSP-no, to be spec.
N4560							Complete product designation

Return Goods Decontamination Form

For internal use only: Confidential & Proprietary

Varec®
An SAIC Company

Because of legal regulations and for the safety of our employees and operating equipment, we require this document to be completed, with your signature, and faxed to us for review before your order can be handled. Please fax directly to 770-810-9456 attention Customer Service.

Customer Information

Company Name:	
Contact Name:	
Address:	
Tel:	
Fax:	
Email:	

Product Information

RMA No.:	
No. of Pieces in RMA:	
Part Number:	
Serial Number:	
Assigned Technician:	

Medium and Warning

Please select one, include safety data sheet and if necessary, special handling instructions.

	Medium	Flammable	Toxic	Corrosive	Harmful/irritant	Other*	Harmless
Process Medium:							
Medium for cleaning:							
Returned part cleaned with:							

*Other: Explosive, oxidizing; dangerous for the environment; biological risk; radioactive.

We hereby certify that this declaration is filled out truthfully and completely to the best of our knowledge. We further certify that the returned part(s) have been carefully cleaned. To the best of our knowledge they are free from and residues in dangerous quantities.

Signature: _____ Date: _____

Varec, Inc. · 5834 Peachtree Corners East · Norcross (Atlanta), Georgia 30092
Tel: (770) 447-9202 · Fax: (770) 662-8939
www.varec.com

Your official representative

Varec, Inc.
5834 Peachtree Corners East, Norcross (Atlanta), GA 30092 USA
Tel: +1 (770) 447-9202 Fax: +1 (770) 662-8939