MM-412

Installation, Operation and Maintenance Instructions

CONTROL UNIT MODEL FFS

ERIEZ MAGNETICS HEADQUARTERS: 2200 ASBURY ROAD, ERIE, PA 16506–1402 U.S.A.
WORLD AUTHORITY IN ADVANCED TECHNOLOGY FOR MAGNETIC, VIBRATORY and INSPECTION APPLICATIONS

Introduction

The texts and illustrations in this instruction manual are for the exclusive purpose of explaining how to operate and handle the FFS control unit. The manufacturer accepts no responsibility for damage resulting from the use or misuse of this equipment. All appropriate safety rules and regulations for the use of this equipment must be adhered to. If you have any questions with regard to the installation and operation of this equipment please do not hesitate to contact us.

This instruction manual must not be copied, saved on computer or otherwise reproduced without the prior permission of the manufacturer. Nor may any extract of this instruction manual be similarly reproduced.

CAUTION

Safety labels must be affixed to this product. Should the safety label(s) be damaged, dislodged or removed, contact Eriez for replacement.

Table of Contents

ERIEZ CONTROL UNIT MODEL FFS

General Information

FIELD OF APPLICATION

- Product liability
- ISO 9000
- TQM (Total Quality Management)
- Protection of consumers and of machines

SYMBOLS USED

Symbol	Meaning
	Important notes
	Danger notes
	Safety notes

Warning signs attached at the equipment:
These labels should call the readers attention to the text of the warning signs.

Symbol	Meaning
	Danger! Danger- risk of electric shock
	Danger! Danger- risk of electric shock
	Danger! Danger- risk of electric shock

LEGAL BASIS

This equipment complies with EMV Guideline 2004/108/EC.

This equipment complies with low voltage guideline 2006/95/EC.

OVERALL VIEW

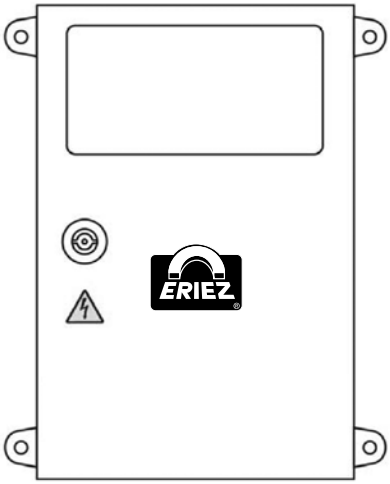


FIGURE 1
FFS standard version (painted mild steel)

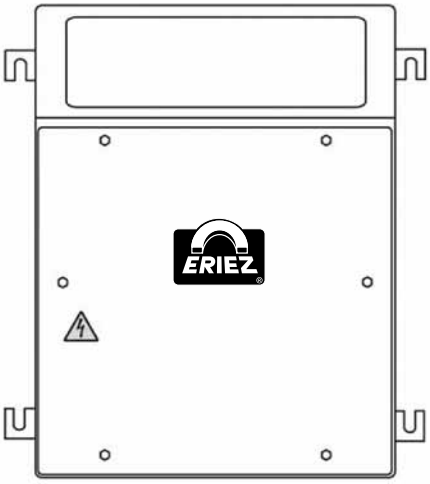


FIGURE 2
FFS alternate version (304 stainless steel)

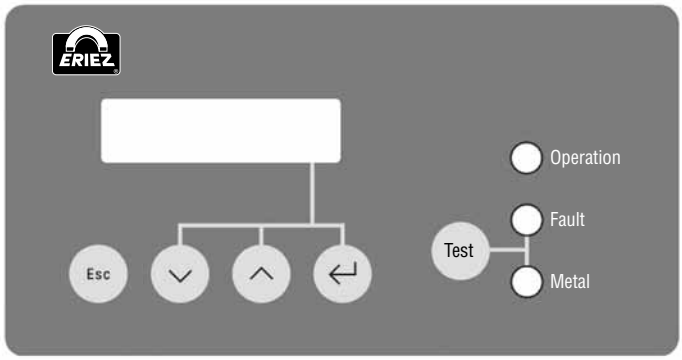


FIGURE 3
FFS front panel

Technical Data

PERFORMANCE DATA

Type
Control Unit FFS

Housing versions
FFS Standard: Mild steel, varnished, aluminium grey (RAL 9007)

FFS Alternate: Stainless steel 1.4301 (AISI 304), glass bead blasted

Weight
11.02 lbs (5 kg)

Connecting cable
(to the detection coil) up to 9.84' (3 m) standard, max. 49.21' (max. 15 m)

Mains cable
1 - 26.25' (8 m) with plug

Ambient temperature
14 - 122°F (-10...+50°C)

Type of protection
IP 65

Power supply
100-240 VAC (±10%), 50/60 Hz

Current consumption
220mA/115V, 110 mA/230V

Fuse
1,6A, slow-blowing

Inputs
1 switching input “Reset”

1 switching input “air pressure monitor” or “thermal switch” or “level indicator”

2 switching inputs for proximity switches

Outputs
2 relay outputs for metal alarm

1 relay output for error message

2 switching outputs 24V DC, 200mA for metal detection

Operation
Operator panel with:
Character display double spaced, 4-key operation

Reset/Test button

Lamp “operation”

Lamp “fault”

Lamp “metal”

Conveyance speed
Depend on type and size of the detection coil used

Can be combined with
Detection coils of the series FF4 and FF5
Metal Separators

Subject to changes due to technical innovation!

Technical Data *(cont.)*

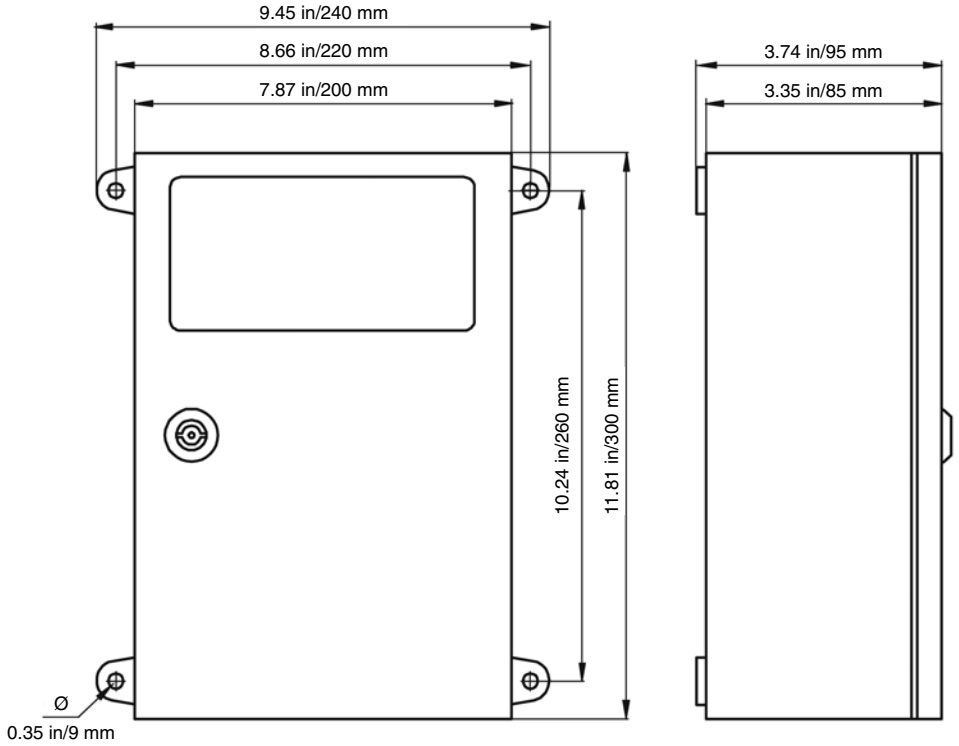


FIGURE 4
FFS standard version

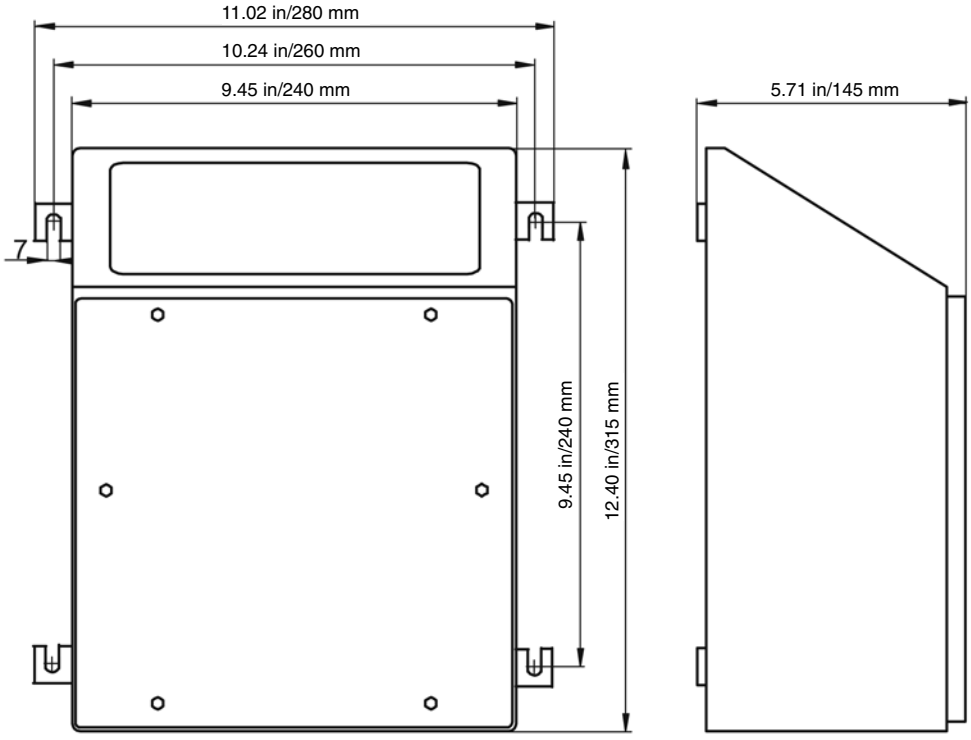
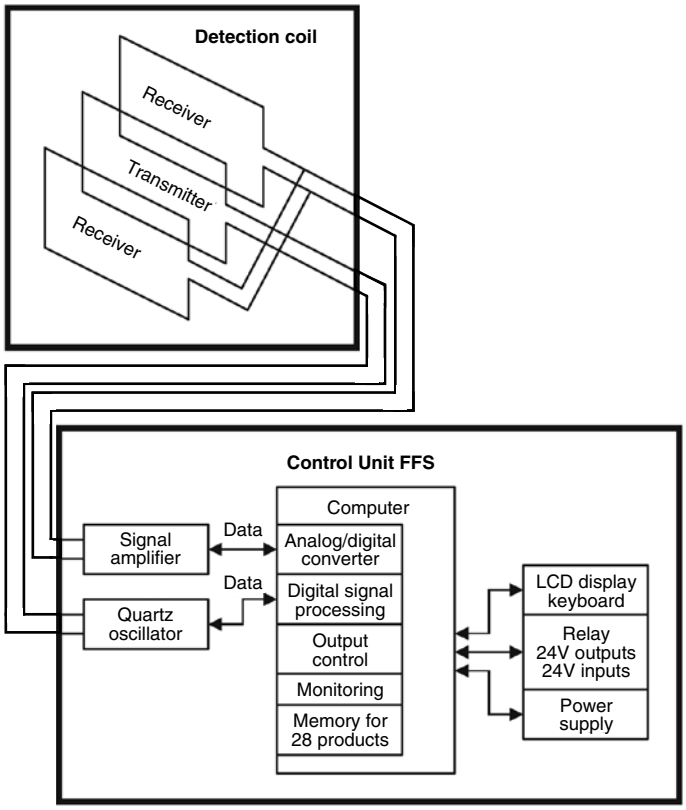


FIGURE 5
FFS alternative version

Design & Method of Operation

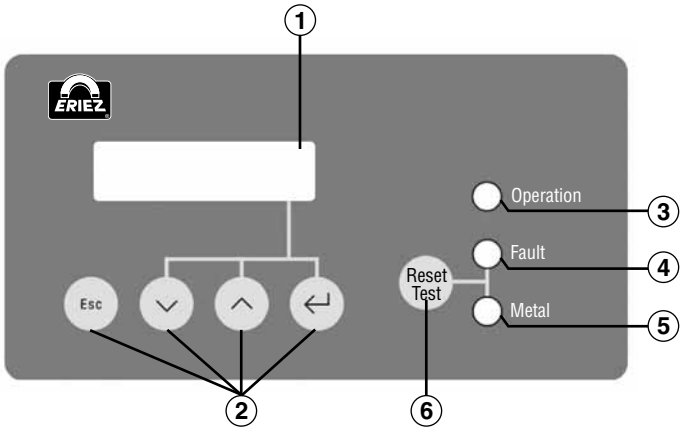
FUNCTIONAL PRINCIPLE

A metal impurity in the material flow causes a change of the high-frequency field in the detection coil. This change is detected by the Control Unit. Since the product flow itself may already have an influence on the field (which is referred to as a product effect), this behavior can be stored in order to avoid false activation caused by the product effect. For this purpose the equipment offers 28 storage places for different products.



FUNCTIONAL AND CONTROL ELEMENTS

The control panel of the FFS equipment has the following control and indication elements.



① LCD-display: double spaced, 32-digit display to operate and set the equipment

② Operator keys: ESC, UP, DOWN and Enter to operate and set the equipment

③ Function key: Reset/Test resetting of the metal and alarm

④ Green lamp: Operation lights up when mains supply is ON

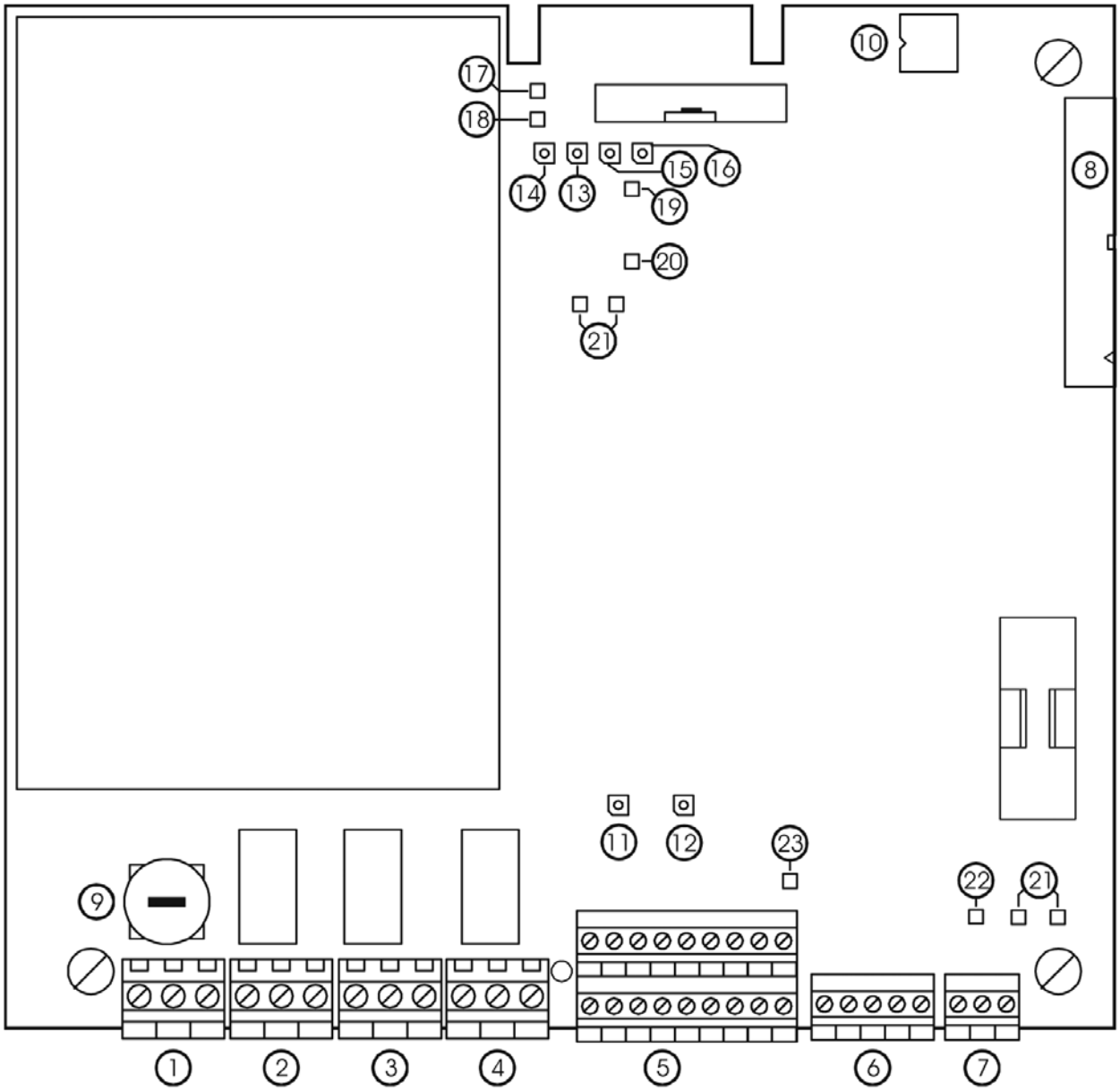
⑤ Red lamp: Fault blinks in case of fault or error

⑥ Yellow lamp: Metal lights up in case of metal detection

Design & Method of Operation *(cont.)*

ELECTRONIC BOARD

The drawing below shows the position of the most important components and the placing of the connectors.



Connectors and terminals	1. “Mains”: Power supply
	2. “Metal 1”: Potential-free change-over-contact
	3. “Fault”: Potential-free change-over-contact
	4. “Metal 2”: Potential-free change-over-contact
	5. “Input/output”: 24V Inputs/outputs
	6. “Receiver”: Input signal from the detector coil
	7. “Transmitter”: Output signal to the detector coil
	8. Ribbon cable connector for control panel
Elements connected to mains voltage:	1. “Mains”: connector
	9. Mains fuses
Elements connected to external voltage	2. “Metal 1”: connector
	3. “Fault”: connector
	4. “Metal 2”: connector
Memory devices:	10. Device and product data
LEDs:	11. Status indication magnetic valve 1 (MV1)
	12. Status indication magnetic valve 2 (MV2)
	13. Active light supply voltage +5V
	14. Active light supply voltage +24V
	15. Active light supply voltage +15V
	16. Active light supply voltage -15V
Test points:	17. Supply voltage +5V
	18. Supply voltage +24V
	19. Supply voltage +15V
	20. Supply voltage –15V
	21. Common ground for all signals (GND)
	22. Sine wave signal to the detection coil (transmitter)
	23. Sine wave signal from the detection coil (receiver)

Safety

Our equipment conforms with all official technical safety regulations. However, as a manufacturer we believe it is our duty to make you aware of the following information.

USE TO THE INTENDED PURPOSE

The equipment is intended to be used for the following fields of application only in combination with a corresponding detection coil: Free-fall applications. The ambient temperature of the equipment must not exceed 122°F (50°C). At the operation field of the device, no steam (i.e. plasticizer) or other substances may occur that attack cord insulation of PVC.

MARKING OF DANGERS

Inside the electronic housing of the control unit, mains voltage is used and possibly connected external electric circuits may also use mains voltage.

DANGER

Therefore, on the cover of the electronic housing the warning sign is attached.

Marking of terminals "Mains" with (1) 

"Metal" (2) and "Fault" (3) with 

If the covering has to be removed during maintenance and repair works notice the references in the Safety Notes for Operation and Maintenance.

RISKS IN CASE OF NON-OBSERVANCE OF THE SAFETY NOTES

In case of non-observance of the safety notes there is a danger for life and health on account of electric voltages.

SAFETY NOTES FOR THE OPERATOR

The control unit FFS may only be operated in the intended purpose and in a perfect functioning condition, especially if the cover of the electronic housing has to be closed during operation. Entered moisture has to be removed! All fixed warning signs on the equipment may not be removed and have to be in a well recognizable condition.

The operating instructions always have to be in a legible condition and completely available. The operator may only appoint qualified personnel for operation, maintenance and repair work. People with a cardiac pacemaker should not permanently stay in the area of the detection coil. If potentially explosive materials are examined, the pertinent regulations must be observed.

SAFETY NOTES FOR OPERATION AND MAINTENANCE

Clean the control housing of pollution and wetness before opening the cover of the electronic housing. Turn off power supply and connected circuits before opening of the control cabinet. Moisture has to be removed! The operator may only appoint qualified personnel for operation, maintenance and repair work.

NOTES ON RESIDUAL RISKS

External circuits can still lead voltage in spite of interrupted mains power supply.

CONSEQUENCES OF UNAUTHORIZED MODIFICATION

In case of unauthorized modification or repair work all the declarations and guarantees given by the manufacturer will become void.

INADMISSIBLE OPERATION

Using the Control Unit FFS for an operation in which it is not intended for is regarded as inadmissible operation. Inadmissible is the operation out of the specifications given in the technical data and the operation under high mechanical static or dynamic loads (i.e. heavy system parts or strong vibrations). Also inadmissible is the examination of aggressive materials such as materials containing alkaline solutions, acids and solvents as well as the use in an explosion hazardous environment.

Commissioning

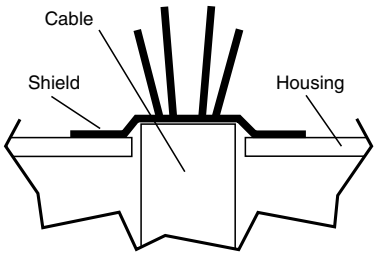
MECHANICAL INSTALLATION

- Ensure that the equipment is securely installed on a level surface and is vibration-free. It should not be used in an unprotected environment (i.e. it should be installed inside or under cover). Do not install in an environment where there is an explosion hazard.
- Do not install in the vicinity of fields of interference (i.e. near large electric motors and frequency inverters). The safe distance depends on the power of the motor or frequency inverter (approx 16.4'/5 m).
- Fix the control unit cabinet to a wall or frame using the screw holes provided (check page 6 for dimensions). Ensure that it is securely fixed to support the weight of the control unit (approx 11.02 lbs/5 kg).
- The control unit must be installed in its own cabinet. On no account install it in other switchgear cabinets as there is a high risk of interference.
- Always discuss with the manufacturer prior to altering cable lengths between the electronic unit and the detection coil. Always use original cables supplied with the machine. These connecting cables must be laid separately from other cables (use fixing clips or lay them in separate cable ducting).
- Where several metal detectors are to be installed next to one another, the distance between detection coils must not be less than 6.56' (2 m). Where metal detectors are installed opposite one another, the distance between them must not be less than 32.81' (10 m). These values are for large machines, reduce the distance by up to 19.69" (50 cm) for smaller machines. Please contact manufacturer if space is limited and the distance between machines is less than that recommended.

CONNECTING THE EQUIPMENT

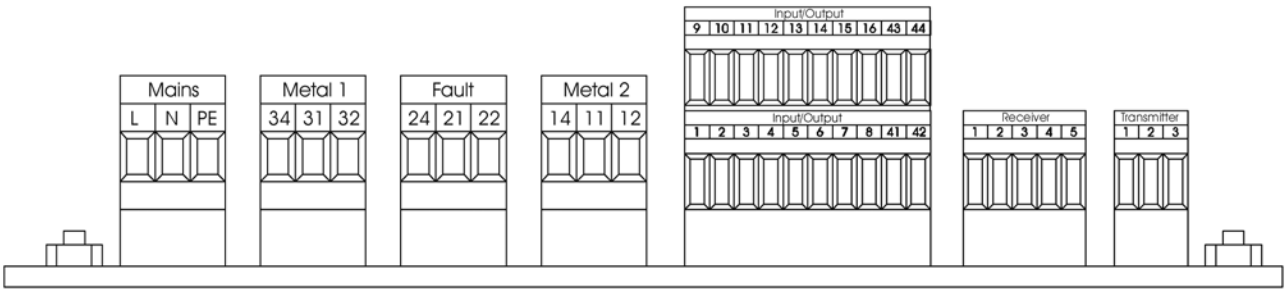
IMPORTANT NOTES

To conform to CE standards all cables external to the electronics and electrical control housings must be shielded. The shielding must be earthed immediately after the cable gland.



PIN CONFIGURATION

(See figure below.)



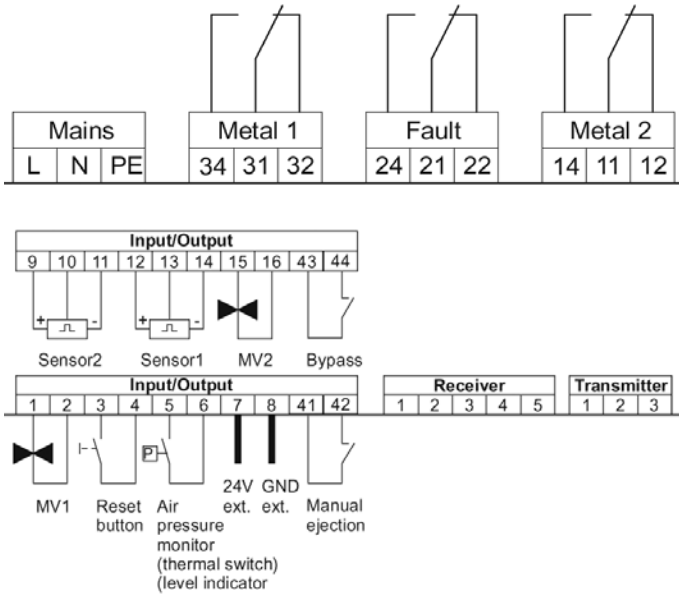
Commissioning *(cont.)*

ELECTRICAL CONNECTION

Connector	Type of Connection	Function
"Mains"	Connection for power supply	As a standard a mains plug with integrated filter is already connected here
"Metal 1"	Potential-free relay contact	Normal operation: contact 31 and 32 is closed Metal detected: contact 31 and 34 is closed
"Fault"	Potential-free relay contact	Normal operation: contact 21 and 24 is closed Fault signal: contact 21 and 22 is closed
"Metal 2"	Potential-free relay contact	Normal operation: contact 11 and 12 is closed, conveyor belt running Fault signal: contact 11 and 14 is closed conveyor belt stop
"Input/ output"	24V Inputs/ outputs	1 24V switching output MV1 2 GND. Remove bridge between 1-2 if connecting external load (valve) 3,4 Input for external reset button 5,6 Input for air pressure monitor, thermal switch, level indicator 7,8 Input external +24V 9, 10, 11 Sensor 2 (PNP) 12, 13, 14 Sensor 1 (PNP) 15 24V switching output MV2 16 GND. Remove bridge between 15-16 if connecting external load (valve) 41, 42 Input for manual ejection 43, 44 Bypass isolates machine functions (i.e. during clean down)
"Receiver"	Connection for detection coil: receiver	1 2 Receiver signal 3 Reference ground for receiver 4 -15V 5 +15V
"Transmitter"	Connection for detection coil: transmitter	1 Transmiter signal 1 2 Reference ground for transmitter 3 Transmitter signal 2

IMPORTANT NOTES

The maximum cable lengths for external components, switches and sensors is 49.21' (15 m). Only shielded cables may be used. The shield must be attached directly to the electronics housing.



IMPORTANT NOTES

If Bypass mode has been selected the "Operation" LED is blinking.

ELECTRICAL RATING

Dry relay contacts	250VAC/3A 120VDC/3A
24V DC Switching output	Max. current load: 200 mA
Control Inputs	Connection of make contacts against ⊥or+ 24V, resp. PNP outputs (NPN on request)

SAFETY NOTES

Switching elements (contactors, relays, etc.) may only be connected to the potential-free contacts in interference-suppressed condition!

MAINS SUPPLY

Connection with shock proof plug

1. Connect the power cord with shockproof plug to an existing mains outlet.
2. After approx 5 sec the system is ready for work.

CONNECTION BY CLAMP CONNECTION

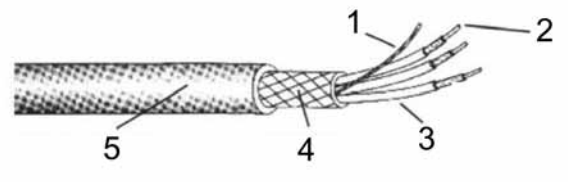
SAFETY NOTES

The work described below may only be performed by qualified personnel! Make sure before opening the housing that no mains voltage or external voltage is applied to the electronic unit!

IMPORTANT NOTES

The power cable and skintop gland may not be removed - it is an essential part of the EM C-concept. The power supply cable is a special cable with ferrite shell and may not be replaced by a standard shielded cable. If the mains plug cannot be used, a connection box should be used.

1. Remove the mains plug.
2. Strip the insulation of the cable for 1.97" (5 cm) and of the wires for 0.39" (1 cm) and sheathe them.

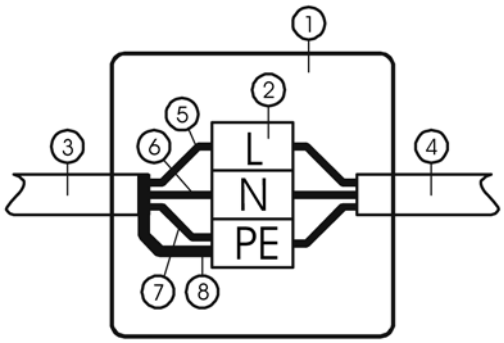


① Shield
② Conductor
③ PVC-insulator
④ Shield
⑤ Sheath

3. Connect the cable according to the sketch below.

SAFETY NOTES

Make sure, that the mains voltage is switched off.



① Terminal box
② 3 pole terminal strip
③ Mains cord of control unit
④ Mains supply
⑤ Conductor L (brown) to terminal L
⑥ Conductor N (blue) to terminal N
⑦ Conductor PE (yellow/green) to terminal PE
⑧ Shield to terminal PE

IMPORTANT NOTES

Connect the shield to PE.

4. Close the terminal box.
5. Approx after 5 sec after switching on the unit is ready for operation.

NOTE: The power cable has a wire cross-section from 0.75 mm2. The safeguard of the AC power cable should be designed correspondingly. One spare piece of mains fuse is on the electronic board FFS.

STARTING STATUS OF THE EQUIPMENT

Status of the lamps and outputs during the starting phase:

Lamp/output	Contact status
Green lamp	On
Red lamp	On
Yellow lamp	On
Metal relay 1	Contacts 31 and 34 is closed (corresponds with metal detection)
Fault relay	Contacts 21 and 22 is closed (corresponds with fault status)
Metal relay 2	as programmed "start=on" contacts 11 and 14 is closed "start=off" contacts 11 and 14 is open
24V switching outputs MV1/MV2	as programmed H-active 0V L-active 24V

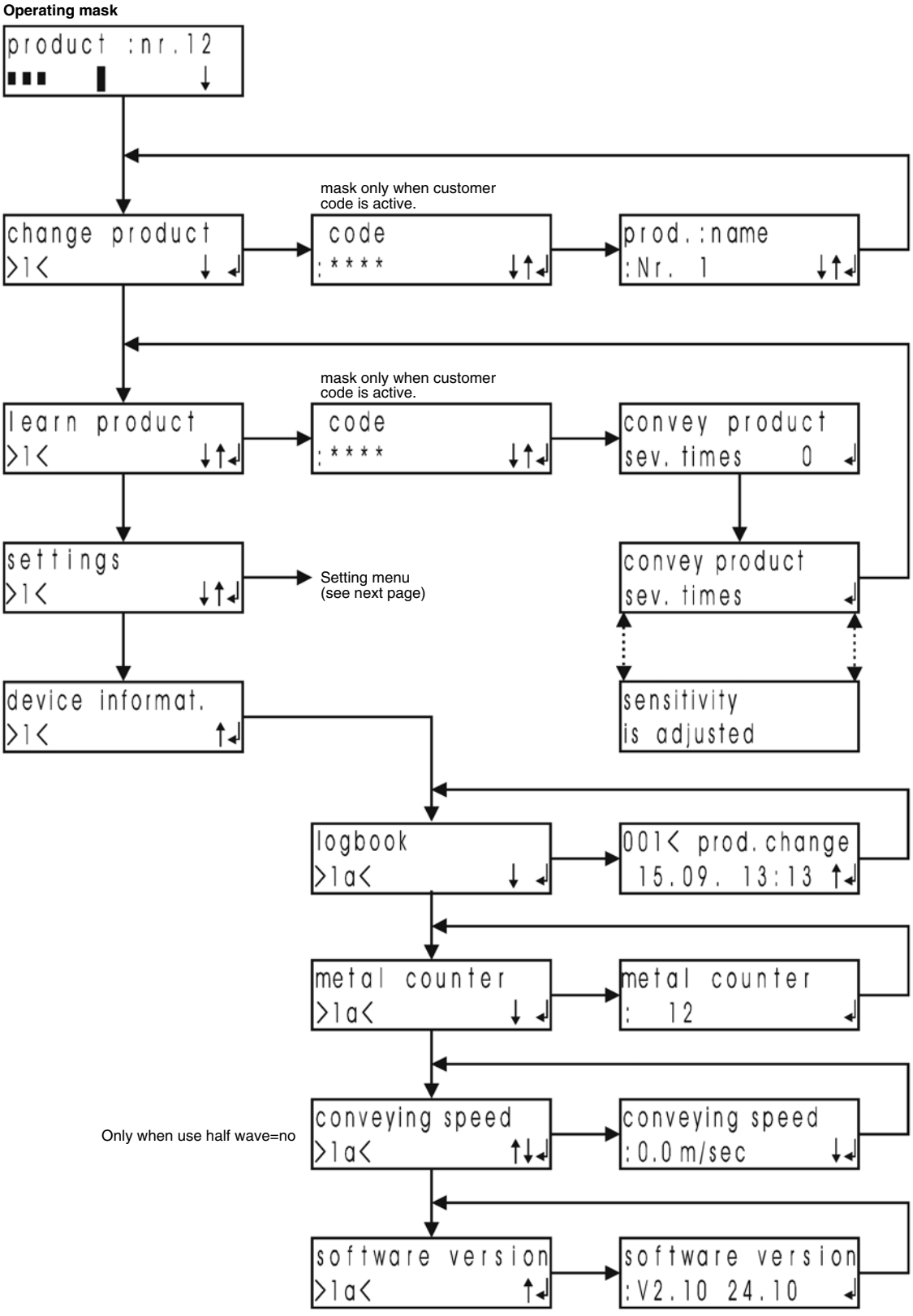
Status of the lamps and outputs after the starting phase:

The FFS control is ready for operation after approx. 5 seconds after being powered up. The display changes to the operation mask.

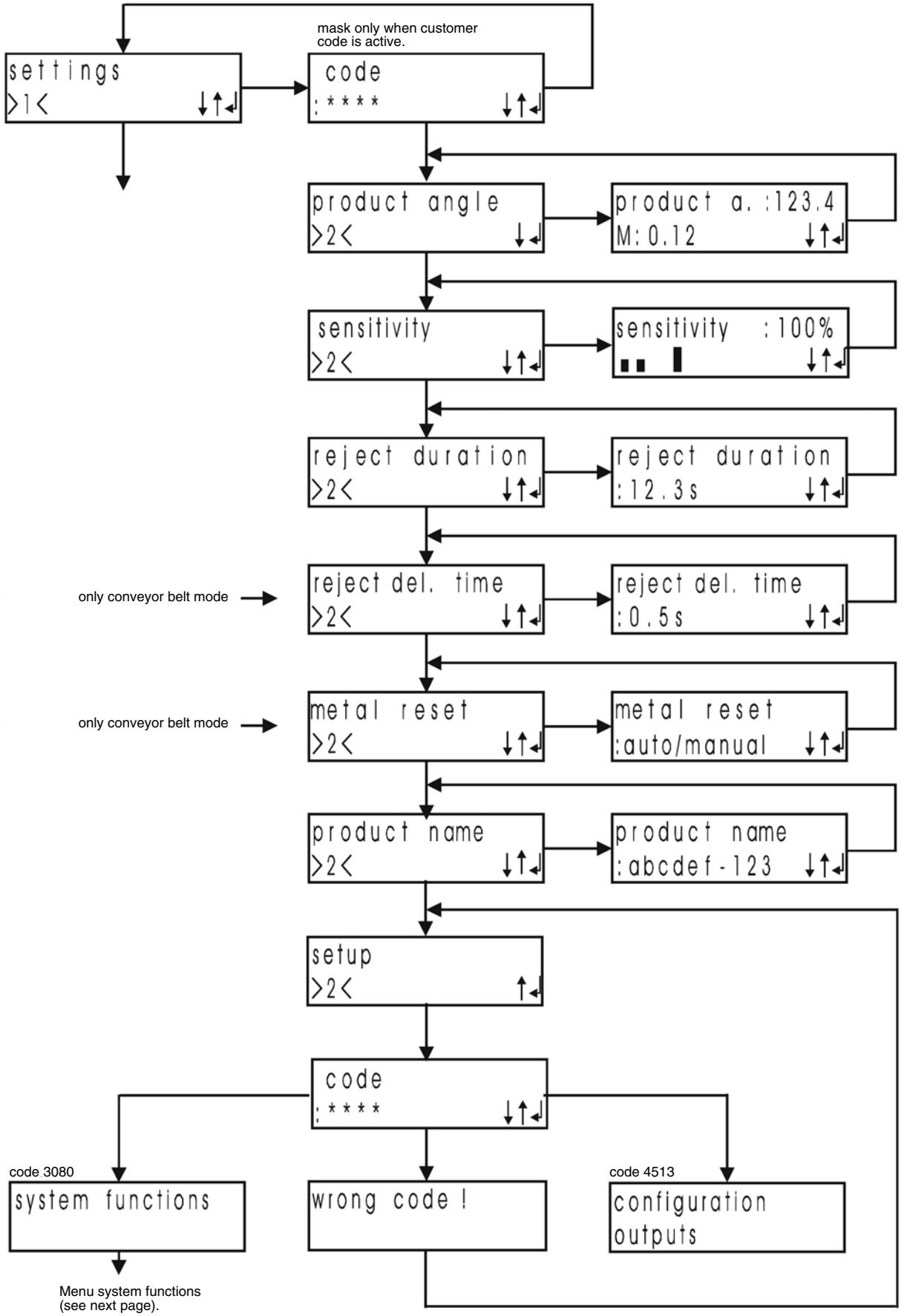
Lamp/output	Contact status
Green lamp	On
Red lamp	Off
Yellow lamp	Off
Metal relay 1	Contacts 31 and 34 is closed
Fault relay	Contacts 21 and 24 is closed
Metal relay 2	as programmed "operation=on" contacts 11 and 14 is closed "operation=off" contacts 11 and 14 is open
24V switching outputs MV1/MV2	as programmed H-active 0V L-active 24V

Menu Structure

MAIN MENU (OPERATING LEVEL 1)

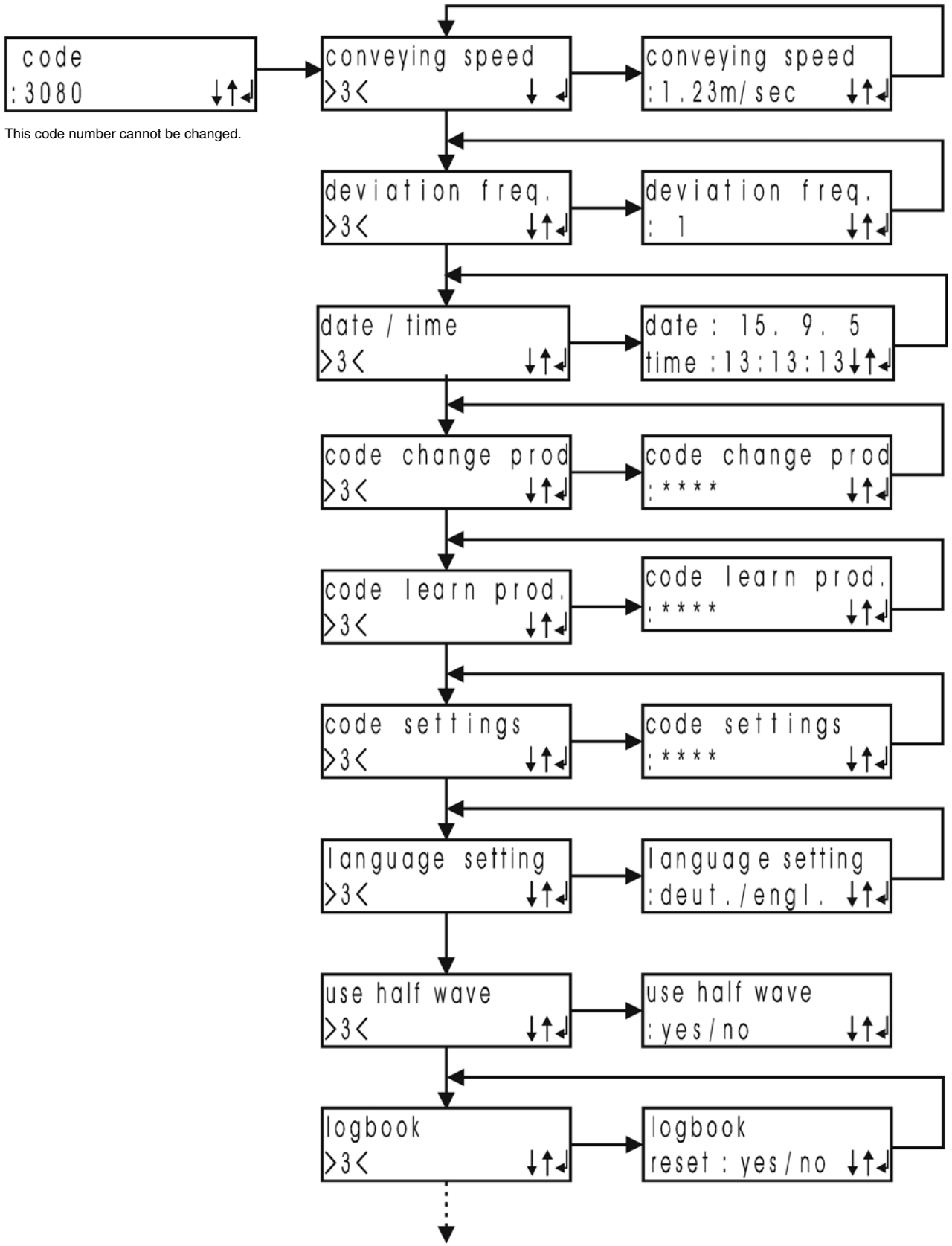


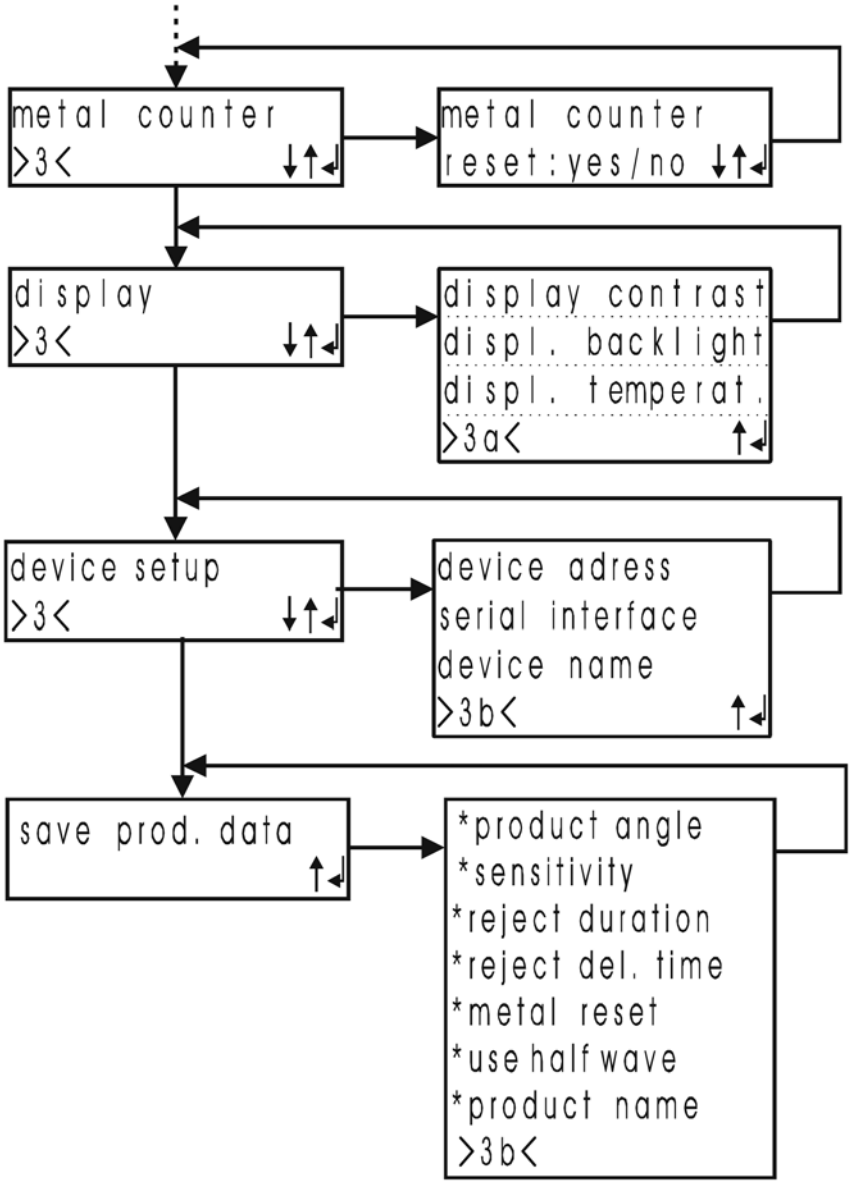
SETTING MENU (OPERATING LEVEL 2)



Menu Structure *(cont.)*

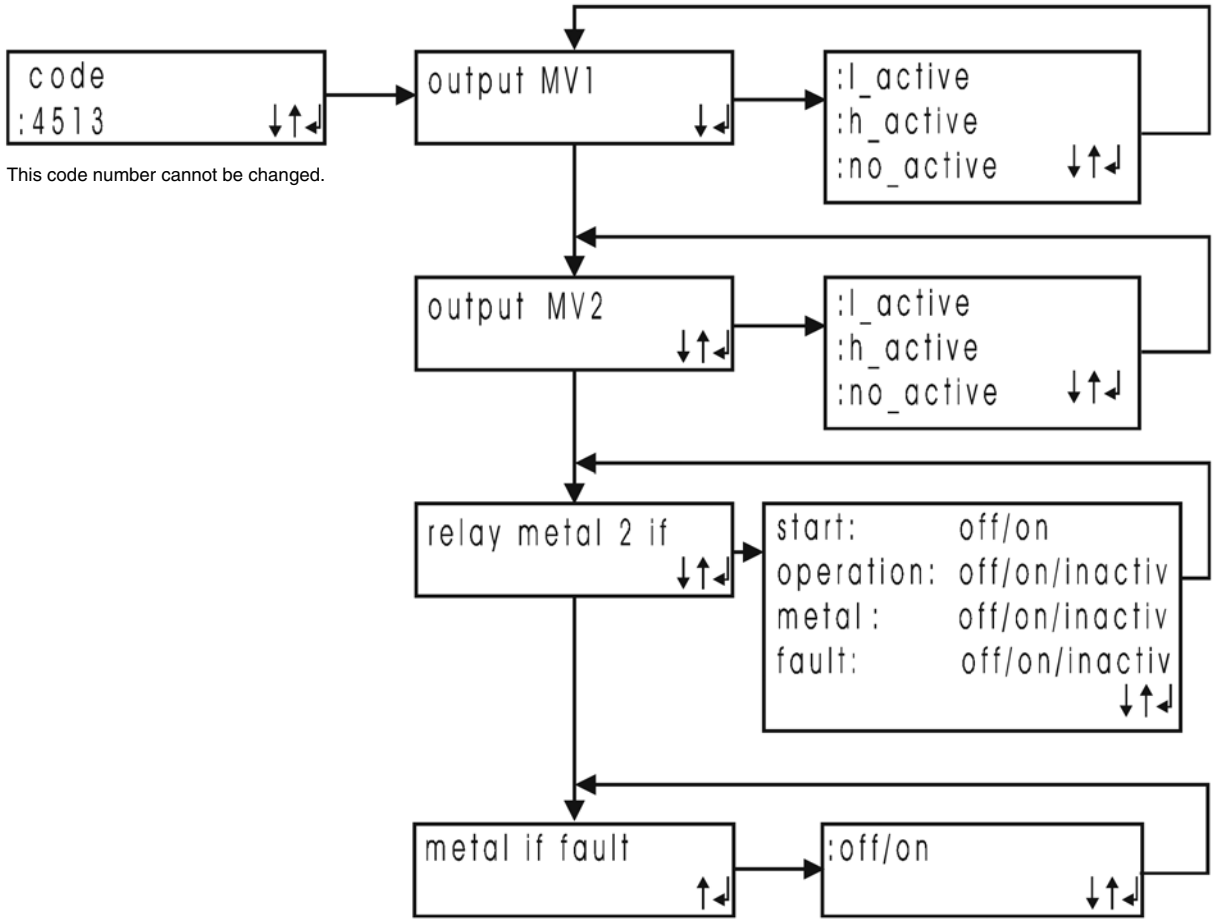
SYSTEM FUNCTION MENU (OPERATING LEVEL 3)




metal counter
>3<
metal counter
reset:yes/no
display
>3<
display contrast
displ. backlight
displ. temperat.
>3a<
device setup
>3<
device adress
serial interface
device name
>3b<
save prod. data
*product angle
*sensitivity
*reject duration
*reject del. time
*metal reset
*use halfwave
*product name
>3b<

Menu Structure *(cont.)*

OUTPUT CONFIGURATION MENU
(OPERATING LEVEL 4)



Operation

GENERAL INFORMATION FOR OPERATION

- To operate the FFS control use the buttons **UP, DOWN, ENTER** ↵ and **ESC**.
- The buttons are used to select menus or set and adjust parameters.
- The button **ESC** always gets to the main menu.
- The button **Reset/Test** allows to reset a metal alarm in the mode “manual”.
- The program automatically returns to the main menu after 30 sec if no operation has been made.

MASKS ON THE DISPLAY

1. **Operation mask:** displayed during normal operation. Four different operation masks can be selected. Select them by continuously pressing the **ESC** button and select with **UP.**

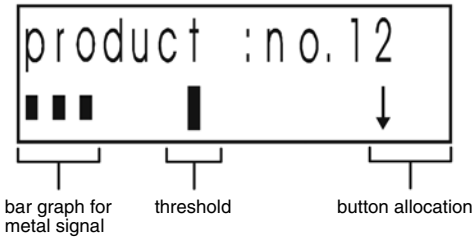
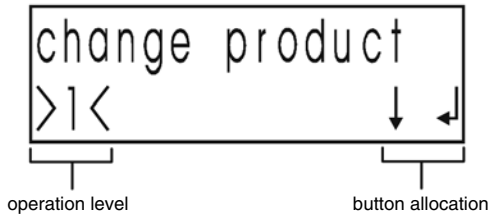


FIGURE 15
Example for an operation mask

2. **Menu selection:** use the buttons **UP/DOWN** to select the desired menu, then confirm by pressing **ENTER**.



Menu structure	Operation level
Main menu	>1< >1a<
Settings	>2<
Setup	>3< >3a< >3b< (system functions)
	>4< (output configuration)

3. **Setting mask:** Use the buttons **UP/DOWN** to set or change the parameters. The new settings are stored by pressing **ENTER**. If the **ESC** button is pressed after a change the previous setting is effective.

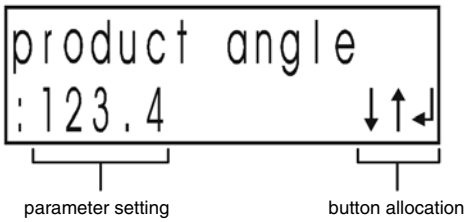


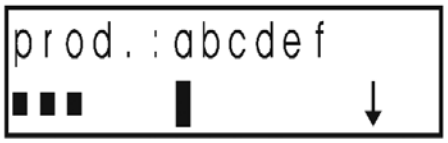
FIGURE 17
Example for a setting mask

MAIN MENU
OPERATING MASK

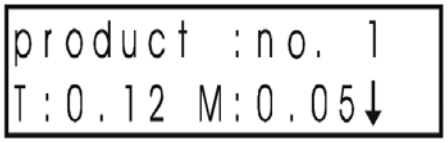
In the normal system operating mode, the operating mask is displayed. It is possible to use four different operating masks. Change the operating mask by keeping pressed the **ESC** key and select by the **UP** key.

Operating mask 1. Displayed information: Current **product number**. Metal signal as bar display.

Operating mask 2. Displayed information: Current **product name**. Metal signal as bar display.

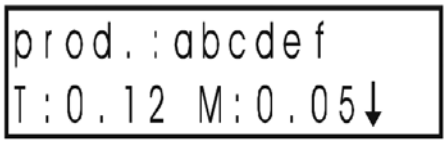


Operating mask 3. Displayed information: Actual **product number**. **T:** Threshold; **M:** Metal signal.



Operation *(cont.)*

Operating mask 4. Displayed information: Actual **product name**. **T:** Threshold; **M:** Metal signal.



IMPORTANT NOTES

In the case of a metal detection, the metal signal is held for a short time with the max. value as a bar or as a measuring value (i.e.: M:0.8).

PRESET PRODUCT MEMORY

The product memory numbers 24, 25, 26, 27, and 28 are factory preset and not changeable. The preset parameters are sensitivity and product angle. The menu “Learn product” is not selectable (as the product angle is already set) All other parameter settings are not limited. Preset parameters are

Product no. 28: maximum sensitivity, 100%, product angle - (no product angle).

Product no. 27: high sensitivity, 100%, product angle corresponds to the vibration angle.

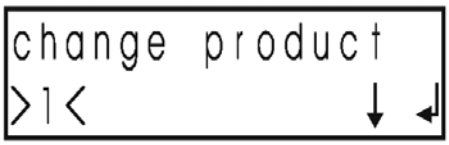
Product no. 26: medium sensitivity, 70%, product angle corresponds to the vibration angle.

Product no. 25: low sensitivity, 50%, product angle corresponds to the vibration angle.

The vibration angle is also coil size dependent and, therefore, preset.

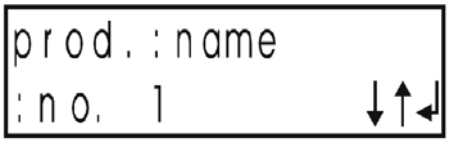
CHANGE PRODUCT

Select the menu **“Change product”** by pressing the **ENTER** key.



If the customer code has been set, input CODE (otherwise, this mask is no longer displayed).

Select the desired product by pressing **UP/DOWN** keys and confirm by **ENTER** key.



LEARN PRODUCT

Select the menu **“Learn product”** by pressing the **ENTER** key.

If the customer code has been set, input CODE (otherwise, this mask is no longer displayed).

The **product teach-in process** is carried out in two steps:

1. Product compensation by automatic determination of the optimum product angle.
2. Adjustment of the maximum sensitivity with the product.

NOTE: If the current running teach-in process has not been finished within four minutes, the program skips back to the main menu.

PRODUCT COMPENSATION

IMPORTANT NOTES

Ensure that only metal-free products are being used.

Convey product through the detector head. There are three possibilities:

1. The product has **no** product effect.
2. The product has a **very high** product effect.
3. The product shows a **small** product effect, but can be compensated without any special adjustments.

1. The product shows **no** product effect. The "number of passage counter" remains at "0". The teach-in procedure can be quit after a few seconds by pressing the **ENTER** button.

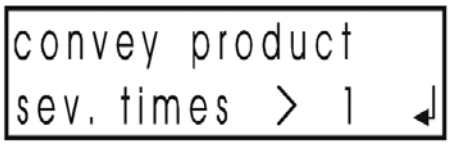
2. The product has a very high product effect. The product has to pass the detector head so often till the product effect is compensated. Then continue by pressing **ENTER**.

Symbol	Definition
>>>:	Indicates product with high product effect. Product effect not compensated.
>:	Indicates that product effect has been compensated.

After product compensation the "number of passage counter" is set to >1, and the procedure will be continued with teach-in step no. 3.

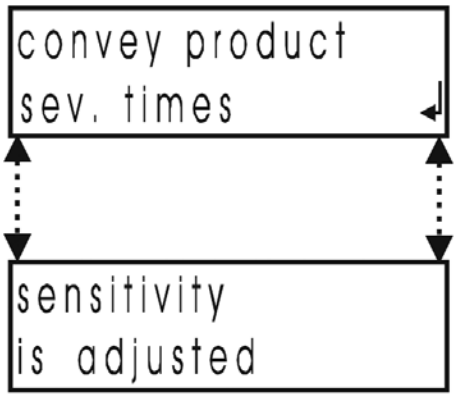
NOTE: As long as the unit tries to compensate a product, the teach-in procedure cannot be quit.

3. The product shows a **small** product effect, but can be easily compensated. The product should pass the detector head several times. The "number of passage counter" displays the number of passages. Quit the teach-in procedure by pressing the **ENTER** button. The found product angel will be stored as a product parameter.



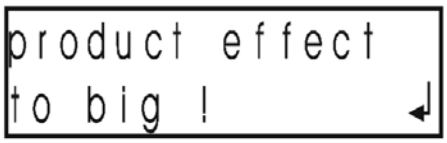
MAXIMUM SENSITIVITY SETTING

Convey the product at least once and finish the teaching process by the **ENTER** key. The device automatically adjusts the max. sensitivity with the product. Both masks are displayed by turns.



SPECIAL CASE: Product effect too large!

This message is displayed if it was not possible to mask out the product effect. The automatic teaching process must be repeated, since it is probable that an unexpected malfunction has occurred.



Possible reasons for unsuccessful teach-in procedure:

Reason	Remedy
Vibration of the detector coil during teach-in procedure.	Repeat teach-in procedure.
Metallic contaminants in product.	Ensure that metal-free product is used for teach-in procedure and repeat.
Several trials without success: Product effect can not be compensated.	Ask manufacturer service for help. Send test sample of the product.

⚠ SAFETY NOTES

To get optimum product compensation, which results in optimum sensitivity, pay attention to the following:

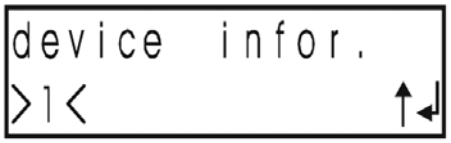
- The real **conveying speed** must correspond with the rate that was set at Setup (deviation max. ± 20%).
- During product teach-in procedure, the products must always be conveyed in the **same direction.**

Operation *(cont.)*

- For products **conveyed piece-by-piece,** each step must be repeated a minimum of **two times.** Better results are achieved with several repetitions to average product straggling.
- For products **conveyed continuously,** wait, as a rule of thumb, until the product has passed five times of the detector length before confirming and initializing the next step.
- Avoid vibrations during teach-in procedure. Vibrations would considerably affect the results!

SETTINGS
Select the menu **"Settings"** by pressing the **ENTER** key. **The submenus will be explained at a later time!**

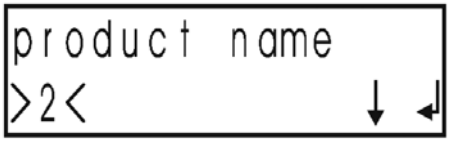
DEVICE INFORMATION
Select the menu **"Device information"** by pressing the **ENTER** key. **The submenus will be explained at a later time!**



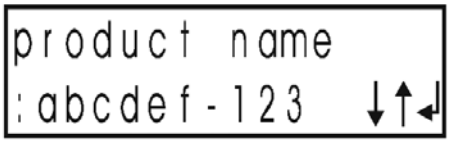
MENU SETTINGS

CODE
If the customer code has been set, input CODE (otherwise, this mask will not be displayed).

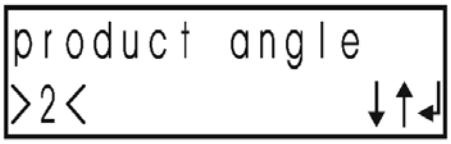
PRODUCT NAME
Select the menu **"Product name"** by pressing the **ENTER** key. Here, a ten-digit name can be given or changed for the current product.



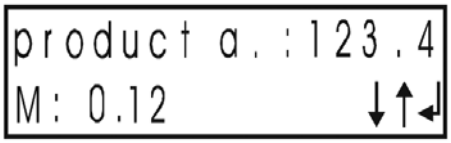
Letters, numbers and various symbols can be selected via the **UP/DOWN** keys. Via **ENTER**, a selected symbol is taken over and the cursor advances by one position. This is repeated until the end of line is reached.



PRODUCT ANGLE
Select the menu **"Product angle"** by pressing the **ENTER** key. Here, it is possible to set or change the angle for the current product.



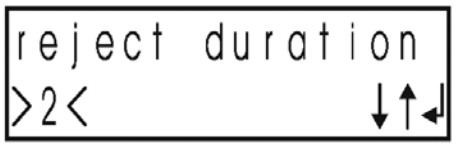
Via the **UP/DOWN** keys, it is possible to adjust the angle between 0.0° and 180.0°. Via **ENTER**, the set angle is taken over. M = Metal signal, supports the manual adjustment of the product compensation. The adjustment is best when the smallest number (M:x.xx) is displayed.



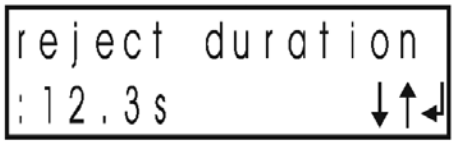
SENSITIVITY
Select the menu **"Sensitivity"** by pressing the **ENTER** key. Here, the key sensitivity for the current product can be set or changed.

Via the **UP/DOWN** keys, it is possible to adjust the sensitivity between 1 and 100 %. Via **ENTER**, the adjusted value is taken over. Metal signal displayed as a bar graph supports the sensitivity adjustment.

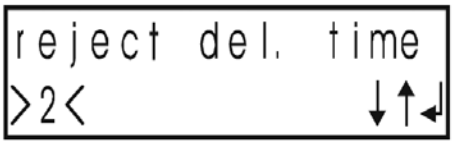
REJECT DURATION
Select the **"Reject duration"** menu by pressing the **ENTER** key. Here, it is possible to set or change the time for the activation of the switch outputs.



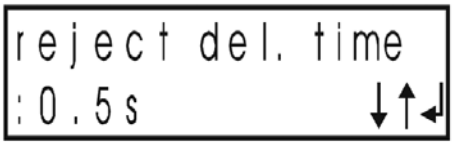
Via the **UP/DOWN** keys, it is possible to adjust the reject duration to a value between **0.05 sec** and **30.0 sec.** Via **ENTER**, the set value is taken over. In the "menu" reset mode, this value is of no importance.



REJECT DELAY TIME
Select the menu **"Reject delay time"** by pressing the **ENTER** key. Here, the time between the conveyor section between metal detection and activation of the switch outputs can be set or changed. **This mask is only active in the conveyor belt mode and is not displayed for the other operating mode.**



It is possible to set the reject delay time to a value between **0.00 sec** and **30.0 sec** via the **UP/DOWN** keys. Via **ENTER**, the set value is taken over.

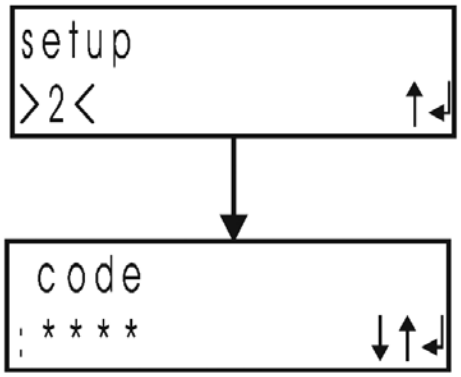


METAL RESET
Select the menu **"Metal reset"** by pressing the **ENTER** key. Here, it can be adjusted whether the metal outputs are to be reset manually or automatically (after setting the reject duration). **This mask is only active in the conveyor belt mode and is not displayed for the other operating modes.**

It is possible to adjust one of the reset types **Auto** and **Manual** via the **UP/DOWN** keys. The adjustment is taken over via the **ENTER** key.

Operation *(cont.)*

SETUP
The menu **"Setup"** is selected by pressing the **ENTER** button. Entering preset access code numbers allow to branch to additional menus.



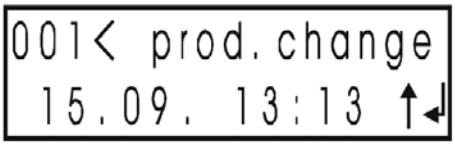
Code-no.: 3080, operating level 3, **system functions.**

Code-no.: 4513, operating level 4,
output configuration.

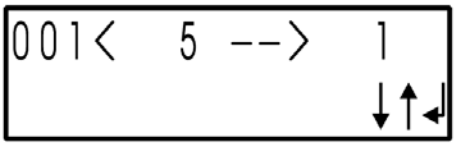
MENU DEVICE INFORMATION

LOGBOOK
Select **"Logbook"** menu by pressing the **ENTER** key.

Screen 1 – Alarm text:
001< Entry number, example no: 001
prod. change Product change.
15.09 13:13 Date and time.
Press key **"UP"** to move to screen 2.



Screen 2 Alarm text information:
Information and advice relating to alarm texts on screen 1 are shown here. Example: Product change from product 5 to product 1.

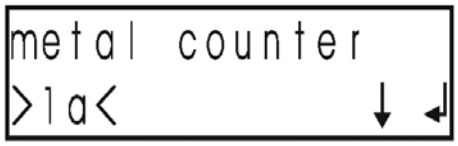


This message appears when there is no entry in the logbook or the logbook has been "emptied" using the reset function in the "System functions" menu.

Screen 1 Line 1	Screen 1 Line 2		Screen 2 Line 1	Screen 2 Line 2	Explanation
	Day. Month.	Hour. Minute			
Power on	15.09	13.13	- - -	- - -	Machine switched on
Power off	xx.xx	xx.xx	- - -	- - -	Machine switched off
Product change	xx.xx	xx.xx	x - - > y	- - -	Product change from product X to Y
Product data	xx.xx	xx.xx	- - -	- - -	Product parameters changed
System data	xx.xx	xx.xx	Conveying speed	- - -	System data changed, conveying speed
System data	xx.xx	xx.xx	Frequency deviation	- - -	System data changed, frequency deviation
Metal	xx.xx	xx.xx	Sig: x.xx	MCnt:xxx	Metal alarm Sig: Metal signal (Vss) MCnt: Current metal count
MV1 error	xx.xx	xx.xx	- - -	- - -	Solenoid valve 1 error
MV2 error	xx.xx	xx.xx	- - -	- - -	Solenoid valve 2 error
TX overload	xx.xx	xx.xx	- - -	- - -	Transmitter (TX) overloaded
Air pressure	xx.xx	xx.xx	- - -	- - -	Compressed air
Therm. overloaded	xx.xx	xx.xx	- - -	- - -	Thermo switch
Cont. full	xx.xx	xx.xx	- - -	- - -	Level monitor
Sensor 1	xx.xx	xx.xx	- - -	- - -	Sensor 1 (diverter position monitor)
Sensor 2	xx.xx	xx.xx	- - -	- - -	Sensor 2 (diverter position monitor)
Recv. high	xx.xx	xx.xx	- - -	- - -	Receiver voltage too high
Recv. broken	xx.xx	xx.xx	- - -	- - -	Receiver voltage too high
Transmitter	xx.xx	xx.xx	- - -	- - -	Transmitter (TX) connection broken

METAL COUNTER

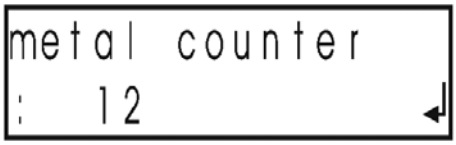
Select the menu “Metal counter” by pressing the **ENTER** key.



Here, the metal detections are counted and displayed. Via **ENTER**, the mask is closed.

Reset the counter:

- The counter can be reset via the menu “System functions”.
- Press the function key **“Reset / Test”** for five sec without interruption.



CHECK OF CONVEYING SPEED

(Precondition: half wave evaluation: NO)

IMPORTANT NOTES

This feature allows a rough check of the conveying speed and is not an exact measuring device.

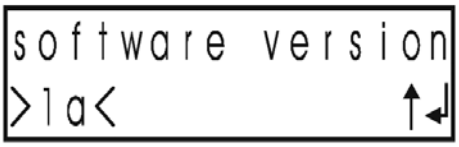
Select the menu **“Conveying speed”** by pressing the **ENTER** key.

Operation *(cont.)*

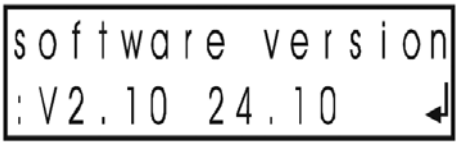
The current conveying speed is displayed if a test piece is passed through the detector head. The display is updated by the metal signal. The **DOWN** button resets the displayed speed to 0.0 m/sec. (Possibly repeat the procedure several times).

The displayed speed in m/sec should be compared with the set speed parameter in operation level 3, submenu **"System functions"**, menu **"Conveying speed"** and adjusted if necessary.

SOFTWARE VERSION
Select the menu **"Software version"** by pressing the **ENTER** key. Here, the current software version is displayed.



Here, the current software version is displayed. The mask is closed via **ENTER**.



MENU SYSTEM FUNCTIONS

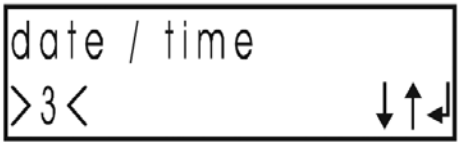
CONVEYING SPEEDS
Select the menu **"Conveying speed"** by pressing the **ENTER** key.

Via the **UP/DOWN** keys, a conveying speed between 0.005 m/sec and a max. limit value can be set. Via **ENTER**, the set value is confirmed. The max. limit value is determined by the coil size/type.

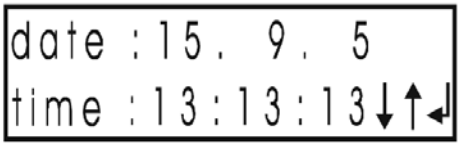
DEVIATION FREQUENCY
Select the menu **"Deviation frequency"** by pressing the **ENTER** key.

It is possible to adjust a frequency deviation between 0 and a max. value via the **UP/DOWN** keys. The set value is taken over via **ENTER**. The max. value is determined by the search coil and has been saved as a system parameter.

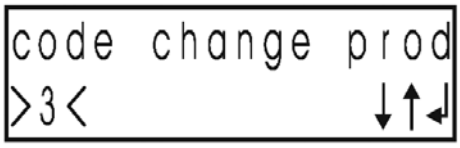
DATE/TIME
Select the menu **"Date/time"** by pressing the **ENTER** key.



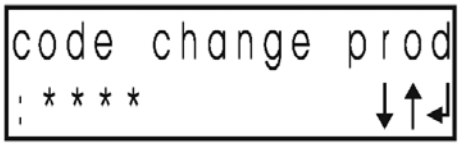
Use **DOWN** key to place cursor on the date, use **UP/DOWN** keys to change date. Press **ENTER** key to accept entered value. The cursor then moves to next position (year, month, day, hours, minutes, seconds). Confirm last entry to accept new date or time.



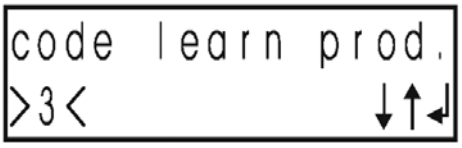
CODE CHANGE PRODUCT
Select the menu **"Code product change"** by pressing the **ENTER** key. Here, a four-digit code can be assigned to the mask Product change.



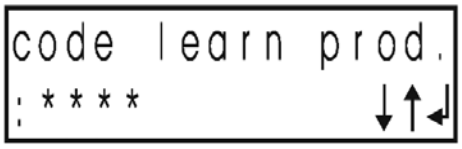
It is possible to select numbers via the **UP/DOWN** keys. Via **ENTER**, a selected number is adopted, and the cursor skips to the next position. Behind the fourth cursor position, the new code is adopted via the **ENTER** key.



CODE LEARN PRODUCT
Select the menu **"Code learn product"** by pressing the **ENTER** key. Here, a four-digit code for the mask learn product can be assigned.



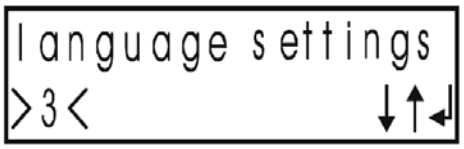
It is possible to select numbers via the **UP/DOWN** keys. Via **ENTER**, a selected number is adopted, and the cursor skips to the next position. Behind the fourth cursor position, the new code is adopted via the **ENTER** key.



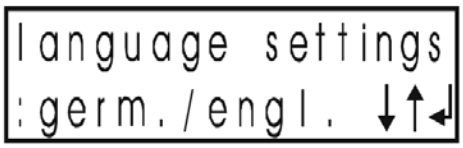
CODE SETTINGS
Select the menu **"Code settings"** by pressing the **ENTER** key. Here, a four-digit code for the mask settings can be assigned.

It is possible to select numbers via the **UP/DOWN** keys. Via **ENTER** , the selected number is adopted, and the cursor skips to the next position. Behind the fourth cursor position, the new code is adopted via the **ENTER** key.

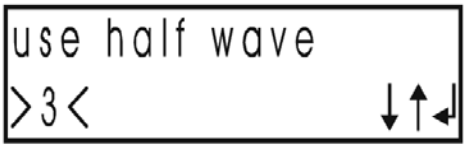
LANGUAGE
Select the menu **"Language settings"** via the **ENTER** key. Here, the language of the individual country can be set.



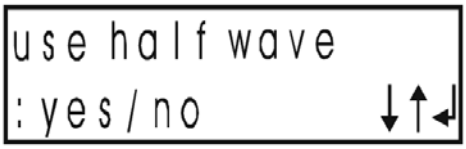
It is possible to select the language of the individual country via the **UP/DOWN** keys. Via **ENTER** , the new language is adopted.



HALF WAVE
Select the menu **"Use half wave"** by pressing the **ENTER** key. Here, it is possible to distinguish between one and two half wave evaluations.



It is possible to switch the two half wave evaluations on or off via the **UP/DOWN** keys. Via **ENTER**, the setting is adopted.



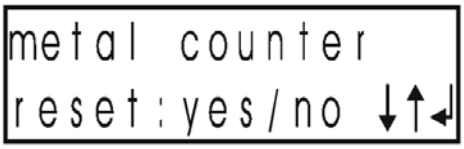
Operation *(cont.)*

LOGBOOK
Select the menu **"Logbook"** by pressing **ENTER** key. Logbook can be reset via device Information menu.

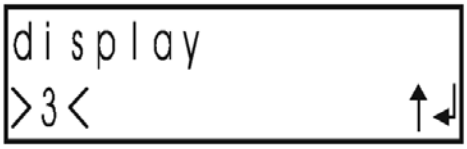
Use **UP/DOWN** keys to activate reset. Use **ENTER** key to make selection.

RESET METAL COUNTER
Select the menu **"Metal counter"** by pressing the **ENTER** key. Here, it is possible to reset the metal counter via the menu device information.

It is possible to activate the reset process via the **UP/DOWN** keys. The selection is carried out via **ENTER**.



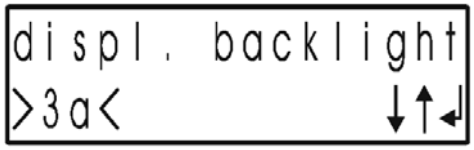
DISPLAY
Select the menu **"Display"** by pressing the **ENTER** key. Here, it is possible to set various display parameters.



DISPLAY CONTRAST
Select the menu **"Display"** by pressing the **ENTER** key. Here, it is possible to set various display parameters.

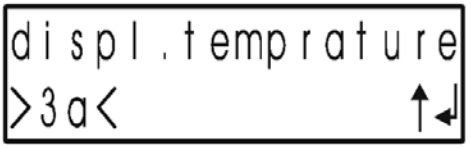
It is possible to set the contrast of the display via the **UP/DOWN** keys. The setting is adopted via **ENTER** . This value is only used for orientation purposes, it is important that the symbols can be read.

Select the menu **"Display illumination"** by pressing the **ENTER** key.

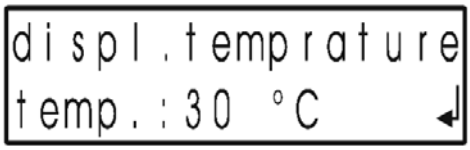


Via the **UP/DOWN** keys, it can be selected that either the illumination is on constantly or it is operated in the interval mode. I.e. if a key is pressed, the illumination is turned on. It is switched off approx. 30 sec after actuating any key. The setting is adopted via **ENTER**.

DISPLAY TEMPERATURE
Select the menu **"Display temperature"** by pressing the **ENTER** key.



The temperature display refers to the temperature in the interior of the housing or on the display. It is necessary for the automatic display contrast adjustment.



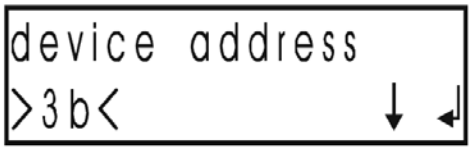
DEVICE SETUP

IMPORTANT NOTES
Relevant only to interface module.

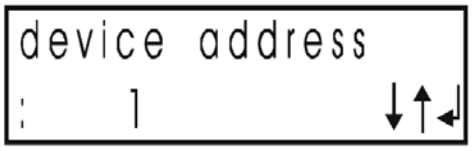
Select the menu **"Device setup"** by pressing **ENTER** key.

DEVICE ADDRESS

Select the menu **"Device address"** by pressing **ENTER** key. "Device address" differentiates between different machines on the network.



Use **UP/DOWN** keys to allocate a device address between 0 and 254. The setting is adopted via **ENTER**.



IMPORTANT NOTES
Address 0: Communication with machine not possible.

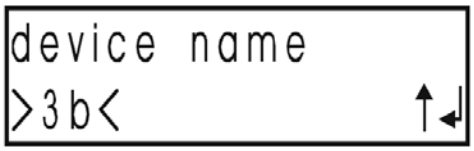
SERIAL INTERFACE

Select the menu **"Serial interface"** by pressing **ENTER** key. Baud rate for RS232 interface on Sensity2 interface module can be set here.

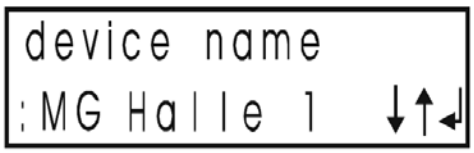
Use **UP/DOWN** keys to set following Baud rates: 9600, 19200, 38400, 57600 and 115200. The setting is adopted via **ENTER**.

DEVICE NAME

Select the menu **"Device name"** by pressing **ENTER** key. A 10-character machine or line name can be entered.

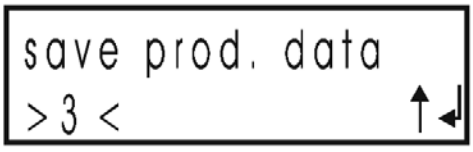


Set cursor on first letter. Use **UP/DOWN** keys to select letters, numbers and symbols. Press **ENTER** to confirm selected letter, number or symbol. Cursor then moves to next position. After entering the tenth character press **ENTER** to confirm.



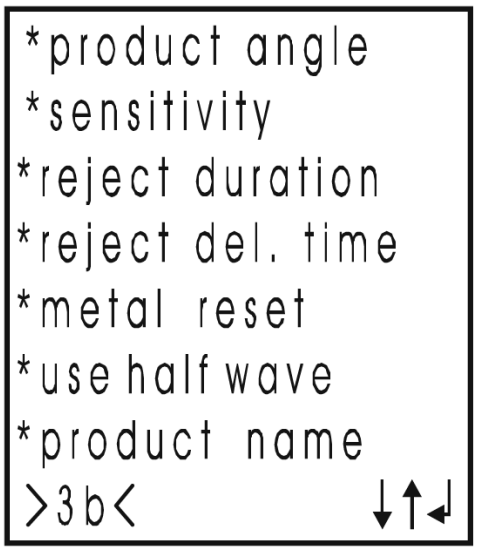
SAVE PRODUCT DATA

Pressing the **ENTER** button gets to the submenu **"Save product data"**. This submenu (>3b<) offers the same settings as operation level 2.

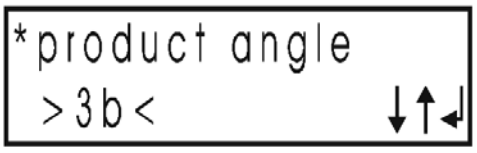


Operation *(cont.)*

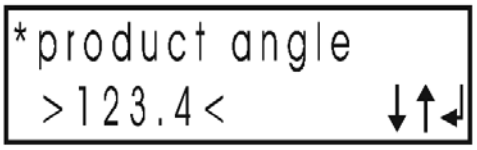
Within the menus the current settings can be changed or copied to product memories 1 to 24.



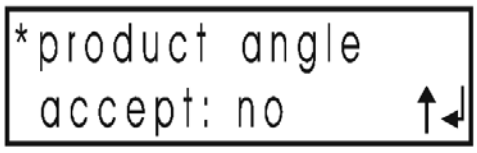
The **ENTER** button gets to menu **"Product angle"**.



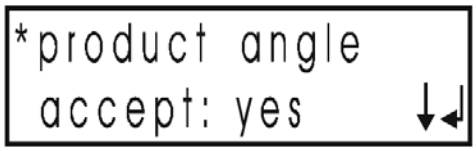
The **UP/DOWN** buttons allow to modify the settings. The **ENTER** button gets to a mask to confirm and store the setting.



With **UP/DOWN** buttons, select between **YES** and **NO.** If **NO** has been selected or the **ESC** button has been pressed, no changing is carried out.



If **YES** has been selected, pressing **ENTER** will store the setting to product memory 1–24.

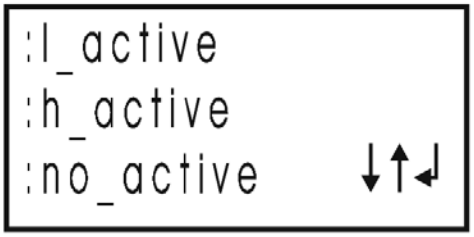


The procedure is the same for all submenus as shown above for the setting of the product angle. The submenu must be exited by **ESC** which gets to **operation level 3, system functions**. Pressing **ESC** again gets back to main menu.

MENU OUTPUT CONFIGURATION (OPERATING LEVEL 4)

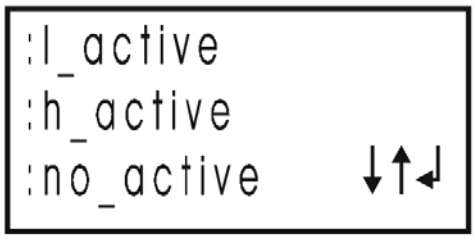
Pressing ENTER gets to **"Output MV1"**. This menu allows to set the switching state of the outputs.

L_active (Low-active)	Output: normal 24V/metal detected: 0V
H_active (High-active)	Output: normal 0V/metal detected: 24V
In_active (In-active)	Output: normal 0V/metal detected: 0V



Pressing **ENTER** gets to **"Output MV2"**. This menu allows to set the switching output state for the magnetic valve no. 2 in case of metal detection.

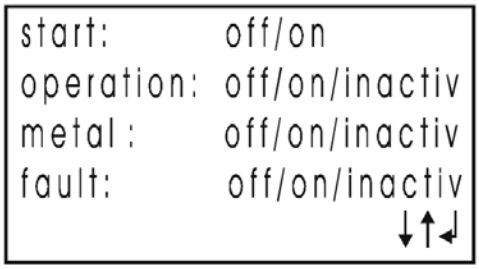
L_active (Low-active)	Output: normal 24V/metal detected: 0V
H_active (High-active)	Output: normal 0V/metal detected: 24V
In_active (In-active)	Output: normal 0V/metal detected: 0V



Pressing **ENTER** gets to menu **"Relay Metal 2".** By defining the switching state of this relay it can be used as an additional metal relay or alarm relay. For special function (i.e. motor control) it is preset and cannot be programmed.

The following switching states can be programmed:

Start	Status of the outputs from Power On till ready for operation (app. 5 sec)
Operation	Output status in "normal operation"
Metal	Output status in case metal detection
Fault	Output status in case of failure
Relay **OFF**	Terminal 11-12 break contact, contact closed
Relay **ON**	Terminal 11-14 make contact, contact closed



Pressing **ENTER** selects the menu **"Metal if fault"**. The switching state of the output metal relay 1 can be programmed in case of failure.

Relay **OFF**	Terminal 31-32 break contact, contact closed
Relay **ON**	Terminal 31-34 make contact, contact closed

Error and Error Remedying

IMPORTANT NOTES
If you should have any questions, please state the equipment type and serial number!

ERROR MESSAGES

Error messages are indicated by the fact that the red lamp “Malfunction” on the operating panel flashes and that the error relay drops out. In addition to that, a metal alarm is given for standard devices. The individual error is displayed.

DEFECTIVE TRANSMITTER

This message is displayed if there is an overload of the transmitter signal to the search coil or if the link to the search coil has been interrupted.

Error messages	Possible causes	Remedy
transmitter overloadet ! ↵	Transmitter cable between electronics and search coil has a short circuit.	Disconnect the transmitter cable at the search coil (tri-axial cable) and measure with an ohmmeter, exchange if necessary.
transm. connect. interrupted ! ↵	Transmitter cable to search coil interrupted.	Inspect the transmitter cable for interruptions, renew if necessary. Inspect the plug-and-socket connections of the transmitter cable, plug-on again/reconnect if necessary.

RECEIVER VOLTAGE TOO HIGH

This message is displayed if the voltage of the signal received by the search coil is too high.

Error messages	Possible causes	Remedy
receiver voltage to high ! ↵	Large metal part (i.e. Al conductor, screw driver, hammer, wrists) directly next to or inside the detection coil.	Inspect the coil and its direct environment. It is possible that there are metal parts at places, which cannot be looked at (between push pipe or sliding plate and coil casing).
	Improper assembly of the search coil.	(cf. operating instructions of the search coil: “Assembly”.) Inspect for the search coil type DLS whether the center sleeve or the locking screws are loose.

RECEIVER CONNECTION

This message is displayed if the voltage of the signal received by the search coil is too high.

Error messages	Possible causes	Remedy
connection to detection coil?	Receiver cable between electronics and search coil is interrupted.	Inspect the receiver cable for interruptions, renew if necessary. Inspect the plug-and-socket connections of the interconnecting cables, plug-on again/re-connect if necessary.

ERROR AT THE SOLENOID VALVE MV1 OR MV2

This message is displayed in case of short-circuit or in case of interruption at the solenoid valve switching outputs.

Error messages	Possible causes	Remedy
MV1 connection ? or overloaded !	Connection to solenoid valve MV1 or MV2 is interrupted.	Inspect the valve cable for interruptions. Replace if necessary. Inspect the valve cable connectors. Pull off and replug or reconnect the cable.
MV2 connection ? or overloaded !	Short circuit at the connection cable to the solenoid valve MV1 or MV2.	Inspect valve cable and plug for short-circuit with an ohmmeter. Replace if necessary. Check the resistance of the solenoid valve: it should be 320… 340 Ω (or 100...140 Ω in case of pusher applications).

COMPRESSED AIR

An air pressure monitor is connected to "Input/Output", terminal 5-6. These messages are displayed if there is no compressed air or if the air pressure is too low.

Error messages	Possible causes	Remedy
compressed air ? or sensor fault !	No compressed air or air hose bent.	Inspection of the air supply.
	Threshold of the pressure monitor is set to high.	Adapt pressure switch.
	The time for which the pressure monitor must be ignored is too short.	Prolong time

Error and Error Remedying *(cont.)*

THERMO MONITOR

A thermo monitor is connected to "Input/Output", terminal 5-6.

Error messages	Possible causes	Remedy
thermal overload ? or sensor fault. ! ↵	The temperature of the device being monitored is too high (i.e. motor drive) or the trigger threshold of the sensor is set too low.	Check device or sensor setting.
	The sensor is broken.	Replace the sensor.
	The sensor is not connected or the cable is broken.	Check sensor connection and cable.

LEVEL MONITOR

A level monitor is connected to "Input/Output", terminal 5-6.

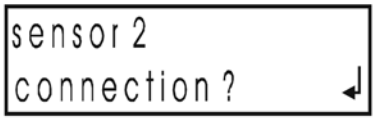
Error messages	Possible causes	Remedy
full container ? or sensor fault ! ↵	The reject bin is full.	Empty bin.
	The sensor is broken.	Replace the sensor.
	The sensor is not connected or the cable is broken.	Check sensor connection and cable.

DIVERTER POSITION MONITOR

A proximity switch is connected to "Input/Output", terminals 12-13-14, called "Sensor 1". Sensor 1 monitors the diverter at reject position.

Error messages	Possible causes	Remedy
sensor 1 connection ? ↵	Defective diverter.	Check diverter.
	No compressed air supply.	Check air supply, pressure.
	The sensor is broken.	Replace the sensor.
	The sensor is not connected or the cable is broken.	Check sensor connection and cable.

A proximity switch is connected to "Input/Output", terminals 9-10-11, called "Sensor 2". Sensor 2 monitors the diverter at normal position (good material outlet).

Error messages	Possible causes	Remedy
	Defective diverter.	Check diverter.
	No compressed air supply.	Check air supply, pressure.
	The sensor is broken.	Replace the sensor.
	The sensor is not connected or the cable is broken.	Check sensor connection and cable.

UNDEFINED ACTIVATION OF THE OUTPUTS

Possible cause	Remedy
Improper installation of the equipment.	See "Installation"
Round coils: Mechanical contact between scanning pipe and detection coil.	Observe a minimum distance of 0.39" (10 mm) between pipe and coil. If necessary, use a scanning pipe with smaller diameter.
Sensitivity setting too high.	Learn the product again. If necessary, reduce the sensitivity manually.
Metal particles that are hard to detect (due to corrosion), or material with metal inclusions.	Check the material thoroughly. If necessary, convey it through the detection coil again.
Loose contact at the coil cables.	Check the connections.
Static charging of the material or conveyor belt (may be audible as a cracking sound at the detection coil).	Prevent static charging by means of additional grounding measures (please consult manufacturer) or by using ion spraying devices.

SPECIAL NOTES ON SEPARATORS

Metal is detected, but is not rejected despite activation of the separating unit.

Possible cause	Remedy
The mechanical unit switches too slowly.	• Check the air pressure (72.5 PSI/5 bar minimum). • Replace air hoses that are too thin and too long with hoses that are as short as possible and have a large diameter. • Check the reject flap for jammed product parts. **ATTENTION! RISK OF ACCIDENT!** **Disconnect compressed air first**
Reject duration of the reject unit too short.	Increase the reject duration.

Error and Error Remedying *(cont.)*

REPLACEMENT OF ELECTRONIC BOARDS

The Control Unit FFS consists of the following two boards: The **evaluation electronics board (3)** and **display board (8)**.

REPLACEMENT OF THE EVALUATION ELECTRONICS BOARD

1. Disconnect voltage supply and external circuits and open the cover at the electronics housing.
2. Remove connectors (1) and (6) and remove the fastening screws (2).
3. Take out the evaluation electronics board (3).
4. Install the new board in reverse order, but **do not connect mains power supply!**

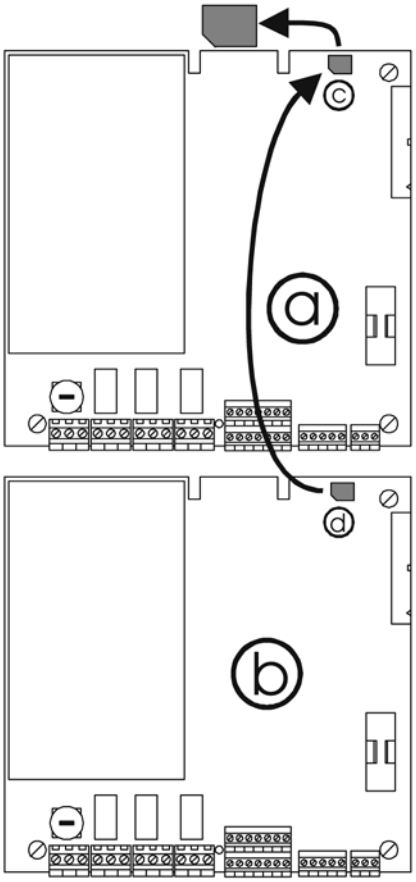
IMPORTANT NOTES

The FFS electronic board is equipped with a memory module which contains all the equipment and product data. If you wish to replace the electronic board, we recommend to remove this memory module from the old board and insert it in the new one. This guarantees that the new board cooperates perfectly with the existing detection coil, and that all the product data set so far are available again.

REPLACEMENT OF THE DATA MEMORY

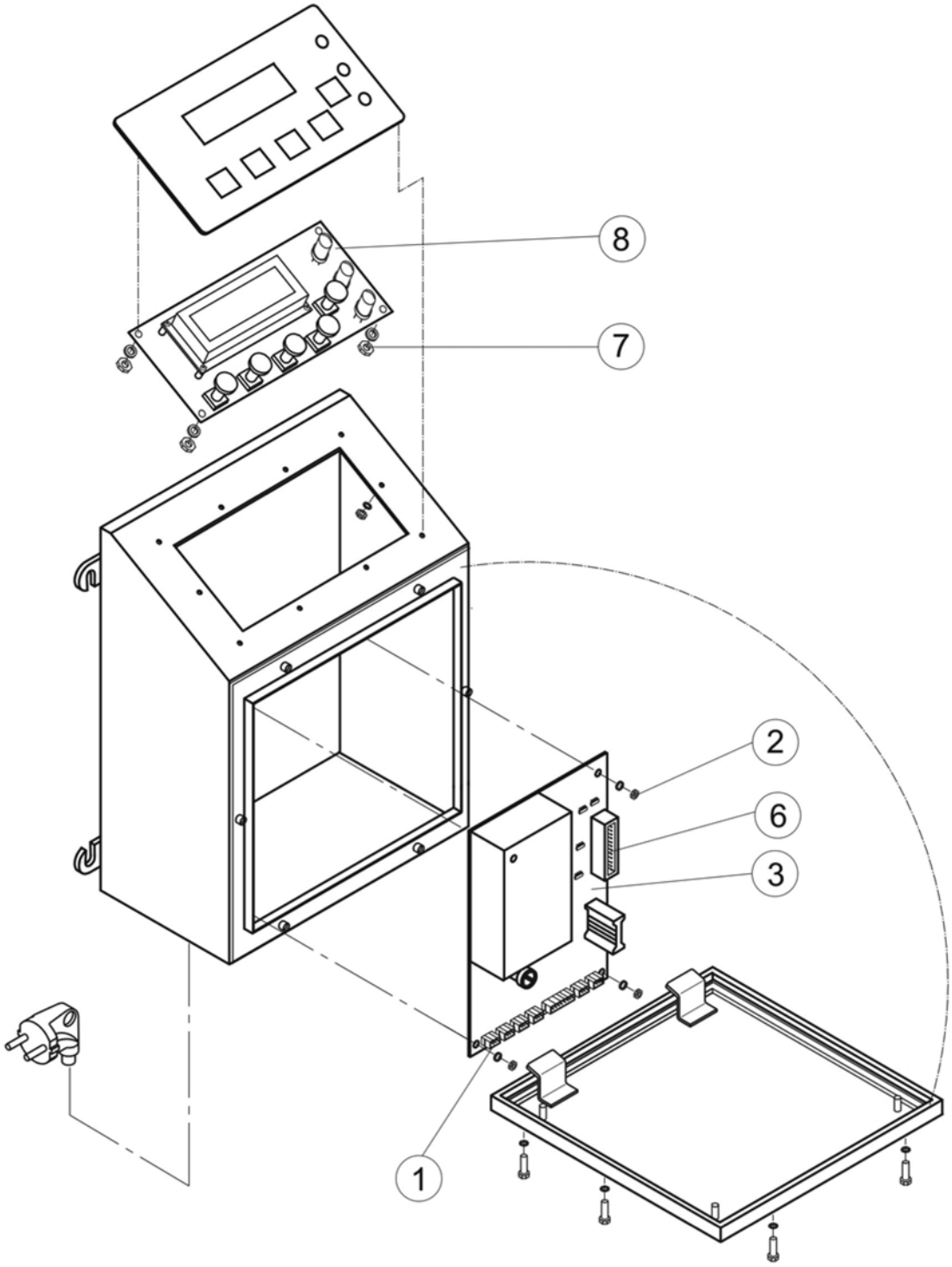
a: New electronic board
b: Old electronic board
c: Device and program memory
d: Device and program memory

1. Remove data memory device c) from the board.
2. Remove data memory d) from the old board b) and plug it carefully into the new board a).
3. Check that the marking on the memory device points to the right.
4. Switch on power supply. The new board runs with the “old” adjustments.



REPLACEMENT OF THE DISPLAY BOARD

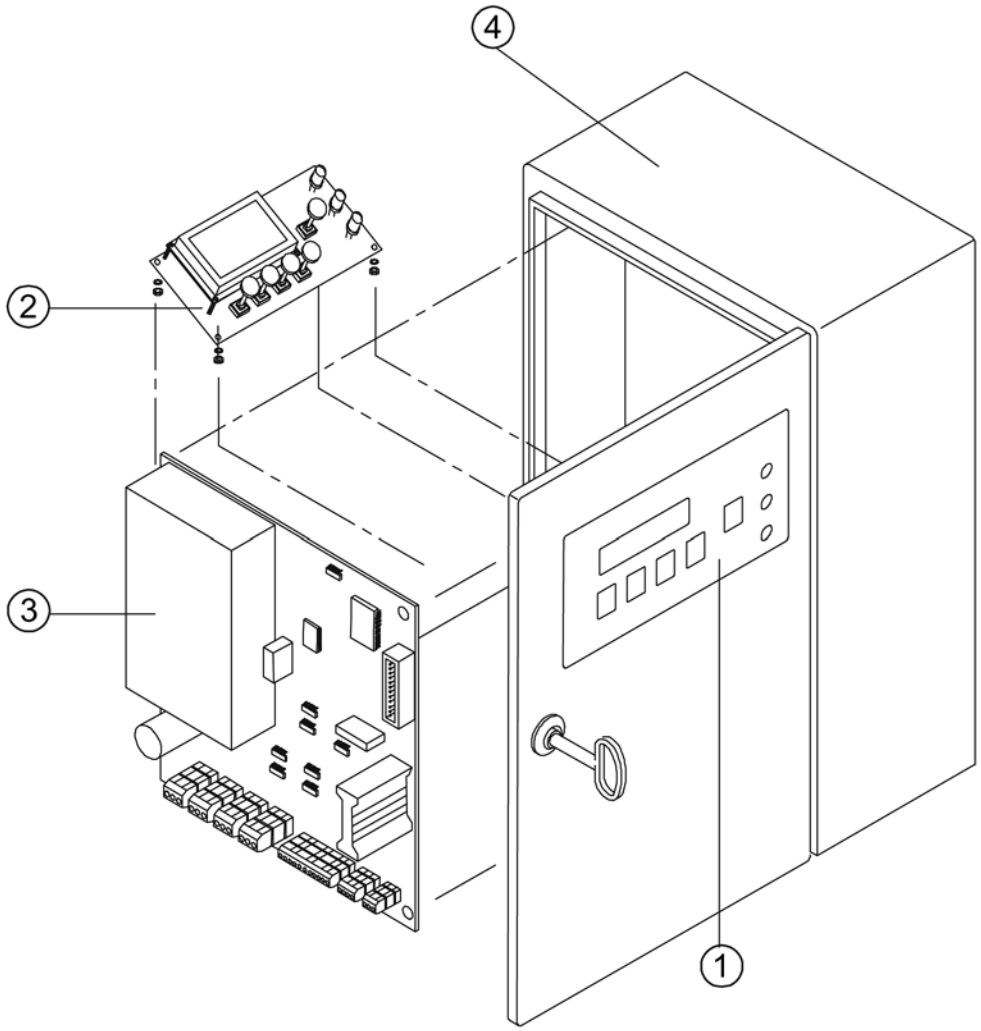
1. Disconnect voltage supply and open the cover at the electronics housing.
2. Remove connectors (6) and remove the fastening screws (7).
3. Take out the display board (8).
4. Install the new board in reverse order!



Spare Parts

Please state type of equipment and serial number when contacting us!

SPARE PARTS DRAWING FFS STANDARD VERSION

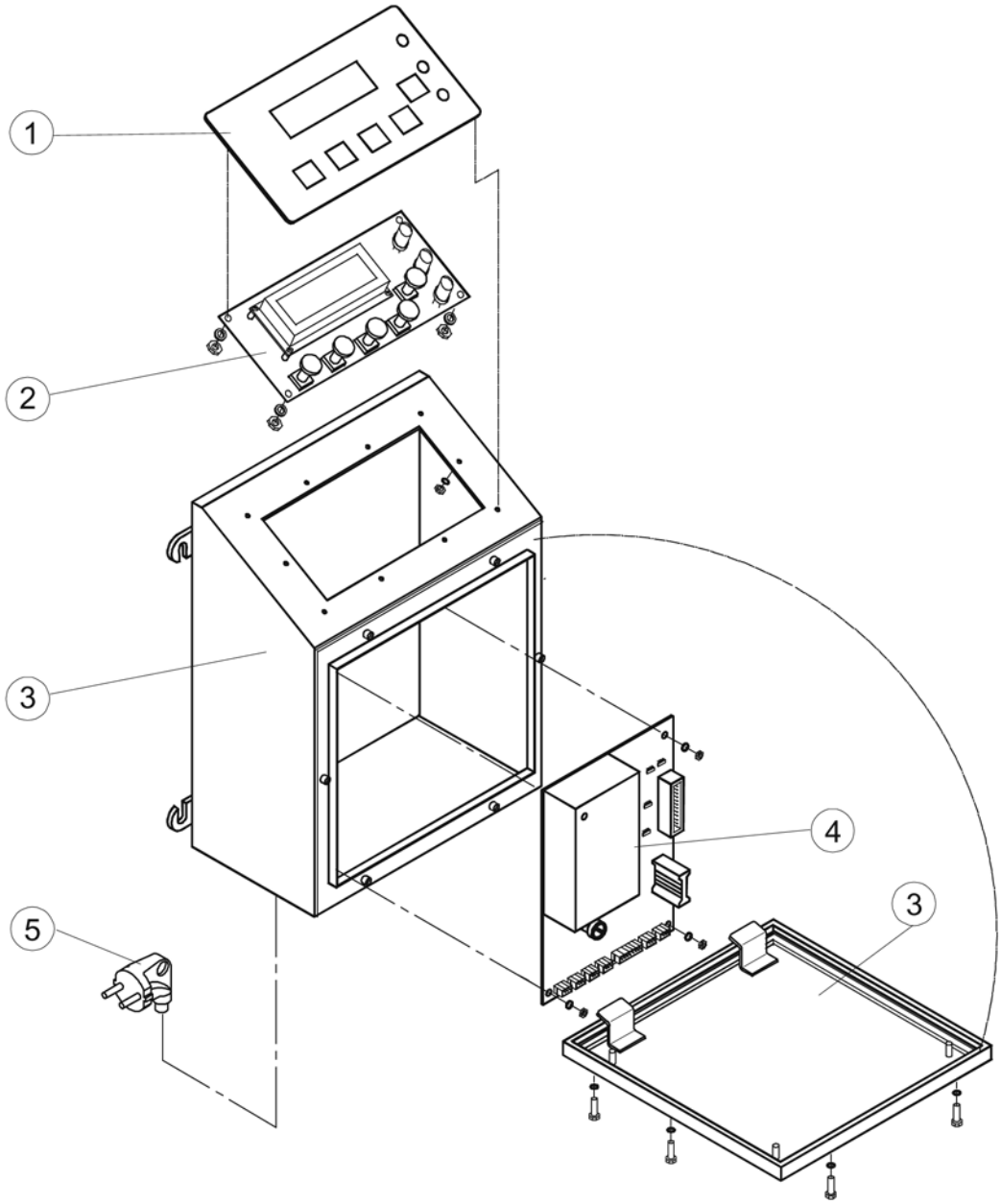


SPARE PARTS LIST FFS STANDARD VERSION

Part Number	Description	Stock Number	Comment/DWG Number
1	Display cover FFS	33005752	
2	Display board FFS	44001344	
3	Evaluation electronics board FFS	44002796	
4	Electronics housing FFS	–	Customized color
4	Electronics housing FFS	33005896	Standard (RAL 9007)
–	Mains cable EMC (not shown)	04015479	
–	Flat cable for display (not shown)	44002046	

Spare Parts *(cont.)*

SPARE PARTS DRAWING FFS ALTERNATE DISPLAY VERSION



SPARE PARTS LIST FFS ALTERNATE DISPLAY VERSION

Part Number	Description	Stock Number	Comment/DWG Number
1	Display cover FFS Alternate Display Version	33005752	
2	Display board FFS Alternate Display Version	44001344	
3	Electronics housing FFS Alternate Display Version with housing cover remote	44002912	V2A, glass bead blasted
4	Evaluation electronics board FFS Alternate Display Version	44002796	
5	Mains cable EMC	04015479	
–	Flat cable for display (not shown)	44002046	

Shipping, Preservation, Waste Disposal, Transport, Storage

SHIPPING, PRESERVATION, WASTE DISPOSAL

⚠ WARNING
Choose packing that is suitable for the type and size of unit, taking into account whether the shipment is for export by sea or airfreight, or for national or international road transport. The packing material must protect the goods from all damage under normal transport conditions.

⚠ WARNING
Depending on the size, weight and nature of the goods, packing in cardboard boxes, boxed pallets etc. is only suitable for road transport. Use reinforced cardboard, corrugated cardboard, blister packing and shredded paper to fill and protect the goods.

Electrostatic sensitive components (electronic boards, electronic modules, etc.) must be packed in antistatic foil or foil bags prior to packing! (This is essential!) Stick additional warning labels on the outside of the packaging (i.e. "Attention, electronic equipment, do not drop," etc.) The packing should be sealed with adhesive tape and, where the weight exceeds 110 lbs (50 kg) additionally with wrapping tape.

⚠ WARNING
When packing for international road transport use the instructions above (see paragraph 2). Larger and heavier shipments must also be protected as for export in wooden crates. Care must be taken to ensure that the goods inside the packing are protected against corrosion. Any parts that will corrode easily must be wrapped in oil paper or corrosion-protective foil. Care must be taken to prevent the components from moving around within the packaging.

⚠ WARNING
International air freight shipments must be packed in wooden crates or on export pallets. Care must be taken that the goods are secure and well protected inside the packing. Any parts liable to corrode must be wrapped in oil paper, protective foil or sprayed with anti-corrosion spray.

⚠ WARNING

Sea freight must be packed in seaworthy export crates. These crates can be obtained from specialist suppliers. The crates must be lined with oil paper to make them resistant to sea water and prevent corrosion. In addition, the goods must be protected against corrosion by use of a spray or be wrapped in protective foil. Care must be taken to ensure that the goods cannot move around inside the crate. After packing, the sea freight crates must be properly closed. The sea crates must also be fastened externally with securing tapes. During loading, care must be taken not to damage the external packaging. The carrier must certify that the shipment has been accepted and loaded correctly by detailing this on the bill of lading, loading list, etc.

⚠ WARNING

Waste disposal: Observe the national waste disposal regulations.

TRANSPORT

⚠ WARNING

- **In order to avoid injury or damage to the unit, it must be handled properly. In addition to following the instructions below, general health and safety, good practice, and specific accident prevention guidelines should be observed.**

⚠ WARNING

- **For correct handling and storage, comply with the following symbols:**

Symbol	Signal Word
	Protect against moisture
	Careful: glass
	Up
	Center of gravity

- **Do not compress the side walls of the unit or any attached parts by pulling obliquely on ropes or chains.**
- **Only remove handling safeguards once all installation work has been completed.**
- **When handling in a loading area, make sure the unit cannot topple over or slip.**
- **Damage caused during transportation must always be reported to the manufacturer.**

Shipping, Preservation, Waste Disposal, Transport, Storage *(cont.)*

STORAGE

⚠ WARNING

- **If possible, the unit should be stored in a closed room until final installation.**
- **If the unit is stored in the open, it must be covered with tarpaulins and open underneath to allow condensation to drain off.**
- **Avoid any high temperature fluctuations. It is possible that condensed water that has formed in the packing cannot properly drain and may corrode equipment surfaces. If a formation of condensed water cannot be avoided, suitable desiccants (i.e. in the form of bags) must be placed in the packing.**
- **If the unit has been packed for transportation by sea, the packaging must not be damaged or opened during transit and storage.**
- **For storage temperature and permissible air humidity, please refer to the technical data sheet.**
- **For correct storage, comply with all storage and handling symbols:**

Symbol	Signal Word
	Protect against moisture
	Careful: glass
	Up

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Note: Some safety warning labels or guarding may have been removed before photographing this equipment.

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