Linear feeder
KLF 5 / KLF7 / KLF15 / KLF25

Translation of original operating instruction

This operation instruction applies to:

Type			Order number
Linear feeder	KLF5	230 V / 50 Hz	15044649
		115 V / 60 Hz	15052019
Linear feeder	KLF7	230 V / 50 Hz	15150973
		115 V / 60 Hz	15173186
Linear feeder	KLF15	230 V / 50 Hz	15021614
		115 V / 60 Hz	15014508
Linear feeder	KLF25	230 V / 50 Hz	15048476
		115 V / 60 Hz	15169958

Version of Documentation: BA_KLF5-25_R04.3_E

Release: 4.3

Date: 2014-11-06

Contents:

1 Declaration of incorporation for the incomplete machine

Declaration of incorporation in compliance with the European Machinery Directive 2006/42/EC, Annex II B

The manufacturer: Afag GmbH, Wernher-von-Braun-Strasse 1, D-92224 Amberg

www.afag.com – Phone: +49 (0)9621 650 27-0

herewith declares, that the incomplete machine: **Linear feeder KLF**

Designation: **KLF 5 / KLF 7 / KLF 15 / KLF 25**

complies with the basic safety and health requirements of the Machinery Directive **2006/42/EC Annex I.**

The incomplete machine also complies with the following:

Relevant EC Directives:
Machinery Directive 2006/42/EC
Low Voltage Directive 2014/35/EU
EMC Directive 2014/30/EU
Applied harmonised standards:
EN ISO 12100-2010

The technical documentation for this incomplete machine was prepared in accordance with Annex VII, Part B. Upon request, the manufacturer undertakes to transmit these technical documents electronically to national authorities, if requested.

Authorised representative for the compilation of the instruction manual:

Claus Piechatzek
Development / Product Management ZTK
Afag GmbH

The start-up of the incomplete machine is prohibited until installed in a complete machine that complies with the regulations of the EC Machinery Directive and until the EC Declaration of Conformity according to Annex II A is available.

City - Date: Amberg, 06.11.2014

Company: Afag GmbH

First name, last name
Mr. Klaus Bott

Managing Director
Afag GmbH

2 Safety instructions

2.1 Explanation of symbols and notes

Symbols: Assembly and commissioning must be carried out by qualified personnel only and according to these operating instructions.

Please observe the meaning of the following symbols and notes. They are grouped into risk levels and classified according to ISO 3864-2.

DANGER	
	**Indicates an immediate threatening danger.** **Non-compliance with this information can result in death or serious personal injuries (invalidity).**

WARNING	
	**Indicates a possible dangerous situation.** **Non-compliance with this information can result in death or serious personal injuries (invalidity).**

CAUTION	
	**Indicates a possibly dangerous situation.** **Non-compliance with this information can result in damage to property or light to medium personal injuries.**

NOTE	
	**Indicates general notes, useful operator tips and operating recommendations which don't affect safety and health of the personnel.**

2.2 Basic safety information

Familiarity with these basic safety rules and regulations constitutes the fundamental prerequisite for safe handling and trouble-free operation of Afag KLF linear feeders.

These operating instructions contain the most significant regulations for safe KLF operation. These operating instructions - and in particular the safety regulations - must be observed by anyone working on and with the KLF. The applicable on-site accident prevention rules and regulations must also be observed. These operating instructions must always be kept handy where the KLF is operated.

Operation of the hopper is only to be carried out by technically qualified personnel.

Qualified personnel are deemed to be persons who, by reason of their training, experience and instructions as well as their knowledge of the prevailing standards, regulations, accident prevention regulations and operational conditions, have been authorized by the people responsible for the safety of the system to perform the required activities, and who are capable of recognizing possible hazards and avoiding them (definition of qualified personnel as per IEC 364).

Any malfunctions that may have an adverse effect on the safety of any persons, the KLF or other material assets must be eliminated without delay.

The following instructions are not only intended to ensure the personal safety of the operators but also the operation of the products described and the devices connected to them:

2.2.1 Electrical hook-up

NOTE	
	▪ **Disconnect the power supply prior to assembling or dismantling as well as when changing fuses or carrying out installation modifications.** ▪ **Observe all current accident prevention and safety regulations applicable to particular cases of operation.** ▪ **Check whether the rated voltage of the hopper coincides with the local power supply prior to putting into operation.** ▪ **All E-Stops must remain effective for all modes of operation. Unlocking the E-Stops must not, under any circumstances, cause uncontrolled restarting of the hopper.** ▪ **The electrical connections must be safeguarded!** ▪ **Ground wires must be checked for proper function subsequent to assembly!** ▪ **Hook-up is only to be carried out by authorized personnel.**

2.2.2 Specific danger points

NOTE	
	**Afag KLF linear feeders are state-of-the-art equipment designed in compliance with the EU Machinery Directive and accepted safety regulations. Nevertheless, however, risks may arise from using this equipment that may endanger life and limb of user or third parties and cause interference with the KLF or other material assets.**

2.3 Appropriate use

The KLF is intended exclusively for the transporting and buffering of components and can also be used for component sorting. For maximum permissible dimensions and weights of add-on components, observe details in chapter 3.3 Table 1: Technical Data, 4 Assembly instructions and chapter 5 Operating instructions. Appropriate use also includes observation of all Notes in these operating instructions.

WARNING	
	**The KLF may <u>not</u> be used:** a) in damply and wet area b) in temperature lower than 10°C or higher than 45°C c) in areas where readily flammable media are present d) in areas where readily explosive media are present e) in heavy polluted or dust- laden area f) in aggressive area (e.g. saliferous atmosphere)

None modification or reconstruction are allowed. The Tracks (in the chapter 5.1 Linear tracks and in the chapter 0

Mounting of the linear track) as well as the accessories (chapter 7) are excluded from this arrangement.

NOTE	
	**Any use other than that described above is deemed to be improper and will cause the warranty to terminate..**

Also refer here to our general terms and conditions of sale.

3 Description of the device

3.1 General

Afag KLF linear feeders are used to transport work pieces away from upstream or towards downstream machines. Once various different criteria have been taken into account, Afag linear feeders may also be used to sort components. The linear feeders may be integrated into individual feeder stations and complex automated assembly systems. The various linear feeder types differ in size and range of applications (see chapter 3 Description of the device, and chapter 4.3.3 Table 2: Recommended values for maximum work piece widths).

NOTE	
	**KLF feeders are to be operated in conjunction with an Afag control unit. This is the only combination that will guarantee perfect transport characteristics.**

3.2 Functional description

The KLFs consist of two push-pull vibrating sections arranged next to each other. These are connected via bifurcated leaf springs to a common base plate where the opposing vibration forces are virtually cancelled out. Optionally, each of the vibrating sections can operate as useful or counter mass. Another option is to operate both as useful masses (see chapter 0

Mounting of the linear track).

A magnet system (armature - magnet core) is built in horizontally between the two vibrating sections.

The advantages of KLF linear feeders are based on the adjustable balancing of useful and counter masses that largely eliminates the free vibration forces directly within the unit.

3.3 Technical data

Figure 1: *Dimensions KLF 5*

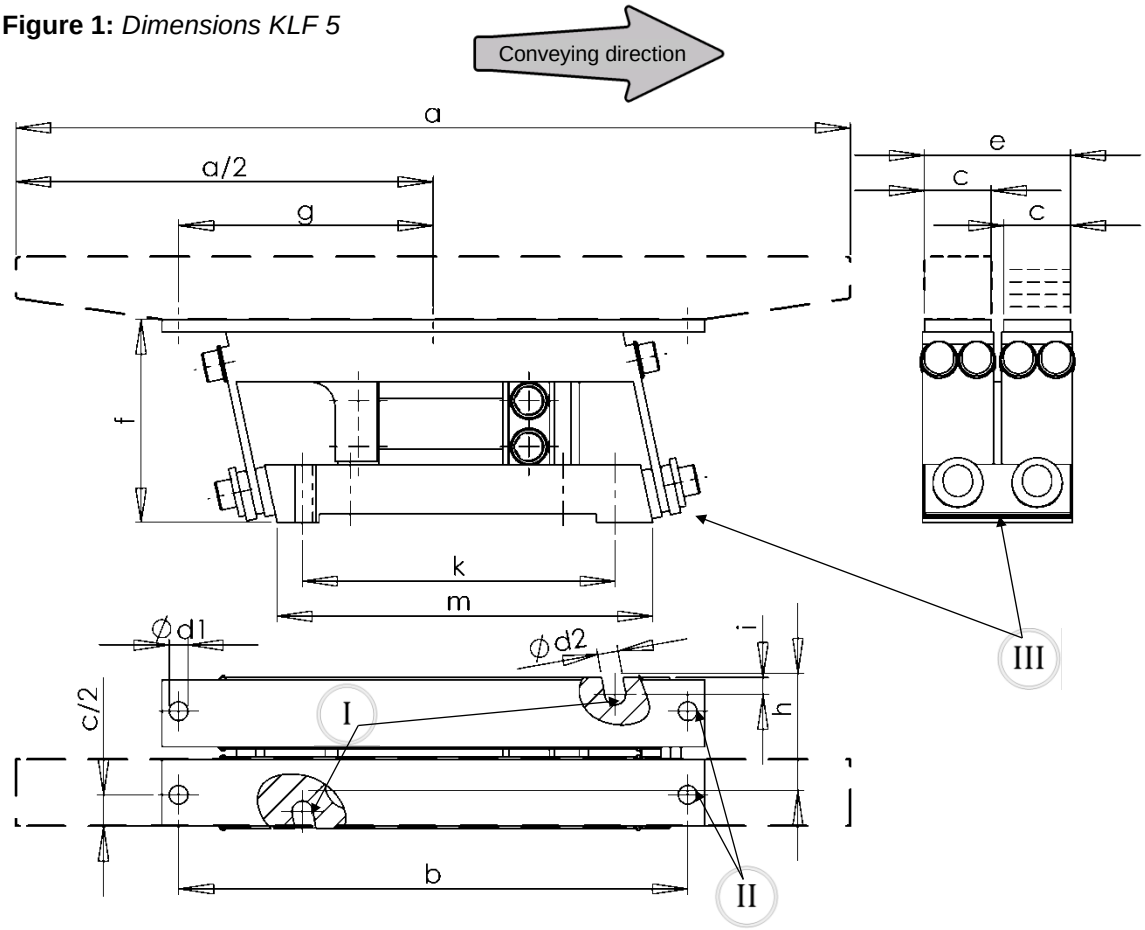
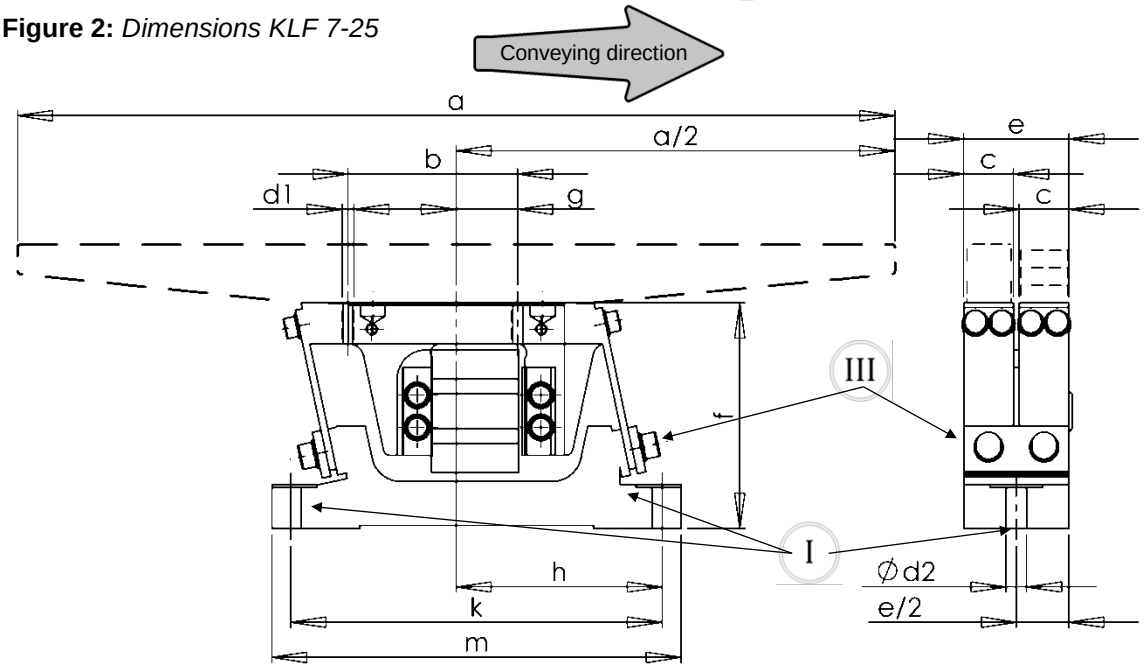


Figure 2: *Dimensions KLF 7-25*



I Adjustment plates

II Fixing bores for linear track/trimming weight

III Fixing slots for attachment to the substructure

Table 1: *Technical Data*

Description		Units	KLF5	KLF7	KLF15	KLF25
Dimensions	a	[mm]	150-250	200-400	300-600	500-800
	b	[mm]	122	58	85	150
	c	[mm]	17	17	24	29
	ød1	[mm]	4,5	4,5	5,5	6,6
	ød2	[mm]	4,5	7	9	10
	e	[mm]	36	36	50	60
	f	[mm]	49	79,7	111,7	139,7
	g	[mm]	56	10	30	45
	h	[mm]	28	52	88	132
	i	[mm]	4	-	-	-
	k	[mm]	75	128	177	283
	m	[mm]	90	140	200	300
	n	[mm]	17,3	-	-	-
Max. weight - feed rail		[kg]	0,3	0,65	1,8	3
Weight - basic unit		[kg]	0,7	1	2	7
Vibration frequency		[Hz]	Double mains frequency			
Power supply		[V/Hz]	230/50 or 115/60			
Max. power consumption		[VA]	10	15	25	60
Degree of protection		[IP]	54			
Control device (not in scope of delivery)		-	IRG			
Environmental conditions for operation: Temperature range		[°C]	+10 to +45			
Noise emission: Continuous noise pressure level (without transported material)		[dB]	<70			
Measuring height/measuring distance		[m]	1,6 / 1			
Measurement direction with respect to the noise source		[°]	90			
Measurement method		-	A evaluation			

Various different sizes are available to suit individual application and spatial requirements (see Table 1: Technical Data). The main decision-making criteria, above all, are the useful / counter masses and the space available for installation. Afag linear feeders are available with 230V / 50Hz and 115V / 60Hz magnets. Afag also offer a range of controllers for the linear feeders (see chapter 7 Accessories).

4 Assembly instructions

4.1 Transport

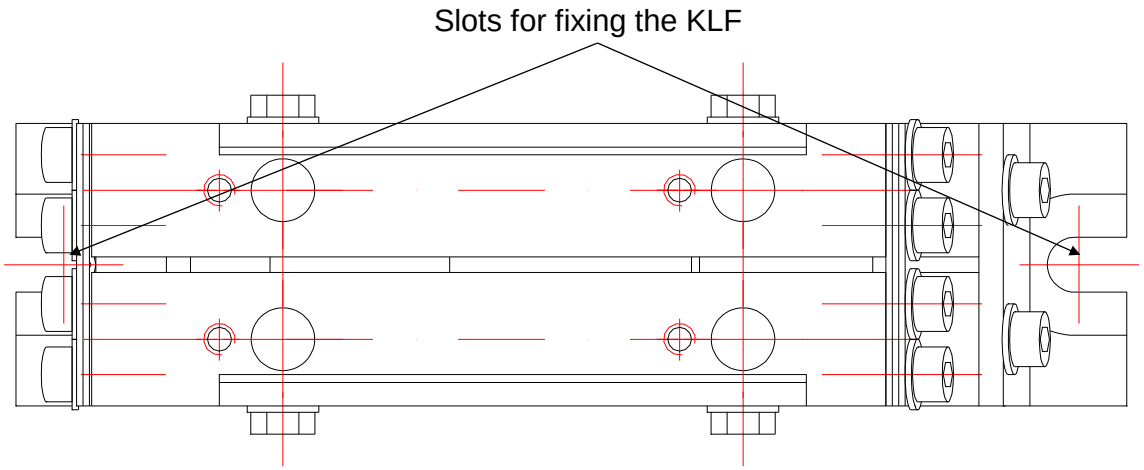
⚠ WARNING	
	**Improper use of transport means (industrial trucks, cranes, technical aids, sling gear etc.) may lead to bruises and other injuries.** **Required behaviour:** - **Observe and follow the transport and maintenance instructions** - **Proper use of transport means**

⚠ CAUTION	
	**During transport, the linear feeder must only be held by the base.** **The linear track is no lifting point.**

4.2 Installing the unit

With the help of the slots in the base plate, the KLF is firmly screwed to the floor (see Figure 3). This allows for exact definition and adjustability of the junction points at the linear track intake and outlet. In the horizontal plane the floor should be non-yielding (plate or block construction) to absorb any residual forces in this plane. Any overhanging profiled structures must be reinforced with a plate to which the linear feeder will be attached. Best suited for this purpose is a steel plate at least 20mm thick and more than 120mm wide. Impacting decisively on floor vibration, vertical vibration forces can be virtually eliminated through careful mass balancing (see chapter 5.2 Balancing the masses). Suitable substructures must be provided for height adjustment. Suitable Afag standard parts are available for complete station extensions in combination with Afag bowl feeders.

Figure 3: *Attachment slots in the base plate*



4.3 Mounting of the linear track

4.3.1 Attaching one linear track

The linear track is attached to either vibrating section with the help of an angle bracket or a lateral plate (see Figure 4 and Figure 5). In the case of the KLF5, the linear track is attached directly to the vibrating section (see chapter 3.3 Figure 1). In any case, make sure to observe the correct attachment position as per chapter 3.3 Figure 1 and Figure 2. Any deviations may adversely affect floor vibration.

Figure 4: *Linear track mounted with angle bracket*

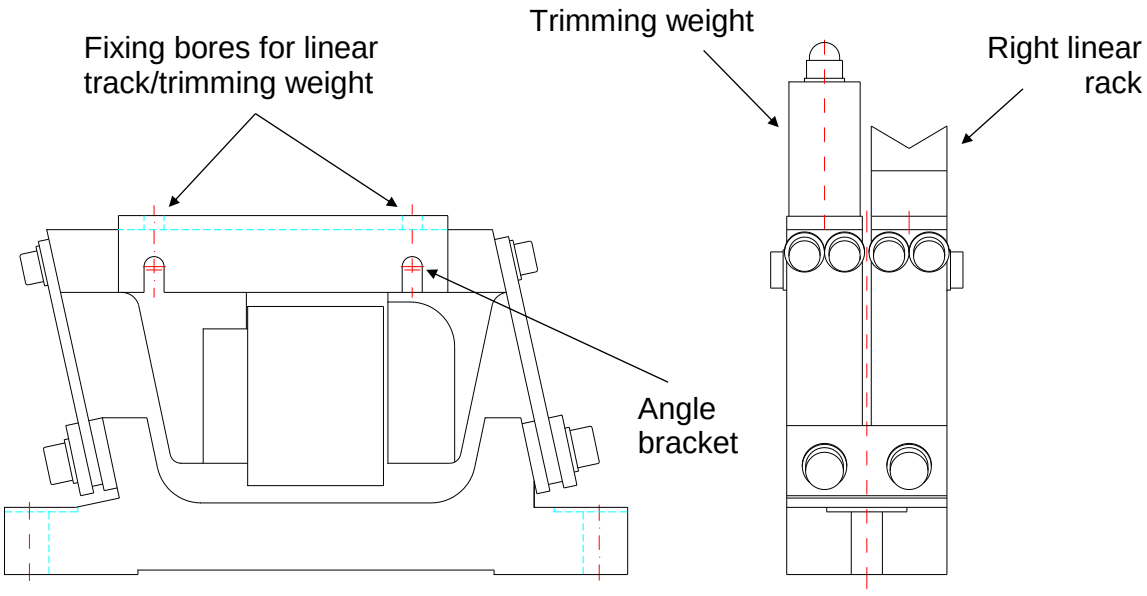
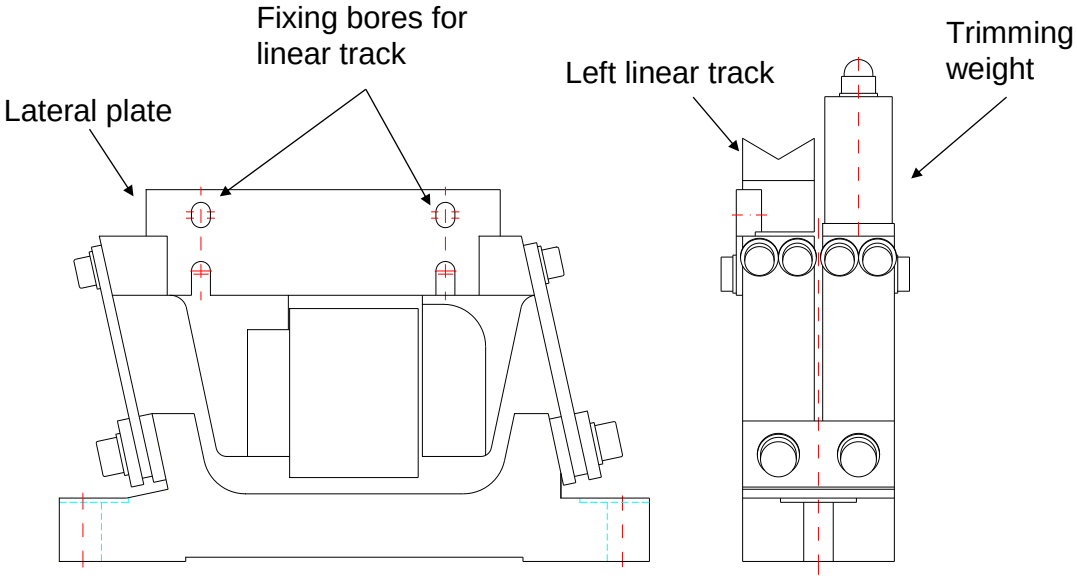


Figure 5: *Linear track mounted with lateral plate*



The vibrating sections are designed with recesses on the outer side to receive the angle brackets and trimming weights. The runout height of the linear track can be precisely adjusted during initial installation by means of the slot-type bores in the lateral plates. Thus

no track readjustment is necessary when the linear track is removed and reinstalled for cleaning purposes or change to a different product.

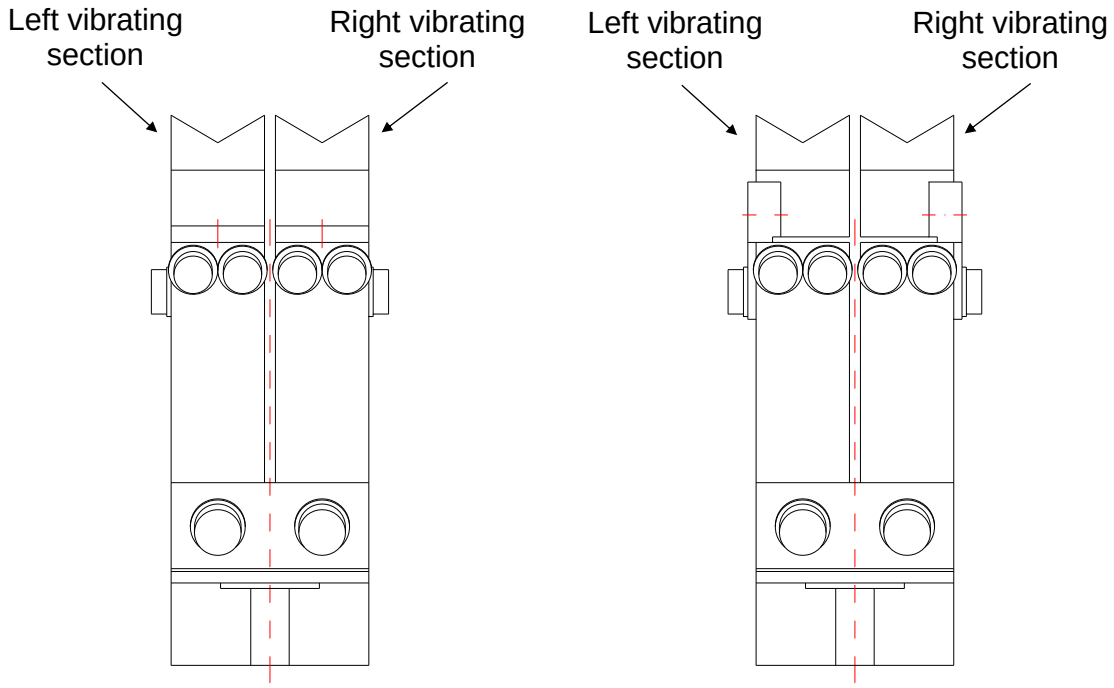
Selection of the linear track location on the left or right is dependent on the installation and transfer requirements of the upstream and downstream equipment. The linear track must always be mounted at the inner side of the lateral plate (see Figure 5). The weight of the linear track (see chapter 5.2 Table 4) and its attachment (angle bracket and/or lateral plate) must be balanced by a counter mass (trimming weight) mounted to the second vibrating section. For a detailed description refer chapter 5.2 Balancing the masses.

NOTE	
	KLF 5 and KLF 25 require useful and counter masses to be identical at all times. KLF 7 and KLF 15 require a specific difference to be adhered to between useful and counter masses. Useful and counter masses should correspond to the values specified in chapter 5.2 Table 4.

4.3.2 Attaching <u>two</u> linear tracks

Instead of the trimming weights (see Figure 4 and Figure 5) it is also possible to attach a second linear track (see Figure 6). Linear tracks may be attached using angle brackets as well as lateral plates. Balance the masses as described in chapter 5.2 Balancing the masses.

Figure 6: *Linear feeder with two linear tracks Linear*



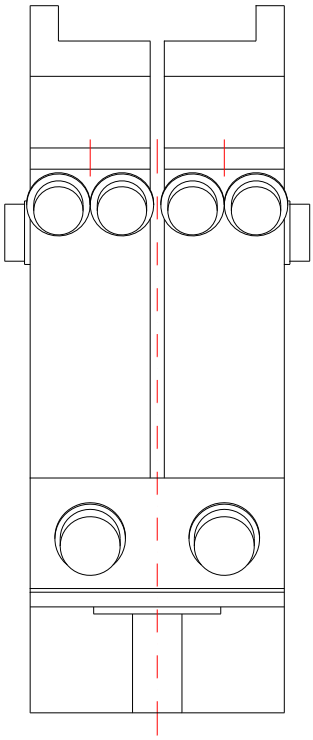
4.3.3 Attaching split linear tracks

For the purpose of feeding larger work pieces it is possible to provide a linear track design split in longitudinal direction, attaching each half to the associated vibrating section. Mass balancing is subject to the rules described in chapter 5.2 Balancing the masses. In this case, the mass balance impacts on the transport speeds of both linear track sections and should be adhered to as exactly as possible.

Larger work pieces are transported smoothly as long as these conditions are observed. Recommended values for max. work piece widths refer Table 2.

Figure 7: Linear feeder with split linear track

Split linear track with angle attachment



Split linear track with lateral plate attachment

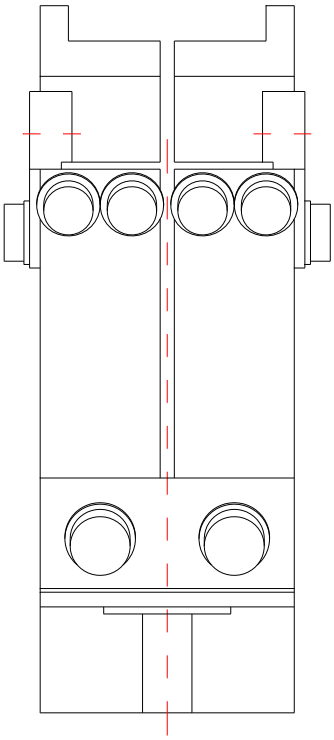


Table 2: *Recommended values for maximum work piece widths*

Type	Max. work piece width
KLF 5	Approx. 30 mm
KLF 7	Approx. 50 mm
KLF 15	Approx. 70 mm
KLF 25	Approx. 80 mm

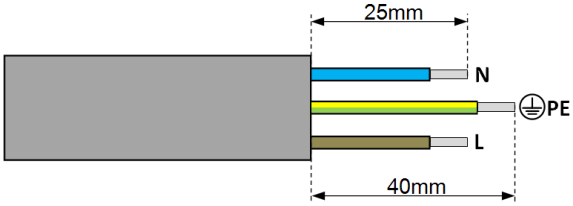
4.4 Power supply

WARNING	
	▪ **Any work performed on the electrical supply may only be performed by trained, authorised, qualified personnel!** ▪ **The power supply must be protected by an FI switch (provided by the customer).** ▪ **The linear feeder may only be operated with the power supply specified on the name plate.**

The control device IRG1-S is used for the activation of the linear feeder. The MSG801 or MSG802 can also be used. Please note that an additional CEE connector plug is required for the MSG controllers (Order number: 11006982)

Installation of the plug is only to be carried out by technically qualified personnel.

Figure 8: *End of the wire for additional plug*



5 Operating instructions

The first step in adjusting the linear feeders is always to balance the masses and then to adjust the natural frequency.

5.1 Linear tracks

The linear tracks must be unyielding so that the transport pulses generated by the unit are fully transferred to the work pieces and no superimposed natural vibration can adversely affect the transport process. This requirement has priority over mass reduction measures. The preferred material for linear tracks is tool steel (e.g. 1.2842, 90MnCrV8). Linear track design should adhere to the useful masses specified in chapter 3 Table 1 and/or chapter 5.2 Table 4: Recommended values for useful and counter masses with mass difference.

The following linear track cross sectional dimension ratio is recommended:

$$\frac{Weight}{Width} = \frac{2}{1}$$

The recommended dimensions are listed in Table 3: Linear track dimensions. The dimensions are for one vibrating section and can be applied to each of the two vibrating sections.

Table 3: *Linear track dimensions*

	KLF5	KLF7	KLF15	KLF25
Length [mm]	250	400	600	800
Width [mm]	17	17	24	29

5.2 Balancing the masses

As a consequence of the push-pull principle, Afag linear feeders virtually balance the vibration forces in the basic unit. However, this balance of vibration forces is ensured only if useful and counter masses are adjusted to each other as precisely as possible. For the linear feeders KLF 5 and KLF 25, this means that useful and counter masses must be identical. KLF 7 and KLF 15 require a specific mass difference to be adhered to between armature and magnet side. Table 4 below lists the armature side as the useful side so that there is a higher mass available for linear track design. Where the available space requires the linear track to be attached only to the magnet side of the serial unit, rearrange the magnet system so that the armature is on the magnet side and vice versa. In that particular case readjust the air gap afterwards as per chapter 5.4 Setting the air gap resumes validity after these steps have been performed.

The useful mass (i.e. the linear track mass) is the total weight of all components attached to the linear track side, including lateral plate or angle bracket. Accordingly, the counter mass is the total of all individual weights of the components on the counter side including lateral plate or angle bracket.

Mass balance is checked through simple weighing of useful and counter masses. Any additional weights required to reach the masses specified in Table 4 must be attached in such a way that the distance between the mass centre points of useful and counter masses, viewed in a direction transverse to the transport direction, is as close as possible. In other words, if possible, the additional masses should not protrude laterally beyond the linear feeder as this would lead to increased residual vibration in the floor.

The masses are precisely balanced when hardly any vibrations are noticeable in the floor and the transport speed of a item freely placed upon the linear track or counter mass, is identical on both vibrating sides.

Table 4: *Recommended values for useful and counter masses with mass difference*

Type	Useful mass [kg] (Armature side)	Counter mass [kg] (Magnet side)	Difference [kg]
KLF 5	0,30	0,30	0,00±0,02
KLF 7	0,65	0,55	0,10±0,02
KLF 15	1,80	1,30	0,50±0,03
KLF 25	3,00	3,00	0,00±0,05

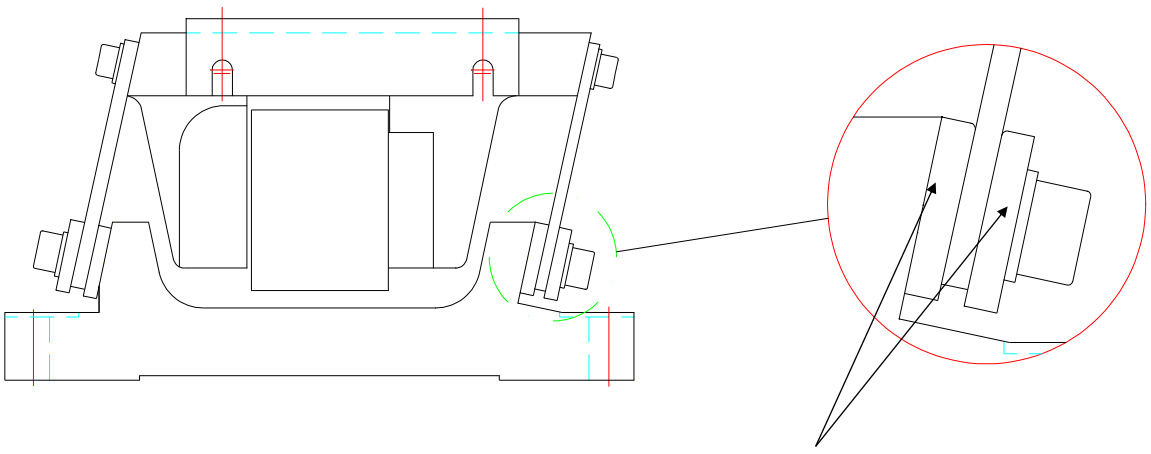
NOTE	
	Useful and counter masses should correspond to the values specified in table 4

NOTE	
	1. Masses are fully balanced if hardly any vibrations are noticeable in the floor. **2. When masses are fully balanced, the transport speeds at useful and counter sides are identical.**

5.3 Adjusting the natural frequency

The Afag linear feeder is a spring- mass vibration system that operates utilising the resonance behaviour. Any changes in the mass require adjustment of the spring stiffness. For this purpose, sliding adjustment plates are provided on the spring assembly attachment at the base plate (see Figure 9). Sliding these adjustment plates sets the natural frequency.

Figure 9: *Spring assembly with adjustment plates*



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The adjustment procedure is as follows:

Place one test component on the linear track and switch on the controller. Use the rotary button to reduce the transport speed of the linear feeder until the component on the linear track moves only slowly. Keeping the controller setting constant, slowly loosen the screws of the adjustment plates at one linear feeder spring assembly (see Figure 9). Check the speed at which the test component is transported while the screws are being loosened. If the transport speed briefly increases initially and then decreases again as the screws are further loosened, the linear feeder is correctly adjusted and the natural frequency is slightly above the exciter frequency. The adjustment plates must be returned to the position they were in before the screws were loosened.

If the transport speed increases while the screws are loosened, and decreases only slightly or not at all when the screws are fully loosened, the linear feeder is adjusted too tightly and its natural frequency is too high. In this case, move the adjustment plates down or remove a leaf spring as required if the weight deviation is too great. Then repeat the test.

If the transport speed decreases immediately while the screws are being loosened, the linear feeder adjustment is too soft. In this case, move the adjustment plates up or install an additional leaf spring as required. Then repeat the test.

Make sure when sliding the adjustment plates that they are always horizontal and always arranged exactly opposite each other.

Adjustment plates up	⇒	Natural frequency increases
Adjustment plates down	⇒	Natural frequency decreases

⚠ CAUTION	
	**It is vital that the linear feeders be 'subcritically' adjusted (i.e. the natural frequency must be about 5% above the exciter frequency) as otherwise the magnet may overheat and burn out, and the transport speed may decrease as soon as components are placed upon the linear track.**

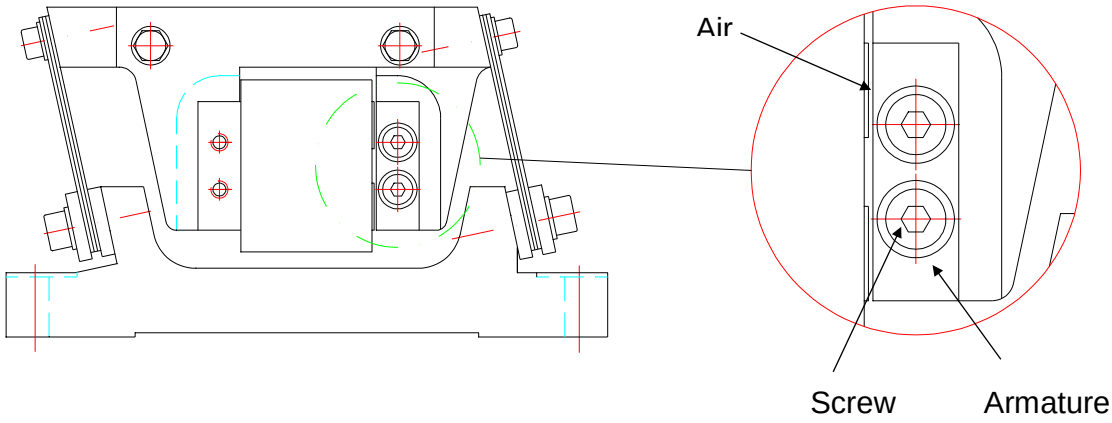
To avoid the vibrating sections from subsiding, make sure to loosen the adjustment plates of one spring assembly only at a time during frequency setting.

NOTE	
	**The adjustment plates must be aligned horizontally. The top edges must always be arranged opposite each other.**

5.4 Setting the air gap

During serial assembly, the air gap of the magnet system is set to the values specified in Table 5. If it deviates from the values specified in Table 5, after adjusting natural frequency, for example, the air gap must be readjusted. For this purpose loosen the lateral armature fixing screws and reset the air gap with the help of a spacer (see Figure 10).

Figure 10: *Armature attachment*



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Type	Power supply	Air gap value [mm]	Tolerance range [mm]
KLF5	230 V / 50 Hz	0,8	± 0,05
	115 V / 60 Hz	0,6	± 0,05
KLF7	230 V / 50 Hz	0,8	± 0,05
	115 V / 60 Hz	0,6	± 0,05
KLF15	230 V / 50 Hz	1,0	± 0,05
	115 V / 60 Hz	0,6	± 0,05
KLF25	230 V / 50 Hz	0,8	± 0,05
	115 V / 60 Hz	0,6	± 0,05

⚠ CAUTION

Setting an air gap larger than specified may cause the magnet to overheat and the coil to burn out. It is therefore vital that the specified air gaps be adhered to.

6 Maintenance instructions

A type KLF linear feeder is basically maintenance-free. The leaf springs, however, may oxidise in certain conditions of use, thus affecting the vibration behaviour in the long run. In such cases the leaf springs may need to be removed and cleaned or to be replaced. Make sure to always dismantle one spring assembly only as the vibrating sections are otherwise displaced and trouble-free functioning is no longer guaranteed.

⚠ CAUTION	
	**The leaf springs must not be oiled or greased as this would make the springs sticky and in turn adversely affect the vibration response.**

6.1 Troubleshooting and fault repair

Conveyor does not run, there is no vibration detectable	
Cause of fault	**Fault repair**
Supply voltage too low or instable, e.g. only 180 V	Check the supply voltage, readjust the conveyor to the existing supply voltage, if necessary
Connection to the power supply interrupted	Check the connection between drive control unit and control mains adapter
Control unit is switched off <0>	Switch on the control unit <1> or check the jam control signal if a jam control is used
Control unit is defective	Electrical check of the device, use an exchange or a replacement unit
The magnet is damaged, the field winding has burnt out	Electrical check of the magnet, replace damaged magnet. Check settings: 50 Hz position, full wave (exciting frequency = 100 Hz)
The air gap between magnet and rotor is too small (striking) or too large	Set the air gap according to the operating manual
Foreign part jammed in the air gap between magnet and rotor	Remove foreign part
Conveyor runs too slowly, there is no movement recognisable	
Cause of fault	**Fault repair**
Supply voltage too low or instable, e.g. only 180 V	Check the supply voltage, readjust the conveyor to the existing supply voltage, if necessary
Output frequency of the control unit is set improperly	Set the switch in the control unit according to the required frequency: 50 Hz position, full wave (exciting frequency = 100 Hz)
The conveyor rail is not sufficiently fastened to the corresponding drive	Tighten fastening screws, check thread, if necessary

The magnet is damaged, the field winding has burnt out	Electrical check of the magnet, replace damaged magnet. Check settings: 50 Hz position, full wave (exciting frequency = 100 Hz)
The air gap between magnet and rotor is too small (striking) or too large	Set the air gap according to the operating manual
Change of the system's natural frequency due to a broken spring	Undo screws of the spring assemblies, check springs, replace broken or damaged springs. CAUTION! Cause for a broken spring is often too high an oscillation amplitude. --> Check air gap
The drive is improperly adjusted, i.e. the system's natural frequency does not match the exciting frequency	Adjust the drive by changing the spring stiffness: Change the position of the adjustment plates. Tighten the screws of the spring assemblies. CAUTION! Adjust the conveyors according to the operating manual!
The weight (moment of interia) of the conveyor bowl exceeds the maximum permissible limit value for the corresponding drive	Carry out a mass balance according to the instructions in the operating manual
Foreign part jammed in the air gap between magnet and rotor	Remove foreign part
The conveying behaviour is instable, the conveyor speed varies	
Cause of fault	**Fault repair**
Supply voltage too low or instable, e.g. only 180 V	Check the supply voltage, readjust the conveyor to the existing supply voltage, if necessary
Output frequency of the control unit is set improperly	Set the switch in the control unit according to the required frequency: 50 Hz position, full wave (exciting frequency = 100 Hz)
The conveyor rail is not sufficiently fastened to the corresponding drive	Tighten fastening screws, check thread, if necessary
The magnet is damaged, the field winding has burnt out	Electrical check of the magnet, replace damaged magnet. Check settings: 50 Hz position, full wave (exciting frequency = 100 Hz)
Change of the system's natural frequency due to a broken spring	Undo screws of the spring assemblies, check springs, replace broken or damaged springs. CAUTION! Cause for a broken spring is often too high an oscillation amplitude. --> Check air gap
The drive is improperly adjusted, i.e. the system's natural frequency does not match the exciting frequency	Adjust the drive by changing the spring stiffness: Change the position of the adjustment plates. Tighten the screws of the spring assemblies. CAUTION! Adjust the conveyors according to the operating manual!
The weight (moment of interia) of the conveyor bowl exceeds the maximum permissible limit value for the corresponding drive	Carry out a mass balance according to the instructions in the operating manual
Foreign part jammed in the air gap between magnet and rotor	Remove foreign part

The conveyor transmit vibrations	
Cause of fault	**Fault repair**
The conveyor rail is not sufficiently fastened to the corresponding drive	Tighten fastening screws, check thread, if necessary
Change of the system's natural frequency due to a broken spring	Undo screws of the spring assemblies, check springs, replace broken or damaged springs. CAUTION! Cause for a broken spring is often too high an oscillation amplitude. --> Check air gap
The drive is improperly adjusted, i.e. the system's natural frequency does not match the exciting frequency	Adjust the drive by changing the spring stiffness: Change the position of the adjustment plates. Tighten the screws of the spring assemblies. CAUTION! Adjust the conveyors according to the operating manual!
The weight (moment of interia) of the conveyor bowl exceeds the maximum permissible limit value for the corresponding drive	Carry out a mass balance according to the instructions in the operating manual
Conveyor rail lifts off or hits	
Cause of fault	**Fault repair**
The conveyor rail is not sufficiently fastened to the corresponding drive	Tighten fastening screws, check thread, if necessary
The air gap between magnet and rotor is too small (striking) or too large	Set the air gap according to the operating manual
Foreign part jammed in the air gap between magnet and rotor	Remove foreign part
Change of the system's natural frequency due to a broken spring	Undo screws of the spring assemblies, check springs, replace broken or damaged springs. CAUTION! Cause for a broken spring is often too high an oscillation amplitude. --> Check air gap
The drive is improperly adjusted, i.e. the system's natural frequency does not match the exciting frequency	Adjust the drive by changing the spring stiffness: Change the position of the adjustment plates. Tighten the screws of the spring assemblies. CAUTION! Adjust the conveyors according to the operating manual!

6.2 Wear parts and spare parts

Table 6: *Wear parts*

Type	Designation	Order number
KLF 5	Leaf spring	15076110
KLF 7	Leaf spring	15137928
KLF 15	Leaf spring	15061275
KLF 25	Leaf spring	15202425

Table 7: *Spare parts*

Type	Designation	Power supply	Order number
KLF 5	Magnet	230V/50Hz	15054450
		115V/60Hz	15002283
KLF 7	Magnet	230V/50Hz	15054450
		115V/60Hz	15002283
KLF 15	Magnet	230V/50Hz	15215514
		115V/60Hz	15138144
KLF 25	Magnet	230V/50Hz	15131097
		115V/60Hz	15150127

7 Accessories

7.1 Mounting parts

Table 8: *Order data*

Type	Designation	Weight [g]	Order number
KLF5	Trimming weight	60	15183426
KLF7	Trimming weight	100	15148404
		50	15209275
	Angle bracket	47	15032942
	Lateral plate	70	15157317
KLF15	Trimming weight	200	15081054
		100	15192548
	Angle bracket	133	15026423
	Lateral plate	190	15107163
KLF25	Trimming weight	400	15005193
		800	15028306
	Angle bracket	350	15208257
	Lateral plate	550	15010882

7.2 Control device

The KLF is connected to the 230V/50Hz AC system via an IRG or MSG controller and can be rated for other mains voltages and frequencies, e.g. 115V/60Hz. They operate in full-wave mode at double mains frequency, i.e. at 50Hz AC, with a vibration frequency of 100Hz, in half-wave mode at single mains frequency with a vibration frequency of 50Hz.

Vibration displacement and thus the transport speeds are infinitely adjustable due to magnet current and thus magnetic force variability.

Soft-starting, all IRG and MSG types can be mounted in various different ways and offer extra controls for photoelectric barriers, initiator elements, or extern 24VDC signal. For a detailed description of the controllers refer full-range catalogue from Afag GmbH.

Third-party controllers can also be used as long as they meet the technical requirements.

Table 9: *Controllers for KLF- Linear feeder*

Type	Power supply	Order number	Comments
IRG1-S	230 V / 50 Hz	50360105	Control with no timer function External target value preset
	115 V / 60 Hz	50360106	
MSG801	230 V / 50 Hz - 115V/60Hz	50391818	With timer function, valve and inter-face outputs, sensor feed
MSG802	230 V / 50 Hz - 115V/60Hz	50391819	With sensor feed

7.3 Address for orders

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8 Disposal

KLF feeders that are no longer in use should not be disposed of as complete units but dismantled into separate materials and recycled. Non-recyclable components must be disposed of correctly.