

Mini Line[®] G198 Mechanical Grade Control

User Manual

V. G704301



tf TECHNOLOGIES
PAVING INNOVATION

Please read carefully before installation

FCC and European Safety notices

The product and its accessories comply with the general conditions of operation in the European countries and the United States and bear the CE conformity marking

Patent Information

Product is patent pending and further information regarding this matter will be available in press releases and on TF-Technologies website

Contact Information

When reporting any problem to TF-Technologies Dealer/Distributor, it is essential to quote the following

Model Number
Serial Number
Part Number

On the Mini-Line® G198, the numbers are located on the green label

For technical assistance contact

TF-Technologies
Kratbjerg 214
DK-3480 Fredensborg
Denmark
Phone +45 4848 2633
Email sales@tf-technologies.com
www.tf-technologies.com

Product verification

Verify for damages to equipment due to transportation. In case of any damage or equipment malfunctioning, contact supplier or TF-Technologies.

Package contents

In 'Stand-Alone' function, Mini-Line® G198 Grade Control System consists of the following items:

1. Electronic part: Mini Line® G198 Grade Control
2. Mechanical part: Sensing Arm, Shoe (incl. Pin and Clip), Counter-balance, Tube Assy
3. Cable: Standard coiled cable (4 m)

WARNING

Packaging materials can be dangerous for children. Keep packaging materials, product and accessories well out of reach of children

Note It is a good practice to use original protection facilities and original packing for further transportation

Note See next page for contents illustrations

Note Mini Line® G198 Grade Control can also be used in a combination system together with a HS301 Handset for enhanced functionalities

Mini Line® G198 Grade Control & Accessories

Product description

The purpose of the Mini-Line® G198 'Stand-Alone' system is to automatically control the elevation of the paving screed to give a smoother asphalt mat finish.

Operating Mechanical system Principle

The mechanical unit of the system consists of the Sensing Arm, Shoe and Counter-balance. Depending on the working environment, at times the Tube Assy is used instead of the Shoe. The mechanical unit detects every single alteration that occurs vertically i.e. any changes in the tow-point elevation and converts the linear displacement into rotational motion.

Electronic System

The electronic system has 3 main features

- 1 Sensor circuitry
- 2 Microprocessor unit
- 3 Power driver circuit

Any linear displacement is accurately and quickly transformed into digital signal, and after being analyzed and compared with the reference point, information in forms of pulses are send to the electro-hydraulic valve in order to regulate the cylinder and consequently the tow-point. Thus the angle of attack of the screed is increased or decreased according to particular conditions.

Fig 1 Product overview



Mini Line® G198
(P/N S-50138)
(S/N see label)



Coiled Cable
(P/N S-50101/4,0)



Counter-balance
(P/N S-50105)



Sensing Arm
(P/N S-50104)



Shoe
(P/N S-50103)



Tube Assy
(P/N S-50106)

Product overview

The Mini Line® G198 electronics is embedded in a single aluminium alloy unit which protects the electronic safely against external harsh environmental conditions such as vibration, shock, heat, water and constant physical contacts. The aluminium alloy 'house' is almost cylindrical in shape with

a head unit (often called the mounting boss) that can be securely fitted into the mounting carrier arm on asphalt paving machines.

- Sensing Arm** The sensing arm is made of aluminium alloy and very light weight. It is part of the mechanical system that detects physically any changes in the grade elevation and transfers the mechanical changes to the G198.
- Counter-balance** The Counter-balance is fixed onto the slant side of the Arm. The utility of the counter-balance is to make the shoe more stable while in operation. Without a counter-balance the shoe will behave slightly unproportional to grade changes. The counter-balance is rust-free and easily cleaned of asphalt deposits.
- Shoe** The shoe-like metal plate is the part which is in contact with the ground or reference line at all times. The metal plate is rust-free and easily cleaned of asphalt deposits.
- Tube Assy** The Tube Assy is an alternative to the shoe. Depending on the work surrounding, a Tube Assy is in certain particular circumstances used instead of a Shoe. The principle and outcome is similar. A Tube Assy is mainly used when a reference beam or string is laid besides the asphalt paver. Thus the Tube Assy, being lighter in weight rests freely on the beam or string. The Tube Assy is also rust-free and easily cleansed of asphalt deposits.
- Cable** Coiled polyurethane cable specially developed for appliances where tough mechanical requirements have to be fulfilled, and have excellent low temperature characteristics. The coiled cable is yellow in colour and delivers in standard length of 4.0 m (when fully uncoiled). The standard coiled cable consists of 2 circular multipole plugs. One with 6-socket contacts with bayonet lock (to the G198) and one with 10-socket contacts threaded connector (to the paver power source)
- Caution** **Assembling and installation of the Mini-Line® G198 and the mechanical parts require particular attention to avoid malfunctions or improper end-results. Assembling the mechanical parts improperly on the Mini-Line® G198 shaft can cause damage to the equipment. Read carefully the installation procedures in this manual before attempting to operate the Mini-Line® G198 Grade Control**
- Note* *Cleaning the equipment (specially the mechanical parts) from asphalt deposits guarantees smoother and better performances from the equipment*
- Note* *The coiled cable can be made to specific requirements. Also available in 1.5 m and 6 m*
- Installation** Installation and set-up of the 'Stand-Alone' system is quick and do not require special tools. The following guidelines explain fully how the user must install and set-up the equipment.
- 1 Locate the Mounting Carrier Arm (often called the Jack Arm) on the asphalt paver. If the machine is not equipped with a mounting carrier, it is essential to have one installed on the asphalt paver. Refer to asphalt-paver machine Operation manual for further information on Mounting Carrier Arm (Jack Arm)
 - 2 Insert the round boss of the G198 into the Mounting Carrier Arm as shown in Fig. 2 and secure firmly by turning the handle

Fig. 2 G198 and a standard mounting Carrier Arm



- 3 Assemble the mechanical parts (Sensing Arm, Counter-balance, and Shoe as shown in Fig. 3

Fig. 3 Counter-balance, Sensing Arm, Shoe, bolts, pin and clip



- 4 Install the mechanical unit onto the shaft of the G198 Grade Control and secure with the supplied bolt

Note *The shaft on the G198 has a flat surface edge. Use this as a guide when installing the mechanical part onto the shaft.*

- 5 Proceed with cable connections as follows

The 6-socket contacts bayonet connector plugs onto the G198 Grade Control
The 10-socket contacts screw type connector plugs onto the asphalt paver/finisher power control box.

Note *Refer to asphalt paver/finisher operation manual for further information on machine power control box.*

Note *Depending on user's ability, installation of the mechanical sensor parts, G198 Grade Control and cable connections may take max. 15 minutes.*

Adjusting Null Position Adjust the paving screed manually to the required grade elevation prior to null position adjustment.

Set the switch on the G198 to OFF.
Connect the coiled cable to the G198 Grade Control and to the appropriate connecting receptacle on the paving machine.

Adjust the mounting carrier arm until LED indicators are OFF (Null position).

Once the Null position has been set corresponding to the required level grade, the G198 is ready. It will start regulating when the G198 switch is set to ON.

Caution Make sure the switch on the G198 is OFF before Null Point adjustments and while transporting the paving machine. Switching OFF the G198 output prevents unwanted regulation of the electro-hydraulic valve.

- Note* *Techniques to adjust the screed manually may vary from machine to machine. Please refer to screed or/and paving machine manual regarding manual adjustment of screed.*
- Note* *The Null Position has been set by default at 144 mm from shaft mid- point to reference beam or ground.*
- Note* *A quick phasing check can be performed by lifting the Sensing Arm (by hand) and observe a downward movement on the appropriate cylinder.*
- Note* *LED indicators provide visual indication of screed angle of attack, thus mat thickness. See table below for LED explanatory notes.*

LED indicator	Angle of attack
1. Top LED blinking (quick)	No change (out of range; too low)
2. Top LED constantly ON	Increases (high pace)
3. Top LED blinking (slow)	Increases (low pace)
4. Top and Bottom LED OFF	No change (on target)
5. Bottom LED blinking (slow)	Decreases (low pace)
6. Bottom LED constantly ON	Decreases (high pace)
7. Bottom LED blinking (quick)	No change (out of range)

Safety Instructions

Connections to power supply must be performed in accordance with safety instructions for electrical facilities and performed only by trained operators. The equipment is NOT for use with 240 vAC mains or in conditions where temperature exceeds 80°C. If the equipment is used in a manner not specified by TF-Technologies the protection provided by the equipment may be impaired

Asphalt Paver Requirements

A pre-condition for the safe use of Mini-Line® Grade Control System in accordance with applicable safety regulations is that the system is only used on asphalt pavers that comply with the applicable safety regulation. The key safety requirements of asphalt pavers which have an influence on the safe use of the Mini-Line® Grade Control System are therefore outlined below.

Key safety requirements of asphalt pavers for the safe use of Mini- Line® Grade Control System

The asphalt paver must comply with the requirements described in EN 60204 Safety on Machinery - Electrical equipment of Machines or similar, and in the EU be CE marked.

The asphalt paver must be equipped with an emergency stop that can stop all potentially dangerous parts of the machine, including switching off the power supply to the Mini-Line® Grade Control System.

The asphalt paver must stop all potentially dangerous parts of the machine in case of a malfunction in the power supply, including switching off the power supply to the Mini-Line® Grade Control System.

The Mini-Line® Grade Control System is developed for use on asphalt pavers with a 12V system and asphalt pavers with a 24V system.

The asphalt paver must be able to deliver a stable power supply as described in EN 60204, for instance via the battery of the asphalt paver.

Key safety requirements for safe installation of Mini-Line® Grade Control System

The Mini-Line® G198 Grade Control System must be installed, mounted and connected in accordance with the instructions in this user manual.

A form of overcurrent protection must be installed between the power supply of the asphalt paver and the Mini-Line® Grade Control System. Check this prior to the connection of the system. The overcurrent protection is usually built into the asphalt paver in the form of a fuse in a central fuse box.

The short circuit breaking capacity must be adapted to the total maximum power consumption of the Mini-Line® Grade Control System, or equal the prospective fault current in case of short-circuiting. The maximum power consumption of all the parts in the Mini-Line® Grade Control System can be found under Technical Specifications.

After installing the Mini-Line® Grade Control System on a new asphalt paver, test that the emergency stop covers the system, so that power supply to the Mini-Line® Grade Control System is switched off when the emergency stop is activated.

Correct Use

The Mini-Line® Grade Control System has been developed as a levelling system for an asphalt paver, and correct use therefore entails that the system is used for this purpose. The Mini-Line® Grade Control System should only be operated by a trained operator, so that personal injury and damaged equipment is avoided.

The operator must

- Read and understand the manual. In case of questions, contact your local representative.
- Be aware of the situations described under Examples of Incorrect Use, Warnings and Dangerous Situations and be able to avoid them.
- Be aware of the specifications of the G198 to ensure that they are working properly. See Technical Specifications (data sheets).

Responsibility of the Operator

When planning the paving job, the operator must remember the following

Investigate local legislation regarding road construction work and the use of protective equipment required for the paving job.

Investigate local health and safety regulation concerning the operation of heavy machinery, and incorporate any risks involved in the use of external controllers in the total risk assessment of the machine, e.g. placing operation stations outside dangerous areas.

Make sure the total risk assessment of the machine is accessible to everyone working with and around the asphalt paver.

Make sure all personnel working with and around the asphalt paver understands how the Mini-Line® Grade Control System affects the asphalt paver.

When commencing the paving job, the operator must remember the following

Avoid the situations described under Examples of Incorrect Use and avoid situations described in the total risk assessment.

Ensure that the Mini-Line® Grade Control System is not damaged. Ensure that the Mini-Line® Grade Control System is connected correctly to the asphalt paver.

Make sure that the measuring areas of the sensors are free from spilled asphalt or other obstacles that will lead to faulty reactions of the system. Ensure that the G198 is working within the specifications. See Technical Specifications.

Inform TF-Technologies or your local representative, if the G198 for any reason not is safe to use.

Examples of Incorrect Use

The Mini-Line® Grade Control System should only be used to what it is constructed to, and most examples of incorrect use are self-explanatory and therefore not described. However, certain key examples of misuse or inappropriate behavior are outlined below, and should be avoided.

Examples of incorrect use of the system before the paving job

Do not remove any of the labels on the G198, as they are required for product identification, e.g. in relation to repair and disposal.

Do not open the aluminum house of the G198, as this will expose the electronics and can damage the products. The G198 must not be rebuilt or refurbished, as TF-Technologies will no longer be able to vouch for the quality, and rebuilding units may cause serious personal injury or material damage.

The Mini-Line® cables must not be disconnected from their connectors or in any way disassembled.

Examples of incorrect use of the system during the paving job

Do not use unauthorized cables or unauthorized spare parts, as this can damage the G198 and lead to unpredictable control of the asphalt paver, which may result in serious personal injury or material damage.

It is not recommended to connect the G198 on a paver, when power is already applied, as the metal jacket on the cable under unfortunate circumstances may lead to short circuiting the asphalt paver, if the metal jacket hits the two power supply pins at the same time.

It is not recommended to adjust the screed manually on the built-in panel on the asphalt paver, while G198 is in auto mode or by use with HS301 where this is in auto mode, as the system will seek to counter the adjustment. Switch the G198/HS301 to manual mode instead, if adjustments on the built-in panel are required.

It is not recommended to mount the G198 on an asphalt paver on the move or in operation, as this may remove focus from the surrounding traffic, which may result in serious personal injuries.

It is not recommended to mount G198 on an asphalt paver on the move or in operation

- It can remove focus from the surrounding traffic, which may result in serious personal injuries
- It can remove focus from the moving parts of the machine, which may result in serious personal injuries

Warnings and Dangerous Situations

The Mini-Line® Grade Control System must not be used

- If the Mini-Line® Grade Control System is obviously damaged.
- If the Mini-Line® Grade Control System has been rebuilt.
- If the G198 is connected to asphalt pavers that use other types of input than the output the G198 is able to deliver.

The Mini-Line® Grade Control System can be damaged

If welding is performed on the asphalt paver or Support Arm, as large currents may travel through the construction and damage the electrical equipment.

The following precautions should be taken before welding

- Remove all electrical equipment wherever possible
- Disconnect the negative pole on the battery of the asphalt paver, or mount voltage protection on the battery
- Place the negative electrode close to the welding point
- Remove paint before welding

When cleaning the asphalt paver, e.g. if using a high-pressure cleaner, as this may expose the Mini-Line® Grade Control System to too large forces. The Mini-Line® Grade Control system should therefore be removed before cleaning the asphalt paver.

The Mini-Line® Grade Control System can lead to serious personal injury

If warnings from the total risk assessment are not complied with. If the G198 is operated by a person without training in operation and safe use, as he will not be able to fulfill the responsibility of the operator.

If the Mini-Line® Grade Control System is used in dangerous areas or in dangerous atmospheres/pressure levels, as the system is not designed to such operation.

Emergency Procedure

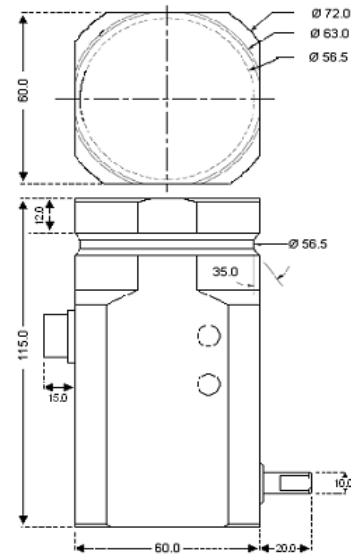
In case of accidents, break-downs or otherwise dangerous situations, the following procedure should be followed

- Press emergency stop
- Turn off the asphalt paver and remove the key
- Disconnect the cable between the Mini-Line® Grade Control System and the asphalt paver
- Commence repair

Precautions	<p>Inspect cables regularly for evidence of wear or deterioration</p> <p>Inspect the receptacles and cable connectors for damages, dirt or water</p>
Caution	<p>Deposits of dirt, grease and asphalt in the receptacles can be cause for bad electrical connection or data transmission</p>
Caution	<p>Asphalt deposits on the mechanical parts can hinder the free mechanical movement and shows irregularities</p>
General recommendations	<p>Make sure that the Shoe or Tube Assy, Sensor Arm and Mini Line G198 are free from obstacles while in operation.</p> <p>The cable connectors must be inserted in the appropriate way. Data transmission will be corrupted in case connectors are wrongly plugged.</p> <p>Regular maintenance of the equipment guarantees smooth operations and good operation performances</p> <p>Regularly clean and remove asphalt deposits or debris on both the G198 and mechanical accessories</p>
Care and Maintenance	<p>Mini Line® G198 is sealed to IP44 standard and can be cleaned and washed with traditional cleansing fluids, though it is recommended to avoid pouring water or other liquid directly onto the shaft and bearing</p> <p>The mechanical accessories can be cleaned and washed thoroughly with same cleaners used for shovels and rakes</p>

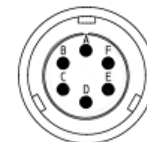
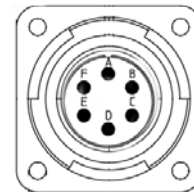
Technical specifications Mini Line® G198

Mini Line® G198	
Input voltage	8...30vdc
Input current	40mA
Output voltage	couple with i/p
Output current	1,2A
Operating temp.	0-70 °C
Storage temp.	-40 °C - 85 °C
Protection	short cct/rvs polarity
Vertical align.	±40mm
Sensitivity ctrl.	5.0
Deadband ctrl.	1mm
Working range	65 - 195mm
Working window	±25mm
Pwm	20ms
Null position	144mm
Weight	1kg approx.
Colour	Mat black

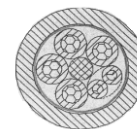


Mini-Line® G 198

Connector/Plug			
	CA3102E14S-6P-B	CA3106E14S-6S-B	CA06COM-E18S-1S
A	8...30VDC	8...30VDC	Ground
B	Ground	Ground	8...30VDC
C	Pulse (up)	Pulse (up)	Pulse (up)
D	Pulse (down)	Pulse (down)	Pulse (down)
E	N/C	N/C	N/C
F	N/C	N/C	N/C
G	N/A	N/A	N/C
H	N/A	N/A	N/C
I	N/A	N/A	N/C
J	N/A	N/A	N/C

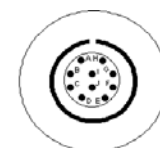


PUR-S 4x0,75 + 2x0,25mm²



CA06COM-E18S-1S

Outer sheath	Diameter: 7,5mm	Colour: Yellow	
Cabling	4 cores 0,75mm ²	1 pair 0,25 mm ²	
Conductor	Finely stranded Cu wire	Class 6	
Insulation	Thermoplastic polyurethane	Hardness: 87 shore A	
weight	Cu content: 35kg/km	PVC content: 0kg/km	Gross weight: 67kg/km
Electric data	DC resistaNCE: 26,0/km at 20°C		



CA3106E14S-6S-B

TF-TECHNOLOGIES

LIMITED WARRANTY

The equipment was designed and manufactured with utmost care and in accordance with safety regulations. Every item has been fully tested prior to delivery. TF-Technologies warrants its products against defects in material and workmanship for a period of twenty-four (24) months from date of shipment, and six (6) months for labour with specific exclusions as indicated below. For instruments sold through authorized TF-Technologies representatives, the date of shipment will be as of the transfer from representative to purchaser. During the applicable warranty period, TF-Technologies obligation under this warranty shall be limited exclusively to the repair at no charge, except for shipping to and from TF-Technologies workshop, of any equipment which may prove defective under normal use and which TF-Technologies examination shall disclose to its satisfaction to be thus defective. Normal use is defined for the purpose of this warranty as operation under normal load, usage, and conditions with proper care and maintenance and competent supervision. In no event shall TF-Technologies be held liable for damages, delays, or losses consequential, incidental, or otherwise attributable to the failure of the equipment. TF-Technologies liability being specifically limited to repair as stated hereinabove. This warranty is automatically initiated except where modified by contractual or other written and signed agreement.

THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF, AND THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, AND TF-TECHNOLOGIES NEITHER ASSUMES, NOR AUTHORIZES ANYONE TO ASSUME FOR IT ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF THE INSTRUMENT OR ANY PART THAT HAS BEEN SUBJECTED TO DAMAGE BY ACCIDENT, NEGLIGENCE, ALTERATION, ABUSE, MISUSE, OR SERVICE NOT AUTHORIZED IN WRITING BY TF-TECHNOLOGIES. SUCH DAMAGE TO INCLUDE BUT NOT BE LIMITED TO BURNING OF CIRCUIT BOARDS FROM IMPROPER SOLDERING TECHNIQUES AND DAMAGE TO THE INSTRUMENT DUE TO PURCHASER'S FAILURE TO PERFORM MAINTENANCE AS OUTLINED IN THE AUTHORIZED OPERATOR'S MANUAL. This warranty excludes damage incurred in shipment. If the equipment is received in damaged condition, the carrier should be contacted immediately. All claims for damage in transit should be filled with the carrier. If requested, TF-Technologies will aid in filing of claims and/or locating products lost in transit

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NOTICE TO CUSTOMERS

Any disclaimer or limitation on the remedies expressed above shall not be effective to the extent prohibited by European law.