Electrical Description
Subsystem 5

Operation and Maintenance Manual
Test Instructions

Imprint

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Update	

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1 GENERAL

1.1 General safety instructions

DOPPELMAYR ropeway control systems have been designed according to the most recent technical knowledge, so that if our instructions are properly observed, the highest possible degree of operational safety can be achieved.
A suitably competent staff is fundamental to the operation of a ropeway

In addition to local regulations the following points should be observed:

1. Do not carry out repair work under voltage. Always turn off the main switch. Repair work may only be carried out by authorized personnel (specialists).

2. Once maintenance or repair work has been completed, the electrical devices may only be switched on (maintenance lock out, main switch) and the ropeway may only be started by the person who turned them off or who instructed someone to do so.

3. The station buildings, especially machinery, the sheave assemblies on the towers etc. may only be climbed when the main switch is turned off.

4. All outdoor control panels and switches must be covered with a protective covering at the end of the day's operation. The protective covering is especially necessary in winter in order to prevent the control buttons from icing up. Key switches may be operated by the operations manager or by authorized personnel only.

5. The break forks on the towers should be checked annually - their function can be tested by simply pulling them out. We recommend filling the hollows with grease or Vaseline before reinserting the break forks.

6. Before a long period of non-operation, or during a thunder storm, the plugs on all telephones should be pulled out, and the overvoltage protection terminals should be disconnected at both terminals (destruction through stroke of lightning or overvoltage).

7. Telephone batteries should be replaced annually. The batteries of the PLC should be replaced every 3 years (see point 14.3).

8. If the batteries (in the stations or for the emergency drive) require maintenance, turn off the main fuse or disconnect the wiring to the batteries, if applicable. First disconnect the negative terminal [blue], then the positive terminal [red]; connect the terminals in reverse order. **Fire hazard by short circuit!**

9. The acid level of the batteries in the stations and of the emergency drive should be checked monthly. Top up with distilled water as required until the water covers the plates. The batteries should then be connected to a battery charger (does not apply for maintenance-free batteries).
   Check the state of charge (battery chargers are always turned on) and the surroundings of the batteries (no humidity, clean battery terminals, soiling, insulation and screw connections of the battery cables). In case of a drop off in battery capacity, replace the battery set in order to avoid any defect of the electronic system or standstills of the installation. Only use batteries of the same type and capacity (match battery with the charger!) for replacement. If in doubt, contact Doppelmayr Seilbahnen GmbH.

10. The various screwed connections and clamping screws on the electrical equipment should be regularly checked and tightened if necessary. The clamping screws may loosen because of vibration. Also, regularly check grounding connections for low contact resistance and replace if necessary.

11. Do not disregard failures until the cause has been found.

12. **It is not permissible to bridge control functions!**

13. Take care that the temperature inside the control panel lies between +10°C and +40°C. Condensation upon the surfaces is not allowed.

14. Due to risk of damage of electrical components do not touch the contact surfaces of electronic plugs and never change them under voltage!

15. During the exchange of a CPU by a substitute-CPU (programmed by Doppelmayr for the same station and installation), of a power supply unit of the PLC or of a battery in the mentioned power supply unit, it is important to note that data can get lost. The data concerned are referred to in chapter 14.3.1. In case these data are not current anymore after the exchange, they need to be inserted respectively registered again.

16. The main drive motor should be maintained according to the operating and maintenance instructions of the manufacturer of the electric motor (brushes, bearings, soiling, etc.).

17. If the station operator stays in the operator room during the operation of the ropeway, he must shut down the lift system by pressing the emergency stop button in case of potential danger. Critical situations shall not be discussed over a loudspeaker system, the installation must be shut down immediately. The situation must be resolved by the operating personnel on the platform before an operation can be resumed.

18. If all displays and screens fail, the operation may only be continued if shutdowns can be quit by external reset buttons (on the platform console or RMC; shutdowns during operation: Stop, Emergency stop, Stop EB buttons). Otherwise the operation must be stopped immediately.

19. For some self tests the control system needs to be rebooted after an operation of 24 hours by turning off and back on the control voltage in all stations.

20. During normal operation (with passengers) the 'ACTIVATION TEST SWITCHES' key switch must be set to position “0” (OFF) in all stations.

21. Mobile communications systems in the hazard area of a ropeway:
Doppelmayr ropeway control units based on the system family Pilz PSS 3000 are tested with the resistance of jamming against electrical field strengths according to DIN EN 62061 (see table). The system reactions according to DIN EN 61131-2 as documented in the test reports, state an uninterrupted operation during the testing phase (criterion A). The resistance against jamming testing for the range of 2.7 to 6 GHz and 6 to 26 GHz was performed in accordance to EN 61000-4-3.

Frequency in MHz	0,15 – 80	80 – 1000 e.g. D network	1000 – 2000 e.g. E + DECT network	2000 – 2700 e.g. UMTS network	2700 – 6000 e.g. WLAN	6000 – 26000 e.g. radio link system
Electric field intensity in V/m	10	10	6	3	3	10

Required values of resistance to jamming in V/m as per DIN EN 62061, Annex E, table E.1 - „Electromagnetic phenomena and increased values of resistance to jamming for SRECS (safety relevant electrical, electronic and programmable electronic control systems)“

In case of operation of radio transmitters (base stations for radio communication, radio relay stations and other transmitting stations) the electric field intensity values at the control cabinets of the low voltage control system and its components must not exceed the values indicated in the table above.

22. In normal operation (with passengers) the doors of the control boxes have to be closed. Using any kind of radio systems while the doors are open (troubleshooting,…),one needs to stay away from the PLC at least 1m.

23. Actuating a maintenance lock-out switch will only close the emergency brakes and lock the installation so that it cannot be started up. The hydraulic units, loading gate and the conveyor belt remain operational!

1.2 Service Life

The electrotechnical equipment of a ropeway includes electronic assembly groups relevant for safety (e.g. safety controls) that have a defined service life in accordance with the information provided by the manufacturer. This service life is defined to be 20 years taking into account the state of the art.

However, for a ropeway control system a service life 20 years is too short. Thus, Doppelmayr Seilbahnen GmbH has provided evidence of the same level of safety within the scope of the conformity assessment, so that the service life of ropeway controls from Doppelmayr is defined to be 30 years. The service life starts with the manufacture of the installation.

A condition for the operator of the installation is a notification requirement, according to which failures of electronic assembly groups relevant for safety must be notified to Doppelmayr as from the 20th year of use. Information on handling the notification system will be communicated in an information notice supplied to the operator of the installation.

In the event that no increased failure rate is noticeable, the electronic assembly groups relevant for safety can be used until the end of the 30-year service life before they must be replaced.

1.3 Using the Wiring Diagrams

The following information aims to help reading the wiring diagrams.

1.3.1 Designation of electrical components

e.g.-269S3
=A1+O1

The first part of the designation refers to the number of the page in the wiring diagram (in this case page 269).
The letter refers to the type of the unit.
(S ... switch, F ... fuse, K ...relays or contactor, X ... terminal,...)
The third part is the consecutive number on the respective page.
The second line refers to the mounting place of the component. (see item 1.3.2).

1.3.2 Division into system and location

The entire control system is divided into different systems and locations. The most important systems and locations are:

A1	Drive station
A2	Return station
A3	Mid station
O1	Control cabinet
O3	Station
O5	Terminal box brake hydraulics
O13	Emergency drive
O130	Terminal box emergency drive
O151	Thyristor 1
O152	Thyristor 2
O44	R.M.C. 4 (incoming)
O45	R.M.C. 5 (outgoing)
O100	Terminal box tensioning unit
O101	Tensioning unit

For the complete list please refer to the electrical diagram of the drive station on page 2 and to the electrical diagram of the return station on page 402.

In this example, 269S3 (=A1+O1) means the following:
1. The component is to be found on page 269 of the wiring diagrams.
2. It is a switch or control element.
3. It is the second control element on this page.
4. It is located in the control cabinet of the drive station.

1.3.3 Cross references

Cross references are used to mark signals that refer to various pages.
There are two different types of cross references:

1. Cross references to an electric potential: In this case only the number of the page and the section, where the potential continues, are indicated (e.g. "/30.1" means that this potential is continued on page 30 in section 1).
2. Cross references to components: In this case the cross reference indicates the component number with the connected pin, and also the page number with its section. For example, "-223S1:6/50.3" means that the wire is connected to switch 223S1 on pin number 6 and is to be found on page 50, section 3.

2 DIFFERENT DRIVE MODES

2.1 Operation with main drive

2.1.1 Direction of operation forward

- Turn on the main switch in the low voltage distribution unit (drive unit).

- Turn the switch DRIVE MODE to MAIN DRIVE.

> Always turn the drive mode switch to main drive first, before switching on the control voltage => otherwise: Watch DOG FS.

- Turn the switch DRIVE DIRECTION to FORWARD.

- Turn on the control voltage with the key switch on the control panel.

- Selection of required operating mode – during operation with passengers it is only allowed to operate the installation in the mode “STATION MANNED”.

- Turn the switch SPACING SYSTEM in top and bottom station to ON.

- Activation anti collision system:
  To activate the anti collision system, a carrier has to pass the complete station (incoming and outgoing) and this carrier has to activate every prox. switch of the anti collision system.
  The key switch "OVERRIDE FUNCTION” must be held until at least one carrier has completely traveled trough the incoming and outgoing sides.
  Press “RESET ANTI COLLISION SYSTEM”.
  After starting the installation the operating staff should carefully monitor the carriers entering and leaving the station. The key switch has to be held until the green led “ACTIVATION FEEDBACK” lights up and a buzzer signal sounds. The lift speed is limited to 2,5m/s.

- Cancel any error signals by pressing the RESET button.

- On the diagram (control panel) the red LED's STOP, EMERGENCY STOP, STOP SB and STOP EB must be off.
  The led RESET must light up.

- Press the RUN button twice. A bell will sound twice in both stations (drive and return station). This indicates to the operator in the return station that the drive station is ready for start and that start clearance is required from the return station.

- If the return station is also ready for start, the operator presses the green READY button. On the control panel of the drive station the led READY lights up for about 10s. If the installation is not started within these 10s, the ready signal of the return station is required once more.

- If the lamps READY and RESET light up, the lift can be started by pressing the RUN button. The drive will be regulated automatically until the preselected speed has been reached (brakes open automatically).

- By means of the speed switch, two slow speed settings (independent of the preselected speed) can be set. The slower speed setting always has precedence.

By pressing the turtle  on the general diagram of the screen the following window appears on the screen:

It is possible to activate the CREEP SPEED of about 0,3m/s.

- There are five ways of stopping the lift (SA1 – SA5):

  SA1 = Stop:

  Activated by pressing one of the stop buttons or by the stop circuit. The drive will slow down automatically within a preadjusted time (electrical brakes). When the drive motor reaches minimal speed (0,2m/s) the service brake comes into operation and the main drive will be shut down.

  SA2 = Emergency Stop:
  Activated by pressing one of the emergency stop buttons or by the emergency stop circuit. The drive will slow down automatically within a preadjusted time (electrical brakes). When the drive motor reaches minimal speed (0,2m/s) the service brake comes into operation and the main drive will be shut down.

  SA3 = Stop-SB:
  Activated by pressing the Stop-SB button on the control panel of the drive station or by the Stop-SB circuit. The drive will shut down immediately and the lift will be brought to a standstill mechanically by the service brake.

  SA4 = Stop-EB:
  Activated by pressing one of the Stop-EB button in drive or return station or by the Stop-EB circuit. The drive will shut down immediately and the lift will be brought to a standstill mechanically by the emergency brake.

  SA5 = Stop-SB+EB:
  Activated by the Stop-SB+EB circuit. The drive will shut down immediately and the lift will be brought to a standstill mechanically by the emergency brake and the service brake.

Lift stopped by / **Effect**	SA1	SA2	SA3	SA4	SA5
STOP	X				
EM.STOP		X			
STOP-SB			X		
STOP-EB				X	
STOP → EM.STOP	X →	X			
STOP → STOP-SB	X →		X		
STOP → STOP-EB	X →			X	
EM.STOP → STOP-SB		X →			X
EM.STOP → STOP-EB		X →			X
STOP-SB → EM.STOP			X →		X
STOP-EB → EM.STOP				X →	X
STOP-SB → STOP-EB			X →		X
STOP-EB → STOP-SB				X →	X
Dec.fault STOP			X		
Dec. Fault EM.STOP					X
Dec. fault STOP-SB					X
Dec.fault STOP-EB					X
Dec.fault STOP - SB+EB					X*)

*) Gradual deceleration, regulation cancelled

2.1.2 Direction of operation reverse

- Inform the return station of the intention to reverse the direction of operation.
- Turn key switch DRIVE DIRECTION to REVERSE.
- Continue as for forward operation.
- During reverse operation the speed setting SLOW 2 is automatically selected.

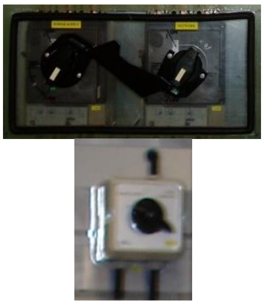
IMPORTANT: In reverse operation the following protective functions are deactivated: The anti-collision system (counter fault max./min., logic fault (optional), block fault, spacing fault in station and outgoing) is completely deactivated. The entry and exit of the carriers must be closely watched by the ropeway attendants.. Door fault (on MGD, CGD) Stow position (as clutch spacing is switched off in reverse operation)

2.2 Switching over „Mains Supply – 0 – Diesel Generator“

In this installation a diesel generator is available for ropeway control in every station, with the help of which the installation can still be operated also at power failure. Via a selector switch one has to change-over from “mains supply” to “diesel generator” in every station (DST, RST).

PLEASE NOTE:
A switching over to Mains Supply or Diesel Generator is only allowed to take place in a ropeway-standstill!

The selector switches are placed in the following control boxes



Station	Selector Switch	Location
Drive Station		Low Voltage Distribution (Customer)
Drive Station	5S1	Battery Panel (=A1+O25)
Return Station	5S1	Battery Panel (=A2+O25)

The diesel generators have to be started at the respective aggregate.

2.3 First and Last Daily Runs with Unmanned Drive Station (Option)

2.3.1 General information

In both stations turn mode selector switches (key switches) STATIONS MANNED – 0 – RETURN STATION UNMANNED - 0 - DRIVE STATION UNMANNED to DRIVE STATION UNMANNED.
Keys can be locked and removed in both stations when in position ‘0’, in the drive station when in position ‘Drive station unmanned’, and in the return station when in position ‘Return station unmanned’.
When the switch is in the DRIVE STATION UNMANNED position, line floodlight and drive station platform lighting are automatically switched on.
Remove and safely store mode selector switch key in drive station.

In this operating mode following safety functions are deactivated:

- counter fault minimum inc.&outg.
- logic fault outgoing
- block fault
- access control barrier
- RPD-AOC rope out of center
  – only if switch rail is on (parking mode)

Public passenger transport is not permitted in this operating mode!

When there are carriers on the rope (this is especially valid for lifts without parking areas) the lift may not (!) be put into operation when the drive station is unmanned.

First and last daily runs must be performed from the return station:
Press the ‘Ready’ button in the return station to activate the safety circuits in the drive station. After all safety circuits have been acknowledged, the ‘Run drive station unmanned’ button in the return station lights up. Press the ‘Run drive station unmanned’ button to start the lift system

2.3.2 Last daily runs

Drive station operators go to return station using the last carrier.
After the last daily run has been completed, control, line floodlight and drive station platform lighting are also switched off using the control voltage switch in the return station.
.

2.3.3 First daily runs

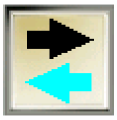
Use the control voltage switch in the return station to switch on control, line floodlight and platform lighting in the drive station.
Drive station operators go to drive station using a group of carriers.

Should the unmanned installation have a slit cover in the curve section of the station, (optional), the installation will be stopped when the first carrier passes the adjusted proximity. After a re-start there will be no further shut down.

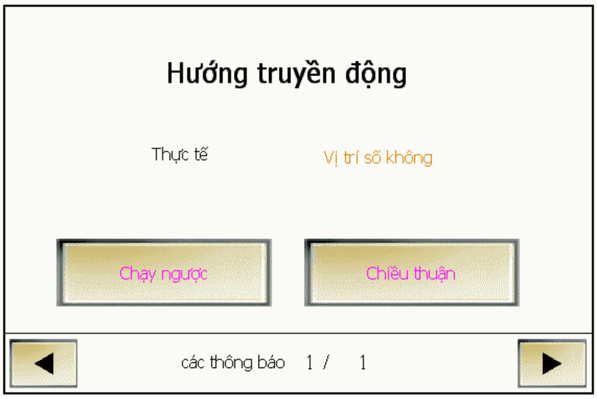
After finishing the first daily run the operation mode selector switches in both stations are switched over to “manned”. After switching over to “Station manned” a possible existing pre-selection of creep speed is going to be deleted on the monitor automatically.

2.3.4 Change drive direction in ‘Drive station unmanned’ mode

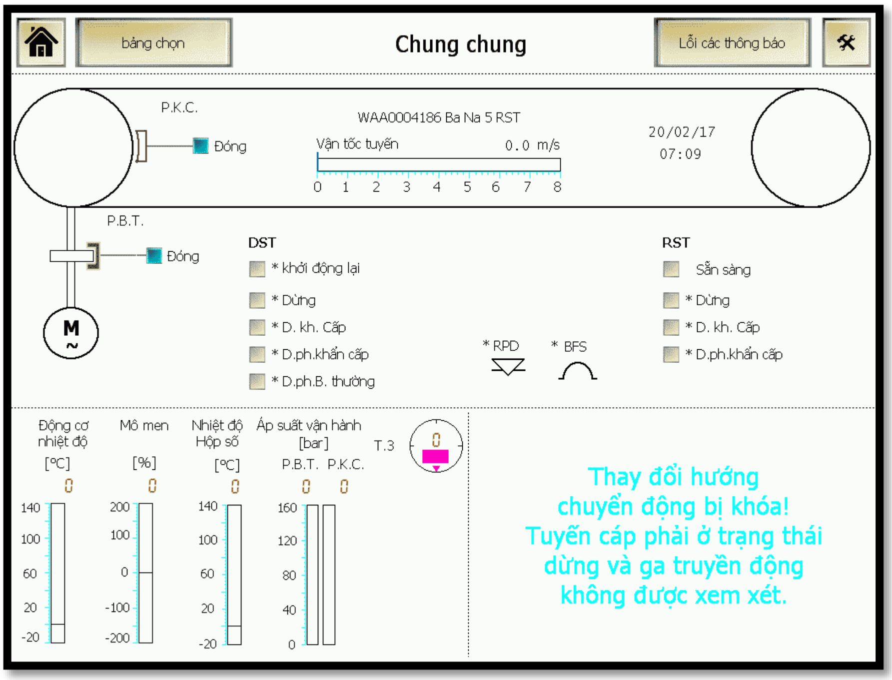
In the ‘drive station unmanned’ mode the drive direction can be changed on the touch screen of the return station independent of the position of the key switch in the drive station.
Press the following field in the overview:



If the ropeway is at a standstill and the ‘Drive station unmanned’ operating mode has been selected, the drive direction can now be changed in the window that appears on the screen:



With operating installation a change of the drive direction is blocked.



2.4 First and Last Daily Runs with Unmanned Return Station (Option)

2.4.1 General information

In both stations turn mode selector switches (key switches) STATIONS MANNED – 0 – DRIVE STATION UNMANNED - 0 - RETURN STATION UNMANNED to RETURN STATION UNMANNED.
Keys can be locked and removed in both stations when in position ‘0’, in the drive station when in position ‘Drive station unmanned’ and in the return station when in position ‘Return station unmanned’.
When the switch is in position RETURN STATION UNMANNED, line floodlight and return station platform lighting are automatically switched on.
Remove and safely store mode selector switch key in return station. The key for control voltage ‘0 - 1’ must be left on ‘1’ (serves as maintenance lock out switch).

In this operating mode following safety functions are not active:

- counter fault minimum inc.&outg.
- logic fault outgoing
- block fault
- access control barrier
- RPD-AOC rope out of center
  – only if switch rail is on (parking mode)

Public passenger transport is not permitted in this operating mode!

When there are carriers on the rope (this is especially valid for lifts without parking areas) the lift may not (!) be put into operation when the return station is unmanned.

First and last daily runs must be performed from the drive station:
By pressing the ‘Reset’ button in the drive station, the safety circuits in the return station are activated and the ‘Reset’ lamp in the drive station lights up. Set the lift system in motion by pressing the key switch AUXILIARY READY and the ‘Run’ button.

2.4.2 Last daily runs

Return station operators go to drive station using the last carrier.
After the last daily run has been completed, control, line floodlight and return station platform lighting are also switched off using the control voltage switch in the drive station.

2.4.3 First daily runs

Use the control voltage switch in the drive station to switch on control, line floodlight and platform lighting in the return station.
Return station operators go to return station using group carriers.

Should the unmanned installation dispose of a slit cover in the horseshoe section of the station, (optional), the installation will be stopped when the first carrier will be passing the adjusted Bero. After a re-start there will be no further shut down.

After finishing the first daily run the operation mode selector switches in both station are going to be switched over to “manned”. After switching over to “Station manned” a possible existing pre-selection of creep speed is going to be deleted on the monitor automatically.

2.5 Filling and Emptying the Ropeway

In general:
When putting the carriers from the parking area back on the line, the first carrier in the spacing unit can be hold back by pressing the ‘Feed / Park rails on’ button on the remote control (as long as the button is pressed the spacing unit remains in ‘Braking’ position).

IMPORTANT:

If the liftable tyre conveyors (optional- only covered tyre conveyers are concerned) are in the upper end position, the following protective functions are deactivated:

- Grip force
- Door fault (on MGD, CGD)
- Anti-collision system max./min.
- Logic fault
- Block fault

If a switch rail is swivelled into the line (ropeway not in normal operation), the following protective functions are deactivated:

- Anti-collision system min.
- Logic fault
- Block fault

2.5.1 Ropeways with dead-end rail parking system

See Electrical Description for Carrier Parking.

If the switch rail is actuated (parking mode) the travel speed in reverse direction is limited to 4,0 m/s instead of Slow 2 (1.5 m/s).

2.5.2 Ropeways with loop parking system (optional)

See Electrical Description for Carrier Parking.

2.6 Limited Operation with the Main Drive:

This operation mode is used to unload the installation in case of a fault that cannot be fixed in short time.

The operation mode can be selected by turning a switch in the control cabinet. The following faults are deactivated in the corresponding station:

- Spacing fault outgoing
- Impulse fault
- Standstill monitoring
- Anti-collision system (counter fault maximum and minimum and logic fault)
- Door fault
- Block controls
- Drive direction fault
- Deactivated clutch-spacing system

With the operation mode “Limited Operation with the Main Drive” the speed is reduced to “Slow2”. While booting the control and switching-over to the operation mode “stations manned”, the selector switch needs to be turned to the position “normal operation”. Otherwise the stop shutdown “position selector switch” will be released. Therewith it is made sure that one has not forgotten to turn back the switch from the position “Limited operation with the Main Drive”.

- In case of a fault, first try to fix the failure (e.g. change sensors, …). Only if the failure cannot be fixed in a reasonable period of time this operation mode can be activated.
- This operation mode is only used to unload the installation. Passengers are not allowed to enter the carriers. Carriers that are transporting passengers are not allowed to exit the stations.
- The staff in the stations need to operate the installation with increased attention (spacing between the carriers in the stations, proper transportation of carriers in the stations, ….)
- In case of an installation – standstill the emergency brakes must be closed (by pressing the stop-EB button).

2.7 Deactivating the Rope Position Monitoring Systems (Break Forks / RPD)

In general:
During operation with the emergency drive the same rope position monitoring systems are active as in the operating mode "Main drive", unless the entire rope position monitoring group has been deactivated via the key switch in the control cabinet of the emergency drive.
I.e. if for instance the RPD system has been deactivated via the key switch in the control cabinet of the main drive and the break fork circuit has been activated, the same applies in the operating mode "Emergency drive" (unless the entire rope position monitoring group has been deactivated in the control cabinet of the emergency drive).

Due to the differences in the design of various ropeway installation types there are various ways to deactivate the rope position monitoring system.

2.7.1 Continuous break fork switch system

On installations which are only equipped with a break fork switch system it is not possible to deactivate the rope position monitoring circuits.

2.7.2 Continuous RPD system

On installations equipped only with the RPD system for rope position monitoring it is not possible to deactivate the rope position monitoring circuits.

2.7.3 Continuous break fork switch system / RPD system on the incoming and outgoing sides

On installations with break fork switches on all towers and additionally with RPD sensors on the incoming and outgoing sides of each tower the installation can be operated in the following operating modes:

With break fork / with RPD

Operation is possible without limitations or compensatory measures.

With break fork / without RPD

In this case the ropeway is no longer monitored by the RPD system, i.e. the installation will not be stopped in case of a rope derailment or slowed down in case of a dislocation of the rope.
Rope derailment will only lead to a shutdown if a break fork switch is actuated by the rope.
Compensatory measures in case of a fault of the RPD system: See technical description of the sheave assemblies.

Without break fork / with RPD

In the brake fork system of installations with aerial cables or overhead control cables, respectively of installations with lightening protection ropes, the position monitoring of these cables or ropes will be looped into the brake fork switch circuit. In case of an operation without brake fork switch system these position monitoring devices are therefore inactive. Substitute measures are to be kept according to the technical description.

Rope derailment or a dislocation of the rope can only lead to a shutdown or slowdown of the ropeway by the RPD system.
An interruption of the power circuits of the break fork switch system will not lead to a shutdown of the installation.
Compensatory measures in case of a fault of the break fork switch system: See technical description of the sheave assemblies.

If due to a ground fault in the break fork switch circuit the latter must be deactivated, the corresponding test switch (480S1, etc.) must also be switched off.

2.7.4 Continuous break fork switch system / partial RPD system (not on all towers)

On installations equipped with break fork switches on all towers and an additional RPD rope position monitoring system on some of the towers the RPD system can be deactivated by means of a key switch in the control cabinet.

In such a case the ropeway is no longer under the influence of the RPD system, i.e. rope derailment will not lead to a shutdown and the installation will not be slowed down due to a change in rope position.

Measures to be taken in case of a fault of the RPD system: See technical description of sheave assemblies.

2.7.5 Continuous break fork switch system / continuous RPD system

Installations equipped with break fork switches on all towers and with a continuous RPD system with sensors on each tower can be operated in the following operating modes:

With break fork / with RPD

Operation is possible without restrictions or compensatory measures.

With break fork / without RPD

In this case the ropeway is no longer under the influence of the RPD system, i.e. it will not be switched off in case of a rope derailment or slowed down in case of a dislocation of the rope.
A shutdown in case of rope derailment can only be triggered by the break fork switch system.
Compensatory measures in case of a fault of the RPD system: See technical description of sheave assemblies.

Without break fork / with RPD

In the brake fork system of installations with aerial cables or overhead control cables, respectively of installations with lightening protection ropes, the position monitoring of these cables or ropes will be looped into the brake fork switch circuit. In case of an operation without brake fork switch system these position monitoring devices are therefore inactive. Substitute measures are to be kept according to the technical description.

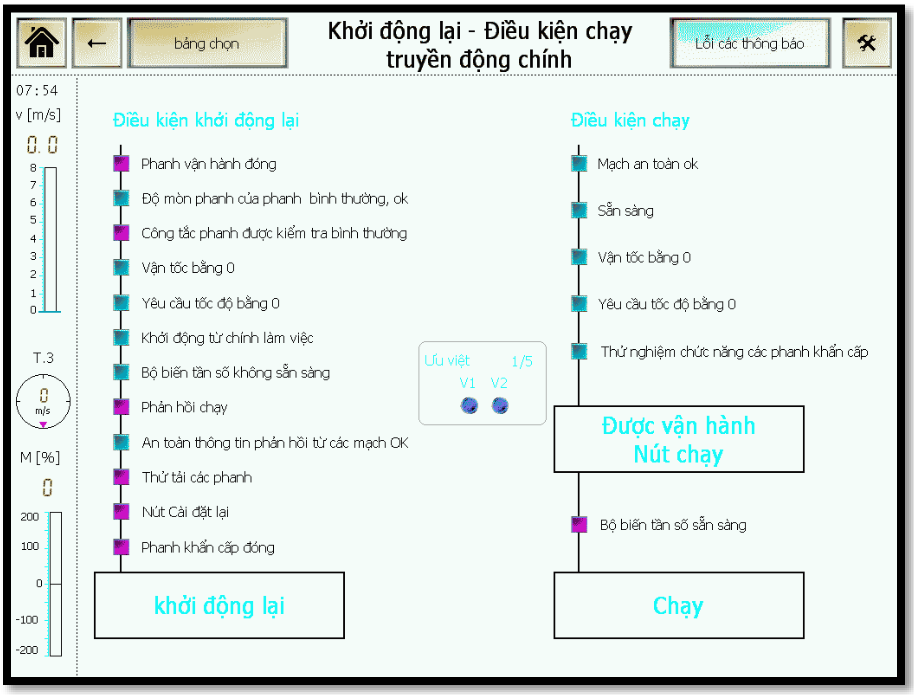
A shutdown or slowdown of the installation in case of rope derailment or rope dislocation can only be detected by the RPD system.
An interruption in the power circuits of the break fork switch system will not lead to a shutdown of the installation.
Compensatory measures in case of a fault of the break fork switch system: See technical description of sheave assemblies

If due to a ground fault in the break fork switch circuit the latter must be deactivated, the corresponding test switch (480S1, etc.) must also be switched off.

3 SAFETY CIRCUITS, RESET+START-CONDITIONS, WARNINGS

3.1 Reset- and Run Conditions

By pressing the button RESET+RUN-CONDITIONS, the following screen with all conditions that are necessary for resetting the stop circuits and also for running the installation appears:



3.1.1 Conditions for reset

To reset the safety circuits, the following conditions have to light up green (conditions are complied).
If a safety circuit after stop, emergency stop, stop-SB or stop-EB cannot be reset, one of the following faults may be the cause (field lights up red):

Indication	Exist.	Description
Service brake closed	X	Check if the service brakes are closed. Detection by the limit switches at the service brakes. (service brakes closed = switches not pressed)
Service brake wear ok	X	The limit switch, that checks at closed service brake the condition of the brake wear, has been activated.
Switch brake test normal	X	Checks if the brake-step switch (226S1 in the control cabinet) is in normal position.

Main Contactor on (AC-Drive)	X	The main contactor(s) oft he regenerative rectifier unit(s) has(have) to be on.
Frequency converter not ready (AC-Drive)	X	The frequency converter of the main drive has to be not ready.
Zero speed	X	The voltage signal of the bullwheel tacho should not exceed 200mV.
Desired zero speed	X	The speed reference at the PLC has to be 0V.
Zero torque monitoring		The motor torque has to be 0%.
Feedback brake opening		The motor inverter unit have to be not in run mode.
Feedback valves EB		The responses of the valves for the emergency brake(s) have to be declined.
Run relay off	X	The run relay (228K3) in the main control and the relay's responses in the motor controls have to be declined.
Response Safety Circuits OK	X	The Safety Circuit Relais (228K4) in the main control and the relay's responses in the motor controls have to be declined.
Emergency brake closed 	X	Controll if the emergency brake(s) is (are) closed This is done by limit switches (appears only after a Stop EB). (Emergency Brake closed = Limit switch pressed) This condition is checked only to acknowledge messages in the stop-EB circuit, i.e., this field is only visible after stop-EB.
Load test brakes	X	Switch for the load test of the brakes (in the control cabinet)must be in NORMAL position.
Reset button	X	Control if a reset button stay activated and the reset signal is permanent on.

ATTENTION:
With the ext. reset-buttons (on the remote control panels) only the following operational shut-downs can be reset. All the other shut-downs can only be reset with the Reset-button at the control panel:

- Stop buttons
- Emergency Stop buttons
- Stop-EB-buttons
- Stop Return Station
- Emergency Stop Return Station
- Stop EB Return Station

3.1.2 Run conditions

To run the installation the following conditions have to be fulfilled. I.e. the conditions have to light up green:

Indication	Exist.	Description
Safety circuit OK	X	All Safety circuits (stop, emergency stop, stop SB, stop EB) in all stations must be ok.
Ready	X	Ready signal from the return station must be received
Zero speed	X	The voltage signal of the bullwheel tacho should not exceed 200mV.
Desired zero speed	X	The speed reference at the PLC has to be 0V.
Frequency converter ready and main contactor on (AC-Drive)		The frequency converter of the main drive has to be ready for start and the main contactor for the converter has to be turned on.
Functional test emergency brakes	X	The test procedure to test the valves of the emergency brake is not finished or has failed! Refer to 3.1.2.1

If these conditions are all met and the installation is made with the option 'Secure Stop', these are the conditions for the release of the run – buttons. After pressing the run – button, the following conditions need to be met before a start of the installation is possible:

Anzeige	Vorh.	Beschreibung
Frequency converter ready	X	The frequency converter oft he main drive must be ready.

3.1.2.1 Functional test emergency brakes

By pressing the button 'RESET' in the drive station or by pessing the button 'READY' in the return station in opweration mode 'drive station unmanned' after a restarting of the control a test procedure to test the two valves of the emergency brake and the limit switches of the emergency brake will be started.

During this test a cycle progress is displayed at the screen:

During operation, the pressure transducer/pressure switch constantly monitors the function of the safety brake valves 65Y1 / 65Y2 (brake valve fault – stop EB).

<u>Sequence of the test:</u>

- The valves for the emergency brakes 65Y1 and 65Y2 are closed.
- The two valves 65Y1 and 65Y2 of the emergency brake are energized. The system pressure at the pressure transducer 66B2 rises above 120bar, the emergency brakes are opened and the limit switches at the emergency brakes report ‘brake open’ (cycle 1).
- The valve 65Y1 of the emergency brake ist turned off. The system pressure at the pressure transducer 66B2 falls below 10bar, the emergency brakes are closed and the limit switches at the emergency brakes report ‘brake closed’ (cycle 2).
- The valve 65Y1 of the emergency brake is energized. The system pressure at the pressure transducer 66B2 rises above 120bar, the emergency brakes is opened and the limit switches at the emergency brakes report ‘brake open’ (cycle 3).
- The valve 65Y2 of the emergency brake ist turned off. The system pressure at the pressure transducer 66B2 falls below 10bar, the emergency brakes are closed and the limit switches at the emergency brakes report ‘brake closed’ (cycle 4).
- The valve 65Y2 of the emergency brake is energized. The system pressure at the pressure transducer 66B2 rises above 120bar, the emergency brakes is opened and the limit switches at the emergency brakes report ‘brake open’ (cycle 5).

After a successful test the message TEST PROCEDURE EMERGENCY BRAKE disappears and the indication FUNCTIONAL TEST EMERGENCY BRAKE in the run conditions turns to green.
For the the test, there is a set time. If this time is exceeded, the test is aborted.

<u>Remedies if the test is not successful:</u>

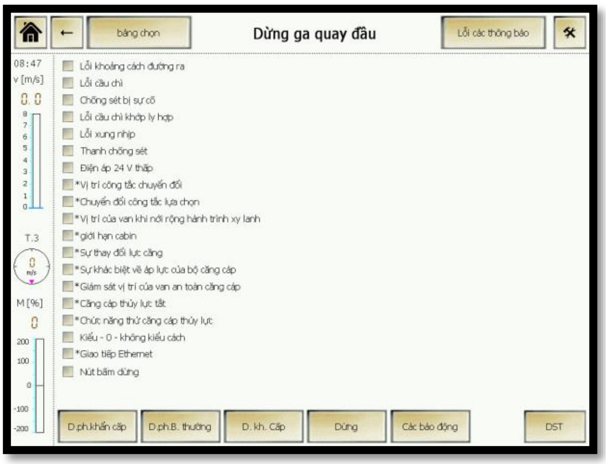
- Check function of hydraulic motor (overcurrent, overtemperature,oil level…?)
- Check rotation direction of the hydraulic motor
- Vent the hydraulic system
- Check pressure transducer/pressure switch (the pressure transducer can be checked in the main window)
- Check valves 65Y1 and 65Y2
- Check the brake hydraulic lines

If the test was not successful, the test can be started again with the button ‘Reset’ and ‘Run’.

3.2 Stop Circuit

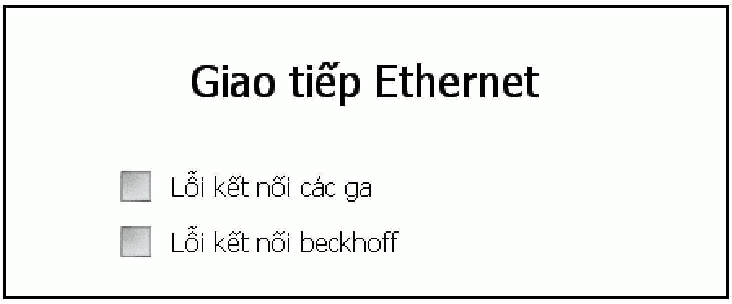
Every Stop shut-down by the stop circuit causes a shut-down of the installation via the main drive (electric motor). The braking process is electrically regulated by the power converter or frequency converter, independent of the load. The adjusted deceleration can be found in the screen SETTINGS (Refer to 4.4.12).

Once *Rope speed 0* (approx. 0.2 m/s) is reached, the service brake will be closed.



Indication	DST	RST	Description
Spacing fault Outgoing	X	X	The monitoring of the spacing fault serves as a control for the minimum spacing of 2 carriers. For this purpose a counter is installed on the outgoing side. A carrier leaving the station starts the distance counter via the last outgoing proximity switch. If the distance between two carriers is 10% lower than the normal distance, the installation shuts down with the stop-instruction 'Spacing fault outgoing! **Should the spacing control be activated on the outgoing side (i.e. 2 carriers are travelling out of the station too close together), the other station must be informed of the situation (with the carrier numbers) so that the operator in the other station can reduce the speed before the two carriers arrive in the station, in order to ensure that a safe distance is maintained between the two carriers when the anti-collision system in the return station is triggered (Behaviour in case of fault, possible reasons and remedy see also 9.3).**
Overcurrent motor brake hydraulic	X		Indicates that the motor of the brake hydraulic is overloaded. ⇒ motor protection switch has triggered
Oil level brake hydraulic	X		Indicates that the oil level in the brake hydraulic system is too low.
Fuse fault magnetic clutches		X	Indicates that one of the fuses (circuit breakers) for the magnetic clutches (regulation systems) has tripped.
Fuse fault	X	X	Indicates that one of the fuses (circuit breakers) in the control panel has tripped.

Lightning protection fault	X	X	Indicates that one of the circuit breakers in the lightning protection box has tripped.
Grounding rod	X	X	Indicates that the grounding rod (station outgoing) is not properly in place.
Low voltage 24V Low voltage 24V System 1 Low voltage 24V System 2	X	X	Indicates that the voltage supply for 24V/DC has sunk below the permitted value of 24V (voltage relays $23K1_{DST}$ (System1), $23K4_{DST}$ (System 2) resp. $423K1_{RST}$). ⇒ check the batteries, the battery chargers and the battery fuses.
Impulse fault	X	X	Indicates failure (0- or 1-signal) of one or both proximity switches (q.v. 3.7.3) or a too low contact pressure of the impulse sheaves on the bullwheel (slipping). Refer to 3.7.3
Manned-0-Unmanned	X	X	Indicates that the switches (manned - 0 - unmanned) in the drive and return station are not in the same position respectively that the operation modes manned/unmanned have been changed.
Position selector switch	X	X	After changing to operation mode "STATION MANNED" several important switches are controlled if they are in the correct position: • Test mode • Deact. grip force sensor 1 / sensor 2 • Carrier distance brake test • Deact. RPD / deact. tower fault (break fork) • Bridging emergency bearing The denoted selector switches must be set in normal position at least once and afterwards (if required) reactivated again. This checking ensures that the functions are only activated/deactivated consciously.
Change - over selector switch	X	X	During changing the position of the following selector switches a stop is triggered: • Deact. grip force sensor 1 / sensor 2 • Deact. RPD / deact. tower fault (break fork) • Bridging emergency bearing • Limited operation with the main drive The denoted selector switches must be set in normal position at least once and afterwards (if required) reactivated again. This checking ensures that the functions are only activated/deactivated consciously.
Tension carriage position		X	Controls the position of the tension carriage. The limit switch in the anterior and backward endposition is triggered via two stoppers.
Valve position extend cylinder		X	Controls the position of the ball valve 'extend cylinder' at the hydr. tensioning.
Tension force variation (Tension with powered control system interval operation)		X	Indicates that the tension force is 8% higher or 8% lower than the normal force. To restart the regulating process of the tensioning, the button ACTIVATION TENSION on the terminal box of the tension unit has to be pressed, until the tension force is in the +/-8% limit.
Position monitoring of safety valves tensioning		X	Indicates that the two valves of the tensioning system are not in the same position. Refer to 5.2.1
Functional test hydr. Tensioning		X	Indicates that at least one oft he start – up tests of the hyraulic tensioning system was not successful. Refer to 5.2.1

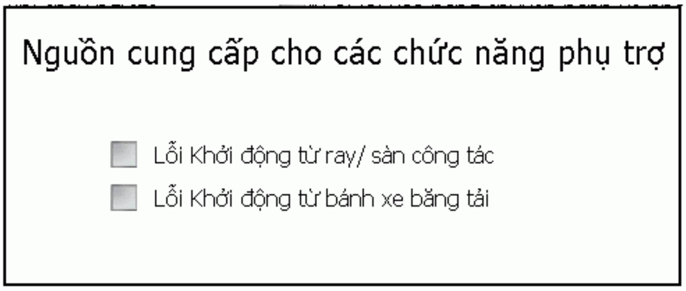
Difference force transducer		X	Indicates that the difference between the 2 force transducers of the tensioning is too big.
Oil Level Minimum Gear Box			Indicates that the oillevel in the gear box is too low.
Stow fault parking			Indicates that a carrier is moving into the parking and the conveyor is not in operation. ⇒ check the safety circuit of the parking system, check if the operating mode switch on the control panel of the parking system is in the right position (compare with the drive direction switch of the main control panel)
Ethernet	X	X	Indicates a fault in the ethernet-connection between the main control system (PSS) and the Beckhoff-I/O-modules 
Flow control switch			Indicates a too low oil flow in the oil circuit at operating oil pump during night mode.
Oil temperature 90°C			Indicates that the oil temperature exceeded 90°C (in the gearbox) during night mode.
Regulation drive/return off	X		Indicates that the spacing system at the top and at the bottom station has been turned off. One of the spacing systems has to be in operation.
Hydraulic tensioning off		X	Indicates that the operating mode fo the hydraulic tensioning system has been switched to the key switch position ‘off’ or ‘maintenance’. Refer to 5.2.2
Feed – 0 – park			Indicates that the position of the switch ‘Feed’ has been changed.
Zero torque monitoring			Indicates that motor torque hasn´t reached a level of +/-5% after starting the installation.
Monitoring system pressure			Indicates a too low system pressure in the brake hydraulic.
Stop return station	X		Indicates a stop shut-down from the return station.
Stop buttons	X	X	Indicates that one of the stop buttons in the drive station has been pressed (control panel, remote panels,…).

3.3 Emergency Stop Circuit

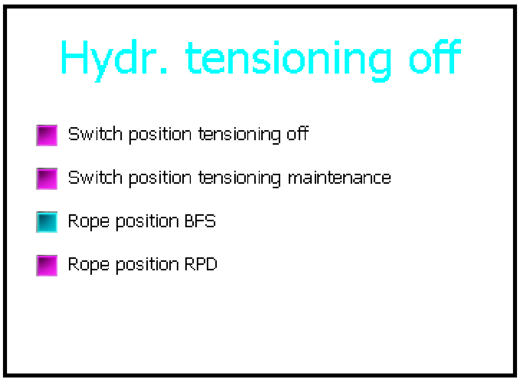
In case of a shut-down by the emergency stop circuit the installation is shut down via the main drive (electric motor). The braking is electrically regulated by the power converter or frequency converter,independent of the load. The adjusted deceleration can be found in the screen SETTINGS (Refer to 4.4.12).
Once *Rope speed 0* (approx. 0.2 m/s) is reached, the service brake will be closed.
When the lift system is shut down for one of the reasons marked with (*), press the corresponding field on the screen to obtain more detailed information concerning the error that occurred.

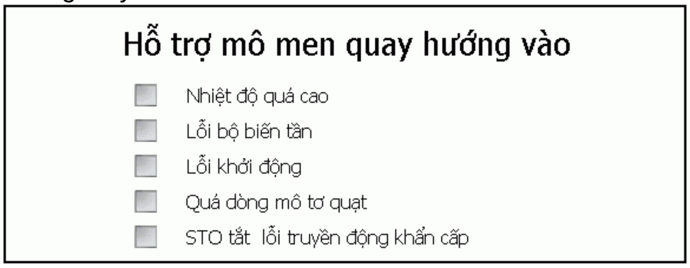
Indication	DST	RST	Description
Rope position incoming	X	X	Checks the rope position at the engaging / disengaging section of the incoming side. **For further proceeding in case of a shutdown see 3.7.15.4**
Rope position outgoing	X	X	Checks the rope position at the engaging / disengaging section of the outgoing side. **For further proceeding in case of a shutdown see 3.7.15.4**
Grip lever fault forward +/-10 %	X	X	Monitors the position of the grip operating lever for +/-10% rope diameter in forward run. **For further proceeding in case of a shutdown see 3.7.15.1**
Grip / rope fault reverse	X	X	Checks whether the grip sits correctly on the rope after the closing procedure. **For further proceeding in case of a shutdown see 3.7.15.3**
Grip / rope fault forward	X	X	Checks whether the grip sits correctly on the rope after the closing procedure. **For further proceeding in case of a shutdown see 3.7.15.3**

Grip fault before launch reverse	X	X	Checks whether the grip is open before it reaches the opening/closing line. **For further proceeding in case of a shutdown see 3.7.15.2**
Grip fault before launch forward	X	X	Checks whether the grip is open before it reaches the opening/closing line. **For further proceeding in case of a shutdown see 3.7.15.2**
Counter fault incoming min.	X	X	Indicates a fault of the counter fault system on the incoming side, if a carrier passes too quickly, i.e. the count remains below the preset minimum value. (refer to 9.2) ⇒ Check of V-belt tension, tyre pressure of the tyre conveyors, pressure of the tyres on the friction plate of the grip, etc.
Counter fault incoming max.	X	X	Indicates a fault of the counter fault system on the incoming side, if a carrier passes too slowly, i.e. the count exceeds the preset maximum value. (refer to 9.2) ⇒ Check of V-belt tension, tyre pressure of the tyre conveyors, pressure of the tyres on the friction plate of the grip, etc.
Counter fault outgoing min.	X	X	Indicates a fault of the counter fault system on the outgoing side, if a carrier passes too quickly, i.e. the count remains below the preset minimum value. (refer to 9.2) ⇒ Check of V-belt tension, tyre pressure of the tyre conveyors, pressure of the tyres on the friction plate of the grip, etc.
Counter fault outgoing max.	X	X	Indicates a fault of the counter fault system on the outgoing side, if a carrier passes too slowly, i.e. the count exceeds the preset maximum value. (refer to 9.2) ⇒ Check of V-belt tension, tyre pressure of the tyre conveyors, pressure of the tyres on the friction plate of the grip, etc.
Grip force		X	If the grip force testing unit recognizes that the grip force sinks (30%) below the programmed value, an emergency stop occurs. **For further proceeding in case of a shutdown see 10.5.1**
* Power supply for auxiliary function	X	X	During ropeway operation functions such as lifting the tyre conveyors (accelerator/decelerator - optional) and moving the switch rails, the weather protection door (optional) and slot cover (optional) must not be active. To ensure this, the status of the contactor that switches on the power supply for these functions is monitored for two different faults:



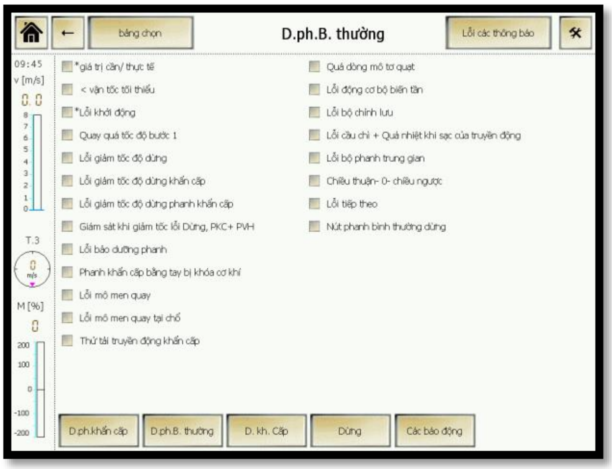
			⇒ Check whether the corresponding contactor responsible to shut down the power supply for these functions has been released and check the corresponding PLC output card that controls the contactor.
* Hardware fault	X	X	Indicates a hardware fault. In this case contact Doppelmayr imediately. **Lỗi phần cứng** Ray nhà ga 1 Chạy/ vận tốc bằng 0 Tín hiệu truyền động khẩn cấp
*Stow fault parking			Indicates that a carrier is moving into the parking and the conveyor is not in operation. ⇒ check the safety circuit of the parking system, check if the operating mode switch on the control panel of the parking system is in the right position (compare with the drive direction switch of the main control panel) The exact fault is indicated in a sepearte window: Stow parking area Release signal of main drive missing
Safety circuit fault (drive station)			The lift system is stopped ('SAFETY CIRCUIT FAULT in emergency stop circuit') when the following faults occur: • Reports that subsequent to a Stop, Emergency Stop or Stop EB in the return station the 'Safety circuit OK return station' input has not been released within one second. When this error occurs, the message cannot be acknowledged before the defective relay has been replaced.
Damped guide rail	X	X	The dampened guide rail on the incoming side has been hit excessively and has actuated a limit switch. ⇒ Check guide rail dampening and adjust if required.
Stow fault			If there is one carrier at active start/stow installation in the start position, one in the 1st stow position, one in the 2nd stow position and another one activates prox. switch "stow 3", the lift is shut down. ⇒ Check the start device as well as the function of the proximity switches BD1 and BD2 (block start device).
* RPD - Fault	X		The SRA signal of the RPD system has detected a rope derailment and the ropeway is shut down immediately. See item 11.
* Tower fault / derail	X		Indicates that a fault has occurred on one of the towers (derail, ground fault,…) Indication of the concerning tower. Refer to 3.7.11. **ATTENTION:** After a tower fault the hydr. tensioning unit will be autom. switched off. i.e. in this case readjusting the

			tensioning is avoided. The following indication will be displayed on the screen: 
Door fault	X	X	Indicates that the door monitoring switch has not been activated when the carrier has reached the start position or that the cabin has not reached the start position within the pre-adjusted value of impulses after the door monitoring switch has been activated. **In case of a 'Door fault', the operating personnel must ensure that prior to resuming operation the door of the carrier that triggered the fault is locked. Move the carrier back behind the start position if required.** **See item 3.7.6**
Access control barrier	X	X	Indicates that the closing rail of the door mechanism is not in correct position or that the door for the access barrier has been moved.
Rail position		X	Indicates that one of the rails is not in the defined end position. (refer to 3.7.8)
Carrier in front of station rail 1		X	Indicates that a carrier approaches the rail in the swung in position. The carrier would collide with the rail. (refer to 3.7.9)
Door Fault Station			Indicates, that the door of the station is not in open limit position .
Door Fault Parking Area			Indicates, that the door of the parking area is not in open limit position .
Position Tyre Conveyors	X	X	Indicates that at least one of the tyre conveyors that are monitored by the limit switches is not in end position anymore (up/down). (refer to 3.7.10)
* Cross circuit monitoring safety circuit			Indicates a cross circuit on the lift-line between the safety circuit signals in the return station. Refer to 3.7.12 in order to see the the respective safety circuit.
* Cross circuit monitoring rope position	X		Indicates a cross circuit on the lift-line betwenn the rope position signals on individual towers. Indication of corresponding rope position, refer to 3.7.11
Fault night mode			Indicates that in night mode either the incoming proximity switch 1.1 or 1.2 or the last outgoing proximity switch has been actuated, respectively that after switching over to night mode the empty lift line has not been confirmed on the monitor.
Fault safety bus	X	X	Indicates that the connection between the safetybus – modules and the PSS is canceled.

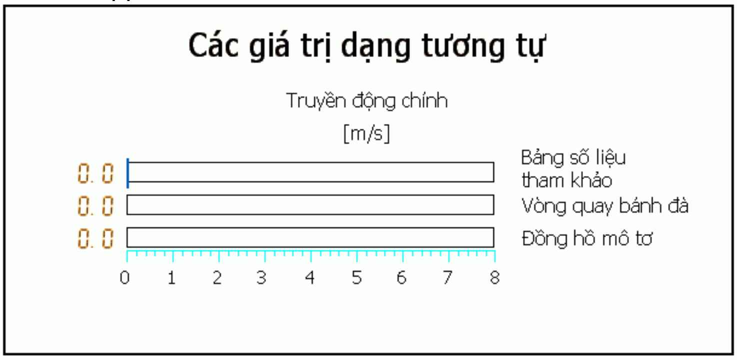
			Refer to 3.9.1
*Logic fault two-channel evaluation	X	X	Indicates that only one channel of a two-channel evaluated safety device has been interrupted. Refer to 3.10
*Fault station conveyor incoming / outgoing	X	X	Indicates a fault at the drive unit of the station conveyor incoming / outgoing: Overtemperature,fault frequency converter, start fault, overcurrent motor fan and STO off fault emergency drive. 
*Fault processor spacing	X	X	Indicates a fault at the drive unit of the processor spacing: Overtemperature,fault frequency converter, start fault, overcurrent motor fan and STO off fault emergency drive. 
Emergency stop return station	X		Emergency stop shut-down from the return station.
Emergency stop buttons	X	X	Indicates that one of the emergency stop buttons has been pressed (control panel, remote panels,…).

3.4 Stop SB Circuit

In the case of a stop SB shutdown, the lift system is immediately stopped by the service brake(s) (regulated/gradual deceleration). The drive is immediately switched off (rectifier and/or frequency converter switched off, main contactor and/or motor contactor off).



<table>
<tr><th>Indication</th><th>DST</th><th>RST</th><th>Description</th></tr>
<tr><td>Reference/actual deviation</td><td>X</td><td></td><td>Indicates that the actual value is not in deviation conformity with the reference value.
Checks that the reference value of the thyristor / frequency converter is in deviation conformity with the actual value (motor tachometer).
At a difference > 0.6 m/s the installation will shut-down (Stop SB).
⇒ the adjustment of the speed signals has to be checked as described in point 3.7.1.

By touching the message text at the display the following window appears:


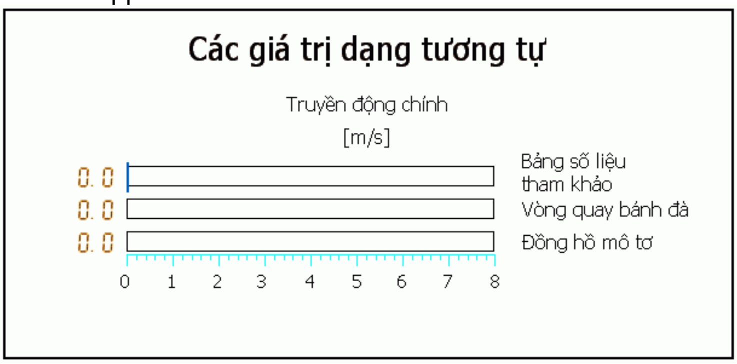
In this window the analogue values of the rope speed splitted in Reference Value, Bullwheel Tacho and Motor Tacho are displayed.</td></tr>
</table>

< Minimum speed	X		Indicates that lift speed dropped under the minimum speed (about 0,2m/s) during the operation.
Start fault	X		Indicates that the lift has not reached the minimum speed (about 0,2m/s) within an adjusted time after the run signal. . The adjusted time can be found in the screen SETTINGS (Refer to 4.4.12).
Overspeed step 1	X		Indicates that the lift has reached an actual speed that is 10% higher than the nominal speed.
Torque fault main motor 1 Torque fault main motor 2	X		Indicates that the motor current / motor torque has reached the max. value. After a short time delay the installation shuts down. Before this monitored limit value is reached, a visual and acoustic warning happens (refer to 3.6). In this case no more passengers should enter the carriers until the motor torque has dropped under this warning value. The levels at these warning and alarm values depend on the condition of the installation (drive with constant speed or accelerating/decelerating).
Torque surge fault	X		Torque surge fault controls the current/torque rise in relation to time (di/dt – dM/dt). If the current/torque rise is too high within a certain period of time (e.g. bullwheel blocked, etc.) the installation will be shut down with the Stop SB-order “Torque surge fault”.
Fuse fault main drive 1 Overtemp. charging resist.	X		Indicates that a circuit breaker in the thyristor or frequency converter panel 1 has tripped or overloaded.
Fuse fault main drive 2 Overtemp. charging resist.			Indicates that a circuit breaker in the thyristor or frequency converter panel 2 has tripped or overloaded.
Fault motor inverter unit 1 Fault motor inverter unit 2	X		Indicates a fault in the motor inverter unit The fault signal can be read on the display on the motor inverter unit (refer to manual of the converter unit / VACON, ABB).
Fault reg. rectifier unit drive 1 Fault reg. rectifier unit drive 2	X		Indicates a fault in the reg. rectifier unit The fault signal can be read on the display on the reg. rectifier unit (refer to manual of the converter unit / VACON, ABB).
Fault brake chopper	X		Indicates a fault in the brake chopper unit The fault signal can be read on the display on the brake chopper unit (refer to manual of the converter unit / VACON, ABB).
Fault frequency converter			Indicates a fault in the frequency converter unit The fault signal can be read on the display on the frequency converter unit (refer to manual of the converter unit / VACON, ABB).
Overcurrent fan main motor 1	X		Indicates that the fan of the main motor 1 is overloaded. The motor protection switch in the thyristor / frequency converter panel has tripped. ⇒ check for damaged bearing, sluggish movement, winding short circuit; check all power supply phases...
Overcurrent fan main motor 2			Indicates that the fan of the main motor 2 is overloaded. The motor protection switch in the thyristor / frequency converter panel has tripped. ⇒ check for damaged bearing, sluggish movement, winding short circuit; check all power supply phases...
Emergency brake mech. blocked	X		Indicates that the emergency brake has been mechanically blocked (lever on the hydr. unit).
Service brake fault	X		Indicates that the service brake has not opened within an adjusted time after the run signal, or that the brake has

			engaged during operation caused by a defect in the brake hydraulics. The adjusted time can be found in the screen SETTINGS (Refer to 4.4.12). ⇒ Check the following: - check the adjustment of the limit switch (brake closed = limit switch not pressed) - Regulation brake Check if either the fast action valve (66Y1 / 24V) and also the proportional valve (66Y2 / 24V power supply, 8V reference value) are activated. - Stepped brake hydraulic: Check if either the fast action valve (227Y4 / 24V) and the step valve (227Y3 / 24V) are activated.
Deceleration fault Stop	X		Indicates that the deceleration after a stop was lower than the min. required deceleration.
Deceleration fault Emergency stop	X		Indicates that the deceleration after an emergency stop was lower than the min. required deceleration.
Deceleration fault Stop-EB	X		Indicates that the deceleration after a stop-EB was lower than the min. required deceleration.
Deceleration fault Stop-EB+SB	X		Indicates that the deceleration after a stop-EB+SB was lower than the min. required deceleration.
Forward – 0 – reverse	X		Indicates that the position of the drive direction switch has been changed or that the switch is in 0-position.
Normal mode – 0 – night mode			Indicates the switchover from normal mode to night mode or vice versa, respectively that the selector switch is situated in 0-position.
Subsequent fault	X		Indicates that during a ‘Stop emergency brake’ shut-down an ‘Emergency stop’ shut-down occurred or that during an ‘Emergency stop’ shut-down a ‘Stop emergency brake’ occurred. In this case, both mechanical braking systems (service and emergency brake) brake the lift system.
Stop-SB button	X		Indicates that one of the stop-SB buttons has been pressed.
Full Load test emergency drive	X		Indicates that the switch for the full load test of the emergency drive in the control cabinet is activated. (Refer to 4.6.7)

3.5 Stop EB Circuit

In the case of a stop-EB shutdown, the lift system is immediately stopped by the emergency brake(s). The drive is immediately switched off (rectifier and/or frequency converter switched off, main contactor and/or motor contactor off).

Indication	DST	RST	Description
Actual/actual deviation	X		Indicates that the actual value of the motor tacho (DC drive) / pulse encoder on the main motor (AC drive) is not in deviation conformity with the actual value of the bullwheel tacho. At a difference > 0,6m/s the installation will shut-down (Stop EB “Actual/actual deviation”). ⇒ the adjustment of the speed signals has to be checked as described in point 3.7.1. By touching the message text at the display the following window appears:  In this window the analogue values of the rope speed splitted in Reference Value, Bullwheel Tacho and Motor Tacho are displayed.
Drive direction fault	X		Indicates that the preselected drive direction is not the same as the actual drive direction (Recognition by impulse proxes). Refer to 3.7.5
Standstill monitoring	X		If the installation is moving forward or reverse although there is no run signal, the emergency brake will close. Refer to 3.7.4

Overspeed Step 2	X		If the lift reaches a speed that is 15% higher than the nominal speed, the installation shuts down (“Stop EB”).
Deceleration fault Emergency Stop	X		Indicates that the deceleration after an emergency stop was lower than the min. required deceleration.
Deceleration fault Stop-SB	X		Indicates that the deceleration after a stop-SB was lower than the min. required deceleration.
Deceleration fault Stop-EB+SB	X		Indicates that the deceleration after a stop-EB+SB was lower than the min. required deceleration. In this case the brake step control of the service brake is switched off. The installation will decelerate with both brake systems (service and emergency brake) without step-control.
Interlock emergency drive	X		Indicates that one of the switches for the gearing control or the V-belts for the emergency drive is in position emergency drive.
Main – 0 – emergency drive (Drive mode)	X		Indicates a change or 0-position of the switch “Drive mode” (main drive – 0 – emergency drive)
Emergency brake fault	X		Indicates that the emergency brake has not opened within 5s after the reset of the stop-EB-circuit, or that the brake has engaged during operation caused by a defect in the brake hydraulics. ⇒ Check the following: - Check the adjustment of the limit switch (brake closed = switch pressed) - Check if both valves of for the emergency brakes are activated (65Y1 / 24V und 65Y2 / 24V).
Brake valve fault	X		Indicates that the redundant valves of the emergency brake (65Y1 / 24V and 65Y2 / 24V) have not been activated or deactivated together. (This is identified by means of a pressure transduce). ⇒ Check control and function of both emergency brake valves.
Emergency brake manual	X		Indicates that one of the levers for the manual closing of the emergency brake has been activated at the brake hydraulics or at the loading area (optional) or in the operator room (optional).
Service brake mech. blocked	X		Indicates that the service brake has been mechanically blocked (lever on the hydr. unit).
Bullwheel position	X	X	Indicates that the bearing of the bullwheel is defect.(Switch for bullwheel position or axle position monitoring)
Axle position monitoring (Emergency bearing)	X	X	Indicates that the axle position monitoring unit of the bullwheel monitoring has been triggered. This monitoring unit can be deactivated by a key switch in the control cabinet to empty the ropeway at reduced speed (Slow 2).
Subsequent fault	X		Indicates that during an Emergency stop shut-down an additional stop-SB shut-down or that during a stop-SB shut-down, an additional emergency stop shut-down triggered. In this case, both mechanical brake systems (service and emergency brake) brake the lift system.

Maintenance lock out	X	X	Indicates that a maintenance lock out switch has been switched off (e.g. necessary for maintenance work in the low voltage room, the drive, etc.) or a emergency trip wire has been triggered. **Maintenance lock out switches may only be switched on again by the one who switched them off! If a maintenance lock out switch is turned off, it has to be locked with a padlock.** **IMPORTANT:** **Switching off a maintenance lock out switch will only close the emergency brakes and lock the installation so that it can not be started up. The hydraulic units remain operational!**
Stop-EB return station	X		Indicates a Stop-EB shut-down from the return station.
Stop-EB-buttons	X	X	Indicates that one of the stop-EB buttons has been pressed (control panel, remote panels,…).

3.6 Acoustic Warnings

In case of an activated acoustic warning the horn symbol 

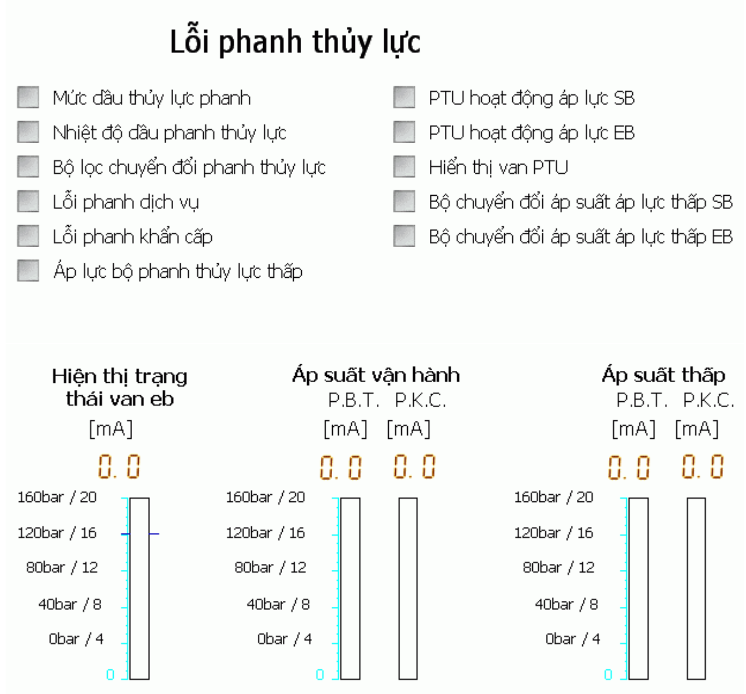
turns from grey to yellow.
Press the horn symbol in the general menu to get a list of the different acoustic warnings.

In case of warnings marked with an asterisk (*), further information on the indicated fault can be retrieved by pressing the corresponding field on the display.

Drive Station

Return Station

Indication	DST	RST	Description
RPD system - Rope out of center	X		Indicates that the rope is out of center but still on the sheaves. ⇒ the installation automatically slows down to slow 2. See point 11
Fault oil cooler	X		Indicates a fault in the oil cooling system of the gearbox. E.g. oilpump or oil cooler is overloaded, oiltemperature in the gearbox > 90°C, fault of the temperature sensor on the gearbox. Detailed information about the fault can be obtained in the window for general information by pressing the field oil cooler. Refer to 5.1
Wind warning	X		Indicates that the wind speed has increased above the windwarning level.
Wind alarm	X		Indicates that the preset value of the windspeed is achieved. A horn signal will sound and the lift will slow down to speed step slow 2.
Fault wind direction Fault wind speed	X		Indicates a fault in the wind direction sensor, wind speed sensor or in the wiring of these devices (line disconnection – current signal 4-20mA).
Oil level brake hydraulic	X		Indicates that the oil level in the brake hydraulic unit is too high.
Oil temperature brake hydraulic	X		Indicates that the oil temperature in the brake hydraulic unit is too high.
Filter switch brake hydraulics	X		Indicates that the filter of the brake hydraulics is dirty and has to be changed.
Fault brake hydraulics	X		Indicates a fault of the pressure transducers (66B1-B5) of the brake hydraulics, see additional pictures.



Indication	DST	RST	Description
Fault emergency brake flushing	X		Indicates that an error occurred during flushing the emergency brake (overpressure in the hydr. system). Refer to 4.4.11
Fault service brake flushing	X		Indicates that an error occurred during flushing the service brake (overpressure in the hydr. system). Refer to 4.4.11
Overvoltage protection low voltage distribution panel			Indicates that the overvoltage protection in the power supply of the low voltage distribution panel has tripped.

Fault battery charger (charging control) System 1 System 2	X	X	Indicates that the charging current for the batteries is too low. Refer to 3.7.13
Logic start/stow			Indicates that bero for clutch spacing is out of order.
Logic processor spacing	X	X	Indicates that bero for processor spacing is out of order. Refer to 8.3.3
Warning grip force		X	Indicates to less grip force of a closed grip. Refer to 10.5.3
Torque fault main motor	X		Indicates that the motor current / motor torque has reached the max. value. In this case no more passengers should enter the carriers until the motor torque has dropped under this warning value. This value switches depending on the driving condition (drive with constant speed or accelerating/decelerating) between 2 values automatically.
Fault hydr. tensioning		X	Indicates a fault in the hydr. tensioning unit (overtemp. oil, motor overloaded, filter dirty,…) Refer to 5.2.1
Fault tyre conveyor	X	X	Indicates a fault of the lifitable tyre conveyor (fuse fault, overtemp. motor, position fault). Refer to 3.7.10
Fault lubrication device		X	Indicates a fault of the lubrication device (fault, broken wire,..) Refer to 13.2
Fault station rail / lifting platform		X	Indicates a fault of a lifiting platform, rail or carrier guide rail (fuse fault, motor overloaded, position fault) Refer to 3.7.8
Motor temperature 125°C	X		Indicates that the temperature of the main motor has reached 125°C
Fault fibre optic coupler elseco	X	X	Indicates a fault of a fibre optic receiver.

3.7 Additional Monitoring

3.7.1 Tachometer and set value signal monitoring

All speed signals (motor tachometer, bullwheel tachometer and set value) are set to +/-8.5V at the PLC input at full speed, i.e., the following voltages must be measured at full speed in forward drive direction:

- +8.5V/DC set voltage supplied to rectifier and/or frequency converter
- -8.5V/DC actual voltage of motor tachometer (with rectifier drive)
- +8.5V/DC actual voltage of incremental encoder (with frequency converter drive)
- +8.5V/DC actual voltage of bullwheel tachometer

3.7.2 Watch Dog FS / ST

The watch dog control system is a self-monitoring system for the central control unit. If this is no longer functioning properly the lift will shut down.
Error messages are shown on the CPU display.
The errors saved in the error stack (max. 16) are shown on the CPU display by pressing the CPU 'F-stack' button in the control cabinet (see 17).

3.7.3 Impulse fault

If one out of two 90° shifted impulses (0-failure) of the impulse proximity switches or one out of two communicates a continuous signal (1-failure), the lift is shut down within approximately 5 sec. (Stop).

- Check the function of the impulse-proximity switches.
- Check switching distance of proximity switches (approx. 2-3mm).
- Check impulse sheave pressure (slipping).
- Replace the relevant input card.

3.7.4 Stillstand Monitoring

Indicates inadmissible movement of lift system with closed service brakes. The movement is identified by the impulse sheave. Emergency brakes are closed to avoid further unintended movement of the lift system (stop-EB).

- Check service brakes (brake force)
- Check brake disks and brake linings of service brakes (oil contamination, etc.)

3.7.5 Drive direction fault

Indicates that the selected drive direction does not correspond to the direction actually determined (by impulse proximity switches) (stop-EB).

- Check PLC analog output card (set value output).
- Check impulse proximity switches (proximity switches replaced and incorrectly connected?)

3.7.6 Door fault

3.7.6.1 General

The door fault monitoring at the outgoing of the station takes place after the closing procedure of the doors at forward operation of the carrier. With this feature it is ensured that the doors of the exiting carrier are closed and locked. The prox. switch “start prox. switch” is situated before the closing rail and the prox. switch “control prox. switch” is situated after the closing rail. Immediately after the closing procedure, the limit switch “control switch” is actuated with the rod switch by the actuating sheave of the carrier.

3.7.6.1 Functional Principle

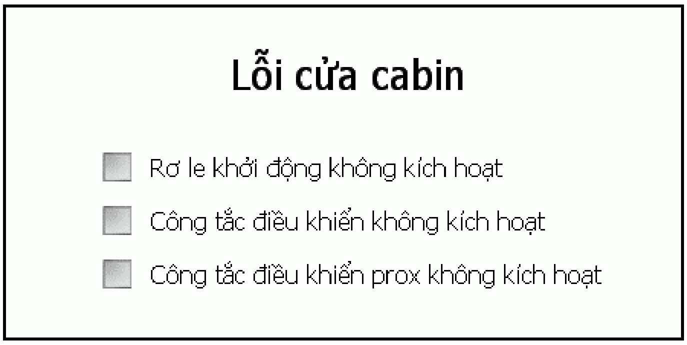
Starting the Monitoring Process:
The monitoring process is started by the prox. switch “start prox. switch”.

Monitoring Process:
Immediately after the closing procedure of the doors, the limit switch “control prox. switch“ is actuated with the rod switch by the carrier. Precondition for the actuation are locked doors, respectively a correctly positioned “control switch”.

Ending the Monitoring Process:
The monitoring process is ended after having reached a defined distance, of which the counter has been started by the prox. switch “start prox. switch”. This distance counter is adjusted to a higher value than the real distance between the prox. switches “start prox. switch and control prox. switch”. With the aid of this distance counter and the switches “start prox. switch, control switch and control prox. switch” it is ensured that a “non-switching” element (“start prox. switch, control switch and control prox. switch”) respectively non-locking doors are recognized during the monitoring process and the installation is put to a standstill.

3.7.6.2 Error meassges

If a door fault occurs an additional picture is called up:



Start Proximity Switch not actuated:
The field ‘Proximity Switch not actuated’ field lights up if the switch that controls the locking procedure of the door has not been actuated and the start position proximity switch has not activated the counting device (software).

Control switch not actuated:
The field “Control switch not actuated” lights up if the start position proximity switch has started the door fault and has not triggered until achieving the control proximity switch of the control switch.

Control Proximity switch not actuated:
The ‘Proximity switch not actuated’ field lights up if the counter that was triggered by the start proximity switch has finished counting before the carrier reaches the start position proximity switch (e.g. start position proximity switch defective).

3.7.7 How to proceed if safety devices are activated:

A ‘Door fault will not only stop the ropeway with an ‘Emergency stop’ but also prevent carrier launching, i.e. the carrier which is kept in start position or in two safety clutches and not launched.

If the safety device 'Door fault' responds, proceed as follows:

1) **Manually lock the carrier doors with the locking rod.**
2) **Check the locking of the doors manually. It must be impossible to open the doors manually.**

If the carrier door cannot be manually locked, proceed as follows:

1) **The passengers must leave carriers with open doors in the station area.**
2) **The carrier that activated the safety device must be moved back to the loading point.**
3) **The passengers must then leave the carrier**
4) **Take the carrier out of operation**
5) **Check the door operating mechanism.**

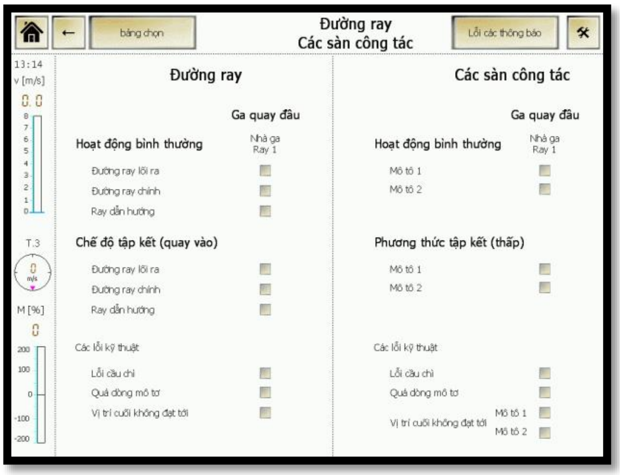
3.7.8 Rail position / Platform position

A movement of rails and platforms is only possible during the standstill of the installation.
In order that carriers cannot derail because of careless handling of the switch rail, every movement of a switch rail or a platform out of the 'normal' or 'out' end position shuts down the lift.
The switch rail and platform control system cannot be reset until all switch rails and platforms have reached a defined position (i.e. either the normal or the out end position).

Possible reasons for faults:

- One spindle motor is defective so that the correct normal end position cannot be reached.
- One switch position has changed.
  Correct 'out' end position means that the 'out' limit switch is free (1 signal) and the 'in' limit switch has been pressed (0 signal).
  Correct 'Platform up' end position means that the 'Platform up' limit switch is pressed (1 signal) and the 'Platform down' limit switch is free (0 signal).
- The relevant input card should be replaced.

By pressing the button RAILS / PLATFORMS in the main menu the following screen will be activated. On this screen the status of all limit switches for the rails and platforms can be monitored.



When the switch rail is actuated a time monitoring function will be activated which will shut down the spindle motor after an adjusted time in case the switch rail does not reach an end position within this period. Press the 'Rail on/off' switch on the remote control again to restart the motor.

3.7.9 "Carrier in front of rail"

Indicates that a carrier approaches a switch rail in the end position ”swing out” from behind. The carrier would collide with the switch rail.
To prevent this the approaching of a carrier is monitored with a proximity switch andthe lift is shut down with an emergency stop if necessary.
The “carrier approaching of rail” can be reset when the rail is in normal position.
If there is no possibility of swinging the rail to normal position the following information picture comes up after pressing the reset-button:

To acknowledge the shut-down, the button OK has to be pressed (for about 1-2s).
If it is not possible to switch the rail (e.g. the carrier is standing on the switch rail and has already been caught by the tyre conveyor), it is however possible to continue the run.

Attention: After pressing the OK button you will get no further stop from the „Carrier approaching rail“ system!

If the control of the switch rail is swiveled in when switching on and the button „Reset“ is pressed, this display appears as well and has to be achknowledged with the OK button.

3.7.10 Position tyre conveyor

The tyre conveyors (accelerator/decelerator/curved section) can only be actuated if the ropeway is at standstill, so the conveyors cannot be lifted by mistake during operation.

Tyre conveyor monitoring can only be reset when all tyre conveyors have reached a defined position (i.e. the upper or lower end position).

In case only the terminal conveyor is performed liftable (with MGD), the endpositions are not monitored. It is also possible to lift the conveyor during operating the installation, without any shutdown.

Possible faults:

- A switch position has been modified.
  Correct 'Tyre conveyor up' end position means that the limit switch 'Conveyor up' is free (1 signal) and the limit switch 'conveyor down' has been pressed (0-signal).
- Replace the corresponding PLC input card.

Press the 

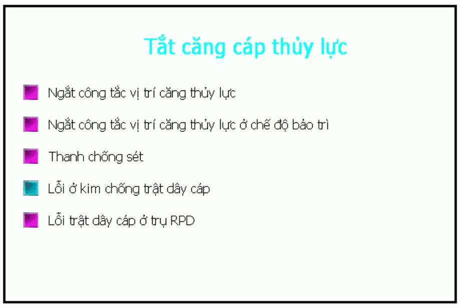
field in the 'Anti collision drive station' or 'Anti collision return station' panel to check the position of the tyre conveyors or their limit switches.

3.7.11 Rope position monitoring

After a shut-down with ‘Derail tower fault’ the location of the fault is indicated on this screen:

On installations with RPD the RPD information panel is also visible.
This panel shows the status (error messages) of the RPD system. Press the ‘+’ and ‘-‘ field to access all current error messages of the RPD system.
Detailed information can be retrieved via the RPD service menu (see description of the RPD system under item 11).

ATTENTION: When the ‘Derailing’ monitor responds, tensioning is switched off, i.e. it is not possible to re-adjust tensioning. The following message is shown on the screen:



The red-marked text indicates the reason for the switch-off of the tensioning. Additionally, it will be displayed, with which button the tensioning can be acknowledged after successful error correction.

The test switches in the control cabinet of the return station (480S1and following) have to be in the upper position while the lift runs. In the middle and lower position the power supply (24V/DC) for the break fork switches of the corresponding tower is switched off.
Refer to 3.7.12

3.7.12 Short circuit and cross circuit fault line cable

Each derailing signal (break forks) and a few control signals (Stop / Emergency Stop / Stop-EB, safety circuits OK return station) between the stations are conducted via individual cores.

The control boxes of the return station (or mid station) contain circuit boards with test switches. The test switches have to be moved to the upward position during the operation of the installation. The signal will be switched off in mid and lower position.

The signals of rope position, stop, emergency stop, stop EB and – circuit return station are going to be monitored in respect to cross circuits. Therefore, every signal core of a standard output in the return station is going to be feeded. Through switching-off of an output and subsequent monitoring of the appropriate PLC-input in the drive station by switching on 0V, a possible cross circuit will be recognized (pulsing of each signal).

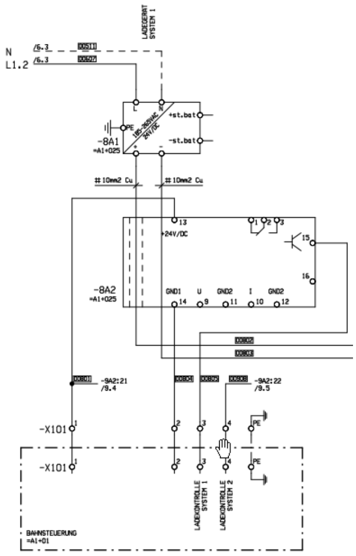
Upon recognizing the cross circuit the installation switches off with the emergency instruction “cross circuit monitoring safety circuit / rope position.” The faulty signal will be displayed in red color in the following window.

The switch-off can only be acknowledged when a fault correction has taken place.

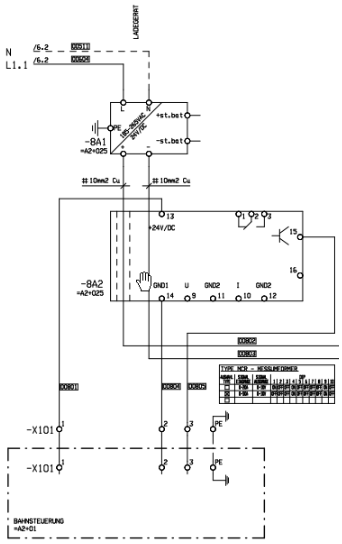
3.7.13 Charging control

3.7.13.1 Power supply 24V by battery charger and batteries

The station battery charging current is checked using a rectifier in the battery cabinet. If charging current is too low, a warning will be shown on the screen and a horn sounds. Check mains supply and/or function of battery charger.



Drive station System 1



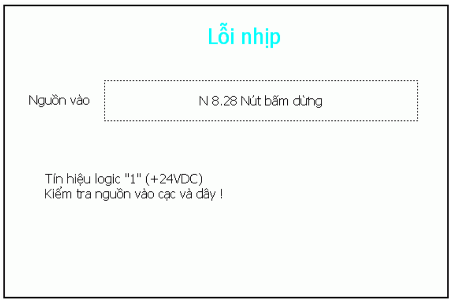
Return station

3.7.14 ST clock fault

To detect a fault in one of the standard signals, the signals are clocked.
It is possible to detect a log."1-fault" (steady 24V) and a short cut between the ST-signals:

- E 7.00 carriage limit
- E 7.12 hydr. tensioning off
- E 8.12 grip not open forward
- E 8.13 grip not open reverse
- E 8.28 stop buttons
- E 9.20 grounding rod
- E 13.27 stop SB button

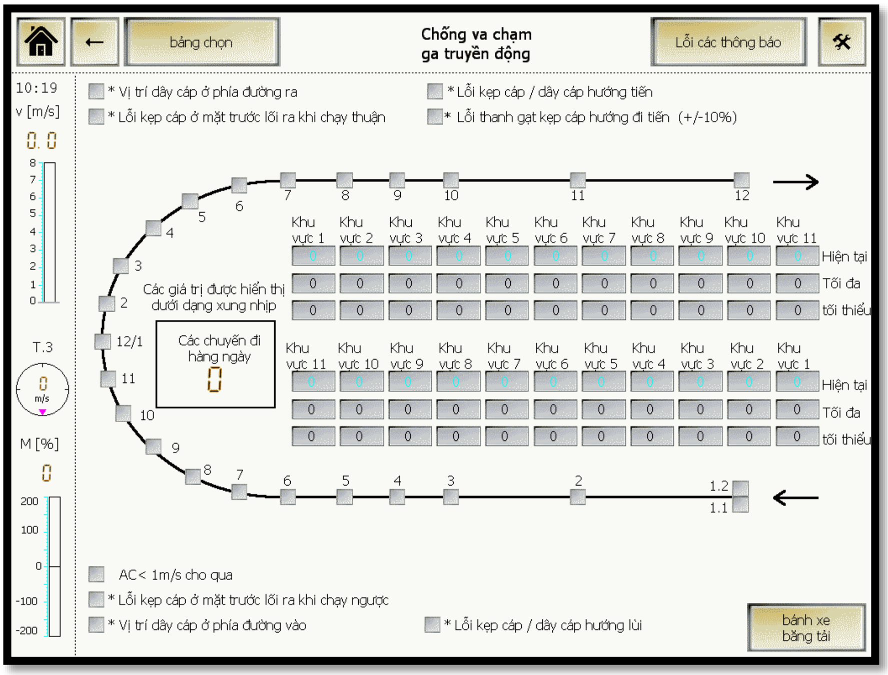
If a fault occurs on one of these signals, the installations shuts down with the corresponding command (e.g. Stop-shutdown, fault: stop buttons) and the following window is additionally shown on the screen:



The window shows the faulty ST-input of the PLC. To locate the fault first of all the corresponding input can be disconnected. If the green LED on the input card of the PLC is turned off, the fault must be in the wiring. If the LED still lights up after disconnecting the input, than the digital input card of the PLC is defective (change card).
If a clock fault occurs, the fault can be reset with the „RESET“-button. If the problem is not solved the fault will occur again after 5 minutes.

ATTENTION:
A clock fault of a signal means that the function is not working correct anymore!
(e.g. clock fault of the signal „STOP BUTTONS“ ⇒ the stop buttons of that station are not active anymore!). Operation of the lift is not allowed until the fault has been remedied.

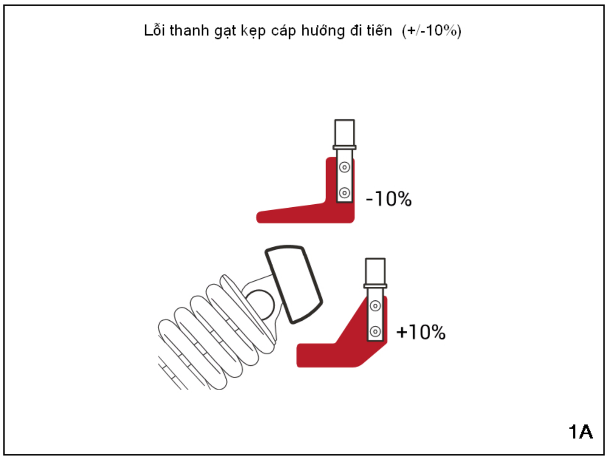
3.7.15 Safety devices



In case that one of the safety devices has responded, touch the illuminated field on the screen to access an assistance window showing those switches which led to the switch-off.

3.7.15.1 Grip lever fault forward (Rope Diameter +/- 10%)

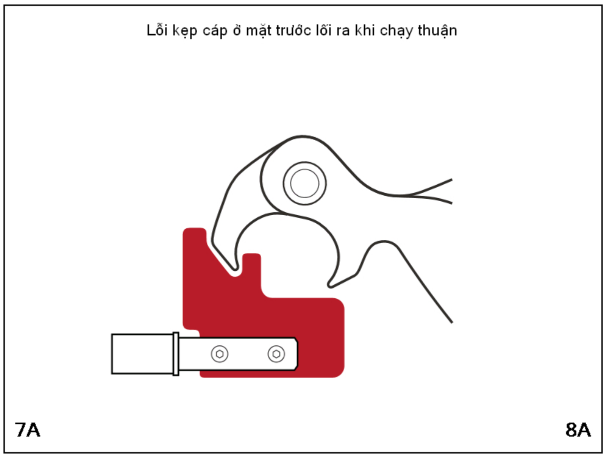
These switches monitor the position of the grip operating lever once the grip has attached to the haul rope in drive direction forward. If the grip operating lever is not in the permissible position (i.e. the grip is beyond the permissible area), one of the two grip gauges is actuated and the ropeway will be shut down.

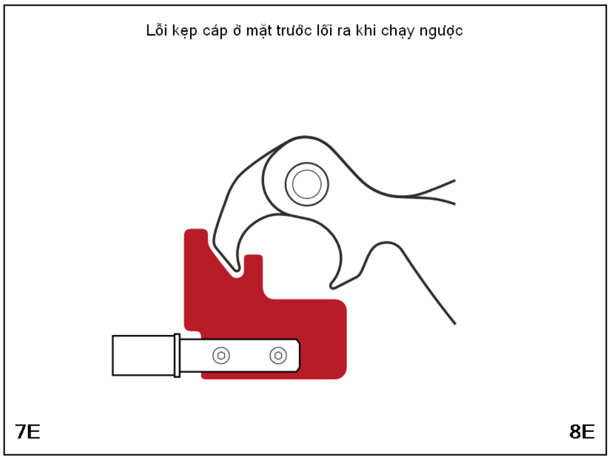


How to Proceed if Safety Devices are Activated:
If the 'Grip lever fault forward' switch has been activated, run the activating carrier back to the passenger loading or unloading area of the station. The passengers must then leave the carrier. The cause of the shutdown must be investigated and eliminated prior to resuming operation. If a fault on the carrier (grip) cannot be eliminated, the carrier must be removed from operation.

3.7.15.2 Grip Fault before Launch forward/reverse

This safety device monitors the correct position of the grip mouth before the accelerator.
In case of a faulty position (e.g. closed grip, lateral or vertical misalignment, etc.) the ropeway will be shut down.



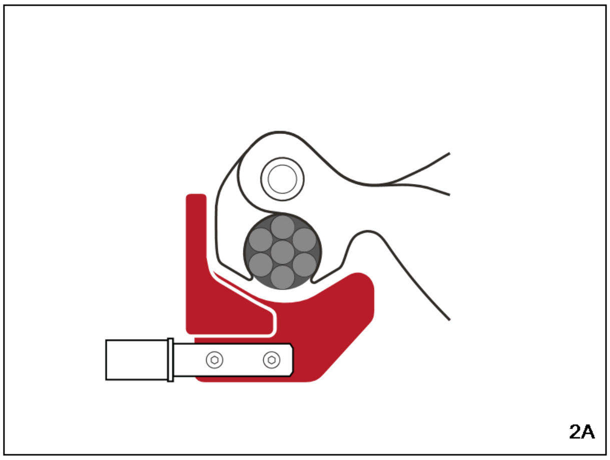


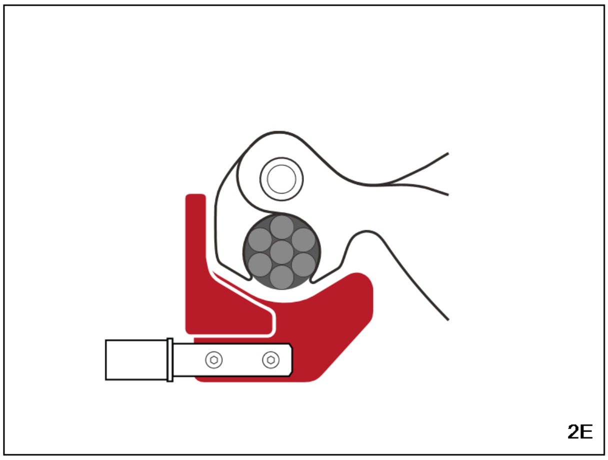
How to Proceed if Safety Devices are Activated:

If the 'Grip fault before launch' has been activated, run the activating carrier back to the passenger loading or unloading area of the station. The passengers must then leave the carrier. The cause of the shutdown must be investigated and eliminated prior to resuming operation. If a fault on the carrier (grip) cannot be eliminated, the carrier must be removed from operation.

3.7.15.3 Grip / rope fault forward/reverse

This safety device is installed on the outgoing side after and on the incoming side before the grip opening/closing line (the latter for reverse travel).
It serves to monitor geometrical changes of the grip jaws, the horizontal displacement of the haul rope, as well as vertical alterations in the rope's position (e.g. wear of the rubber liners on the entrance sheave assembly).

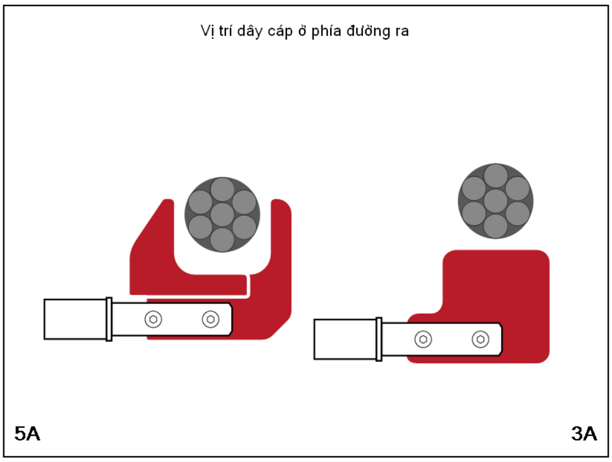


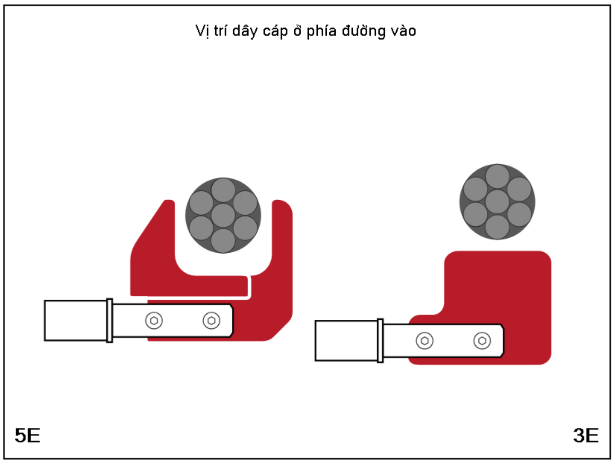


How to Proceed if Safety Devices are Activated:
If the 'Grip / rope fault' switch has been activated, run the activating carrier back to the passenger loading or unloading area of the station. The passengers must then leave the carrier. The cause of the shutdown must be investigated and eliminated prior to resuming operation. If a fault on the carrier (grip) cannot be eliminated, the carrier must be removed from operation.

3.7.15.4 Rope Position in Station incoming/outgoing

These limit switches monitor the correct vertical and horizontal position of the rope before the grip disengaging/engaging procedure.
A horizontal or vertical displacement of the rope will be detected by the respective switch gauge and causes a shut-down of the installation.



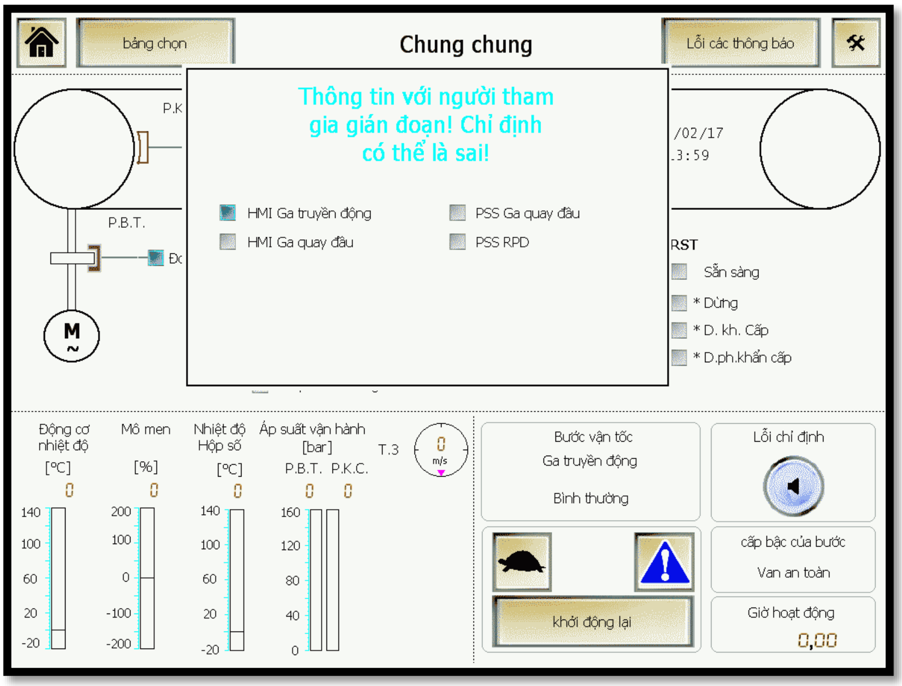


How to Proceed if Safety Devices are Activated:
If the safety device 'Rope position vertical' or 'Rope position horizontal' limit switch has been activated, the cause of the shutdown must be investigated and eliminated prior to resuming operation. In addition, check if during the shutdown the haul rope touched the gauge or the safety rail in the grip opening/closing line (check for scratches, abrasion marks in the paint, etc.). In case of a contact, visually check the respective area of the rope. Any damage to the haul rope must be inspected by the rope manufacturer and repaired.

3.8 Ethernet-connection

3.8.1 Monitoring of PSS / HMI communication

Should the communication between the HMI (screen) and the PSS (PLC) be interrupted, messages shown on the HMI are not refreshed and the user might receive wrong information (e.g. Rope OK even though a break fork was confirmed). Since this information does not permit correct evaluations of the lift system, the following message is shown on the screen:



In order to ease fault localization, the system also indicates the component of the system bus to which the connection has been interrupted.

Possible causes of communication interruption:

- Check whether the PSS is in run mode (‘0000’ on the display of the PSS)
- Check communication cables between PSS – HMI and drive station – return station
- Check DSL-modem and lightning protection devices.
- HMI and/or PSS defective.

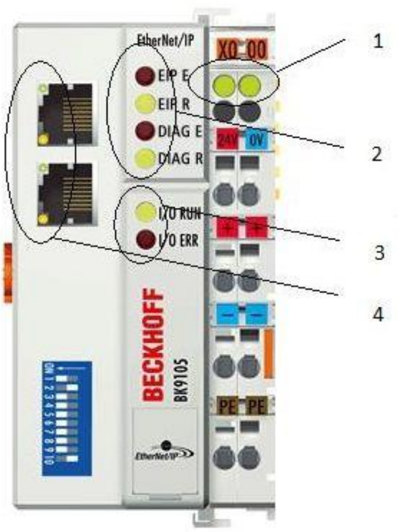
IMPORTANT:
When the communication between the HMI (screen) and the PSS (SPC) is interrupted, the information shown on the screen must not be used any longer to evaluate the condition of the lift system (e.g. messages in safety circuits, wind messages, derailing, ...)!

3.8.2 Beckhoff I/O-modules

For various installations, Beckhoff I/O-modules are used additionally.

The PSS main control system and the Beckhoff modules are connected with the Ethernet bus. The PSS monitors whether the Beckhoff modules are alive, by sending one “life bit” to each module. Within 0,5sec each Beckhoff has to answer to the PSS. Otherwise the lift shuts down with a stop command ‘FAULT ETHERNET CONNECTION BECKHOFF’.

When Beckhoff is ready the led ‘COM’ must light up permanently, otherwise the Beckhoff is not connected to the PSS main control system. The led ‘WDG’ must light up, otherwise is a “Watch Dog” fault indicated.



1. Diagnosis Power Supply
2. Diagnosis Fieldbus/WDG
3. Diagnosis K-Bus
4. Diagnosis Switch

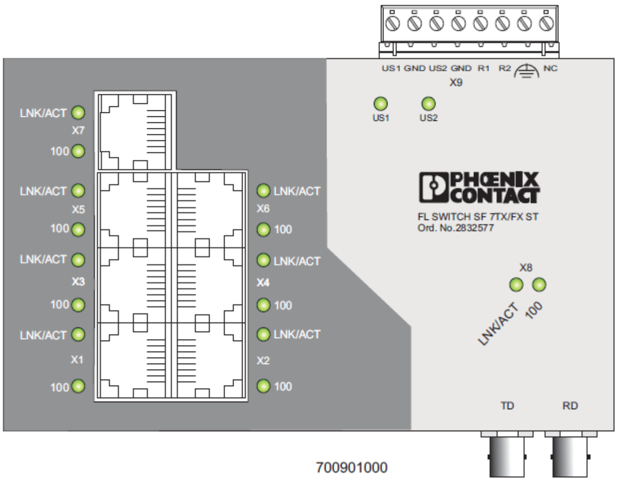
Troubleshooting:

- Check whether all Ethernet connectors are firmly tight (plug-in point).
- Check all dip switches at the Beckhoff module (refer also to the electric diagram).

3.8.3 FL-Switch (Ethernet connection over fibre optic connection between the stations)

When turning on the controls, the connection between the FL-switch of the drive and the return/mid station is build up automatically.
Depending on the lift length this can take up to two minutes!

When connection is ok, the LED ‘LNK/ACT’ straight lights up or flashes.



Once connection between the modems is ok, the PLC builds up the Ethernet communication to the return station. If the connection is not built up in a certain time, the warning “Communication with participant interrupted” appears – refer to 3.8.1
In case there is no connection between the station at all, the installation shuts down due to a communication fault.

Settings DIP-switches for lift length: refer to electric drawings

Troubleshooting:

- Check all Ethernet connectors for good connection

3.9 Safety Bus – Connection

3.9.1 Monitoring of communication

If the communication between the PSS and the other safety bus – participants (PSS or PSS universal) is stopped, the installation will be stopped with an emergency stop ‘fault safety bus’. (Refer to 3.3)

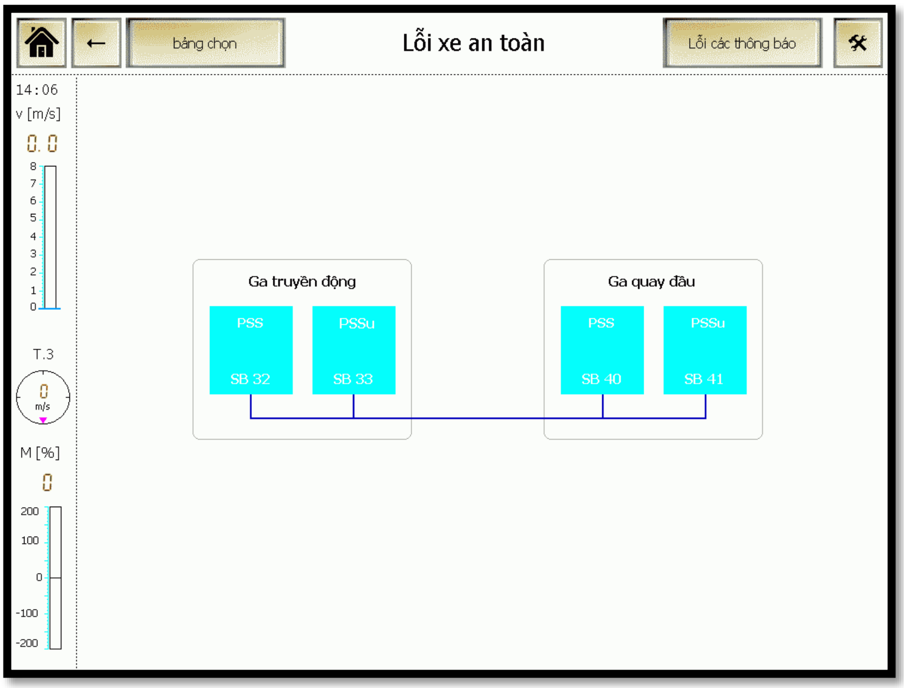
Troubleshooting:

- Check if a PSS in in stop mode.
- Check the communication medium (copper or fibre optic connection) between PSS and the other safety bus participants.
- Check the lightning protection (at installation with copper connection)
- Check the fibre optic router
- PSS or PSSunviversal defective
- A safety bus – plug faulty.

You may need to turn off the control voltage and switch it on again after about 10 seconds to rebuild the connection between the participants of the safety bus.

3.9.2 Safety Bus Status

When the button SAFETYBUS STATUS in the main menu is pressed, the following picture appears:



In this picture it can be observed which participants can not be reached or in case of a fault which participants cannot be reached. Participants will be displayed in yellow when they are active. Participants will be displayed in red when they are not active.

3.10 Logic fault two-channel evaluation

Safety devices with higher required class, e.g.: Emergency stop buttons, Maintenance lock out or Bullwheel position, are monitored by 2 channels with NC contacts. Both channels have to give the same feedback to the PLC.
If only one channel has been interrupted, the fault Logic fault two-channel evaluation appears.
Possible causes are cross-circuits in the wiring or a faulty switch contact.

To reset the fault both channels have to be on 0 and then on 1 again. Only when both channels are clear, the fault is clear for a reset.

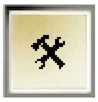
4 INDICATION AND OPERATIONAL DEVICES

4.1 Indications on the touch screen

After the control voltage has been switched on, the general overview appears automatically on the display.

4.1.1 Heading line

Heading line shows some important operating values and common used buttons for fast operating with the touch screen.

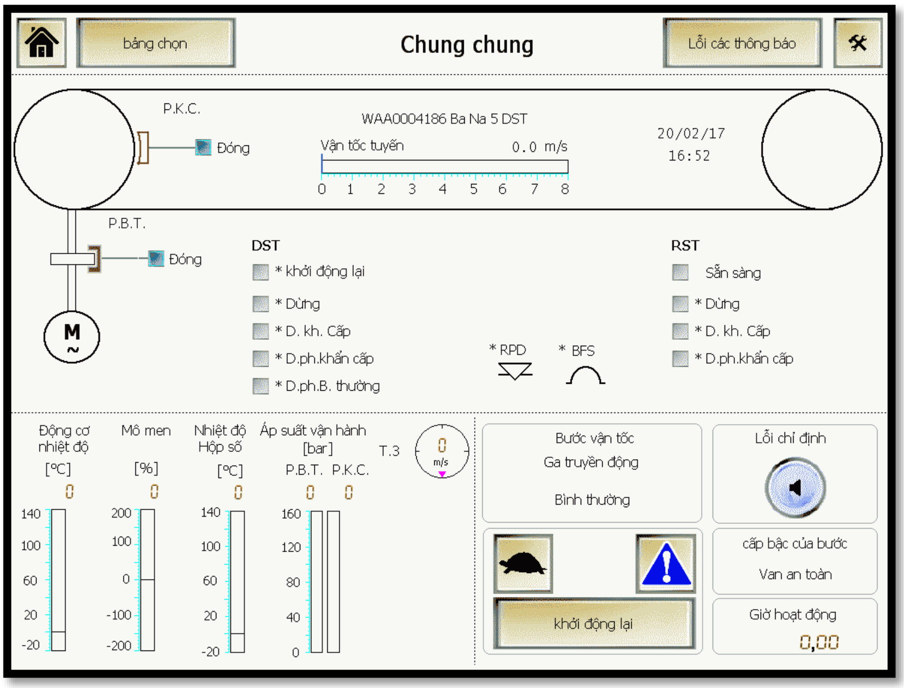
Indication	Description
	By pressing this button the „general“ screen is called up. This button can be pressed on each picture.
	By pressing this button the „menu“ screen is called up. This button can be pressed on each picture.
	By pressing this button all actual faults are indicated on the screen (selected by safety circuits). This button can be pressed on each picture.
	By pressing this button the service menu can be entered. Additionally the language can get changed. This button can be pressed on each picture.
Indication rope speed	The actual rope speed is indicated. In drive direction forward the indication bar is blue, in direction reverse the bar is red.
Indication Torque / Armature current	The actual torque (AC-drive) or armature current (DC-drive) of the main motor is indicated.
Wind speed Wind direction	Indicates the actual wind speed and direction,

4.1.2 Main menu

After pressing the button MENU the following screen will be displayed on the touch screen:

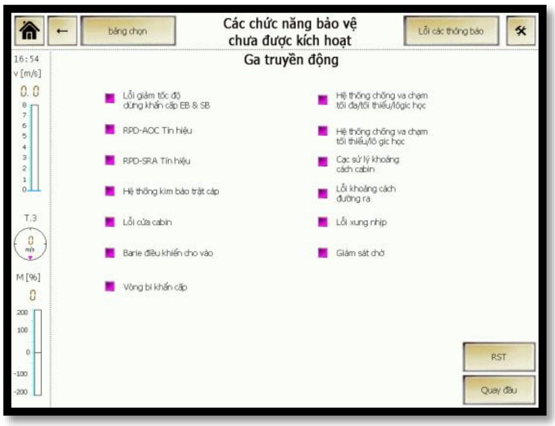
By pressing the buttons in the main menu, the display changes into these submenus. The following descriptions will give more detailed information:

4.1.3 General

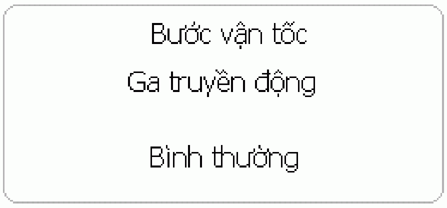
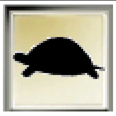
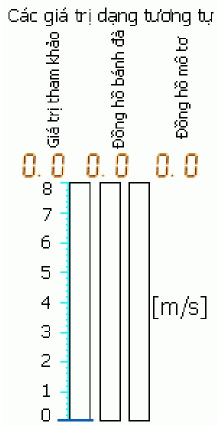


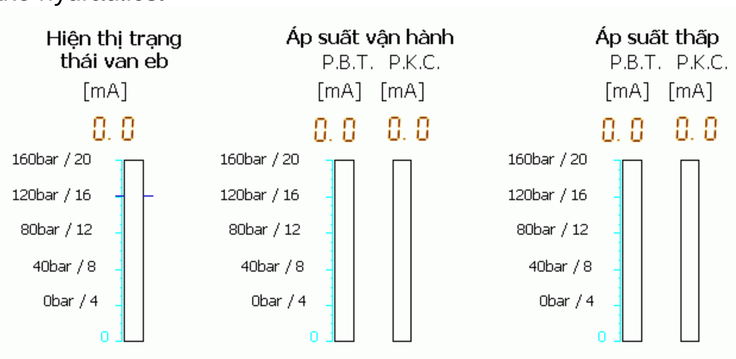
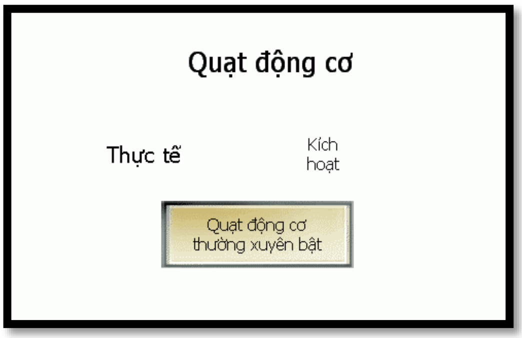
Indication	Description
Reset	Indicates that the control circuits "stop", "emergency stop", "stop-SB" and "stop-EB" are functioning and can be activated with the "reset" button.
Ready	Indicates that the return station is ready to run. This signal is active for 10 - 15 seconds, then the return station must request the Ready signal again.
Run	Lights up instead of the Reset lamp when the installation is in operation.
Stop Emergency stop Stop-SB Stop-EB	Indicates a shutdown in the relevant safety circuit. The exact reason for the shutdown is shown in the corresponding safety circuit screens.
Emergency brake open Emergency brake closed	Limit switches on the emergency brakes are indicating if the brakes are opened or closed.
Service brake open Service brake closed	Limit switches on the service brakes are indicating if the brakes are opened or closed.
Oil cooler	If a fault occurs in the oil cooler, the button oil cooler lights up red. Refer to 5.1

<table>
<tr><td>Acoustic warnings

</td><td>Indicates all faults that cause just an acoustic warning and no shutdown of the installation (refer to 3.6). It closes when pressing the display.</td></tr>
<tr><td>Protective function deactivated
</td><td>Reports that an operation mode or an operating status was selected, where one or more safety functions are automatically deactivated. (e.g. operating mode drive or return station unmanned, drive reverse, upper tire conveyor,...).
A list with affected functions can be accessed by touching the top left-hand corner of the screen.

</td></tr>
<tr><td>Wind</td><td>In addition to the acoustic warning, a fault of a wind direction or wind speed sensor respectively a fault in the wiring of these components (power circuit 4 – 20 mA interrupted) is indicated by the text of the affected sensor blinking in red.</td></tr>
<tr><td>Wind speed
Wind direction</td><td>Indicates the actual wind speed and direction, and the max. recorded windspeed. By pressing on the field of the wind speed or direction, the following window will appear. It is now possible to reset the max. recorded wind speed. When the screen is touched outside this field, it closes.

</td></tr>
</table>

Speed step	Indicates if one of the slow steps is activated and which station the slow step has activated. 
Creep speed	 If the turtle is pressed , the following window will appear. It is now possible to activate and deactivate the creep speed (0.3 m/s). When the screen is touched outside this field, it closes. 
Indication rope speed	The actual rope speed is indicated. In drive direction forward the indication bar is blue, in direction reverse the bar is red. By touching the Rope speed indication at the display the following window appears:  In this window the analogue values of the rope speed splitted in Reference Value, Bullwheel Tacho and Motor Tacho are displayed.
Indication rope speed	The actual rope speed is indicated. In drive direction forward the indication bar is blue, in direction reverse the bar is red.
Indication gearbox temperature	The actual gearbox temp. is indicated. The registration of the temp. is done with the sensor on the gearbox.
Indication motor temperature Indication motor bearing temperature	The actual motor temperature is indicated. The registration of the temp. is done with a PT100 sensor in the motor.

Indication Torque / Armature current	The actual torque (AC-drive) or armature current (DC-drive) of the main motor is indicated.
Indication working pressure service brake	The actual working pressure of the service brake is indicated.
Indication working pressure emergency brake	The actual working pressure of the emergency brake is indicated.
Additional display brake pressure	By touching the display operating pressure service brake or emergency brake one will see the additional display of all five pressure transducer of the brake hydraulics. 
Motor fan	By touching the display MOTOR TEMPERATURE the following window appears:  With this button the operating mode can be switched between AUTOMATIC and PERMANETLY ON.

4.2 V I t (brake curves)

If V_I_t is pressed, the brake curves are displayed. The upper diagram represents a curve showing the relation between torque and time after an electrical stop (stop, emergency stop) and the relation between operation pressure of the service brake and the time after a mechanical stop (stop-SB, stop-EB, stop-EB+SB). The diagram below represents a curve showing the relation between speed and time.

When 

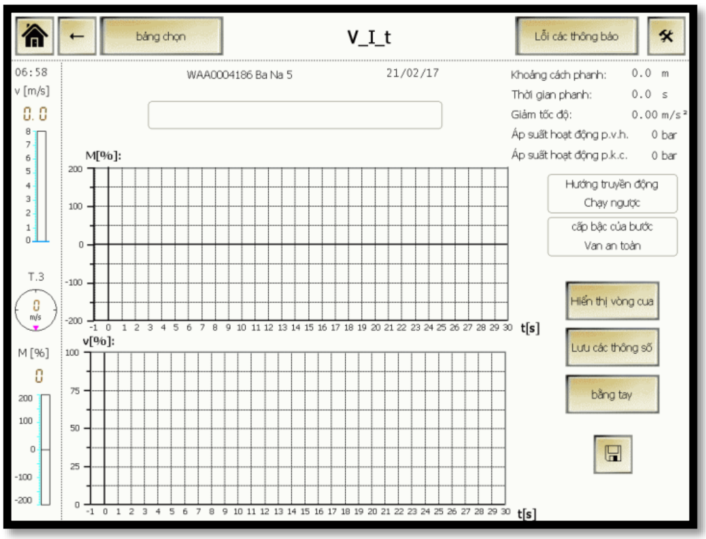
is pressed, the curves can be saved after entering the password. The saved curves can be displayed on the screen at any time by pressing 

or 

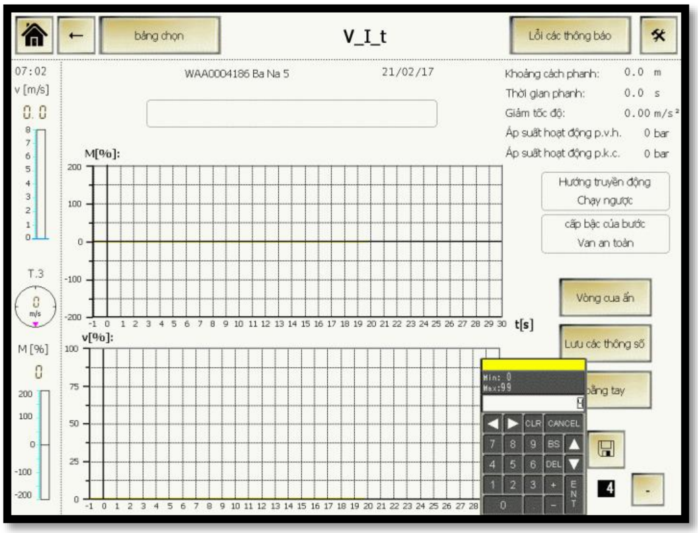
, and compared with the actual curves. It is possible to save a separate reference curve for all types of stops:

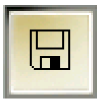
- STOP
- EMERGENCY STOP
- STOP SB – stepped (regulated)
- STOP SB – blocked
- STOP SB – safety valve (fast action valve)
- STOP EB
- STOP EB+SB – stepped (regulated)
- STOP EB+SB – blocked
- STOP EB+SB – safety valve (fast action valve)

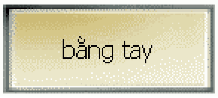
By activating the key switch 2 buttons (+/-) will appear, with which it is possible to adjust the test numbers for the brake test.



Touch the test number (next to the +/- buttons) to open a number pad, where you can enter the test number directly.

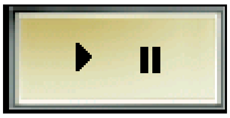


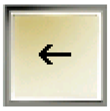
Press the  symbol to save the current display on a USB stick.

Press the button 

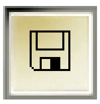
to display a window for recording a torque-speed diagram. In that window it is possible to record e.g. an acceleration/deceleration curve.

On installation with two motors the torque of both is displayed..

The torque and speed is recorded all the time. By pressing the button  the record can be stopped.During that the torque and speed is still recorded in the back.

With the buttons  and  the the view oft he curve can be moved on the time axle. Next to the arrows the start and end time of the actual shown curve is displayed. On the screen a maximum of 200sec are shown.

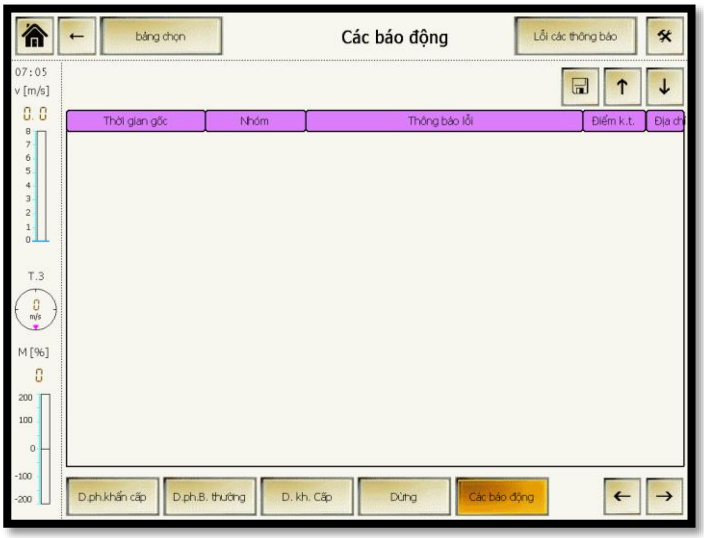
With the buttons  and  the view can get enlarged or minimized.

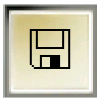
Press the  symbol to save the current display on a USB stick.

4.3 Fault messeages / Alarms

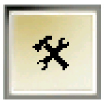
By pressing the button fault meassages all actual faults are indicated on the screen (selected by safety circuits). This button can be pressed on each picture.

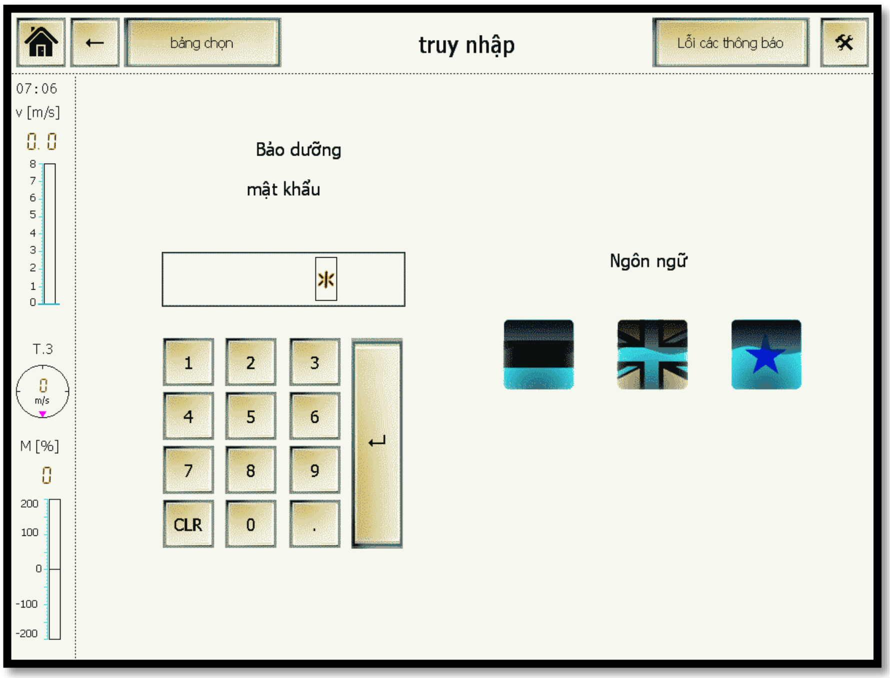
When ALARMS is pressed, a list of errors which have occurred is displayed. Information about when the error occurred (date and time) and what the error was can be obtained.



Press the  symbol to save the current display on a USB stick.

4.4 Service

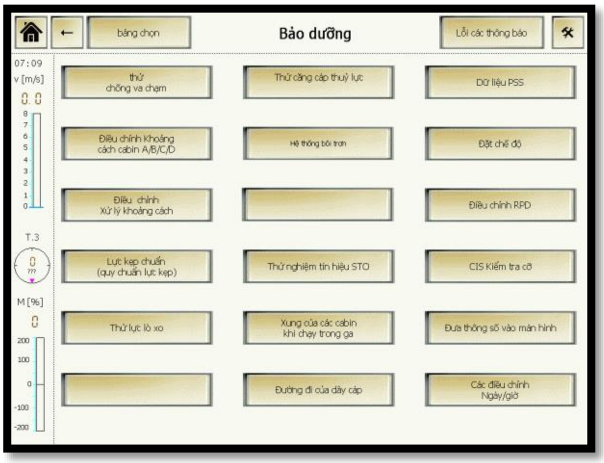
When  is pressed, the system asks for a password. Additionally the language can get changed. (Just outside the German-speaking).



When the password has been entered, the following appears on the screen:

Drive station:

Return station:



In this picture can be seen, among other things, when the last transmission of the failsafe software was performed by Doppelmayr.

4.4.1 Tests Anticollision

When TESTS ANTICOLLISION is pressed, checks regarding the anti-collision system can be carried out (refer to 9.5).

4.4.2 Test functions drive

When TEST FUNCTIONS is pressed, checks on the power converter can be carried out (refer to point 6.2).

4.4.3 Adjustment carrier spacing A/B/C/D

When ADJUSTMENT CARRIER SPACING A/B/C/D is pressed, one of the fix programmed carrier distances (A, B, C or D) can be chosen. (refer to 8.2).

4.4.4 Adjustment processor spacing

When ADJUSTMENT PROCESSOR SPACING is pressed, it´s possible to test the motor of the processor spacing with the simulation and the tolerance for the processor spacing can be enered (refer to 8.3.1)

4.4.5 Adjustments wind warning

When ADJUSTMENTS WIND WARNING is pressed, the different limit values for wind warning and wind alarm can be entered (refer to 7.3).

4.4.6 CIS calibration

When CIS CALIBRATION is pressed, the Carrier Indicating System can be calibrated (refer to 12.2).

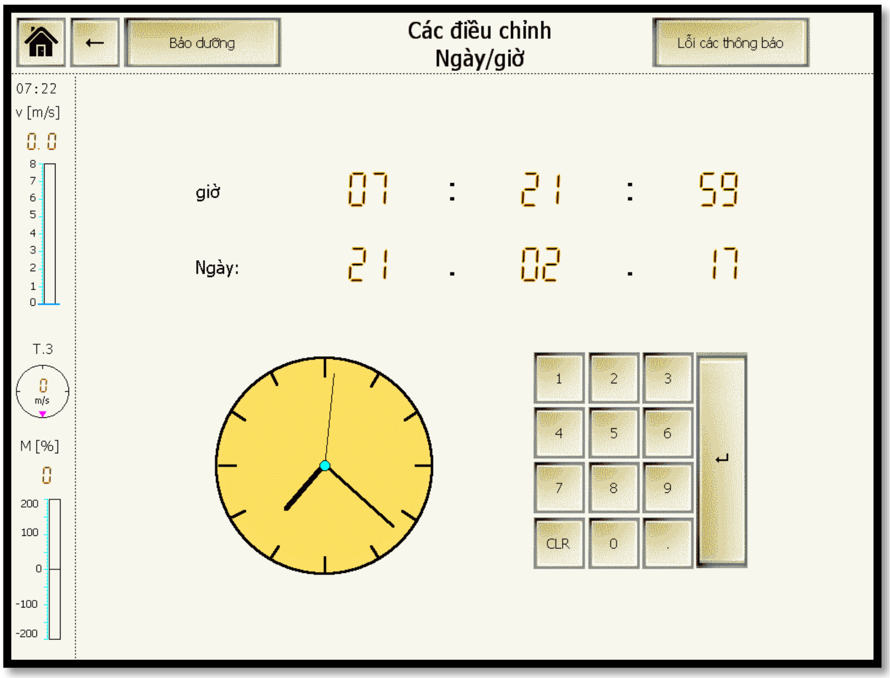
4.4.7 Calibration grip force

If GRIP FORCE CALIBRATION is pressed grip force testing unit can be calibrated (refer to 10.3).

4.4.8 Grip force test

If GRIP FORCE TEST is pressed, grip force testing unit can be checked (refer to 10.5.1).

4.4.9 Adjustments date/time



When ADJUSTMENTS DATE / TIME is pressed, the time and the date can be set.

4.4.10 Rope travel counter

There are two independent rope travel counters in the system. The field TOTAL ROPE TRAVEL indicates the entire rope travel in km. The distance the rope travels is added up both during forward and reverse travel. TOTAL ROPE TRAVEL can be reset to zero by pressing the RESET-button on the control cabinet and on the touch screen simultaneously (key switch TEST MODE must be switched on).

The other counter (field ROPE TRAVEL) shows the distance the rope has travelled either in meters (max. approx. 3000 m) or in impulses (max. approx. 9800 Imp). To change between meters and impulses press on the field once. The rope travel is added up in forward mode and subtracted in reverse mode.
This counter serves for locating specific points on the rope in relation to a reference point during rope tests. Reset by pressing RESET on the touch screen (the key switch TEST MODE must be switched on).

4.4.11 Brake flushing

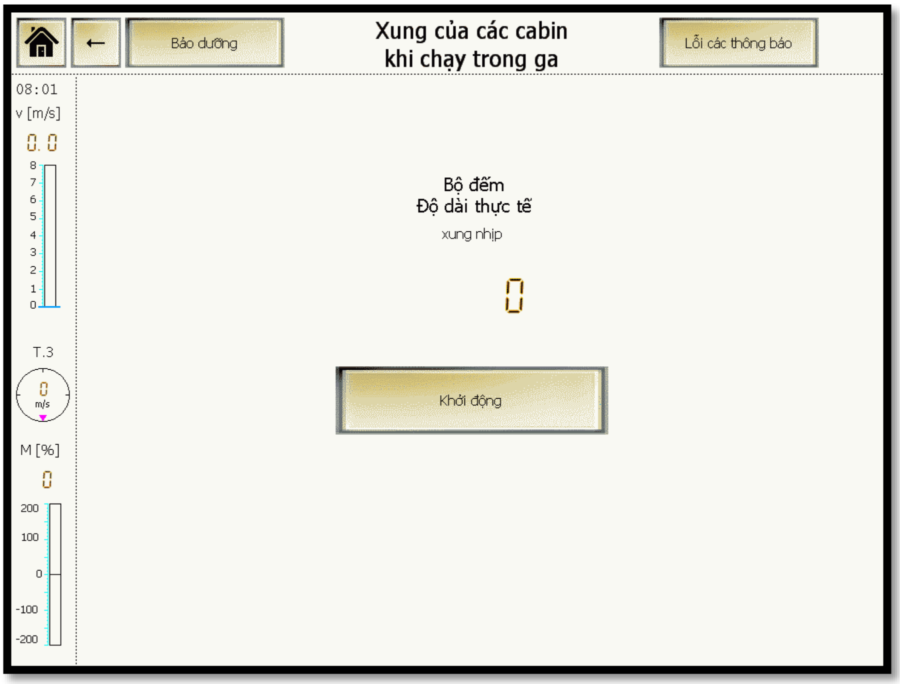
Refer to 5.3.1

4.4.12 Settings

Press the field SETTINGS to read out the system-specific parameters programmed in the control.

4.4.13 Impulses of carrier passing through station

When this field is pressed, it is possible to count the impulses that one carrier needs to travel trough the station.



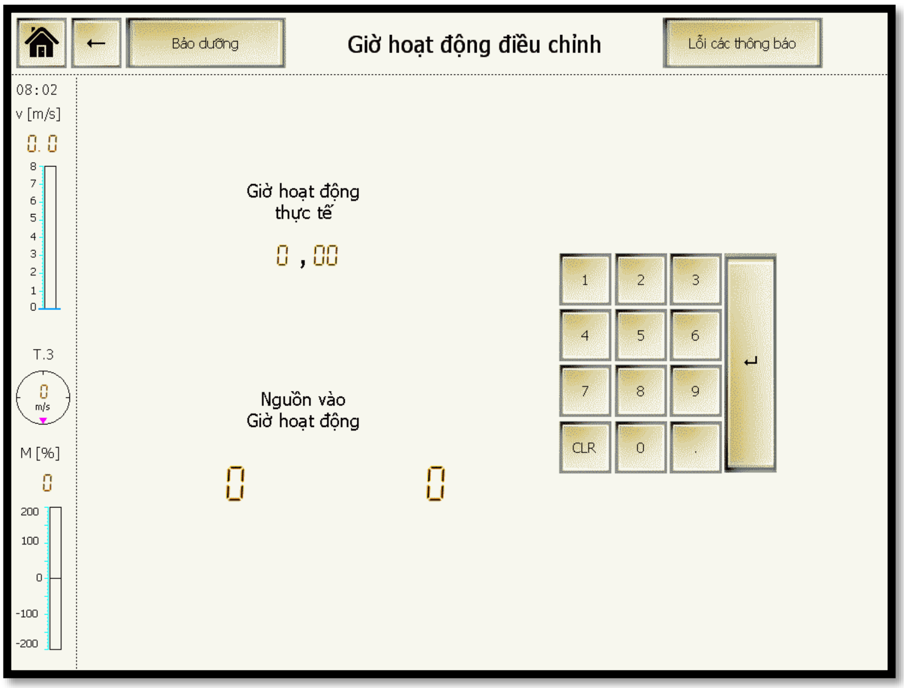
Start of measurement:

- Key switch TEST MODE → on
- Push the button START
- The text on the button changes to STOP/SAVE COUNTER
- The next incoming carrier starts the measurement when the first incoming proximity switch is activated.
- Push the button STOP/SAVE COUNTER until the carrier has passed the prox. shortly before the carrier, which has started the measurement, reaches the last outgoing proximity switch. The measurement will be stopped and the counter will be saved.

4.4.14 Test hydr. tensioning

When TEST HYDR. TENSIONING is pressed, the tests on the hydr. tensioning unit can be done (refer to 5.2.4).

4.4.15 Adjustment Operation Hours



The operating hours are recorded by the hardware (counter in the power converter cabinet resp. frequency converter cabinet) and the software (display).
By pressing the OPERATING HOUR SETTINGS field, the software counter can be adjusted resp. brought in line with the hardware counter.
This is required for instance if the CPU has been replaced (the count of the software counter does not match the count of the hardware counter any more).

4.4.16 PSS data

Refer to 15.

4.4.17 Load simulation with main drive for service and emergency brake

4.4.17.1 General:

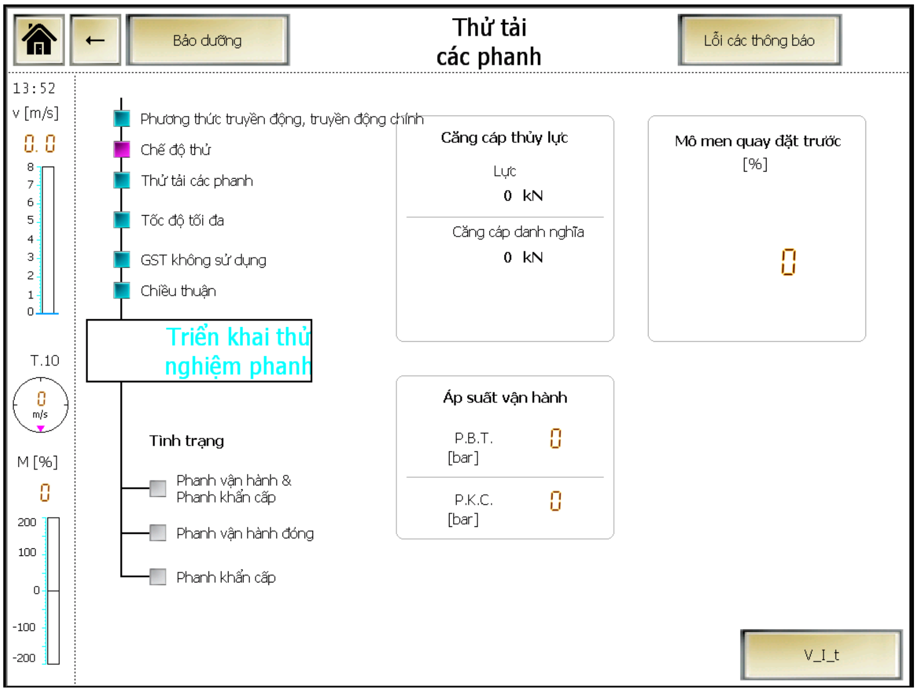
This function serves to check the effect of the individual mechanical braking systems. For this, the brakes (emergency brake/service brake/service and emergency brake) are closed at full operating speed and operation of the main drive is continued with a fixed constant torque. The brake process is recorded (deceleration, distance and time) and the 'current stopping distance' is compared with the "limit value for stopping distance'.

The torque for the main drive as well as the reference values for the stopping distance for each individual braking system are determined and documented during the first load tests or on the occasion of the commissioning by the technician in charge of the commissioning. The torque value is saved in the control system.

Load tests with loaded carriers must be performed regularly (for the interval see the check list in the operation and service manual for the brakes). Once the load tests have been completed with success, the load simulation must be performed immediately for each braking system and the stopping distances must be determined. These reference values serve as 'limit values for stopping distance' until the next regular performance of the load tests.

The test has to be executed with all carriers (all carriers on the rope unloaded and with normal spacing).

4.4.17.2 Course of the test:



- Turn rotary switch "Drive mode" in position <MAIN DRIVE>
- Turn key switch „Test mode“ in position <ON>
- Select the operation mode „return station unmanned“
- Turn rotary switch "drive direction" in position <FORWARD>
- The actual tension force has to be within +/-2% of the nominal tension force. If the actual tension force is out of this range a warning is indicated. In this case the tension force has to be readjusted.

- Start the installation and operate with full speed
- Turn the key switch “load test” in the panel to position <BRAKES>
- Press the stop-SB button (for testing the service brake) or stop EB-button (for testing the emergency brake) or stop-SB and stop-EB button together (for testing the service and emergency brakes) in order to start the test
- During the test, the actual torque of the main motor is compared to the entered target torque. If these values don´t match, the test is aborted and the following message on the screen appears:

Chú ý

Giá trị thực tế của Mô-men quay
không bằng
giá trị chuẩn của mô-men quay!
Giá trị đo không hợp lệ!

- The message will disappear when the key switch for starting the test is switched to position ‘0’.
- Insert the values into the “periodical test protocol” (protocol see operation and maintenance manual for drive and brakes)

4.4.18 Load simulation with main drive for the emergency drive

4.4.18.1 General:

This function serves to check the output of the emergency drive motor. For this, the emergency drive is operated with or against the main drive. A torque is generated with the main drive (counter-torque for uphill load resp. support torque for downhill load). This torque serves to simulate the load.

The test has to be executed with all carriers (all carriers on the rope unloaded and with normal spacing).

The reference values of the torque for main drive are determined and documented during the first load tests or on the occasion of the commissioning by the technician in charge of the commissioning. The reference values are determined as torque difference between the load cases 'empty carriers' and 'loaded carriers' (uphill load and, if provided, downhill load). In case of load simulation with the main drive for the emergency drive, these reference values are given to the main drive by the controls. The main drive then operates with (downhill load) or against (uphill load) the emergency drive during the function test.

4.4.18.2 Procedure for testing the emergency drive when operating the ropeway against or with the main drive:

- Activate the test for the emergency drive via a selector switch in the control panel.
- Turn key switch „Test mode“ in position <ON>
- Call-up the frame “Testing the Emergency Drive with the Main Drive” on the screen.

- Turn rotary switch "Drive mode" in position <EMERGENCY DRIVE>
- Start the stop-circuit of the emergency drive
  ATTENTION: The functions of the stop-circuit must not be deactivated.
  The following functions must be activated:
  - Emergency stop and stop-EB as well as safety circuits of all stations
  - Grip operating monitoring of all stations
  - Overspeed control
  - Variation tension force
  - Boost pressure
- Put the rpm of the emergency drive to maximum-rpm
- Press button „Reset“. If the reset conditions for the main drive are met, safety circuits can be reset.
- If the start conditions for the main drive are met, the installation can be started with the button “Run”.

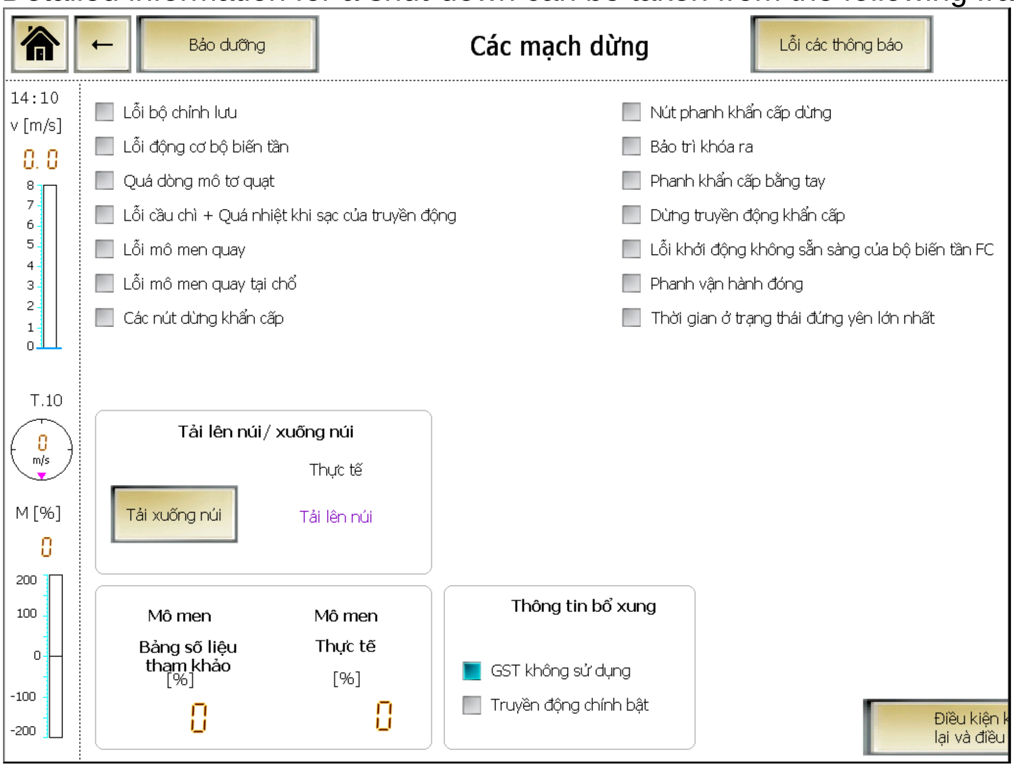
- The motor can stop / be stopped due to the following functions:

  AC Drive:
  - Fault regenerative rectifier unit
  - Fault motor inverter unit
  - Fuse fault + Overtemperature charging resistance drive

  DC Drive:
  - Fault SCR unit
  - Overtemperature drive motor
  - Fuse fault drive
  - Overcurrent thyristor fan

  General:
  - Overcurrent motor fan
  - Torque fault
  - Torque surge fault
  - Emergency stop and stop-EB-button of the drive station
  - Maintenance lockout switch of the drive station
  - Emergency brake manual operation
  - Stop circuit of the emergency brake
  - Service brakes closed
  - maximum duration of standstill

  Detailed information for a shut-down can be taken from the following frame:



-

4.4.18.3 Testing the start load and the constant load at uphill load:

- Select "uphill load" on the screen in order to generate a negative torque (motor operates against the direction of the emergency drive).
- Start the motor and increase the torque of the main drive with the set value potentiometer until the determined reference value for starting the installation is reached.
- Within 30sec after having started the main drive, the installation has to be started with the emergency drive.
- Full speed has to be reached and kept.
- When having reached full speed, with the set value potentiometer the torque has to be reduced to the determined reference value for continuous duty.
- Operate the emergency drive with this counter torque for a complete ropeway length.
- In order to complete the test turn the set value potentiometer slowly to 0-position and stop the installation with the emergency stop button.
- The test was successful if the emergency drive is able to raise to full speed at the respective counter torques and operates without fault during the testing procedure.
- Insert the test result into the „test protocol emergency drive" (protocol see operation and maintenance manual for drive and brakes).

4.4.18.4 Test for constant load at downhill load (only for installations with downhill load):

- Select „downhill load" on the screen in order to create a positive torque (main drive operates with the direction of the emergency drive)
- Start the motor and increase the torque of the main drive with the set value potentiometer until the determined reference value for constant load is reached (M7).
- Within 30sec. after starting the main drive, the installation must be started with the emergency drive.
- Full speed must be reached and kept.
- Operate the emergency drive with this supporting torque for a complete ropeway length.
- In order to complete the test turn the set value potentiometer slowly to 0-position and stop the installation with an emergency stop button.
- The test was successful if the emergency drive is able raise to full speed but does not exceed the speed and operates without fault during the entire testing procedure.
- Insert the test result into the „test protocol emergency drive" (protocol see operation and maintenance manual for drive and brakes).

4.4.19 Adjustments RPD

When ADJUSTMENTS RPD is pressed, some adjustments for the RPD System can be changed. (refer to 11).

4.4.20 Screen adjustments

By pressing SCREEN ADJUSTMENTS, the following functions can be performed:

4.4.20.1 Reset/Run automatically

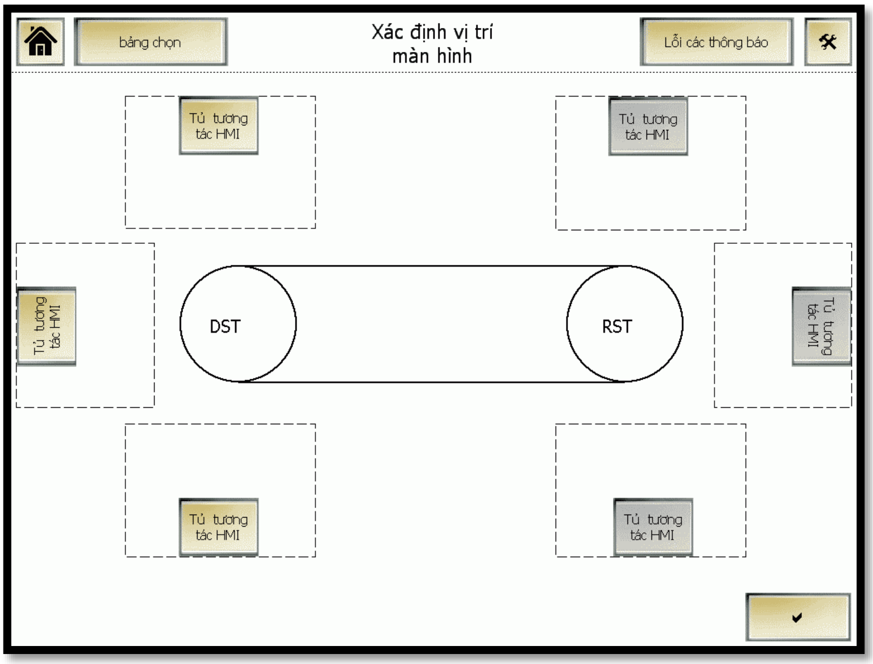
When this function is chosen every time when a rest- or run button is pressed and in the same time a reset- or a run- condition is missing, the screen is switching automatically to the window „Reset-/Run- Condition".

4.4.20.2 USB Boot

This fuction is needed, when an update via USB- stick is sended by Doppelmayr. Details to this will be sent together witch the USB- stick.

4.4.20.3 Screen position define

With this function the screen position to the ropeway geometry can be defined. Then the screens for example for the anti collision and the regualtions can be displayed correctly.



With the symbol „✓“ this selection must be confirmed.

4.4.20.4 Fault messages automatic

When this function is chosen every time when a fault occurs the screen is switching automatically to the window „Fault messages“.

4.4.20.5 Adjustments Date/Time

When this function is pressed, the time and the date can be set.

4.4.20.6 Change service password

By pressing CHANGE SERVICE PASSWORD, a numerical keyboard will appear with the help of wich a new password can be entered. The new password must be repeated for confirmation.

4.4.20.7 Offlinemenu

By pressing OFFLINEMENU internal HMI adjustemnts can be carried out.

4.4.20.8 Restart

Press RESTART to restart the screen.

4.4.20.9 Select Station

With this function the location of the screen can be defined (DST, RST, MST, DESKTOP CONTROL PANEL). With the symbol „✓“ this selection must be confirmed.

At the screen the adjusted IP adress of the actual screen is displayed. If the IP address does not match with the desired selection, the following message is displayed:

4.4.21 Test STO-Signal

By pressing the field TEST STO-SIGNAL in the service menu, the correct function of the Safe-Torque-Off for station conveyors can be tested.

4.4.21.1 Test STO-Signal station conveyor

By pressing the testbutton the start signal for the frequency convertors of the station conveyors is set. Because no Safe-Torque-Off signal is activated, the station conveyors arn`t allowed to start.

Course of the test:

- The installation must be in standstill
- Turn the key switch „Testmode“ in position <ON>
- Press the button TEST STO-SIGNAL at the screen
- Make sure that the no motor starts and no operation feedback of a frequency convertor is shown at the screen
  Please note: At the panels of the particular convertors a warning occurs that the drive cannot be started.

4.5 Indications on the Control Cabinet

All lamps can be checked with the light test button on the mimic diagram

Lamp	DST	RST	Description
Controls on	X	X	Indicates that the control voltage is on, controlled via 24V control voltage.
Stop return station	X		"Stop"-shut down from the return station.
Emergency stop return station	X		"Emergency stop"-shut down from the return station.
Stop-EB return station	X		"Stop-EB"-shut down from the return station.
Σ fuse fault	X	X	Indicates that a circuit breaker has tripped.
Load break switch "ON"	X		Indicates the position of the load break switch in the low voltage distribution panel.
Main contactor 1 "ON" / Motor contactor 1 “ON”	X		Indicates the switching state of the main contactor in the power converter- or frequency converter unit.
Main contactor 2 "On" /Motor contactor 2 “ON”			Indicates the switching state of the main contactor in the power converter- or frequency converter unit.
Release Drive 1	X		Indicates that the motor converters of the drive 1 are ready for run.
Release Drive 2			Indicates that the motor converters of the drive 2 are ready for run.
Zero speed	X		The bullwheel tacho indicates that the lift has reached minimum speed (< 0,2 m/s).
Watch Dog - FS	X	X	Indicates a system error in the fail safe part of the PLC.The error messages can be read at the display of the CPU (refer to 3.7.2).
Watch Dog - ST	X	X	Indicates by continuous illumination a system error in the standard part of the PLC. The error messages can be read at the display of the CPU (refer to 3.7.2) Indicates by flashing that after a restart of the controls the communication to the other stations or to other communication partners is not built yet or that after a restart of the controls a fault in the cross circuit in the line cable is monitored. (Refer to 3.7.12)
Emergency brake open Emergency brake closed	X		Limit switches on the emergency brakes are indicating if the emergency brakes are open or closed.
Service brake open Service brake closed	X		Limit switches on the service brakes are indicating if the service brakes are open or closed.
Stop	X	X	Indicates a stop-shut down.
Emergency stop	X	X	Indicates an emergency stop shut down.
Stop-SB	X		Indicates a stop-SB-shut down.
Stop-EB	X	X	Indicates a stop-EB-shut down.
Reset	X		Indicates that the control circuits "stop", "emergency stop", " stop-SB" and "stop-EB" are functioning and are activated with the "reset" button.
Ready	X		Indicates that the return station is ready to run.
Run	X		Indicates that the lift is in operation.
Desired zero speed	X		Indicates that the reference value for the thyristor / frequency converter has reached 0 (required for running the lift).
Windwarning	X		Indicates that the windspeed has exceeded the windwarning level. At the same time an acoustic signal sounds.
Windalarm	X		Indicates that the presented value of the windspeed is exceeded. At the same time an acoustig signal sounds and the lift slows down to speed step slow 2.

Zero speed (motor tacho)	X		The motor tacho indicates that the lift has reached minimum speed (< about 0,2m/s).
Activation feedback	X	X	Indicates (lights up) when all proximity switches have been activated by a carrier.
Operational check	X	X	Indicates that not all proximity switches have been activated. To start the installation (operation mode with passengers) the anti collision system has to be activated. To activate the anti collision system, a carrier has to pass the complete station (incoming and outgoing) and this carrier has to activate every prox. switch of the anti collision system. The key switch "override function" must be held until at least one carrier has completely travelled trough the incoming and outgoing sides. Press "reset anti collision system". After starting the installation the operating staff should carefully monitor the carriers entering and leaving the station. The key switch has to be hold until the green LED "activation feedback" lights up and a buzzer signal sounds. The lift speed is limited to 2.5m/s.
RPD SRA RPD ACO	X X		Indicates directly the incoming SRA and AOC signals from the line (RPD-system).

4.6 Operation devices on/in the control cabinet and on the remote control panel

4.6.1 Key switch brake tests (226S1)

Prior to carrying out load tests the TEST MODE switch must be turned to ON. Switch 226S1 is located in the control cabinet.

When TEST MODE is switched to ON, the max. speed during reverse operation is no longer limited to slow 2.

Effect	Switch position 226S1 (SB stepped)	Switch position 226S1 (SB regulated)	Push the following buttons
SB remains open EB remains open (coasting)	BLOCKED	BLOCKED	Stop-SB
SB stepped/regulated EB remains open	STEPPED	NORMAL	Stop-SB
SB not stepped/reg. EB remains open	CLOSE	CLOSE	Stop-SB
SB remains open EB closes immediately	NORMAL	NORMAL	Stop-EB
SB stepped/regulated EB closes immediately	STEPPED	NORMAL	Stop-SB + Stop-EB (simultaneously)
SB not stepped/reg. EB closes immediately	CLOSE	CLOSE	Stop-SB + Stop-EB (simultaneously)

ATTENTION:
A start of the safety circuits is only possible, when this switch for the brake tests is in NORMAL OPERATION (brake step control / brake regulation on)! (refer to 3.1.1)

To do the brake test the installation should be in ”Return station unmanned“ mode, but all stations have to be observed by operators. This mode is necessary to operate the installation with full speed without the “activation feedback”.

If the switch is not in the 'NORMAL' position, the following safety functions are deactivated:

- Deceleration fault stop SB
- Deceleration fault stop EB
- Deceleration fault stop EB+SB

4.6.2 Switch hydr. tensioning

The switch to deactivate the hydr. tensioning is located in the control cabinet.

- In the position TENSIONING OFF a re-adjustment of the tensioning unit is prevented.
- In the position TENSIONING MAINTENANCE the hydr. motor can be started by pressing the activation button on the terminal box of the hydr. unit.

In both cases a readjustment of the tensioning is prevented and a window (warning) will appear on the screen.

4.6.3 Switch grip force

This switch is served to deactivate a defect grip force sensor (refer to 10.5).

4.6.4 Switch tower fault

Serves to deactivate the break fork or RPD system – see item 2.7.

In general:
During operation with the emergency drive the same rope position monitoring systems are active as in the operating mode "Main drive", unless the entire rope position monitoring group has been deactivated via the key switch in the control cabinet of the emergency drive.
I.e. if for instance the RPD system has been deactivated via the key switch in the control cabinet of the main drive and the break fork circuit has been activated, the same applies in the operating mode "Emergency drive" (unless the entire rope position monitoring group has been deactivated in the control cabinet of the emergency drive).

4.6.5 Buttons for rail operation

The buttons for the rail operation have two functions:
During a standstill of the installation, these buttons are used to move the rails (start the spindle motors). The button has to be pressed until the rail has reached the end position. The blue control LED on the remote control panel lights up. If the end position is not reached within 25s, the spindle motors are switched off automatically. To restart the motors press the button again (check the limit switches on the rails).
During operation of the installation with the rail in parking position, it is possible to stop a carrier in the spacing clutch. As long as the button to swing on the rail is pressed, the carrier stops in the spacing clutch (clutch off/brake on).

4.6.6 Switch Bypass AC<1.0m/s

With the switch BYPASS AC<1.0m/s the following functions will be switched (switch on -> input 3.7 lights up):

- The counter fault minimum will be deactivated below 1m/s
- The logic fault will be deactivated below 1m/s
- Deboning of the anti-collision proximities will be activated

This functions can be activated in each station separately. The switch is located IN the control panel.

4.6.7 Switch Load Test

This switch is used for the selection of different load tests.
The following Load Tests are possible:

- Load Test Service- and Emergency Brakes (Refer to 4.4.17)
- Load Test Emergency drive (Refer to 4.4.18)

5 HYDRAULIC UNITS AND GEARBOX OIL COOLER

5.1 Oil cooler (gearbox)

By touching the display gearbox temperature additional informations about the gearbox are shown. By pressing it again, the window closes.

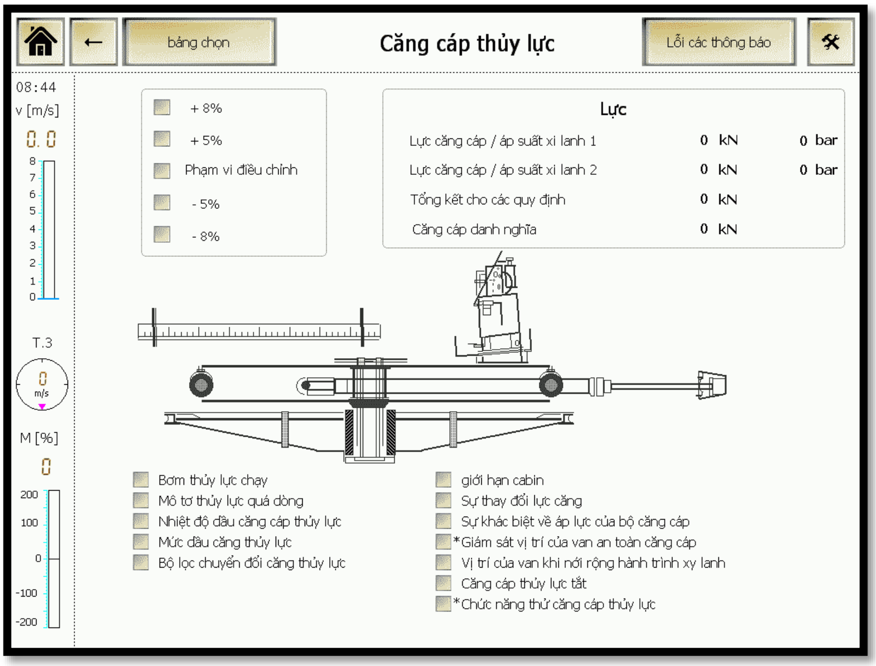
Indication	Description
Oil cooler on	Indicates that the motor of the oil cooler (fan) is on.
Oil pump on	Indicates that the motor of the oil pump is on.
Oil temperature 30°C	Indicates that the oil temperature exceeded 30°C (at the oil cooler).
Oil temperature 60°C	Indicates that the oil temperature exceeded 60°C (in the gearbox).
Oil temperature 95°C	Indicates that the oil temperature exceeded 95°C (in the gearbox).
Overcurrent oil cooler	Indicates that the motor of the oil cooler is overloaded. (motor protection switch has tripped)
Overcurrent oil pump	Indicates that the motor of the oil pump is overloaded. (motor protection switch has tripped)
Fault temperature sensor	Indicates a fault in the sensor of the gearbox temperature (line disconnection – current signal 4-20mA).

When the gearbox oil temperature reaches 60°C, the oil pump is switched on. When also the oil temperature at the cooler output reaches 30°C, the oil cooler (fan) is activated, too.
Oil pump and oil cooler (fan) are switched off after a certain interval when gear oil temperature drops below 60°C.

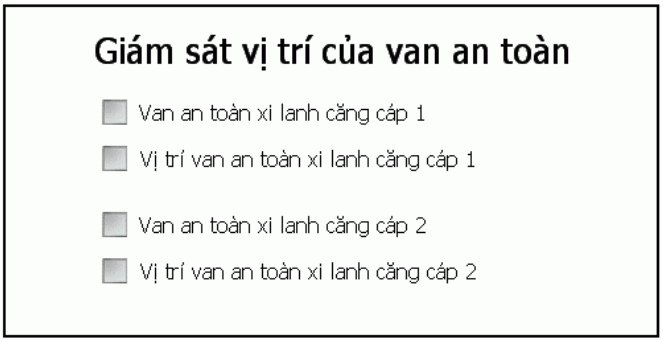
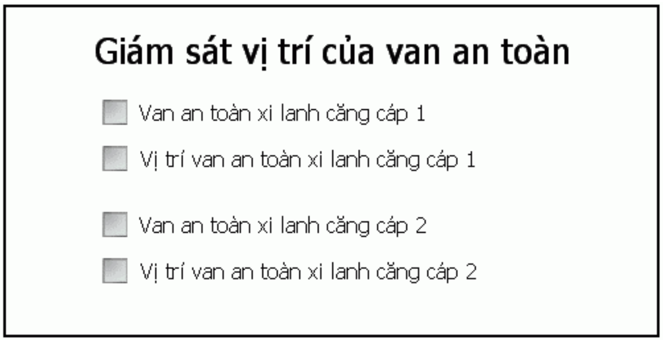
5.2 Hydr. tensioning

5.2.1 Indications of the hydr. tensioning unit

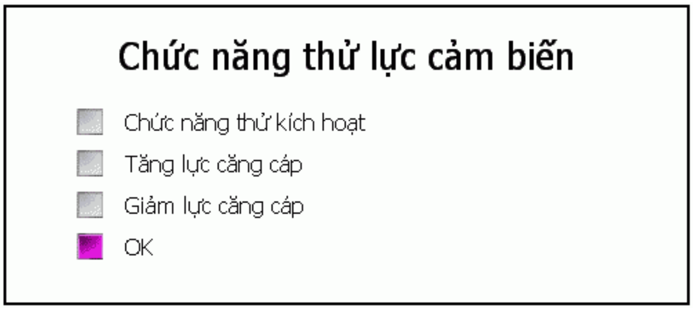
It is possible to access the window „Hydr. tensioning" from the drive and the return station.



Indication	Description
Tension force / Pressure cylinder 1	Indication of the force of the force transducer 1 and the force in cylinder 1
Tension force / Pressure cylinder 2	Indication of the force of the force transducer 2 and the force in cylinder 2
Sum for regulation	Sum of the forces from force transducer 1 and 2 for the regulation
Nom. Force	Nominal force of the tensioning system (see hydraulic schematic)
Hydraulic motor on	Indicates that the hydr. motor of the tensioning unit is switched on.
Overcurrent hydraulic motor	Indicates that the hydr. motor is overloaded. (motor protection switch has tripped)
Oil temperature	Indicates that the temperature of the oil is too high (in addition to a horn signal).
Oil level	Indicates that the level of the oil is too high or too low (in addition to a horn signal).
Filter switch	Indicates that the filter of the tensioning system is dirty (in addition to a horn signal).
Valve position extend cylinder	Monitores the position of the ball cock valves 'extend cylinder'
Carriage limit	Monitors the position of the carriage limit. Indicates by lighting up that the tension carriage has reached the front or rear end position.
Hydraulic tensioning off	Indicates that the operating mode fo the hydraulic tensioning system has been switched to the key switch position 'off' or 'maintenance'. Refer to 5.2.2
Tension force variation or Tension pressure variation	Indicates that the force or the pressure is 8% higher or 8% lower than nominal pressure.

(tension with interval mode)	To start the regulation of the tensioning system again, the „activation-button“ on the terminal box has to be pressed until the force or the pressure is within +/-8%.
Difference pressure transducer	Indicates that the difference between the pressure of transducer 1 (for regulation) an the pressure of transducer 2 (for control) is too high (>8%).
* Position monitoring of safety valves tensioning	Indicates that the two safety valves are not in the same position or the position indicators do not match the desired position of the valves. By pressing this indication a window with status information appears: 
* Functional test hydr. Tensioning	After switching on the controls, a start up – test is carried out. By pressing this indication a window with status information appears:  The start up – test is divided into two phases: ➢ Functional test safety valves Each safety valve is activated individually and compared with the position feedback on accuracy. If the start up – test is not ok, the fault can not be resetted. This function test is also performed when the key switch ‘Tension system‘ in the control cabinet is set from the position ‘revision’ to ‘automatic’. By pressing this indication a window with status information appears:  ➢ Functional test force transducer

In this functional test, the control limits of +/-5% will be simulated. First, the control limit of -5% is simulated, and thereafter the hydraulic system regulates to the nominal tension force. Then, the control limit +5% is simulated, and thereafter the hydraulic system regulatesto the nominal tension force again.
The tension force transducer on the hydraulic cylinders must capture a force change of at least 3% between the approached values. If this is not captured, the fault can not be resetted.
By pressing this indication a window with status information appears:



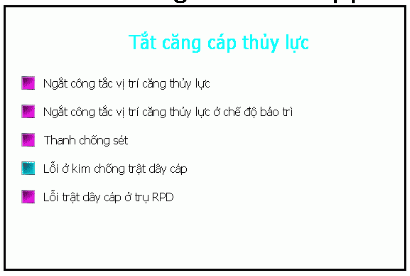
+ 8%	Indicates that the pressure is 8% higher than nominal pressure
+ 5%	Indicates that the pressure is 5% higher than nominal pressure
Range of adjustment	Indicates that the pressure is in range of adjustment
- 5%	Indicates that the pressure is 5% lower than nominal pressure
- 8%	Indicates that the pressure is 8% lower than nominal pressure
Activate button hydr. tensioning	To activate the tensioning system after a stop ‚Tension force variation‘.

5.2.2 Tensioning operating modes

With a key switch in the control panel the tensioning system can be switched to automatic or maintenance mode or can be turned off.

The tensioning is automatically shut-down if one of the following faults responds:

- Rope position monitoring (Break fork and RPD-System)
  The following window appears:



- Tension carriage end position (Stop)
- Overcurrent hydraulic motor (Acoustic Warning)
- Oil level min. or max. (Acoustic Warning)
- Oil temperature (Acoustic Warning)

The hydraulic motor is reactivated when the fault is eliminated.

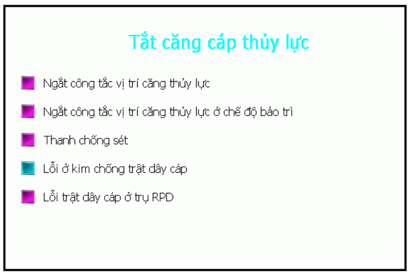
IMPORTANT:
The monitoring of the limits +/-8% is still active even if the regulation of the tensioning is switched off.

5.2.2.1 Automatic mode

In the automatic mode of the tensioning, the tensioning force is adjusted automatically. If a deviation of the tensioning force of +/- 5% is detected, it will be readjusted until the nominal tensioning force is achieved. The hydraulic motor is only switched on for readjustment.

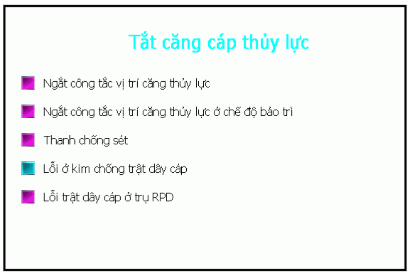
5.2.2.2 Hydraulic tensioning off

If the key switch is switched to position TENSIONING OFF, a readjustment of the tensioning is prevented. The following window will appear.



5.2.2.3 Maintenance mode

If the key switch is switched to position TENSIONING REVISION, the operation of the hydraulic tensioning takes place from the side of the unit. The following window will appear.



How to operate the tension hydraulics in maintenance mode can be taken from the manual of the hydraulic tensioning unit.

5.2.3 Activation of tensioning unit

5.2.3.1 Activation of the tensioning unit after switching on the control voltage

In order to start the regulating process of the tensioning, the button ACTIVATION TENSION INCREASE TENSION FORCE needs to be pressed on the screen in the window of the hydraulic tensioning, if the rope tension is below 92% of the nominal tension force and the difference of the rope tension between the two cylinders is greater than 10%. This button needs to be pressed until the tensioning force is balanced between the limits of +/- 8%.

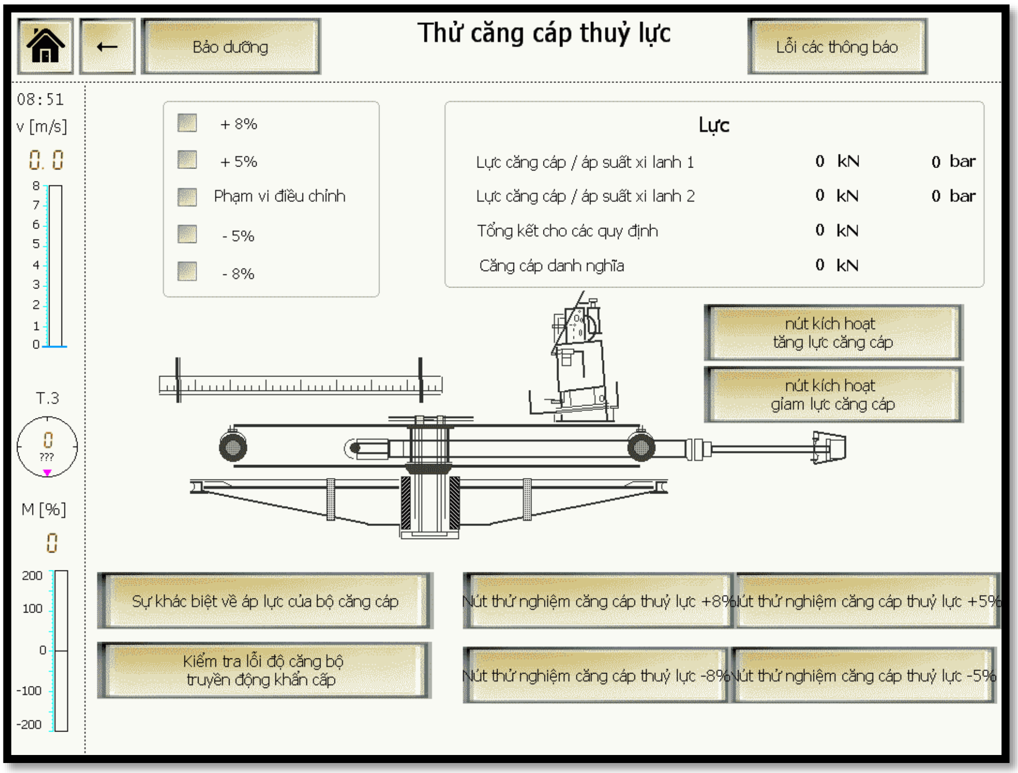
5.2.3.2 Activation of the tensioning unit during operation

In order to start the regulating process of the tensioning, the button ACTIVATION TENSION INCREASE TENSION FORCE or the button ACTIVATION TENSION DECREASE TENSION FORCE needs to be pressed on the screen in the window of the hydraulic tensioning. This button needs to be pressed until the tensioning force is balanced between the limits of +/- 8%.

If the tensioning unit is situated in the return station and the operating mode 'return station unmanned' is selected, the button ACTIVATION TENSION INCREASE TENSION FORCE and the button ACTIVATION TENSION DECREASE TENSION FORCE are indicated in the frame of the drive station tensioning unit. With this buttons the regulating process of the tensioning unit in the return station can be activated from the side of the drive station.

This is also true for the opposite, if the hydraulic tensioning is situated in the unmanned drive station. In this case, in the operating mode “drive station unmanned” the hydraulic tensioning can be activated in the drive station from the side of the return station by pressing the button ACTIVATION TENSION INCREASE TENSION FORCE or the button ACTIVATION TENSION DECREASE TENSION FORCE.

5.2.4 Test tensioning system



5.2.4.1 Testing the hydraulic tensioning + 8%

Procedure:

- Put the key switch TEST MODE in the control cabinet to position ON.
- Press the test button tensioning + 8% on the screen and keep it pressed.
- The tensioning unit is increasing the tensioning force.
- The installation needs to shut down with the stop-order DEVIATION TENSIONING FORCE.
- Let go the button TEST BUTTON TENSIONING +8% on the screen.
- Reactivate the hydraulic tensioning.
- The maximum values of the test are displayed in a appeared window.

5.2.4.2 Testing the hydraulic tensioning – 8 %

Procedure:
- Put the key switch TEST MODE in the control cabinet to position ON.
- Press the test button tensioning - 8% on the screen and keep it pressed.
- The tensioning unit is decreasing the tensioning force.
- The installation needs to shut down with the stop-order DEVIATION TENSIONING FORCE.
- Let go the button TEST BUTTON TENSIONING -8% on the screen.
- Reactivate the hydraulic tensioning.
- The maximum values of the test are displayed in a appeared window.

5.2.4.3 Testing the hydraulic tensioning +5%

Procedure:
- Put the key switch TEST MODE in the control cabinet to position ON.
- Press the test button hydraulic tensioning + 5% on the screen and keep it pressed.
- The tensioning unit is increasing the tensioning force.
- After having reached +5% (signal light on the screen), let go the test button hydraulic tensioning +5%, the tensioning unit automatically balances back to the regulating area after a time delay.
- The maximum values of the test are displayed in a appeared window.

5.2.4.4 Testing the hydraulic tensioning -5%

Procedure:
- Put the key switch TEST MODE in the control cabinet to position ON.
- Press the test button hydraulic tensioning -5% on the screen and keep it pressed.
- The tensioning unit is decreasing the tensioning force.
- After having reached -5% (signal light on the screen), let go the test button hydraulic tensioning -5%, the tensioning unit automatically balances back to the regulating area after a time delay.
- The maximum values of the test are displayed in a appeared window.

5.2.4.5 Test Difference pressure transducer

How to proceed:
- Turn key switch „TEST MODE“ on the main control panel in position ON.
- Press button TEST DIFFERENCE PRESS. TRANSDUCER on the screen.
- The installation shuts down with a Stop (Difference pressure transducer)

5.2.4.6 Test Tension force variation for emergency drive

This test has to be carried out before the installation is operated in emergency drive mode.

How to proceed:

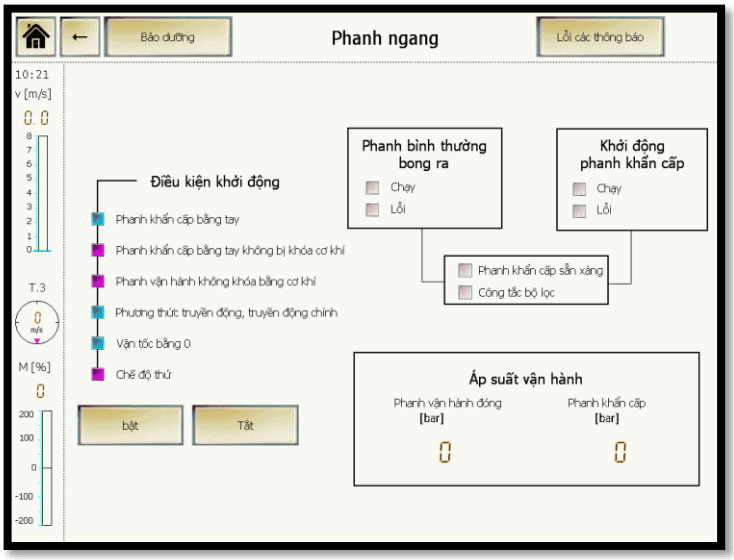
- Installation has to be on drive mode „emergency drive“.
- Reset the safety circuit of the emergency drive panel.
- Turn key switch „TEST MODE“ on the main control panel in position ON.
- Press button TENSION FORCE VAR. EMERGENCY DRIVE on the screen.
- The safety circuit of the emergency drive is turned off and the indication TENSION FORCE VARIATION on the emergency drive panel has to light up.

5.3 Brake Hydraulics

5.3.1 Brake Hydraulics – Service Brake Stepped

At a stepped brake hydraulic the service brake(s) are operated load-controlled with up to three steps. This is achieved with a step and a quick-action stop valve. The determination of the necessary brake force is determined by measuring the motor torque at the time of the braking.
The settings in the software for the selection of the correct braking step is set by Doppelmayr during the first start- up of the installation.
This settings are visible on the screen in the 'settings' (refer to 4.4.12)
The emergency brake is controlled unregulated by two independent valves.

5.3.2 Flush brakes



Following is prerequisite for starting the flushing process:

- Emergency brake manual
- Emergency brake mech. blocked
- Service brake mech. blocked
- Mode switch in position "Main Drive"
- Installation has to be stopped (Zero speed of bullwheel tachometer)
- Switch "Test Mode" in position "ON"

It's not allowed to start the flushing process during public operation.

ATTENTION: Before starting the flushing process the reset button has to be pressed. In the stop EB circuit only the indication "Emergency brake manual" may light up.

The flush process takes 15 min. for each brake. As soon as the message “BRAKE FLUSH DONE” lights up, the flushing has to be finished with button „OFF“. Afterwards the switch “TEST MODE” has to be turned off.
If a fault occurs during the flushing process (too high pressure in the brake system), a horn sounds and the field “ERROR” lights up.

In the table it’s shown which valves are activated and deactivated during the flushing process of the service and the emergency brake:

Name	Pos. (shematic)	Flush Serv.Brake	Flush Em. Brake
Flush valve Serv.brake	252Y1	■	□
Safety valve Serv. Brake	227Y4	■	□
Step valve or regulation valve	227Y3 or 66Y1	■	□
Valve 1 Em. brake	65Y1	□	■
Valve 2 Em. brake	65Y2	□	■

■ ... activated
□ … deactivated

If the field „FILTER SWITCH“ lights up, the filter in the brake hydraulic system needs to be changed.

6 DRIVE

6.1 Frequency converted three-phase drive (AC-Drive)

6.1.1 General Issues

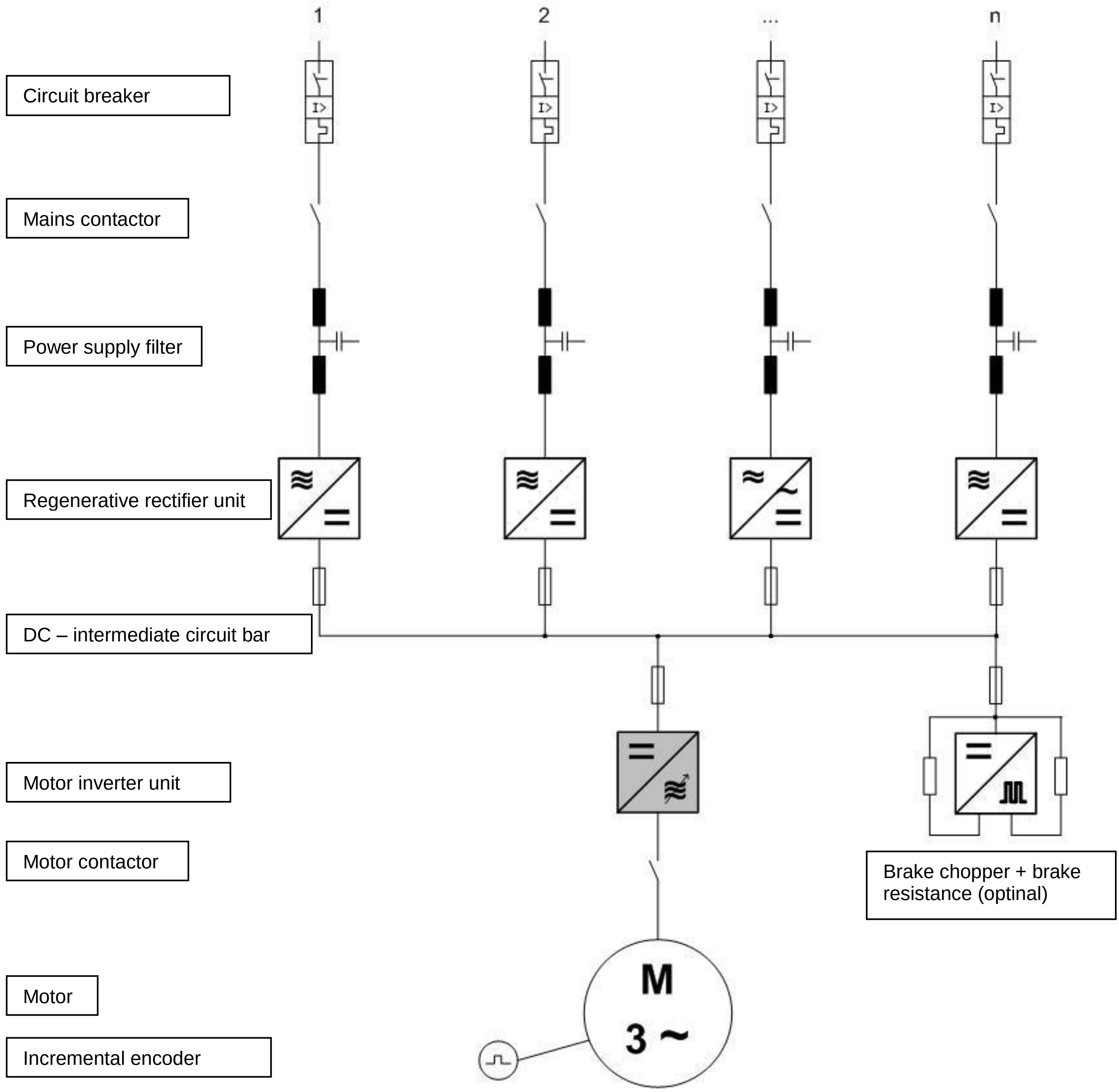
With the revolution-variable three-phase drive a revolving field with variable frequency and variable voltage will be produced by frequency converters.
The converter take over the drives' RPM-regulation with the aid of an actual RPM of the drive motor. In this way, the drive cannot only be operated as motor but also as generator and is therefore able to slow down the installation (electrical deceleration for stop and emergency stop or downhill load).
The AC-drive's main components are the main contactor for the change over to the supply voltage, the input filter for reducing circuit feedback, regenerative inverter unit for supplying a common DC bar and the motor inverter unit for the regulation of the AC drive. Optionally, in certain applications a brake chopper is inserted in combination with a brake resistor for every generator operation (electrical brake with stop and emergency stop respespectively downhill load).
For safety reasons the motor contactor is used for the galvanical disconnection of motor inverter unit and AC drive.
The motor-inverter units will be fed by one or several parallel regenerative inverter units via the common DC bar. This part of the curcuit between the regenerative- and the motor inverter units is called DC intermediate circuit.
For technical reasons it is necessary to load the DC intermediate circuit bar slowly via a rectifier / resistor combination, before the regenerative inverter units take over operation.
The charging connection takes place already with the turn-on of the control voltage.
In normal operation the DC-intermediate circuit will be fed by the existing regenerative inverter units and the motor inverter units produce the revolving field with a variable frequency. The connection between the AC drive control and the ropeway equipment takes place via hardware signals. Additionally, information will be transfered via the bus system to the main control for visualising purposes (optional). Switching "ON" and "OFF" of the motor contactor takes place via relay technology for safety reasons.

6.1.2 Asynchronous machine

The rotors of the asynchronous machine are called squirrel-cage rotor. These short-circuit rotors consist of permanently hot-wired massive windings.

During motor operation these motors turn shortly below (asynchron) the synchronous RPM, which is determined by the three-phase power supply. During frequency converter operation the exact RPM of the rotor will be captured with an incremental encoder. The motor inverter unit regulates with this actual value onto the desired RPM, according to setpoint setting.
The multi-purpose application (application user manual of the manufacturer) will be used as frequency converter software.

6.1.3 Block diagram AC-Drive



6.1.4 Charging Circuit

After turning on the installation with the key switch “Control voltage ON” the charging circuit will be activated. The task of the charging circuit is to charge the capacitors in the DC-intermediate circuit via resistors.
During the switch-on of the installation first the charging contactors are closed, through which the DC intermediate circuits are charged via the charging rectifier and the charging resistors. If the intermediate circuit voltage is high enough, the charging contactors will be opened and the mains contactor will be closed, from which point onwards the installation is ready for operation.

Possible Faults:

- The charging contactors are closed but the intermediate circuit will not be charged and consequently also the mains contactors do not close.

Cause:

The charging circuit does not have power supply, the short circuit in the intermediate circuit or the relay contact in the regenerative inverter unit is defect.

- There will be a commutation between the charging connection and the mains contacter(s), however, the displays of the frequency converters will expire again.

Cause:

The power supply is missing. Possibly, the circuit breaker in front of the mains contactor will be switched-off.

6.1.5 Regenerative Rectifier Unit (AFE – Active Front End)

In normal operation the regenerative rectifier unit works as rectifier. The produced increased direct current voltage (factor 1.1) is about 594 V (with 400 V AC power voltage).

PLEASE NOTE: Due to the capacitors in the frequency converters the DC-voltage will not be released for 5 minutes after the switch-off of the control voltage.

For the command STOP/EMERGENCY STOP the motor will be decelerated, upon which the regenerative rectivier unit works as AC inverter. The surplus energy of the intermediate circuit which is produced during deceleration is going to be fed back into the mains power supply.

During normal operation the regenerative rectifier unit’s LED will light up on the display for READY and RUN.

Possible Faults:

- On the screen of the regenerative inverter unit a fault message will be displayed and the FAULT-display lights up red.

6.1.6 Motor Inverter Unit (INU)

Same as the regenerative rectifier units also the motor inverter units work as rectifiers and inverters. In normal operation a variable frequency and a variable voltage for the connected AC-motor are produced from the DC-intermediate circuit voltage. The complete speed regulation will be conducted in the electronics of the motor inverter unit.

6.1.7 Brake chopper (optional)

The brake chopper operates as unidirectional rectifier that leads the surplus energy of the DC busbar onto an external brake resistor, where it is led away in the form of warmth. This brake chopper unit will be necessary if during generator operation (electrical brake with stop and emergency stop respectively downhill load) the energy cannot be passed back to the supply system via the regenerative rectifier unit. E.g. this applies to a power supply via a DIESEL generator. The brake chopper operates as soon as the DC busbar voltage exceeds a certain limit value.

6.1.8 Fuses and Circuit Breakers

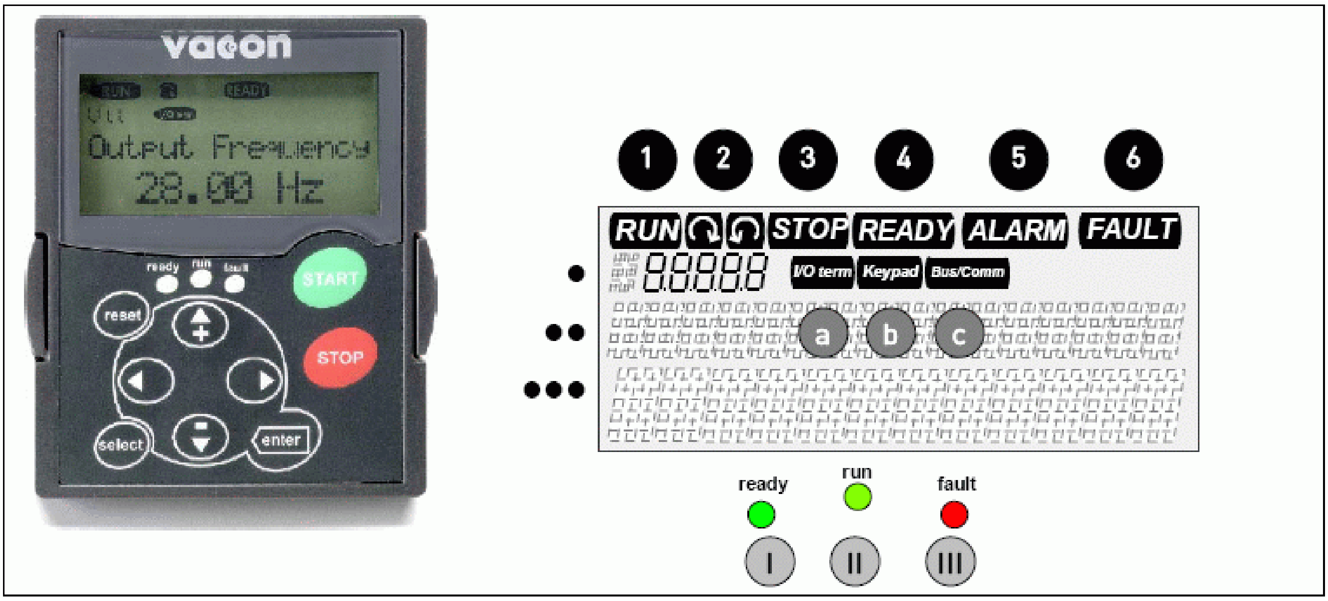
In front of every main contactor a circuit breaker for the protection of electrical cables and at the same time for protection of used components, i.e. of main contactor, line filter and regenerative rectifier unit are integrated. These circuit breakers have fast release in order to be able to protect also semiconductor devices of the regenerative rectifier units in a case of error.
Between the converters and the DC-intermediate circuit bar there are special semiconductor fuses in order to protect the devices in case of an error. An indicator on the fuse indicate the activation of the fuse.

ATTENTION: Changing the intermediate circuit fuses, as well as other work at the DC-intermediate circuit bar can only be conducted in an electrical voltage-free intermediate circuit and the electrical safety regulations have to be met.
Due to the capacitors in the frequency converters the DC-voltage will not be released for 5 minutes after the switch-off of the control voltage.

6.1.9 The Frequency Converter Display (Extract of User`s Manual)

The fequency converter display (control panel) forms the interface between the Vacon-frequency converter and the user. The control panel contains an alphanumeric display with seven status indicators (RUN, READY, STOP, FAULT, ALARM, rotational direction left/right) and three control-position displays. Additionally, the control panel has three status LEDs (green-green-red).
The control information, i.e. the menu number, the menu description of the indicated value and the numerical information are going to be displayed in three lines.

The buttons can be used for adjustments of parameters and for the indication of operational dates.
The control panel is detachable and isolated from the mains potential.



6.1.9.1 Status Indicators on the Display

READY: The DC intermediate voltage is available, the converter doesn’t have any fault and the safety circuits are closed.
RUN: The inverter has started and issues AC voltage.
FAULT: The invertor will be stopped due to a fault. The brief description of the error will be indicated at the display.
ALARM: The inverter indicates a warning (does not lead to switch-off). The brief description will be indicated at the display.
STOP: Indicates that the drive is not in operation.

6.1.9.2 Troubleshooting at the Frequency Converter (Extract of User`s Manual)

If the frequency converter’s control electronics detacts a fault, the drive will be stopped and the fault symbol F will appear on the display together with the fault’s ordinal number, the fault code and the brief description of the fault.
The fault can be set back by pressing the “Reset-Button” on the control panel.
The fault will be saved in the “fault history menu” (M5), which can be searched through by the user.
The various fault codes are displayed in chapter 9 in the user`s manual.

6.1.10 General information on the screen

By pressing DATA FREQENCY CONVERTER the following screen appears:

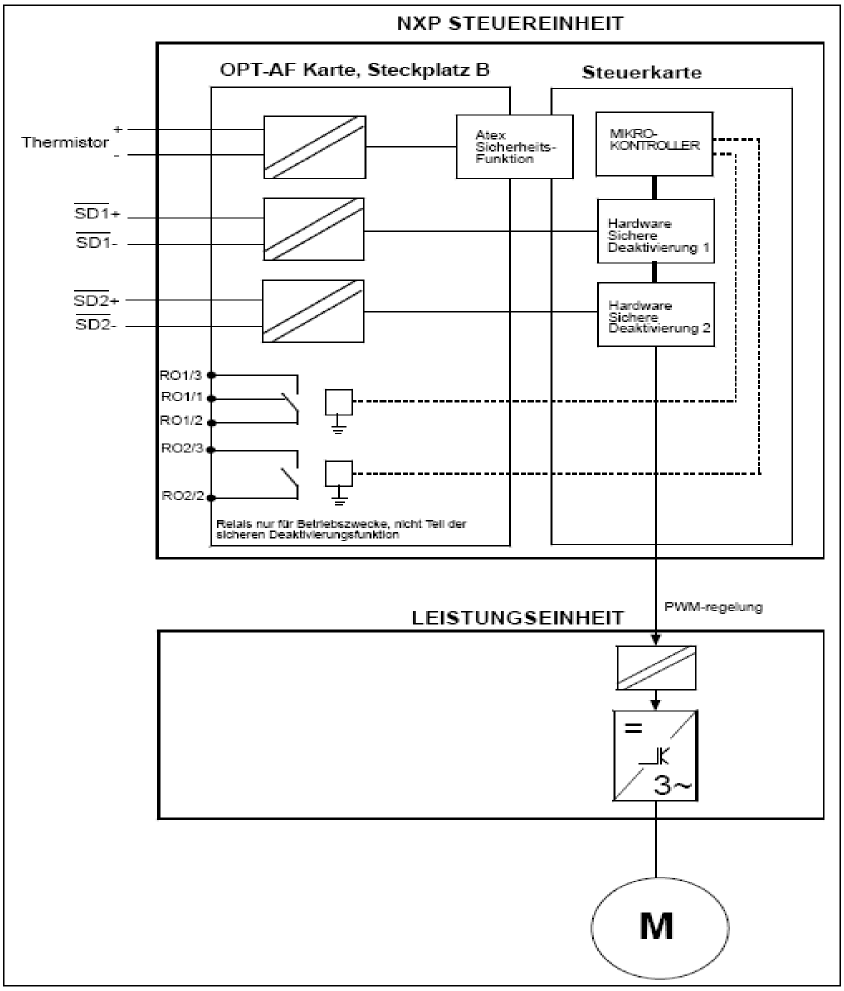
This screen shows infomations and different conditions about the frequency converters. These informations are not relevant for safety functions.

6.1.11 Secure Stop - optional

In case of a „Secure Stop“ the motor contactor (between power unit and drive motor) is omitted. The E/A extension card OPT-AF enables with the frequency converts NXP the hardware based function “Secure Stop“ to avoid an unintended rotation of the motor shaft. This function is in accordance with EN 954-1, categorie 3.

The function “Secure Stop“ is activated by the deactivation of the drive modulation. Therewith, the signal outputs of the gate driver to the driver electronics are blocked. The output signals of the gate driver control the IGBT module. If the output signals of the gate driver are deactivated, the frequency converter does not produce a torque at the motor shaft.

6.1.11.1 Principle of the „Secure Stop“



ATTENTION:	The function “Secure Stop” does not disconnect the power output of the converter. To execute electrical work at the drive, the motor or the motor wires, the load break switch has to fully disconnect the drive from the power system.

6.1.12 Motor fan

The motor fan is switched on and off depending on the motor temperature.
This is to avoid unnecessary noise. If the motor temperature rises above 70°C, the motor fan turns on. If the motor temperature falls below 60°C, the motor fan turns off.

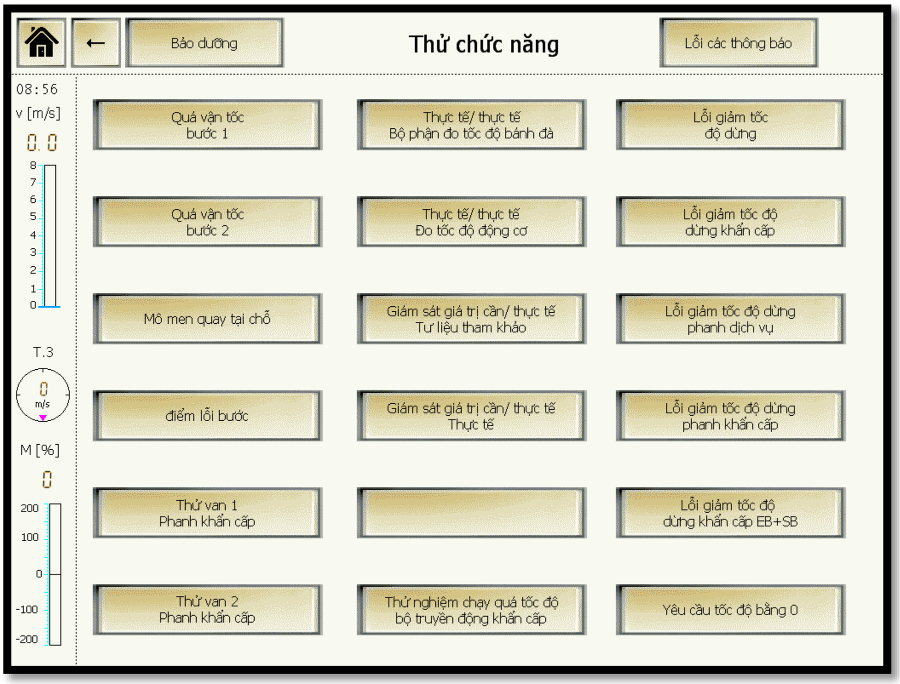
The motor fan can also be activated permanently. This can be done in the screen GENERAL. (details – refer to 4.1.3)

6.2 Test Functions Drive

In order to be able to carry out checks on test functions, the key switch "Test Mode“ must be turned on. When the tests have been completed, the key switch "Test mode“ must be turned off again.

When the option "SERVICE“ is selected on the touch screen in the main menu, the system asks for a password to be entered. After typing in a five-figure code followed by "ENT“, a general menu appears on the touch screen (TESTS & ADJUSTMENTS) with the possible test functions.

As soon as the option “TEST FUNCTIONS“ has been selected, the following appears on the touch screen:



6.2.1 Overspeed Step 1

With this test function the lift speed is falsified. Run the lift with approx. 1,5m/s, press test function "Overspeed Step 1" and start increasing the lift speed.
The PLC adds a pre-setted value to the bullwheel tacho signal and the installation must shut down via the stop-SB command "Overspeed Step1“ at a speed of approx. 6.6 m/s.

6.2.2 Overspeed Step 2

With this test function the lift speed is falsified. Run the lift with apprrox. 1.5m/s, press test function "Overspeed Step 2" and start increasing the lift speed.
The PLC adds a pre-setted value to the bullwheel tacho signal and the installation must shut down via the stop-EB command "Overspeed Step2“ at a speed of approx. 6.9 m/s.

6.2.3 Rush Current di/dt

Pressing this function causes a “Set value jump“ on the set value input of the power converter. Set lift speed to approx. 2.0m/s. Press the test function "Rush Current di/dt ". The installation must shut down via the stop-SB command “Rush of current main motor“.

6.2.4 Reference-0

This check is carried out when the installation is out of operation. For run condition the set value on the power converter must be zero. By pressing the test function "Reference-0" a set value is preset on the power converter.
The light diode "Reference-0" must go out. After pressing the "RUN" button no departure clearance may be given.

6.2.5 Test emergency brake valve 1

This check is carried out when the installation is out of operation. With this button the function of the emergency brake valve 1 is tested.
Activate the stop-EB circuit (emergency brake opens). This button switches off the valve 1 of the emergency brake (valve 2 remains on). The brake has to close.

6.2.6 Test emergency brake valve 2

This check is carried out when the installation is out of operation. With this button the function of the emergency brake valve 2 is tested.
Activate the stop-EB circuit (emergency brake opens). This button switches off the valve 2 of the emergency brake (valve 1 remains on). The brake has to close.

6.2.7 Act./Act. Bullwheel tacho

With this test function the bullwheel tachometer signal is falsified.
Press the test button "Act./Act. bullwheel tacho" and start the installation. At a speed of approx. 0.6 m/s the installation must shut down via the stop-EB command “Act./Act. deviation“.

6.2.8 Act./Act. Motor tacho

With this test function the motor tachometer signal is falsified.
Press the test button "Act./Act. motor tacho" and start the installation.
At a speed of approx. 0.6 m/s the installation must shut down via the stop-EB command "Act./Act. deviation ".

6.2.9 Reference – Actual Actual

With this button the actual value (motor tachometer signal) is falsified.
Press the "Reference – actual ACTUAL" button and start the installation. At a speed of approx. 0.6 m/s the installation must shut down via the stop-SB command "Reference - actual deviation"

6.2.10 Reference – Actual Reference

With this button the set value preset on the power converter is falsified.
Press the "Reference – Actual REFERENCE" button and start the installation. At a speed of approx. 0.6 m/s the installation must shut down via the stop-SB command "Reference - actual deviation".

6.2.11 Step-Fault

The speed has to be carried out at full speed. The switch for the brake tests 226S1 in position "Service Brake blocked". Press the button Step-error on the screen and after that the button Stop-SB. After an adjusted time the service brake has to close. The adjusted time can be found in the screen SETTINGS (Refer to 4.4.12).

6.2.12 Test Overspeed Emergency Drive

This test has to be carried out before the installation is operated in emergency drive mode.

How to proceed:

- Installation has to be on drive mode „emergency drive“.
- Reset the safety circuit of the emergency drive panel.
- Press button OVERSPEED EMERGENCY DRIVE on the screen.
- The safety circuit of the emergency drive is turned off and the indication OVERSPEED on the emergency drive panel has to light up.

6.2.13 Dec. fault stop

This test has to be carried out at full lift speed. This test button causes a stop command, the installation however does not shut-down. The deceleration after the stop command is too small. The installation must be shut down via the stop-SB command "Dec. fault stop ".

6.2.14 Dec. fault emergency stop

This test has to be carried out at full lift speed. This test button causes an emergency stop command, the installation however does not shut down. The deceleration after the emergency stop command is too small. The installation must shut down via the stop-SB+stop-EB command "Dec. fault emergency stop“.

6.2.15 Dec. fault stop SB

This test has to be carried out at full lift speed. This test button causes an stop-SB command, the installation however does not shut down. The deceleration after the stop-SB command is too small. The installation must shut down via the stop-EB command "Dec. fault stop-SB”.

6.2.16 Dec. fault stop EB

This test has be carried out at full lift speed. This test button causes a stop-EB command, the installation however does not shut down. The deceleration after the stop-EB command is too small. The installation must shut down via the stop-SB command "Dec. fault stop-EB".

6.2.17 Dec. fault stop EB+SB

This test has to be carried out at full lift speed. This test button causes an activation of the stop-SB and the stop-EB, the installation, however, does not shut down. The deceleration after the stop-SB+EB command is too small. The installation must shut down via the stop-SB+EB command "Dec. fault stop-EB+SB". (The service brake will be closed with the safety valve – fast action valve).

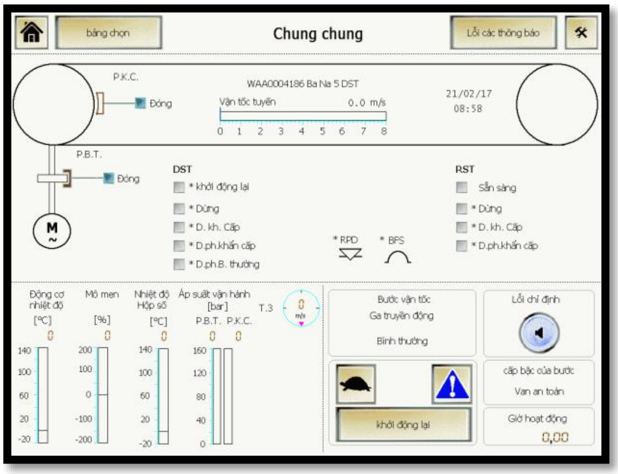
ATTENTION:
With this test all emergency brakes and service brakes are closing immediately (no level or step system active)!
⇒ This ensures max. braking force / max. deceleration!

7 WIND SYSTEM

7.1 Indication

In the general picture the actual wind speed and wind direction of all measuring units is indicated. Also the max. measured wind speed is indicated.

In case of a current wind warning the circle of the wind direction indicator turns yellow. In case of a fault of the wind indicating system, for instance a wire breakage, the circle of the wind direction turns red.



7.2 Reset Max. Wind Speed

If in the general picture of the drive station the field of the windspeed indication is pressed, a window comes up. When the button "RESET WIND MAX." is pressed the maximum wind speed will be reset. By pressing next to the button the window will disappear.

7.3 Adjustment Wind System

When WIND WARNING is pressed, values for the wind warning system and for the wind alarm can be entered. The measuring system for which the values have to be entered can be selected with UNIT 1 - UNIT 4. Whichever of these is selected lights up. In total, 6 values can be entered – 3 values for the warning system and 3 for the alarm. The first value is for a wind direction of 0°, the second for a wind direction of 45° and the third for a wind direction of 90° to the lift axis. When one of these 6 spaces is selected, it lights up and the value can be entered. At the same time a minimum and a maximum value appear above the keyboard. If a value within the admissible range is entered and confirmed with ENT, the light goes out and the value is stored. If the value entered lies outside the admissible range, the light remains lit and the value is not stored.

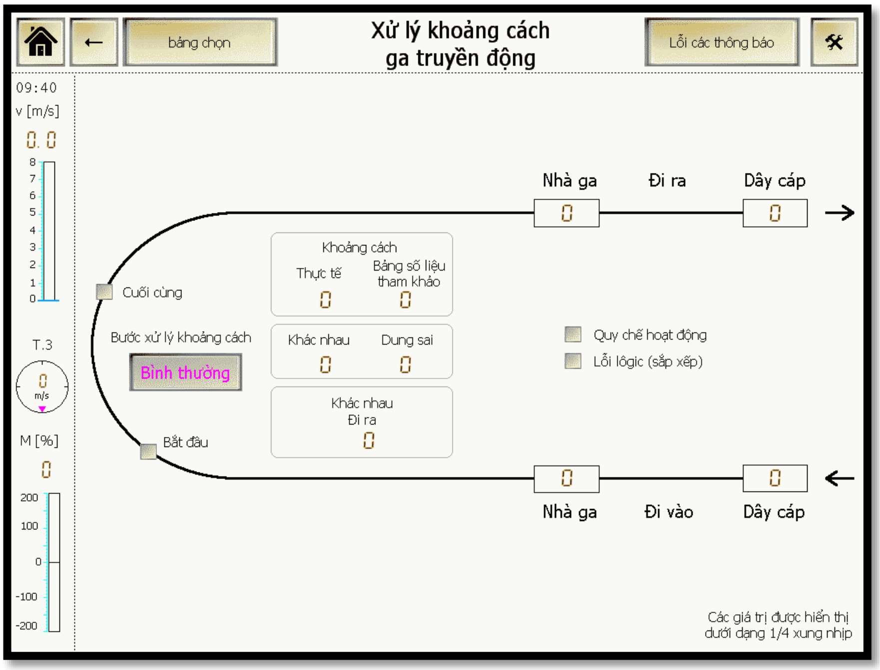
Attention: In order to read off the inserted values, one has to wait for approximately 1 second after selecting a wind measuring unit (tower) – then the values will appear.
Additionally, the unit, which displays the wind speed (m/s or km/h), can be selected. If the installation is equipped with more than one wind anemometer, a certain wind anemometer can be selected which is permanently displayed on the side bar of the screen.

8 CARRIER SPACING CONTROL

8.1 General

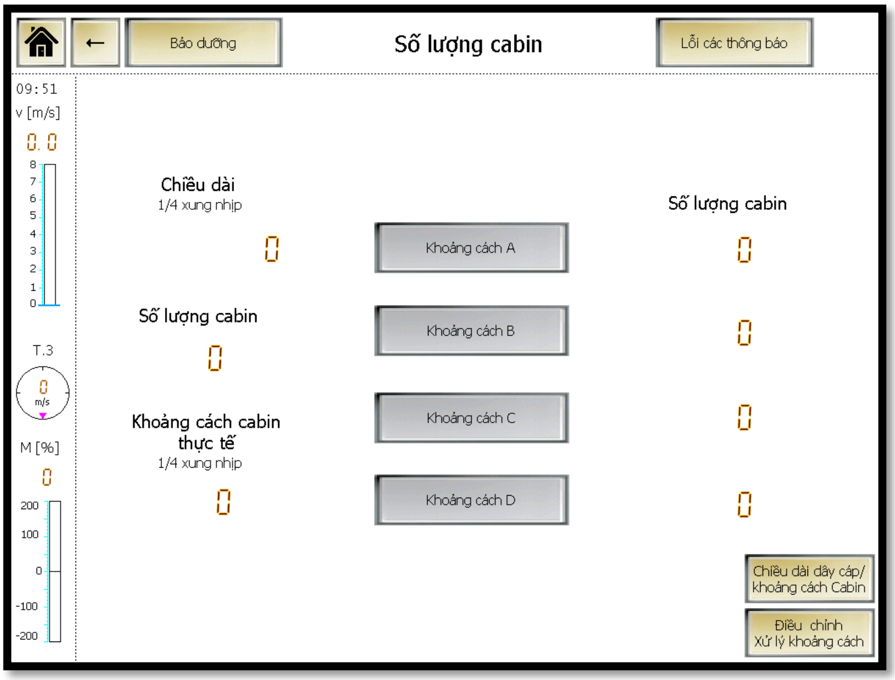
Contrary to the clutch spacing, the carriers must not be stopped for the regulation of their spacing. The processor spacing can correct spacing faults of max. -20.0 m – with respect to the position on the haul rope. This is obtained by means of reducing the speed of the tyre conveyor in the regulating range. This way, the distance to the preceding carrier is increased.

As soon as the option PROCESSOR SPACING DRIVE STATION or PROCESSOR SPACING RETURN STATION has been selected, the following appears on the touch screen:



8.2 Preselection of the desired passenger-carrying capacity (carrier distance)

It is possible to operate the installation with 4 different carrier distances. It is possible to preselect the desired passenger-carrying capacity (carrier distance A/B/C/D) in the service menu of every station. (number of carriers). The latest selected distance will be used for all stations.
The spacing system operates automatically with the preselected spacing value. The spacing system has to be operated in AUTOMATIC mode. In the operating mode MANUAL the distance value that has been entered in the service menu is used, irrespective of the automatic value. Refer to 8.3.1

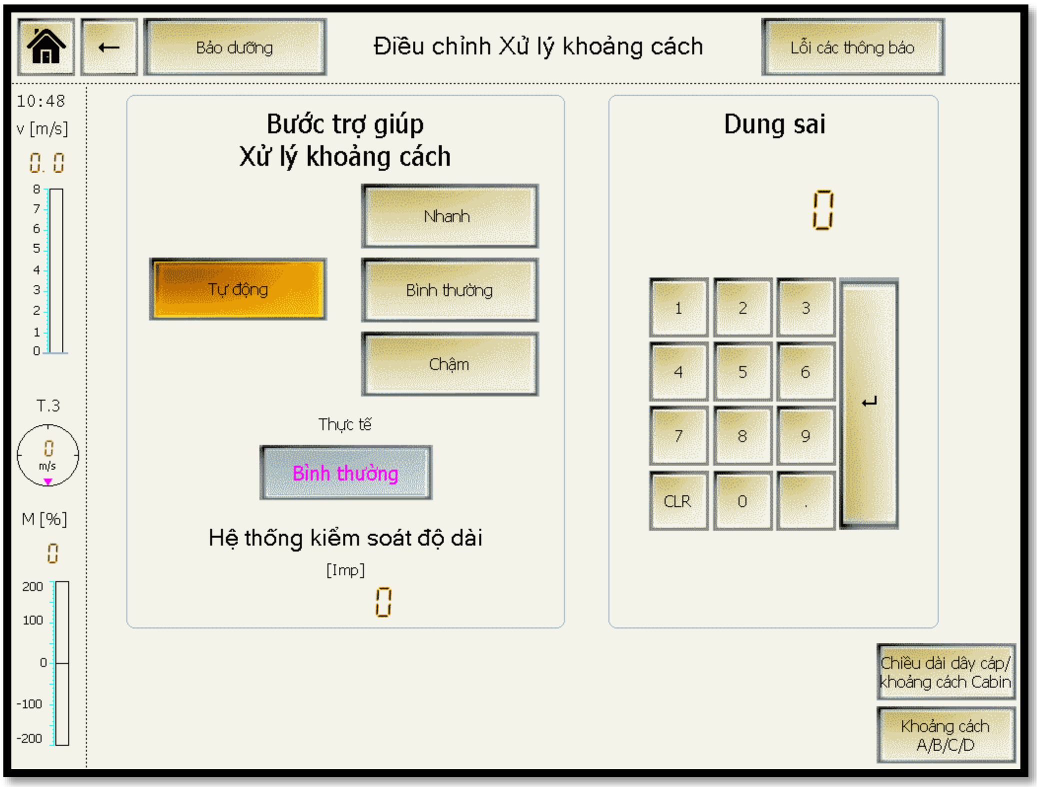


8.3 Processor Spacing

Contrary to the clutch spacing, the carriers must not be stopped for the regulation of their spacing. The processor spacing can correct spacing faults of max. -20.0 m – with respect to the position on the haul rope. This is obtained by means of reducing the speed of the tyre conveyor in the regulating range. This way, the distance to the preceding carrier is increased.

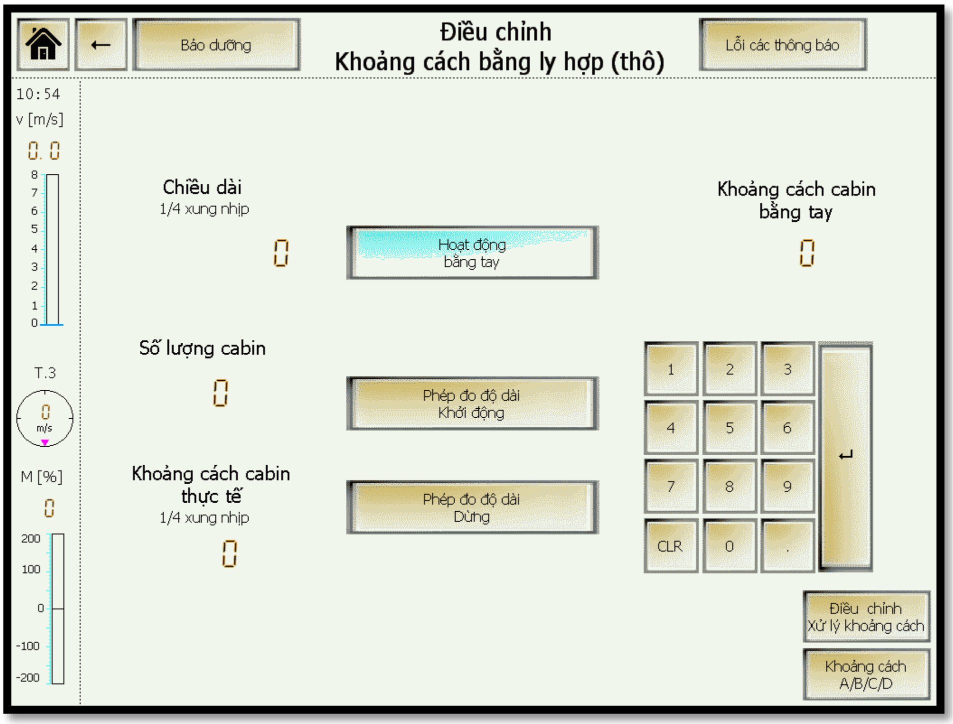
8.3.1 Adjusting the Processor Spacing/Line Length Measurement

If the button ADJUSTMENT PROCESSOR SPACING is pressed in the service menu, the following screen appears:



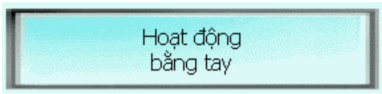
To test the functioning of the gear motor of the processor spacing, the frequency converter can be triggered manually. For this, the buttons NORMAL or SLOW must be pressed. The key switch ACTIVATION TEST BUTTONS must be connected for this and the selector switch SPACING REGULATION must be in position OFF. This way, the regulating distance is switched to normal (synchronous to the station speed) or slow speed, irrespective of the carrier spacing, for as long as the buttons are pressed. The impulse counter for the length of the regulating distance measures the impulses of a carrier along the entire regulating distance. The function of the motor can be tested by means of this counter. The counter must show a higher value in the position 'Slow' and a lower value in the position 'Normal'.
In the field 'Tolerance', the impulse difference to the normal spacing (normal case: 10 – 15 impulses) as of which a regulation of the spacing will take place can be entered.

As soon as the item LINE LENGTH/CARRIER SPACING is selected, the following screen is shown on the monitor:



There are two possibilities available to enter the carrier spacing in impulses (1 impulse ≅ 0.076 m):

Manual:
With this setting, the carrier spacing can be entered manually.
Switch over the upper field so that it is labeled with MANUAL ACTIVE. Then, manually actuate the field 'Carrier spacing' and enter the desired values. Confirm by pressing ENTER. The value entered is adopted to the field 'Carrier spacing current'. The clutch spacing operated with this value from this moment on.
IMPORTANT: The carrier spacing is <u>not</u> corrected automatically if the carrier spacing A/B/C/D is switched to a different number of carriers.



Automatic:
Switch over the upper field so that it is labeled with AUTOMATIC ACTIVE.
With this setting the carrier spacing is calculated automatically (calculated from the measured line length and the selected number of carriers). The calculated value is adopted to the field 'Carrier spacing current'.

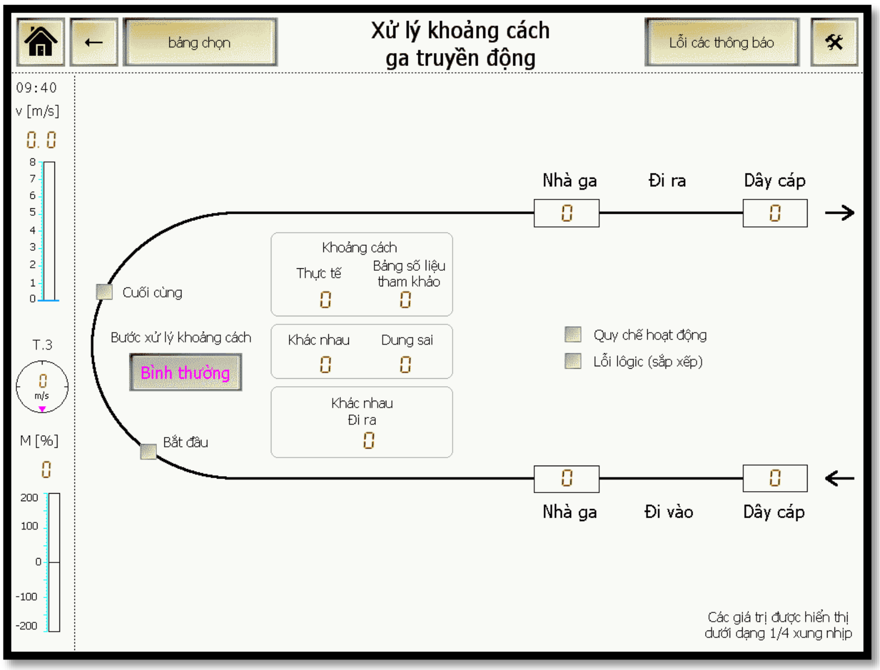
The automatic measurement of the length of the line by the clutch spacing is carried out as follows:

- Set the key switch ACTIVATION TEST BUTTONS to ON. When a marked carrier leaves, press the button LINE LENGTH MEASUREMENT START before the carrier passes the last proximity switch on the outgoing side. Keep the button pressed until counting starts in the field LINE LENGTH.
- Operate for one circulation.
- Before the marked carrier reaches the last proximity switch on the outgoing side again, press the button LINE LENGTH MEASUREMENT STOP and keep is pressed until the counting stops.

Important:
The carrier used for the measurement of the length of the line should be the first of a carrier group; i.e. the distance before this carrier should be larger in order to prevent the reference carrier from being stopped by the regulating unit in the other station as this would falsify the measured length of the line.
The measurement of the length of the line must be performed in BOTH stations.

8.3.2 Operating the Processor Spacing

In the MAIN MENU, the following screen can be opened by means of the button PROCESSOR SPACING DRIVE STATION or PROCESSOR SPACING RETURN STATION:



The processor spacing can be switched on using the selector switch SPACING REGULATION. The switching between ON and OFF can take place during operation of the installation and does not cause a shutdown. If the processor spacing is on, the lamp REGULATION ON lights up in green. If the switch is in the position OFF, the gear motor and frequency converter are connected but there is no change in speed in case of spacing faults (the regulating distance is synchronous to the respective speed in the station).
The processor spacing is automatically shut down (indication REGULATION ON is not lit up) in case of reverse operation, switch rail moved into the line, feeding/parking, lifted tyre conveyors or emergency stop FAULT PROCESSOR SPACING.

If there is a defect on the gear motor or the frequency converter of the processor spacing, the complete unit can be shut down by means of the switch position DEACTIVATED on the selector switch. However, then the regulating distance must be separated from the gear motor by means of the mechanical devices and attached to the decelerator or accelerator.

Too-small carrier spacing:

When a carrier reaches the proximity switch START of the regulating distance, a measurement of the distance to the preceding carrier is carried out. If the distance counter in the field ACTUAL VALUE is smaller than the REFERENCE VALUE minus the set tolerance, the processor spacing detects a too-small carrier spacing.
In the field CORRECTION the calculated impulse number is now indicated, for which the STEP PROCESSOR SPACING is switched to SLOW. Due to the slow passage through the regulating distance (in relation to the rope speed), the distance to the preceding carrier is increased and the spacing fault is corrected.
The indication END of the regulating distance lights up once the carrier has left the regulating distance. The length of the regulating distance is dimensioned in such way that there is only one carrier inside the distance usually. In the event that there are two carriers in the regulating distance (due to a spacing fault or manual manipulation of the carriers in the station), a fault (logic monitoring) is produced. In this case, the processor spacing can be shut down until the carrier spacing has been normalized again by the clutch spacing.

Normal or too-big carrier spacing:

When a carrier reaches the proximity switch START of the regulating distance, a measurement of the distance to the preceding carrier is carried out. If the distance counter in the field ACTUAL VALUE is bigger than the REFERENCE VALUE minus the set tolerance, the processor spacing detects a normal or too-big carrier spacing.
In the field CORRECTION the impulse number zero is now indicated and the STEP PROCESSOR SPACING remains at NORMAL. This way, the carrier passes through the regulating distance at a constant speed (in relation to the rope speed) and the distance to the preceding carrier is not altered.
The indication END of the regulating distance lights up once the carrier has left the regulating distance.

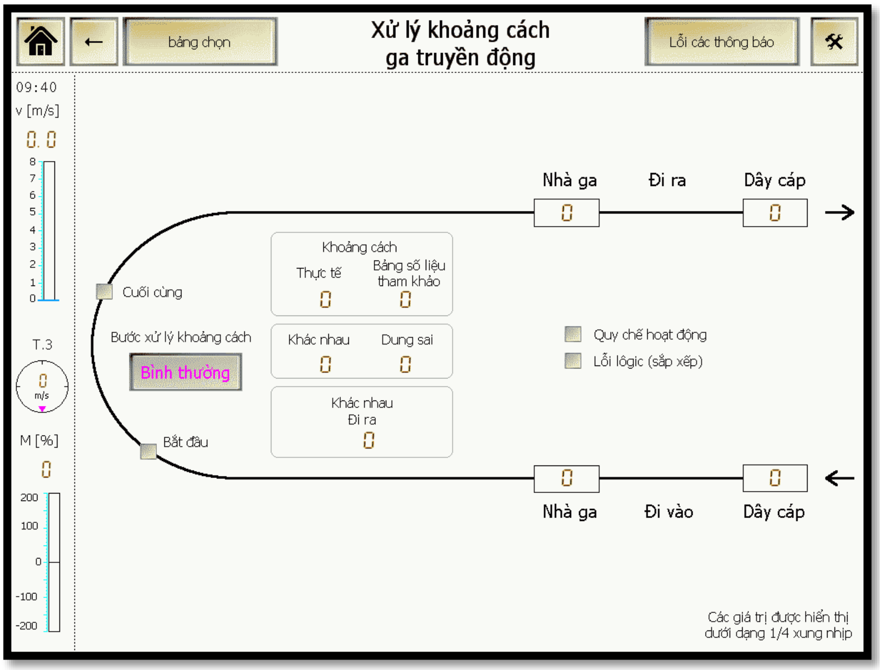
8.3.3 Logic Monitoring Processor Spacing

If one of the proximity switches of the regulating distance (proximity switch START or proximity switch END) fails, an acoustic warning is emitted. This warning can be acknowledged by means of the button ACKNOWLEDGEMENT HORN. In addition, the indication LOGIC PROCESSOR SPACING in the fault message screen and LOGIC MONITORING in the processor spacing screen light up and the proximity switch that caused the fault flashes (either the indicated proximity switch did not switch at all or the next proximity switch has switched double due to a malfunction). The fault is acknowledged by pressing the button ACKNOWLEDGEMENT HORN again.

8.4 Carrier Spacing Measurement in the Station / on the Rope (Slip Measurement)

Carrier spacing on the rope and in the station can be displayed in all stations on the incoming and outgoing side alike.

Carrier spacing is displayed in the spacing control window.



Carrier spacing measurement procedure:

If a carrier activates a certain proximity switch a counter will be started and then stopped by the next carrier. The value is indicated in the display and at the same time the counter is restarted again. Carrier spacing on the ROPE is measured at the last proximity switch on the outgoing side or the first proximity switch on the incoming side, spacing in the STATION is measured by a proximity switch in the slow section in the station.

The ROPE and STATION fields change their colour with each measuring (light grey / dark grey). If both fields have the same colour both spacing values refer to the same carrier.

Slippage in the accelerator or decelerator can be controlled quite simply in this display. The bigger the difference in the number of impulses measured in the station and on the rope the bigger the slippage.

⇒ Check V-belt tensioning

⇒ Check tyre pressure

⇒ Check if the friction plates on the grips of the carriers are iced up or soiled.

9 ANTI-COLLISION SYSTEM

9.1 Function

The anticollision system monitors the correct transportation of the carriers through the accelerating and decelerating areas of the stations.
The system consists of following independent functions:

1. Counter fault
2. Logic fault
3. Spacing fault

The inductive proximity switches and test switches enable all monitoring to be regularly controlled. This is further explained in item 9.5

After a shutdown by the anti-collision system or once the direction of operation has been switched from reverse to forward again, the anti-collision system has to be activated by pressing the ACTIVATION ANTI-COLLISION switch and the RESET button simultaneously. The ACTIVATION ANTI-COLLISION switch has to be held until all proximities have been activated by a carrier. During holding the switch the anti collision system is not active.

Attention:
During activating the anti collision system the operating staff must monitor the movement of the carriers on the incoming and outgoing sides visually! The speed is set to 2.5m/s!

The key switch has to be held until the LED „Activation Feedback“ lights up (from now on all functions of the anti-collision system are active). Also a buzzer signal sounds up.

9.2 Counter fault

9.2.1 Function Counter fault

The deceleration section is made up of several zones and the acceleration section of one or more zone(s). In each zone an electronic counter is installed which is started when the carrier is at the beginning of the zone and is stopped when the carrier is at the end of the zone. The path-dependent impulses for the zone counter come from a pulse generator which is driven torque-free by the haul rope. This pulse generator produces 4 x 2 impulses with a 90° shift per rotation (1 impulse ≈ 0.3 m).

By means of the two impulses with a 90° shift the counter can automatically tell the counting direction (forward or reverse) from the direction of movement of the rope (normally forward). This is necessary to re-balance the counter after rope swings which can be caused by an emergency stop, and to maintain the counter constant in relation to the position.

Each carrier must pass through each of the zones (incoming and outgoing sides) in a particular number of impulses (path-dependent). If a carrier gets stuck for any reason, or if a carrier is not properly carried forward, the counter reaches a preset maximum value and shuts the installation with an emergency stop down. When a carrier travels through a zone too quickly, the counter goes below the minimum value and the installation shuts down via an emergency stop. On the touch screen the zone, in which the counter control system was triggered, can be seen.

The anti-collision system recognizes a fault situation in time so that one more carrier can be stopped with sufficient safety distance including the braking distance to the carrier in front of it.

Attention:
On installations with station areas without automatic anti-collision monitoring a station attendant must observe the passage of the carriers through these areas. In case of a standstill of a carrier in this area the installation must be shut down manually.

9.2.2 Troubleshooting

The fault area between the two proximity switches that monitor the zone is red and blinking (e.g: area between prox. switch 3 and 4 Incoming is red and blinking = counter fault max. zone 3 incoming).

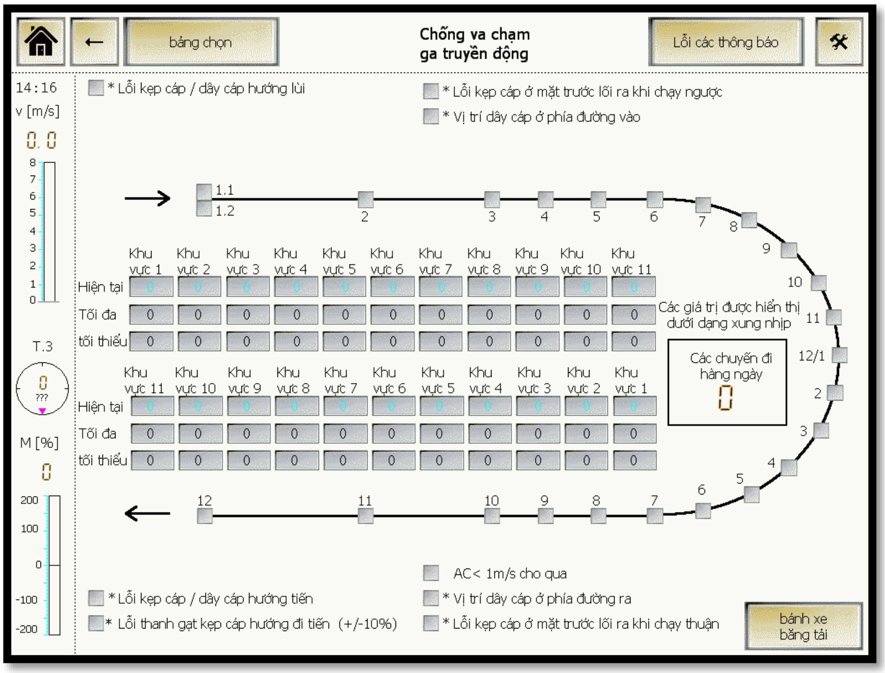
The following can lead to a shutdown with counter fault max.:

- If following the shutdown the carrier is no longer in the corresponding zone and measuring for the next zone has already been started or the carrier has already left the corresponding zone, the proximity switch at the end of the zone has switched correctly but the carrier has passed the zone too slowly (slippage in the tyre conveyor due to insufficient pressure of the tyres, pressure in the tyres too low, strong contrary wind in the station, etc.).
- If following the shutdown the carrier is no longer in the corresponding zone and measuring for the next zone has not been started yet, the proximity switch at the end of the corresponding zone has probably not triggered a signal (excessive switch distance, faulty proximity switch, input card defective, etc.).
- ......

The following can lead to a shutdown with counter fault min:

- If following the shutdown the carrier is no longer in the corresponding zone , the carrier has passed the zone too quickly (slip in the tyre conveyor due to a too low contact pressure of the tyres, too low air pressure, strong tailwind in the station,…).
- If following the shutdown the carrier is still in the corresponding zone, the zone counter was probably stopped due to a triggering fault of the proximity switch at the end of the zone (switch possibly actuated by rope or similar, proximity switch defective, input card defective, etc.).
- ......

9.2.3 Indications on the screen



Indication	Description
Grip lever fault (+/-10%)	See point 3.7.15.1
Grip / rope fault	See point 3.7.15.3
Rope position in station	See point 3.7.15.4
Grip fault before launch	See point 3.7.15.2
Dist. Counter	Lights up as long as the correct distance between two carriers is to small. The counter starts with the carrier passing the last outgoing proximity switch. The “distance counter“ message lights up. If the counter stops, the lamp goes out and the next carrier can leave the station. If the distance counter has not stopped during a carrier activates the last outgoing prox. the lift shuts down with a stop command “spacing fault”.
Proximity E1.1, E1.2, E2, E3, E4, E5, E6, E7, E8, E9, E10, E11, E12 / A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12	Lights up as soon as a proximity switch is activated by a carrier. If the counter fault max/min. has been triggered the line between the proxes is flashing.
Daily counter	Indicates how many carriers have left the station in one day.
Bypass AC < 1m/s	Indicates that “Bypass AC < 1m/s“ is on and the installation runs at less than 1m/s. (switch 217A2 in the control panel of the drive station or. 617A2 in the control panel of the return station).

Counter ACT Counter MAX Counter MIN	The actual value indicates the current number of impulses in the corresponding counter zone. The actual value is shown in red as soon as it exceeds the tolerance range (max./min.). A carrier must pass each zone in a certain number of impulses. The corresponding maximum and minimum values for each zone are indicated on the screen.
Symbol Tyre conveyors  	Actuate the symbol for the tyre conveyors to check all limit switches of the liftable tyre conveyors (optional). See item 3.7.10.

Reset grip daily counter:

If the button GRIP DAILY COUNTER is pressed, following picture appears on the screen:

By pressing the button „RESET GRIP DAILY COUNTER“ the counter is set to zero. By pressing next to the button the window will disappear.

9.3 Spacing Fault

9.3.1 Spacing Fault outgoing

The spacing control system is used to monitor the minimum distance between two carriers. For this a separate electronic counter is installed on the outgoing side. A carrier coming to the last outgoing proximity switch starts the distance counter, which only allows the next carrier to come to the last outgoing proximity switch after a certain number of impulses (minimum spacing). If the spacing between to carriers is smaller than 10% less of the nominal distance the installations shuts down via a spacing fault (stop circuit)

How to proceed in case of a carrier spacing fault on the outgoing side:
Should the spacing fault be activated on the outgoing side (i.e. 2 carriers are travelling out of the station too close together), the return station must be informed of the situation (with the carrier numbers) so that the operator in the return station can reduce the speed before the two carriers arrive in the return station, in order to ensure that a safe distance is maintained between the two carriers when the anti-collision system in the return station is triggered.

Possible cause / remedies:

- Check if start blocking in the corresponding station works properly. Set the SPACING SYSTEM switch to ‘Hold’. The next carrier must be kept in start position until the SPACING SYSTEM switch is set to ‘On’ or the MANUAL START button is pressed. In case of a malfunction check if the ‘Carrier in start position’ and ‘Carrier started’ proximity switches are actuated simultaneously by the switch activating plates for a short time. Increase the distance between the two proximity switches if needed.
- In the DRIVE STATION CONTROL or RETURN STATION CONTROL panel, check if the correct carrier spacing impulse value (shown in ¼ impulses) is entered in the REFERENCE VALUE ADJUSTMENT field (¼ impulse ≅ 0.076 m). For ropeway length measurement or manual setting of an impulse value refer to item **Fehler! Verweisquelle konnte nicht gefunden werden.**.

9.4 Logic Fault

This monitoring system is used solely for the self-testing of the proximity switches and the electronics. The next proximity switch in the row on the incoming and outgoing sides always checks if the switches before it have functioned properly and if the electronics have stored the signals properly. In case of a logic fault the corresponding proximity switch is shown (blinking) in the 'Anti-collision system drive station' or 'Anti-collision system return station' panel.

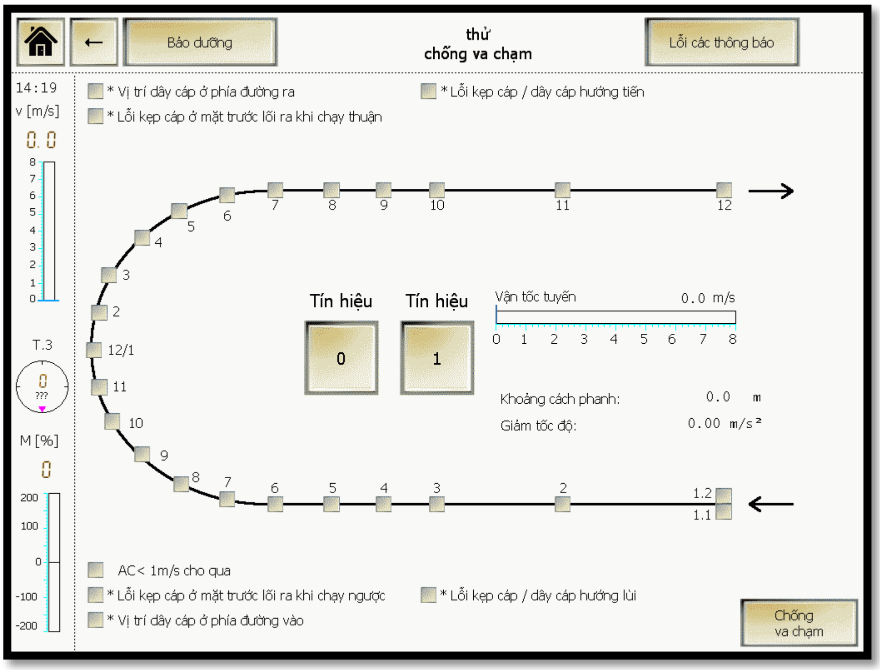
Possible cause / remedies:

Either the indicated (blinking) proximity switch has not switched or the next proximity switch has switched twice.

- Check the switching distance between the proximity switch and the activating plate of the grip (5 – 8 mm)
  When the grip passes the proximity switch only one impulse shall be released.
- Check the proximity switch for correct functioning (manually activate the proximity switch with a metal object ⇒ red LED on the proximity switch must light up).
- Check the signal at the PLC input: If the signal does not reach the PLC input, check the plug of the proximity switch and the wiring (terminal clamping points) leading to the control cabinet.
- Check the signal at the PLC input: If the signal reaches the PLC input, check the display if the corresponding proximity switch field is illuminated in the anti-collision diagram (Note: result is shown with 1 – 2 s delay) after the proximity switch has been activated. If the field does not light up the corresponding PLC input card must be replaced.

9.5 Testing the Anti-Collision System

In order to be able to carry out tests on the anti collision system, the key switch "Activation test buttons" on the diagram must be turned on. After completion of the tests, the key switch "Activation test buttons" must be turned off again.
After typing in the password and selecting the function “TESTS ANTICOLLISION“ on “TESTS & ADJUSTMENTS“ the following appears on the screen:



The following description of tests refers to the drive station. The tests for the return station shall be carried out analogously.

9.5.1 Testing the counter fault

After every test the key switch „Activation anti-collision“ has to be pressed until the LED „Activation feedback“ lights up.
The test has to be done for all zones on the incoming and outgoing side.

9.5.1.1 Upper limit value

The speed is approx. 3 m/s.

- Select prox. switch which is stopping the counter of the selected zone
- Run a carrier over the proximity which starts the counter of the selected zone
- Press „Prox. off“ on the touch screen until the carrier has passed over the proximity which is stopping the counter
- The installation must shut down via the emergency stop command "Counter fault incoming max." or “Counter fault outgoing max.”

9.5.1.2 Lower limit value

Testing takes place at a lift speed of approx. 0.5 m/s and with the 'BYPASS ACS <1m/s' (E3.07) switch turned off in operation mode “Station manned”.

- Select prox. switch which is stopping the counter of the selected zone
- Run a carrier over the proximity which starts the counter of the selected zone
- Press immediately „SIGNAL 1“ (for approx. 2 seconds).
- The installation must shut down via the emergency stop command "Counter fault incoming min." or “Counter fault outgoing min.”

9.5.2 Testing the spacing fault

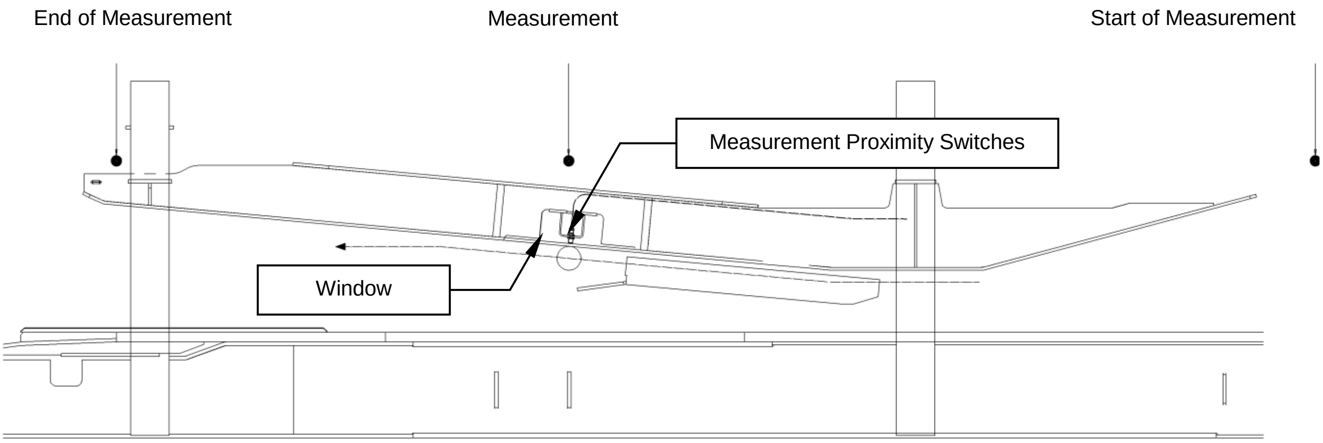
The speed is 3m/s.

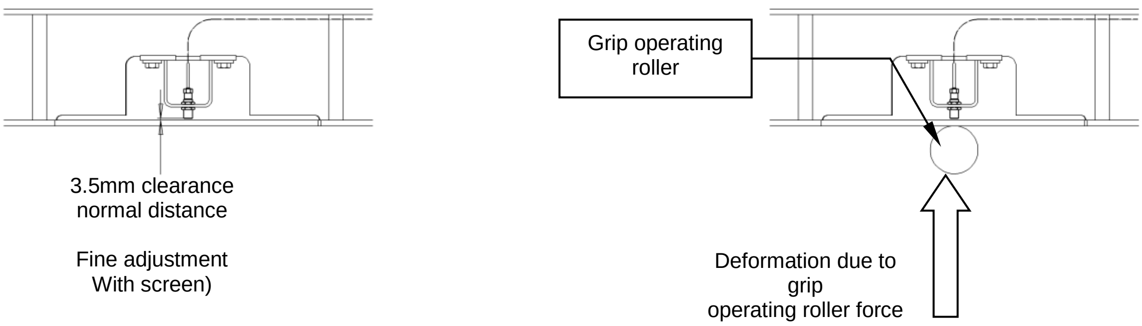
- Select last outgoing prox. switch on the touch screen
- Activate last outgoing prox. switch with a carrier
- As soon as the carrier has left the station press „Prox. on“ on the touch screen.
- The installation shuts down via the stop command "Spacing fault".

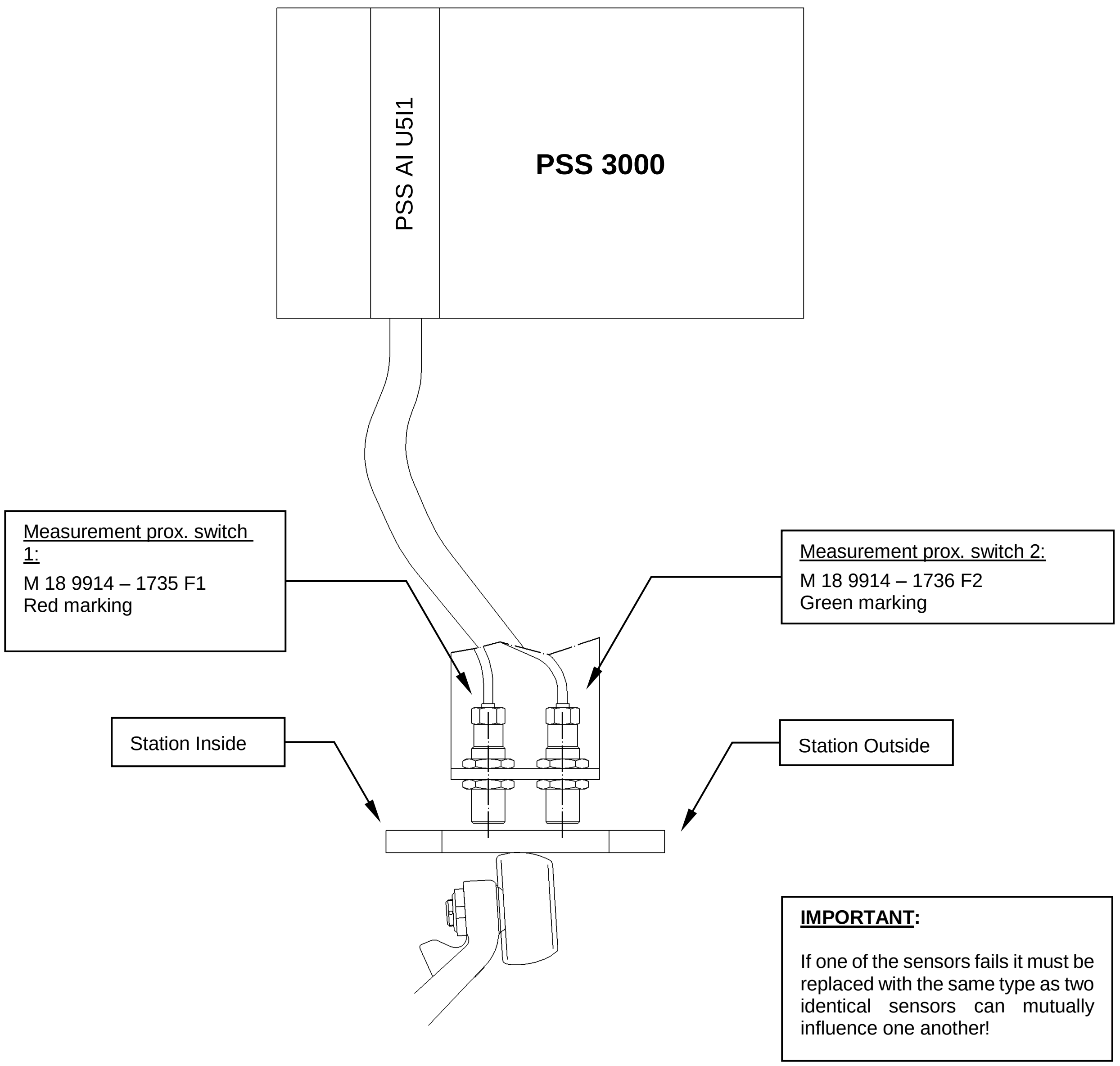
10 DESCRIPTION OF THE GRIP FORCE TESTING SYSTEM

10.1 Layout

The grip force testing system is situated in the engaging/disengaging line on the incoming or the outgoing side of the station or on an additional engaging/disengaging line in the station (depending on the type of grip and the length of the safety distance). The grip force is measured during the closing process of the grip while running forward and during the opening process of the grip while running in reverse.
As the grip passes through the engaging/disengaging line, the grip operating roller exerts pressure on the grip opening and closing rail.
This grip operating roller force has the effect that the rail deforms in the area of a special measuring window. This deformation is registered by two measuring proximity switches with an analogue output. The measuring window is opened by the proximity switch “Start of measurement” and it is closed by the proximity switch “End of measurement”. In the evaluation unit (PSS3000) the correctness of the measuring signal is checked and shown on the touch screen. Any system or operational errors are also displayed (see 10.7).







Data of the measurement proximity switches:

Output signal	4 - 20 mA
Range	0.5 - 5 mm
Voltage	10 - 35 V/DC
Temperature	-40°C to +70°C
Protection type	IP 67
Thread	M 18 x 1

10.2 Functional principles

The grip force testing system is situated in the engaging/disengaging line on the incoming or the outgoing side of the station or on an additional engaging/disengaging line in the station (depending on the type of grip and the length of the safety distance).

Start of measurement:

Grip force measurement is triggered by the proximity switch "start of measurement". A separate proximity switch is used on gondola ropeways, while on chairlifts one of the proximity switches in the anti-collision zone is used. When measurement starts, the measuring electronics check whether the distance between the sensors and the grip closing rail is normal (approx. 3.5 mm).

Measurement:

As the grip passes through the rail, it deforms the rail by approx. 1.5 mm. The deformation is proportionally measured by the sensors and analysed by means of the measuring electronics.

End of measurement:

The measurement completes with the proximity switch “end of measurement” (last outgoing prox.)
A failure of the proximity switch "end of measurement" will be detected by a response from the monitoring device "anti-collision - max." in the last zone.

The measuring sensors work independently of one another but at the same time monitor each other. If the difference between the grip force evaluated by Sensors 1 and 2 is outside the set tolerance range, the lift installation will be shut down.

Attention:
If information is lost (control voltage Off/On or reverse operation), the carrier located in the measuring zone must be run back to a point which precedes the beginning of the measuring zone!

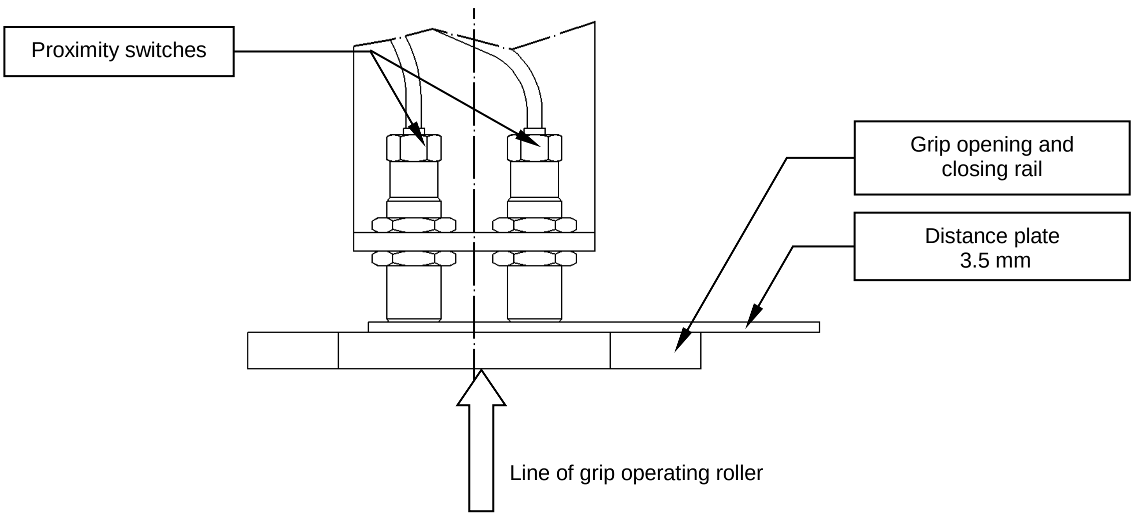
10.3 Start-up grip force testing

10.3.1 Adjusting the proximity switches

The measuring sensors are adjusted according to the drawing below (see diagram 1) by means of the setting gauge supplied (3.5 mm). The fine adjustment takes place according to chapter 10.3.2. The setting gauge must be kept for possible later adjustments (e.g. in case of replacement) of the measuring sensors.
The measuring range of the sensors is 0.5 mm - 5 mm.

Important:
Ensure that the grip closing rail is correctly adjusted (height!). Check adjustment annually.

The measuring sensors must be centred on the track of the grip operating roller!



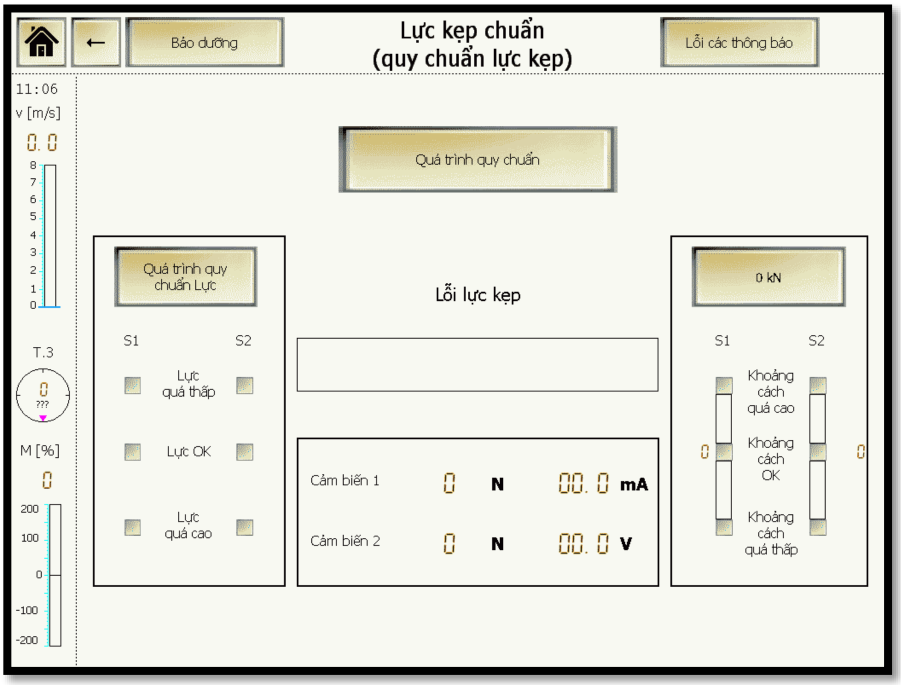
(diagram 1)

Attention:
If the distance between the proximity switches and the rail is less than 1.5mm, the proximity switches could be damaged as a grip passes by.

10.3.2 Calibration

Every time a measuring sensor is replaced the grip force testing device must be calibrated in accordance with the instructions given in the operating manual.

As soon as the option "GRIP FORCE CALIBRATION" in the menu "TESTS & ADJUSTMENTS" has been selected, the following appears on the touch screen:



Use the "CALIB. FORCE" and "0 N" buttons to select for calibration.

<u>IMPORTANT:</u> Always press **"RESET"** before calibration!

10.3.2.1 Calibration 0 N

To calibrate “0 N” no carrier may be in the grip opening/closing section and the measuring proximity switches have to be adjusted correctly (the display “Distance OK” lights up).
Press “0 N” until it lights up.

Then press the CALIBRATION button until the beep of the monitor stops.
The following conditions must be met to ensure successful calibration:

- The installation must be at a standstill.
- The key switch ACTIVATION TEST BUTTONS must be switched on.
- The clearance between the measuring sensors and the push rail must be set to the required 3.5mm (± a tolerance of 2.5% based on the calibrating force),otherwise fault
  #221 S1: CALIBRATION DATA OUTSIDE TOLERANCE RANGE or
  #224 S2: CALIBRATION DATA OUTSIDE TOLERANCE RANGE
  will light up on the display.

  → Check distance of measuring proximity switches (S1 or S2).

10.3.2.2 Calibration CALIB. FORCE

Press “CALIB.-FORCE“ until it lights up.
Generate the force by means of the special grip force calibrating device (Diagram 2). The force is different for every grip (see point 10.4)

If the value on the calibrating device is correct (the display “FORCE OK“ lights up), press the CALIBRATION button until the beep of the monitor stops.
The following conditions must be met to ensure successful calibration:

- The installation must be at a standstill.
- The key switch ACTIVATION TEST BUTTONS must be switched on.
- The calibration force must be within a certain tolerance range (± 2.5% based on the calibrating force), otherwise fault
  # 221 S1: CALIBRATION DATA OUTSIDE TOLERANCE RANGE or
  # 224 S2: CALIBRATION DATA OUTSIDE TOLERANCE RANGE
  will light up on the display.

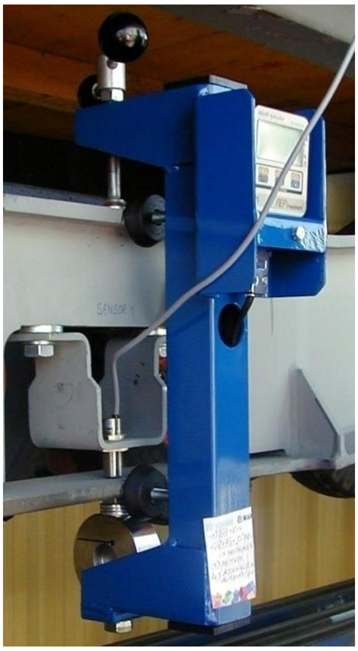
→ Check distance of measuring proximity switches (S1 or S2).
→ Check position of calibrating device.
→ Check calibration force of calibrating device

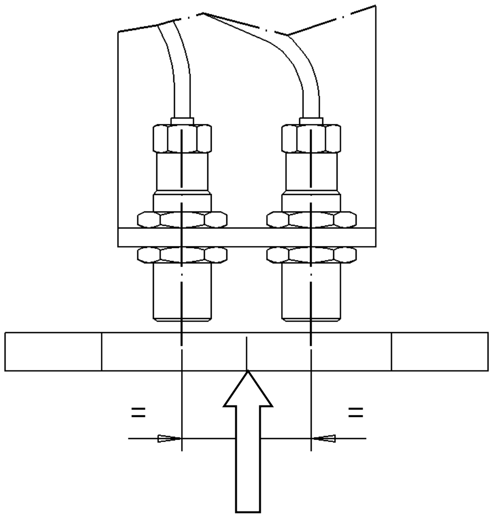
The CONTROL VALUE SENSOR 1 and SENSOR 2 shows the current force on the push rail. This permits control measurements to be taken after calibration. Until both calibrations have been performed a force of “-1 N” will be displayed.

<u>Grip force calibrating device:</u>

<u>Attention:</u> Put screw in moving line of grip operating roller! Max. permissible force on the grip opening/closing rail is 10000 N, otherwise the rail will be permanently deformed!

<u>Important:</u> The measuring accuracy of the grip force calibration device must be verified every second year by the authority in charge (e.g. gauging office)!





Put screw in moving line of grip operating roller!

(diagram 2)

10.4 Values for Calibration

See technical description

10.5 Normal Operation

Following the passage of a grip through the opening/closing line, the measured grip force from both sensors is displayed in “Newton” and in “percent”. In addition, the current analogue signals from Sensor 1 (mA) and Sensor 2 (V) are shown.

If one of the sensors fails it can be deactivated using a selector switch. A deactivation can only be conducted in a standstill position of the installation. After the next start of the installation the deactivation has taken place. The following switch positions are possible:

- “Sensors 1 + 2”:
  Both sensors are activated.
  The last 10 grip force values detected by Sensor 1 are stored and visualized on the screen.

- “Sensor 1”:
  Only Sensor 1 is activated. Sensor 2 is deactivated and shows 0 Newton.
  The last 10 grip force values detected by Sensor 1 are stored and visualized on the screen.

- “Sensor 2“:
  Only Sensor 2 is activated. Sensor 1 is deactivated and shows 0 Newton.
  The last 10 grip force values detected by Sensor 2 are stored and visualized on the screen.

Attention:

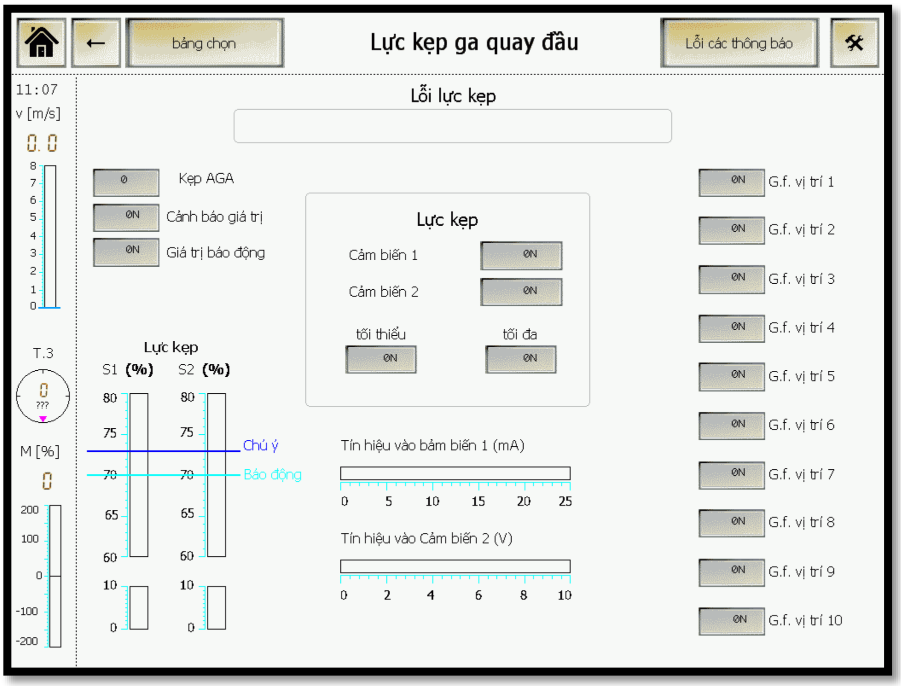
A sensor may only be deactivated if both sensors were functioning correctly at the start of operations and at least one carrier passed the grip force testing device without initiating a stop. The following points must be borne in mind when deactivating a sensor:

1) The lift installation may only be operated on the same day that the sensor was deactivated!

2) Once operations have been closed down the grip force testing device must be repaired.

3) Operations may only be resumed if both sensors are activated again!

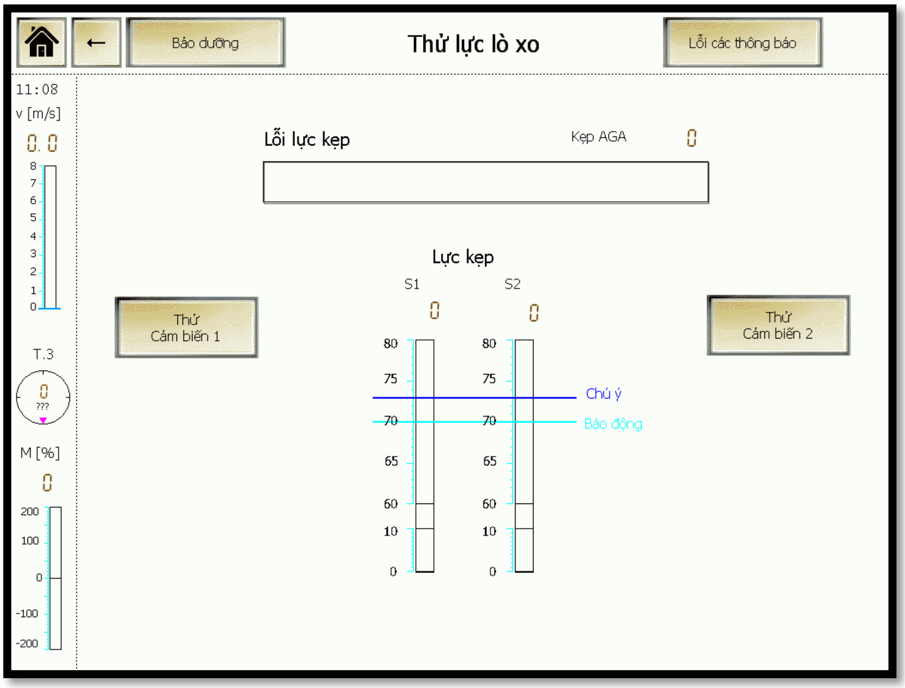
If the installation shuts down with a GRIP FORCE emergency stop the exact cause will be displayed in the field FAULT GRIP FORCE (for a description of the faults refer to item 10.7).



The maximum and the minimum comprehend value is saved in the fields „GRIP FORCE MINIMUM“ and “GRIP FORCE MAXIMUM“. By touching one of the fields a window appears where the values can be reset.

10.5.1 Checking shut-down upon detection of insufficient grip force

In order to be able to carry out following test functions, the key switch "Test Mode“ must be turned on. When the tests have been completed, the key switch "Test mode“ must be turned off again. As soon as the option “GRIP FORCE TEST“ in the menu “TESTS & ADJUSTMENTS” has been selected, the following appears on the touch screen:



With the buttons “TEST SENSOR 1" and “TEST SENSOR 2” the shut-down function can be checked. The switch “ACTIVATION TEST BUTTONS" has to be activated. The button “TEST SENSOR 1" or “TEST SENSOR 2” is pressed and held during the passage of a grip. A constant value is thus subtracted from the grip force measured by the respective sensor so that the result is below the shutdown limit value (see table 10.4). After the grip has passed through the measuring point, the lift must shut down via the emergency stop command “Grip Force“.

10.5.2 Procedure upon response of the grip force testing system

If the electronic grip force testing unit responds, the activating carrier must be moved back to the loading area in the station (if the carrier is out of the station).
The passengers must then leave the carrier.
Inspect the grip concerned, as well as the grip O/C rail and the testing unit visually for any changes.
If no obvious change is found, run the same carrier again through the grip force testing system without passengers.
If the system is shut down again, the carrier must be removed from operation and the grip subjected to a detailed inspection.
At the same time check the electronic grip force testing unit for proper functioning.

10.5.3 Warning grip force

If the grip force is still within the permissible range but outside the warning range (item 0) the WARNING GRIP FORCE sign will come on the screen. The screen will also show which sensor initiated the warning (Sensors 1+2, Sensor 1 or Sensor 2). In addition, an acoustic signal will sound which can be reset by pressing HORN RESET. Press WARNING OFF to fade out the warning on the screen.
If the WARNING GRIP FORCE is activated at the same grip for several times, the grip should be checked.

10.6 Calibration - Short Description

- Set key switch ACTIVATION TEST BUTTONS to ON.
- Adjust measuring sensors to 3.5mm. (Display “Distance OK” lights up).
- Select menu SERVICE on the screen and enter password.
- Press GRIP FORCE CALIBRATION.
- Press 0 N on the screen until it lights up.
- Set the measuring sensor roughly at 3.5 mm and adjust it step by step until the 'Spacing OK' field in the calibration window lights up and the bars of both sensors are indicating almost 0.
- Press RESET button.
- Press CALIBRATION on the screen (a beep will sound).
- Press CALIB.-FORCE on the screen until it lights up.
- Press RESET button.
- Fit the calibration device and pretension to correct force (see point 10.4). (Display “FORCE OK“ lights up)
- Press CALIBRATION on the screen (a whistle will sound).
- Control measurements can be performed. The display on the screen “CONTROL VALUE SENSOR 1 and SENSOR 2” can be compared with the display on the grip force calibrating device.
- Remove calibration device.

10.7 Error Messages

- **#201 S1: ANALOGUE VALUE TOO HIGH AT START OF MEASUREMENT**
  If the START OF MEASUREMENT proximity switch is actuated the analogue value of sensor 1 measured by the PLC is too high (tolerance ± 8% based on the signal at 0 Newton). This corresponds to an insufficient grip force.
  → Measuring proximity switch 1 defective.
  → Distance between measuring proximity switch 1 and grip opening/closing rail much more than 3.5 mm or short to +24V/DC.

- **#202 S1: ANALOGUE VALUE TOO LOW AT START OF MEASUREMENT**
  If the START OF MEASUREMENT proximity switch is actuated, the analogue value of sensor 1 measured by the PLC is too low (tolerance ± 8% based on the signal at 0 Newton). This corresponds to an excessive grip force.
  → Measuring proximity switch 1 defective.
  → Distance between measuring proximity switch 1 and grip opening/closing rail much less than 3.5 mm or short to 0V or wire breakage.

- **#203 S1: GRIP FORCE LOWER THAN MINIMUM LIMIT**
  Grip force below min. permissible value. The grip force measured by sensor 1 is below the corresponding shut-down value. Proceed as described in 10.5.2

- **#205 S1: GRIP FORCE HIGHER THAN MAXIMUM LIMIT**
  The grip force measured by sensor 1 is above the max. permissible value.
  (Not active during reverse operation)
  → Measuring proximity switch 1 defective.
  → Difficult to close grip mechanically.

- **#206 S2: ANALOGUE VALUE TOO HIGH AT START OF MEASUREMENT**
  If the START OF MEASUREMENT proximity switch is actuated the analogue value of sensor 2 measured by the PLC is too high (tolerance ± 8% based on the signal at 0 Newton). This corresponds to an insufficient grip force.
  → Measuring proximity switch 2 defective.
  → Distance between measuring proximity switch 2 and grip opening/closing rail much more than 3.5 mm or short to +24V/DC.

- **#207 S2: ANALOGUE VALUE TOO LOW AT START OF MEASUREMENT**
  If the START OF MEASUREMENT proximity switch is actuated, the analogue value of sensor 2 measured by the PLC is too low (tolerance ± 8% based on the signal at 0 Newton). This corresponds to an excessive grip force.
  → Measuring proximity switch 2 defective.
  → Distance between measuring proximity switch 2 and grip opening/closing rail much less than 3.5 mm or short to 0V or wire breakage..

- **#208 S2: GRIP FORCE LOW SHUTDOWN VALUE**
  The minimal grip force has not been reached. The measured grip force of sensor 2 is below the corresponding switch value. Procedure described in 10.5.2.

- **#209 S2: GRIP FORCE HIGHER THAN MAXIMUM LIMIT**
  The grip force measured by sensor 2 is above the max. permissible value.
  (Not active during reverse operation)
  → Measuring proximity switch 2 defective.
  → Difficult to close grip mechanically.

- **#210 HIGH - FAULT OF PROX. END**
  A carrier actuates the START OF MEASUREMENT proximity switch and the END OF MEASUREMENT proximity switch is still high (only in reverse direction).
  →END OF MEASUREMENT proximity switch defective (high - fault of proximity switch)

- **#211 HIGH - FAULT OF PROX. START**
  A carrier actuates the END OF MEASUREMENT proximity switch and the START OF MEASUREMENT proximity switch is still high (only in reverse direction).
  → START OF MEASUREMENT proximity switch defective (high - fault of proximity switch)
  The counter stops and the control recognises that the START OF MEASUREMENT proximity still indicates a high signal (only in forward direction).
  → START OF MEASUREMENT proximity switch defective (high - fault of proximity switch)

- **#212 NO START SIGNAL** (only in reverse direction)
  A carrier actuates the START OF MEASUREMENT proximity switch. Controls recognise that the start signal (proximity switch END OF MEASUREMENT) has not been emitted.
  → END OF MEASUREMENT proximity switch defective (low - fault of proximity switch).

- **#213 NO STOP SIGNAL** (only in reverse direction)
  A carrier actuates the END OF MEASUREMENT proximity switch. Controls recognise that the stop signal of the previous measurement (proximity switch START OF MEASUREMENT) has not been emitted.
  → START OF MEASUREMENT proximity switch defective (low - fault of proximity switch)

- **#215 MEASURED VALUE S1 VS. MEASURED VALUE S2 OUTSIDE TOLERANCE**
  The grip force measured by Sensor 2 shows an excessive deviation from the grip forced measured by Sensor 1. (Tolerance 10%)
  → Check whether measuring sensor 1 or measuring sensor 2 is drifting

- **#220 S1: NO CALIBRATION DATA (CALIBRATION FORCE)**
  Calibration has not been performed on Sensor 1.
  For exact procedure refer to 10.3.2.2

- **#221 S1: CALIBRATION DATA OUTSIDE TOLERANCE RANGE**
  Calibration data for sensor 1 not accepted by controls (outside tolerance range of ± 2.5% based on calibrating force).
  → Re-calibrate
  For exact procedure refer to 10.3.2.1 or 10.3.2.2

- **#222 S1: NO CALIBRATION DATA (0N)**
  0 N calibration for sensor 1 not performed.
  For exact procedure refer to 10.3.2.1

- **#223 S2: NO CALIBRATION DATA (CALIBRATION FORCE)**
  Calibration has not been performed on Sensor 2.
  For exact procedure refer to 10.3.2.2

- **#224 S2: CALIBRATION DATA OUTSIDE TOLERANCE RANGE**
  Calibration data for sensor 2 not accepted by controls (outside tolerance range of ± 2.5% based on calibrating force).
  → Re-calibrate
  For exact procedure refer to 10.3.2.1 or 10.3.2.2

- **#225 S2: NO CALIBRATION DATA (0N)**
  0 N calibration for sensor 2 not performed.
  For exact procedure refer to 10.3.2.1

- **#228 BOTH SENSORS DEACTIVATED**
  Sensor 1 and Sensor 2 are deactivated.
  → Check selector switch "Deactivate Sensors"

- **#229 CALIBRATING OPERATION ACTIVE**
  The lift installation cannot be operated during the calibrating operation. If you are in the calibrating mask and the key switch "Activation test buttons" is switched on the lift installation will shut down with this error as soon as the "Run" signal is recognized.
  → End the calibrating operation and switch off the key switch "Activation test buttons".

- **#231 NO SIGNAL PROX. END** (only in forward direction)
  A carrier actuates the START OF MEASUREMENT proximity switch. Controls recognise that the proximity switch END OF MEASUREMENT of the previous measurement has not been emitted.
  → END OF MEASUREMENT proximity switch defective (Low or high fault of proximity switch)

- **#232 COUNTER SIGNAL NOT STOPPED (PROX. START)** (only in forward direction)
  A carrier actuates the START OF MEASUREMENT proximity switch. Controls recognise that the distance counter of the previous measurement is still running.
  → double signal of proximity START OF MEASUREMENT
  → check impulse proximity switches

- **#233 COUNTER SIGNAL NOT STOPPED (PROX. END)** (only in forward direction)
  A carrier actuates the END OF MEASUREMENT proximity switch. Controls recognise that the distance counter of the previous measurement is still running.
  → check impulse proximity switches
  → distance counter adjusted not correctly

- **#234 NO SIGNAL PROX. START** (only in forward direction)
  A carrier actuates the END OF MEASUREMENT proximity switch. Controls recognise that the start signal (proximity switch START OF MEASUREMENT) has not been emitted.
  → START OF MEASUREMENT proximity switch defective (Low or high fault of proximity switch)

11 RPD SYSTEM OPERATING MANUAL (ROPE POSITION DETECTION)

11.1 Functional Specification

The RPD consists of non-contact sensors located at a distance of 15 mm below the haul rope on the entry side of the first evener frame, and in the case of larger sheave assemblies on both entry and exit sides. These switches are interconnected by cable and constantly supply information about the respective rope position on each sheave assembly to a fail-safe programmable logic controller (referred to as "PSS" = Programmable Safety System).

The following rope positions on the sheave are covered and detected:

1. Normal position of the haul rope (centre of sheave)
2. Rope has left liner groove but is still on the sheave = **AOC Signal**
3. Rope has left liner groove and is moving off side plate = **SRA Signal**
4. Rope approaching switch as a result of= **SRA Signal**
   - lost sheave, or
   - blocked sheave - by haul rope cutting into sheave liner.

For more exact details please refer to the operating and maintenance instructions!

11.2 Important Information for RPD assembly

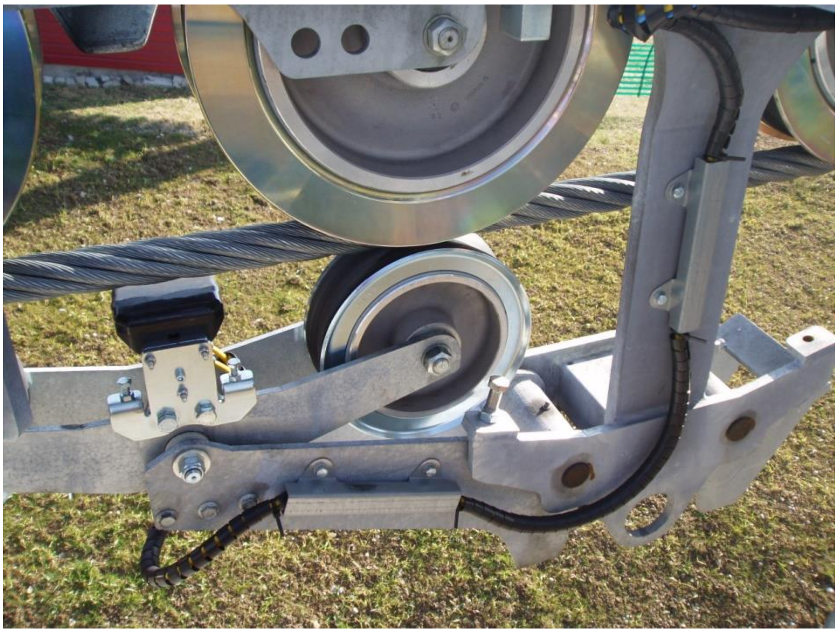
In order to prevent problems concerning the operation of the installation, the following aspects are to be regarded during assembly:

- All plugs of the RPD system have to be filled with SGB AEROSOL (Ident 1096484) before assembly. This will prevent corrosion.

- In order to prevent plug damage, the connection of the RPD cable to the RPD sensors should take place with an demounted RPD sensor (pay attention to a straight connection of plug and socket).

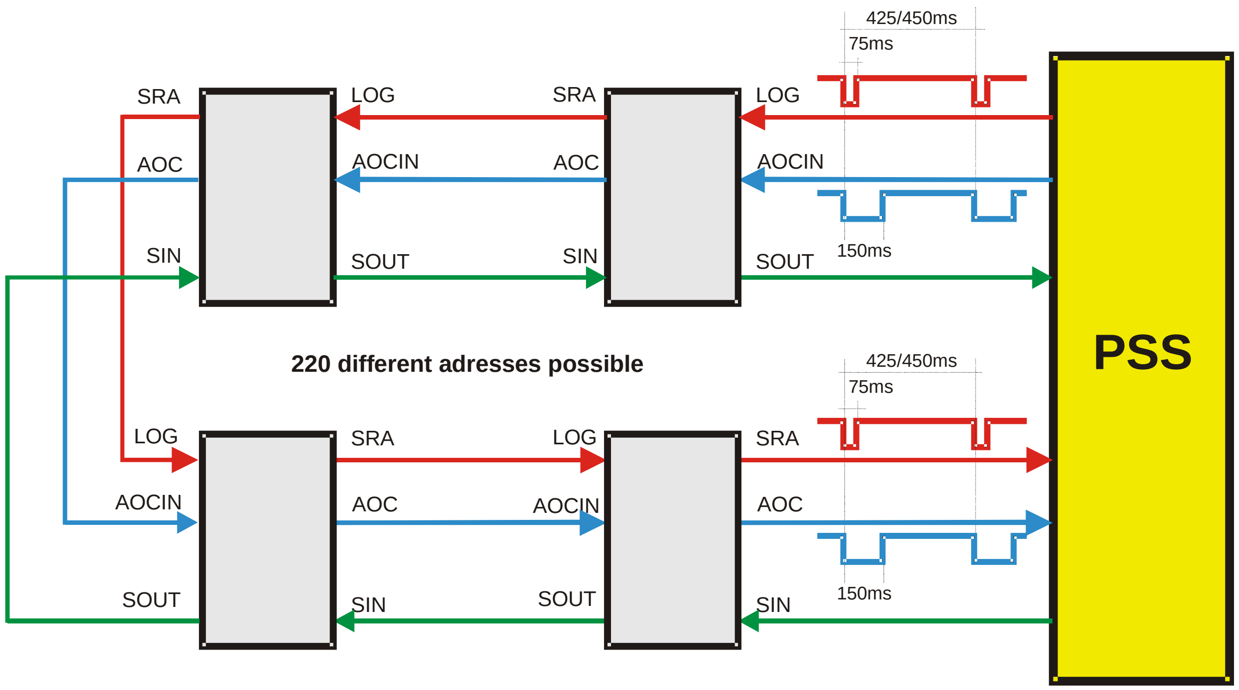
- The plugs of the RPD cable may only be tightened manually and not with a tool (e.g. pliers) in order not to damage the gasket or the vibration lock.

- With a protection hose the RPD cables are to be protected against mechanical damage

	**Sheave Assembly with RPD:** Wiring RPD switch: - Lay cable with protection hose - Strain relief with cable ties
	**Sheave Assembly with RPD:** Wiring RPD switch: - Lay cable with protection hose - Strain relief with cable ties

11.3 Function description

The AOC and SRA signals are generated by the 25 ms system clock pulse of the programmable safety system (PSS 3047) and sent to the first RPD sensor in the system via the outputs 2.8 and 2.9 (AOC → AOCIN and SRA → LOG).
Provided that the RPD sensor is intact and the rope is in its proper position, these signals will be reproduced at the outputs of the first RPD sensor and transmitted to the next sensor in the system. The last sensor in the system sends the AOC and SRA signals back to the respective inputs (SRA = E 0.4, AOC = E 0.5) of the PSS.



Error tolerance time: SRA ≤ 500ms
AOC ≤ 5 s

= sin / sout = not fail-safe !

A function module in the PSS checks the arriving SRA and AOC signals for the correct shape. If the SRA signal does not arrive at LOG "0" or LOG "1" within 75 ms or not at all, the 2-pole fail-safe output 2.16 is immediately de-energized and the ropeway shuts down with an emergency stop.

The same applies to the AOC signal, however in this case the required time for the signal to arrive at LOG "0" or "1" is 150 ms after which the 2-pole, fail-safe output 2.17 is de-energized, initiating a reduction of rope speed (DOPPELMAYR rope speed max. Slow 2). This speed reduction cannot be removed until the rope is back in the center of the sheave and the signal has been reset by means of the reset button.

In order to prevent beating interference within the rope position detection system, the signal length changes back and forth between 425 ms and 450 ms. In the event of rope derailment or if the rope deviates from its normal position, the daisy chain is immediately interrupted and the ropeway is immediately shut down or slowed down via the PSS.

More precise information (e.g. deropement, rope has left centre of sheave, rope too close, and which switch in the system has sent the information) is provided via existing incorporated serial interface (SIN, SOUT).

The individual sensors are also addressed via the serial interface, while the addresses are allocated in reverse order to the SRA and AOC signals. This means that the last sensor in the system is given address 1 and the first sensor in the system receives the highest address (max. 200 sensors are possible in the system).

If the RPD system reports a rope deviation or a derailment on one tower, the lift operating crew is obligated to check immediately the circumstances of rope deviation at the location in question.

If the rope position detection system can no longer be reset due to a system fault, passengers must be evacuated from the line using the evacuation drive. This applies to installations without functional break fork system (see also point 2.7). In the event of a complete failure of the RPD system, suitable alternative measures must be adopted in order to clear the line (e.g. posting of operating personnel to observe the line at the most critical sections (with radio sets)).

If the RPD system reports a hardware fault on a specific sensor, the operating personnel must replace it immediately and address the new sensor (also refer to chapter 11.4.9).

If the report display for the RPD system fails, ropeway operation can be maintained provided there is no rope position fault present. However, in the event of a fault it may no longer be possible to indicate the location of the fault on the display.

In the event of a failure in serial data transmission between the sensors and the RPD control, again operation can be maintained provided that there is no rope position fault present. If a fault is present it will no longer be possible to start up the ropeway (not possible to initiate system test after "reset") and it will be necessary to evacuate the line with the evacuation drive by adopting alternative measures as in the case of RPD failure.

As long as it is only the serial data transmission which is down, and the SRA and AOC signals are being sent back to the control system properly, the line can also be cleared under constant observation of the incoming signals (SRA = E 0.4, AOC = E 0.5) on the PSS. In this case it will not be necessary to adopt the alternative measures as in the case of RPD failure. As soon as the SRA signals interrupted the ropeway must be shut down.

Important: It is not possible to override an individual sensor in the system.

Change of Sensors:

If a sensor is replaced, the new sensor must be addressed. If there is a fault on the serial interface, it will not be possible to perform the addressing operation. Irrespective of this, however, the SRA and AOC signals should function again immediately. In this case it will at least be possible to use the method described in the last paragraph to clear the ropeway.

It is possible to find out where the serial interface has a fault using the function "Sensor Programming". First of all, the sensor with the address "1" must be forced to transmit e.g. AOC and SRA LOG "1" (remember the way the signals run – the serial signal runs in the reverse order to the SRA and AOC signals!). If the signals are being supplied by the second sensor, then you know that this sensor is operational. A wire break in a signal cable, for example, or a faulty sensor can be localized if this operation is then repeated with increasing address number (2, 3, 4, 5, etc.) until a sensor does not respond (see chapter 11.4.12).

As soon as a switch rail is engaged to load or park carriers, the "slow" signal (AOC = rope has left sheave centre) will be suppressed by the RPD system. Instead there will be an acoustic signal. The signal can be observed optically on the RPD display

11.4 System Description

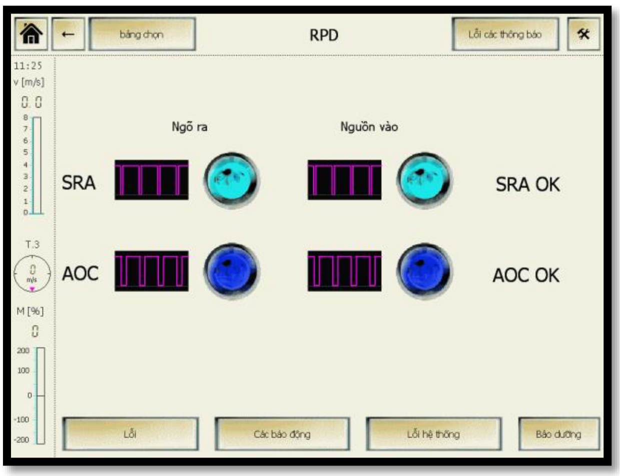
11.4.1 Start Display

In order to enter the main mask of the RPD system, click onto RPD System in the screen Rope position monitoring.

Main menu

In the RPD overview screen you have access to the most important functions of the RPD.

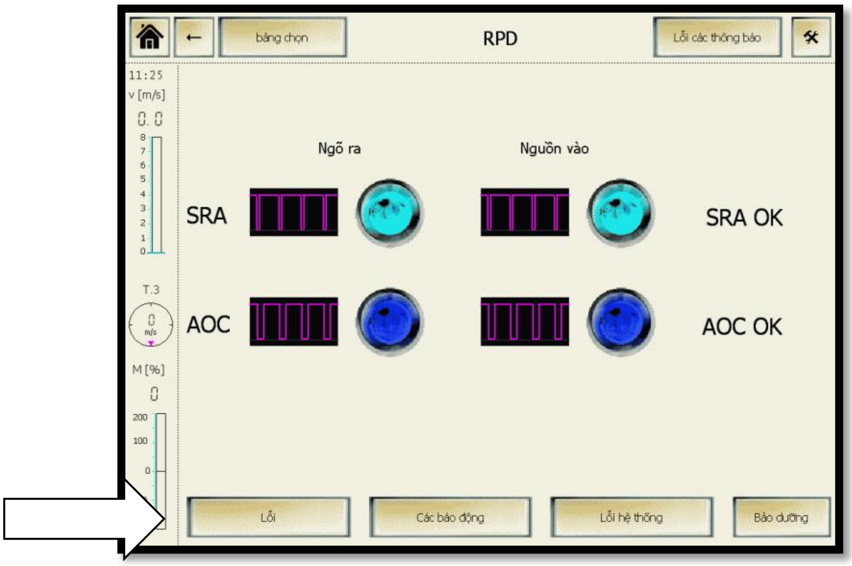
11.4.2 Overview Screen



IMPORTANT:
When the RPD system is activated for the first time, please process an overall initialization, as described in chapter 11.4.8.

11.4.3 Fault Display

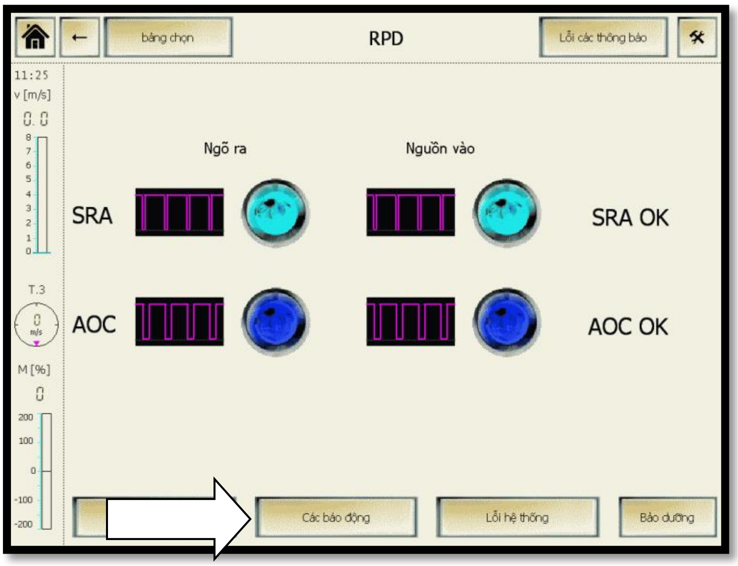
If the RPD detects a faulty rope devolution, automatically, measures for damage limitation will be initiated (slowdown or shutdown of the installation). Pressing "RPD Sensor error" in the main menu will take you to the sensor-related fault list.



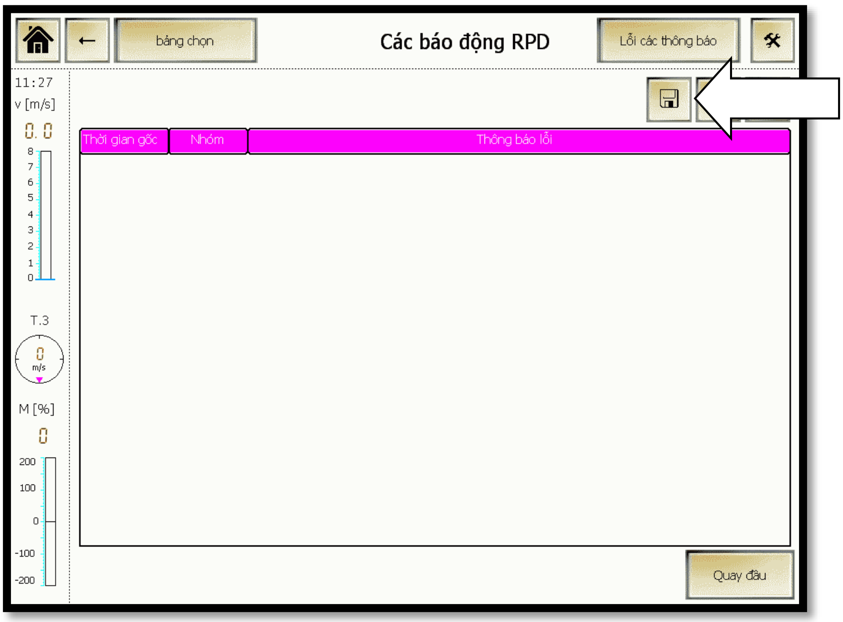
This picture shows an overview of the current sensor faults. Via scrawling, one can switch back and forth between the faults.

11.4.4 Error list

In order to receive a list for all faults that have occurred so far, one can select the button "Alarms" in the main menu.

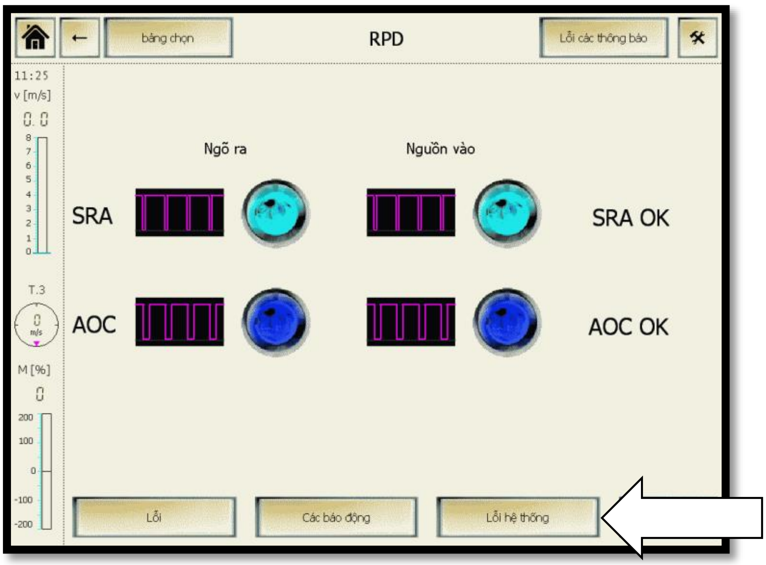


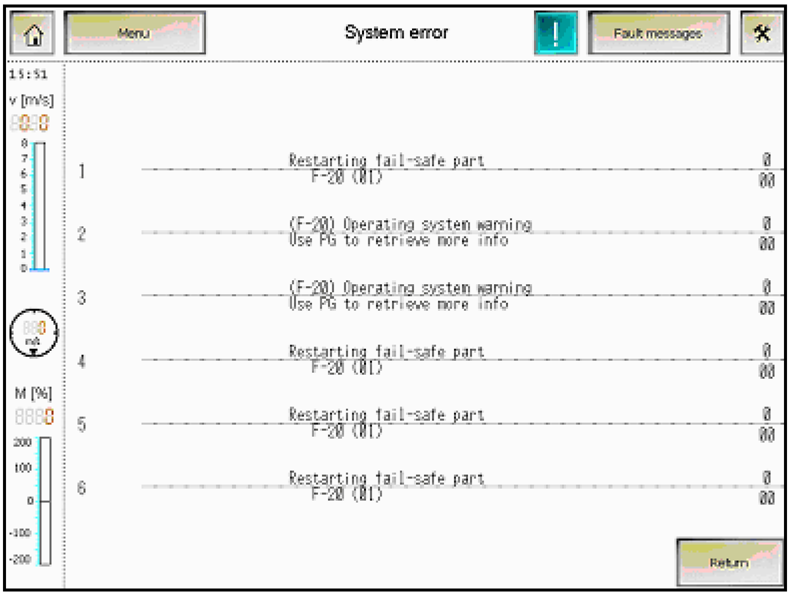
There is an alarm list with date and time of the last 50 faults indicated in the alarm display. They can be scrolled up and down by tipping on an alarm and then using the arrows up/down next to the floppy-disk button.
By pressing the floppy-disk-symbol, the system safes a screenshot of the list on a USB stick.



11.4.5 Error Stack History of the PSS

By pressing the "System error" button in the overview screen, the last 6 internal warnings in the system may be displayed. This error history is non-resetting on voltage failure and therefore remains unchanged until a new error occurs.

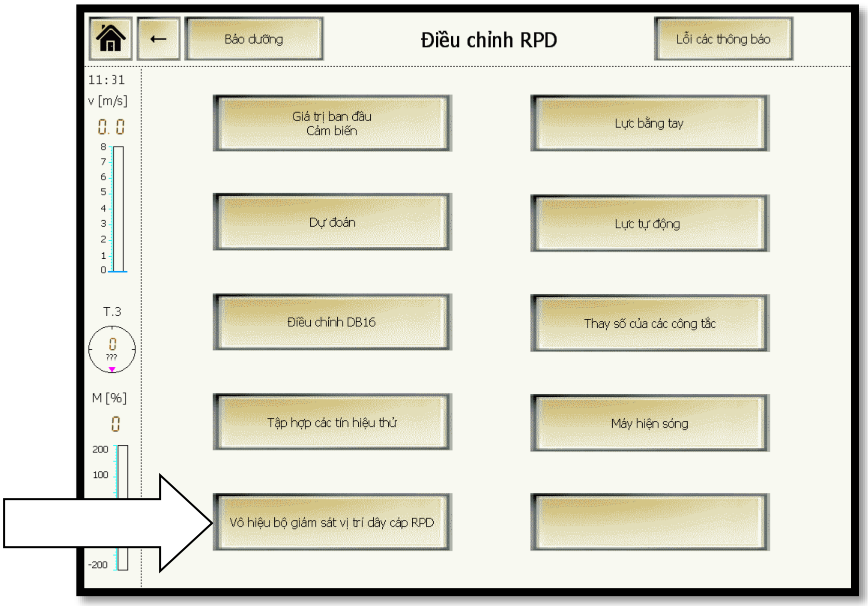




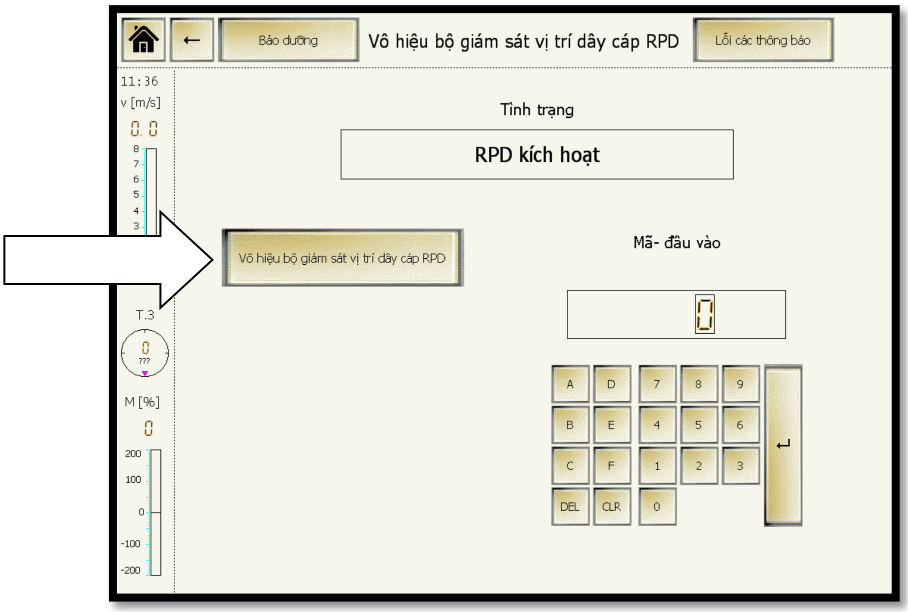
For more information on the error stack please refer to the operating manual for the ropeway control system.

11.4.6 System Deactivation

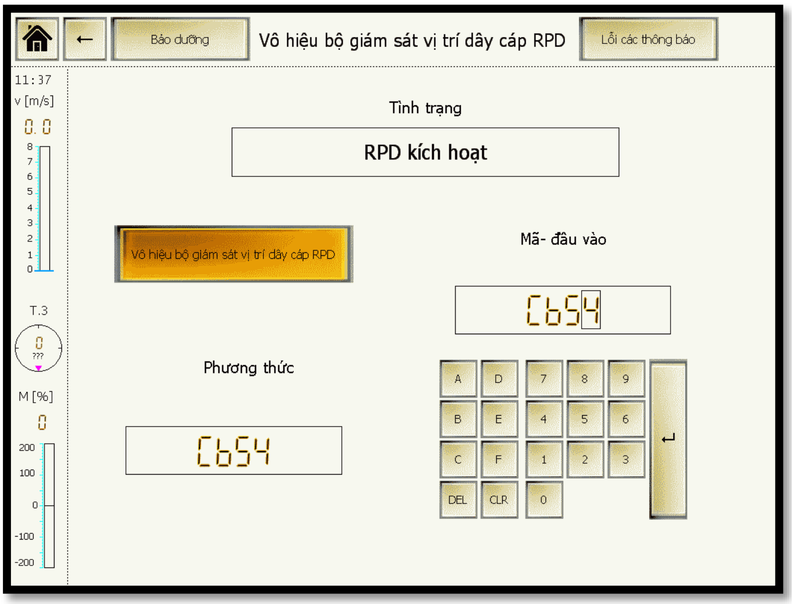
For installations that are equipped with an RPD-system as a second system, this system can be deactivated by a key switch or in the return station at the screen (deactivation button in the screen ‘settings RPD’ only visible in the mode ‘drive station unmanned’). In this case, the rope position is monitored by means of the break fork switches only.



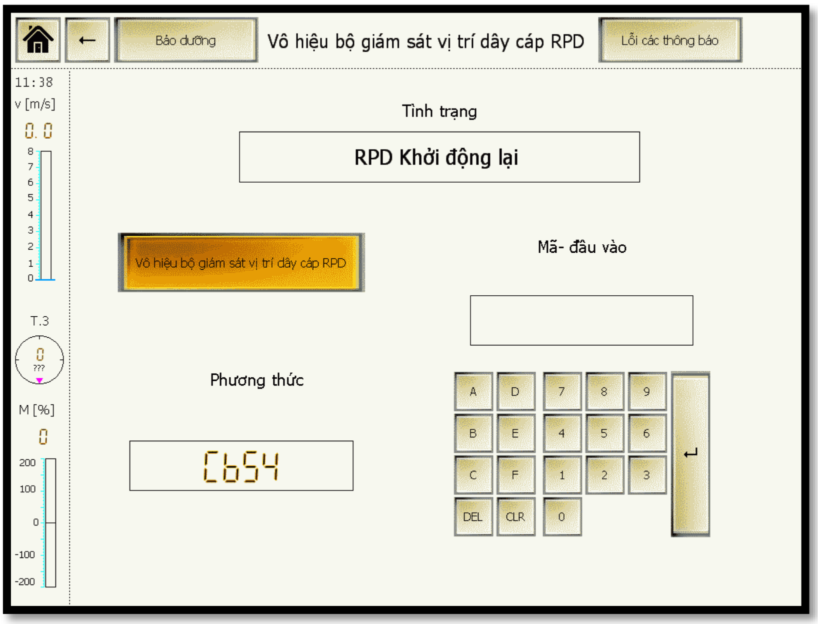
A new window opens in which the RPD system can be deactivated in 'Drive station unmanned' mode.



When pressing the button 'DEACTIVATE RPD' on the screen, a code is indicated on the screen. This code must be entered into the field 'ENTER CODE'.

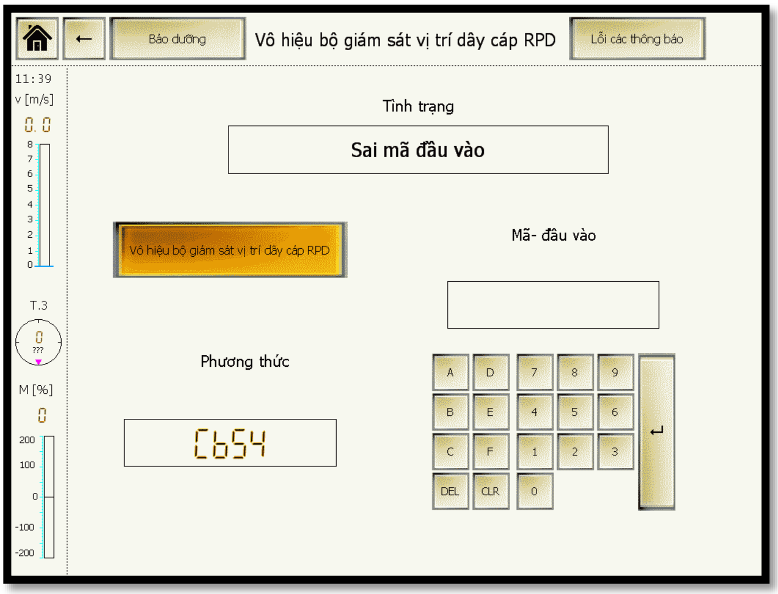


Once the code has been entered correctly and been confirmed, the system status on the screen changes into 'RPD DEACTIVATED'.



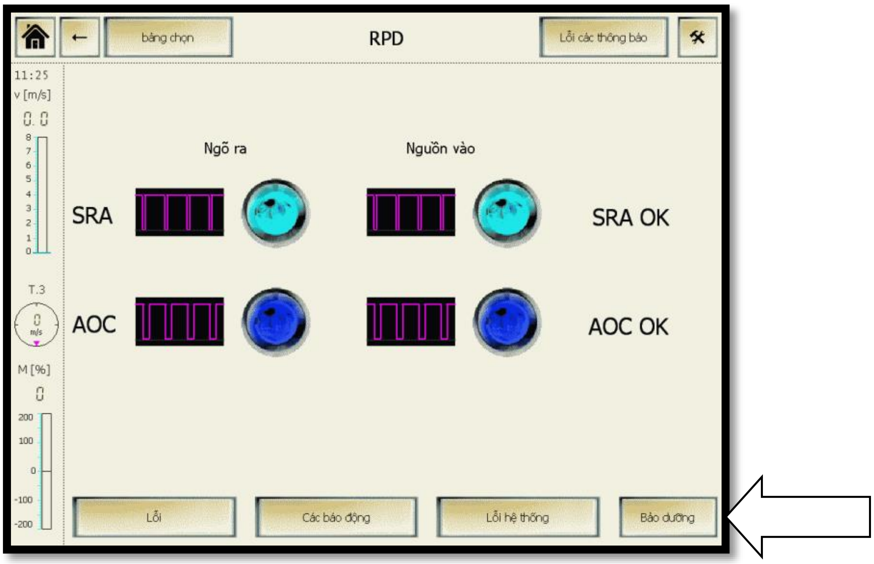
IMPORTANT:
In case of an RPD-deactivation, the RPD serves only as visualizing-system and does not decelerate or switch-off the ropeway anymore.

In the event that the code was not entered correctly, this is indicated in the status field. In this case, the deactivation and the code entered must be compared once more.

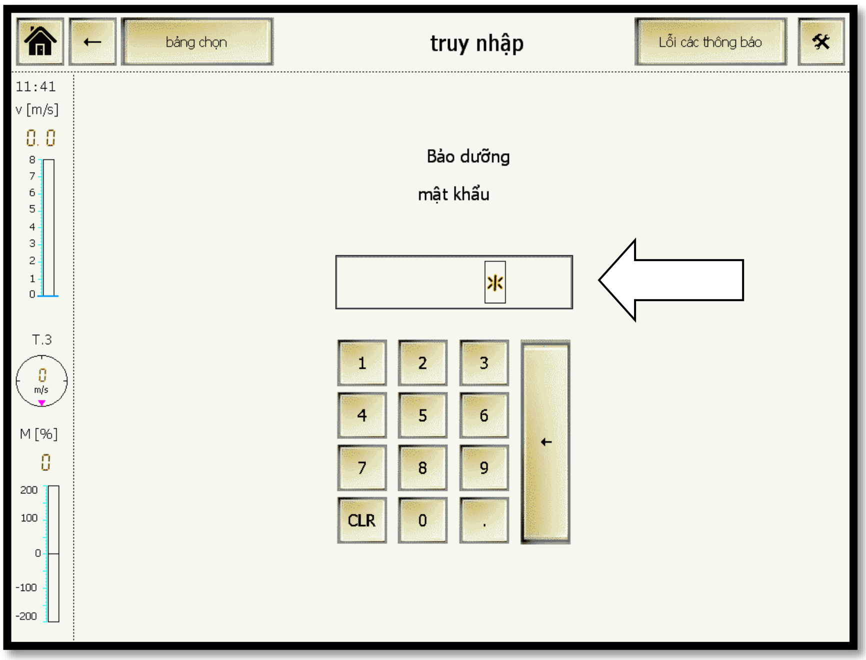


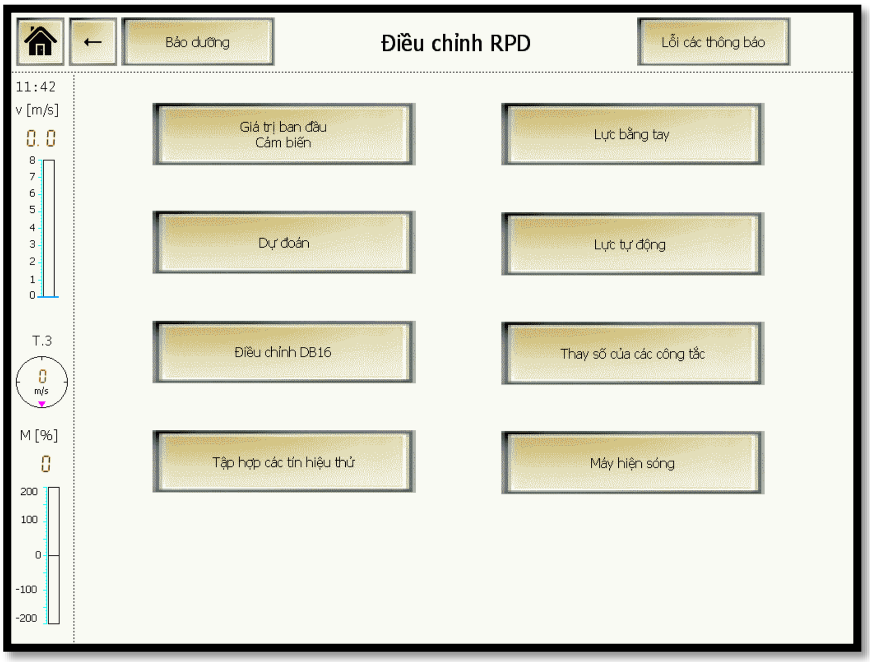
11.4.7 Service Menu

In order to perform service tasks on the RPD-system one can refer to the service menu, which can be entered via selecting "Service" in the main mask.



The following screen occurs and by inserting the correct code one can enter the service menu.

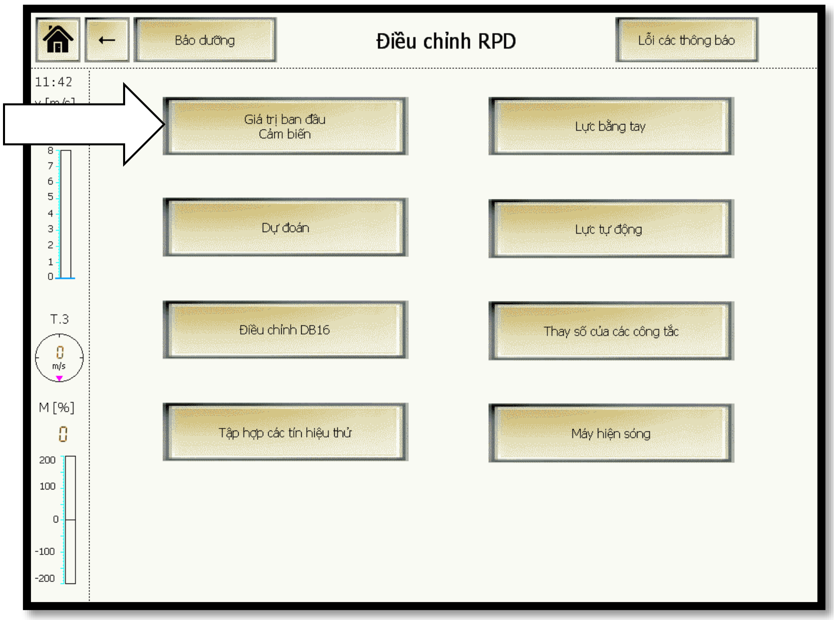

bảng chọn
truy nhập
Lỗi các thông báo
11:41
v [m/s]
T.3
M [%]
Bảo dưỡng
mật khẩu
1
2
3
4
5
6
7
8
9
CLR
0


Bảo dưỡng
Điều chỉnh RPD
Lỗi các thông báo
11:42
v [m/s]
T.3
M [%]
Giá trị ban đầu Cảm biến
Lực bằng tay
Dự đoán
Lực tự động
Điều chỉnh DB16
Thay số của các công tắc
Tập hợp các tín hiệu thử
Máy hiện sóng

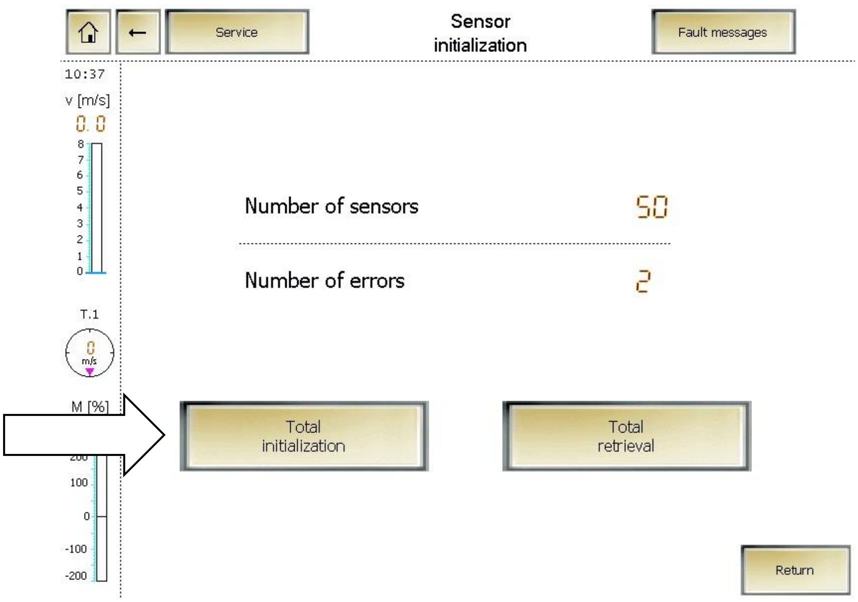
11.4.8 Sensor Initialization

If the system is started-up for the first time the sensors have no addresses. The function "Overall Initialization" now dedicates one address to each sensor. This process can take up to 25 minutes depending on the number of sensors.

Press "Sensor initialisation" in the main mask in order to accomplish the overall initialization.

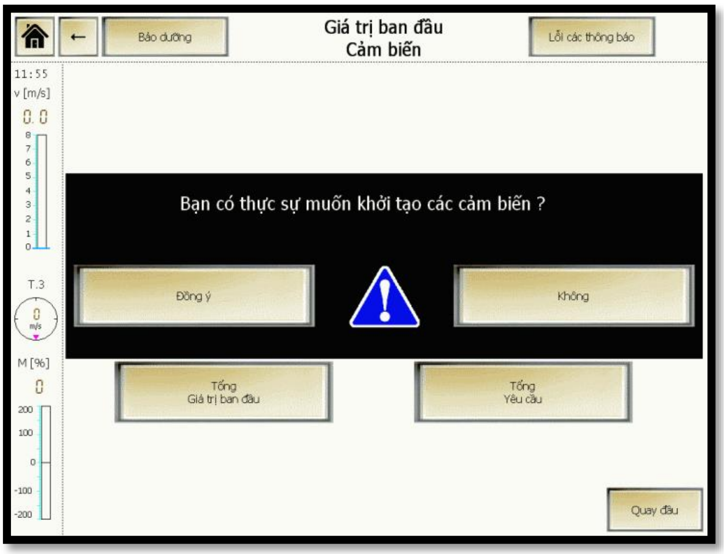


The mask "Sensor overview" will appear, on which "Total initialization" can be called up.

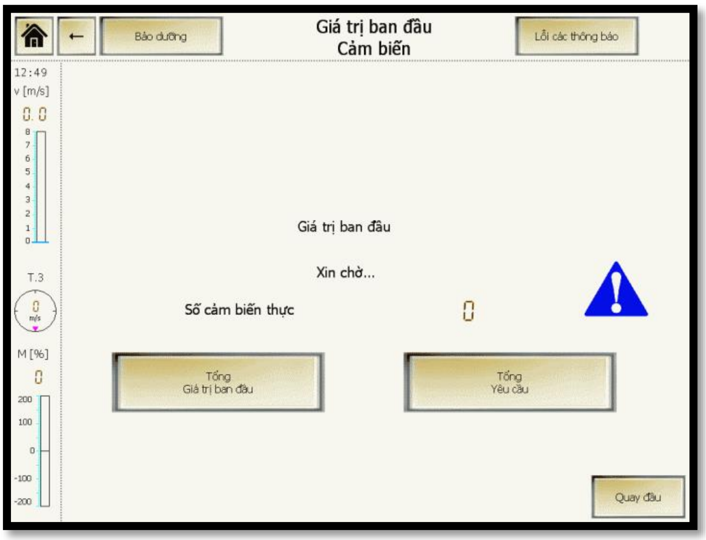


IMPORTANT:
This button should only be pressed when starting up the RPD system for the first time.

Since the initialization process takes up several minutes, you will have to reconfirm initialization before the process starts:

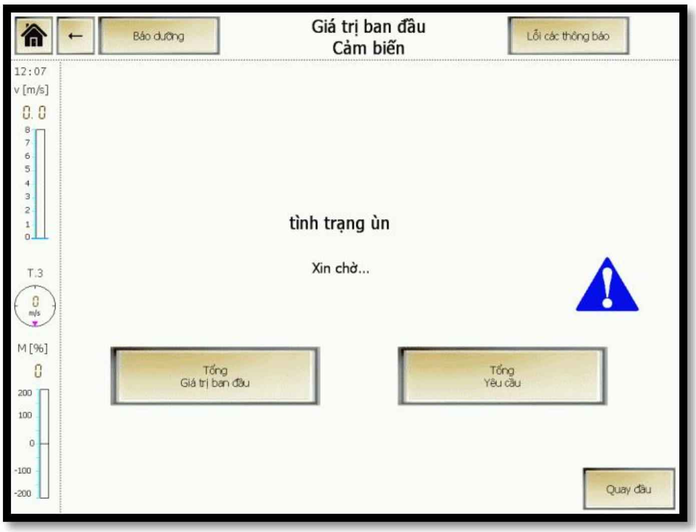


Upon reconfirmation of the initialization process all addresses will be deleted and assigned anew. During this process the following message is displayed:



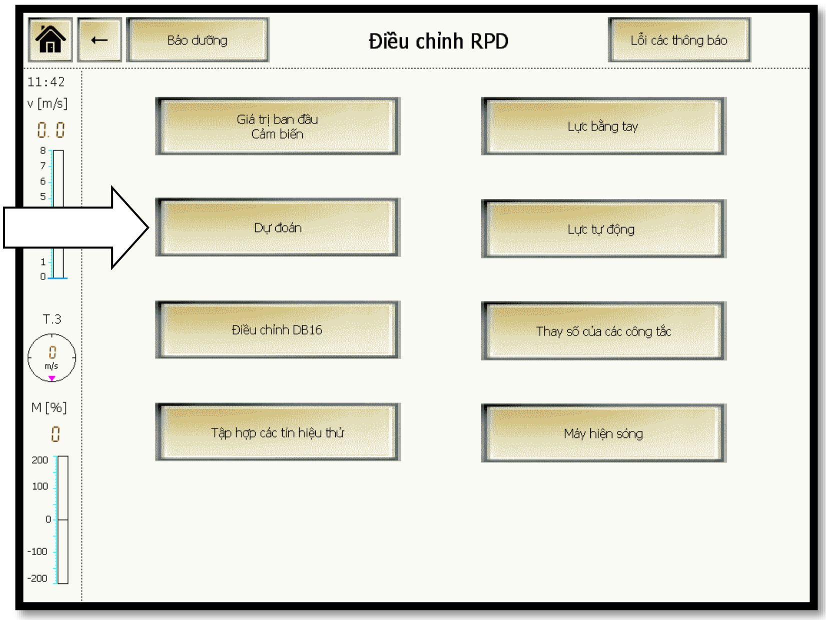
IMPORTANT:
If you want to initialize individual sensors, use the "Sensor Diagnostics – Sensor Initialization" menu.

Via the button "Overall Request" the current conditions of all sensors can be requested at once, respectively, after a fault the system can be set back.

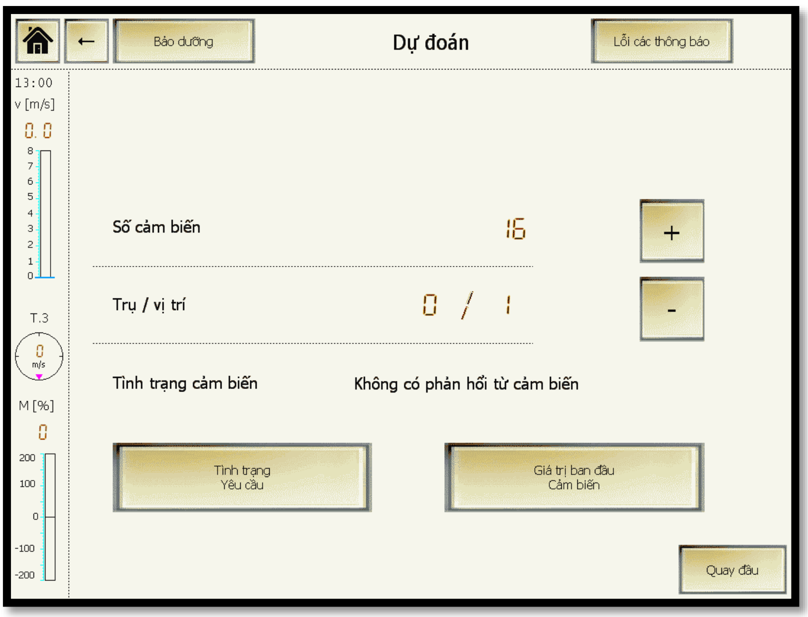


11.4.9 Sensor Diagnosis

By pressing the button "Sensor diagnosis" in the service menu, you will be taken to the submenu sensor diagnosis.

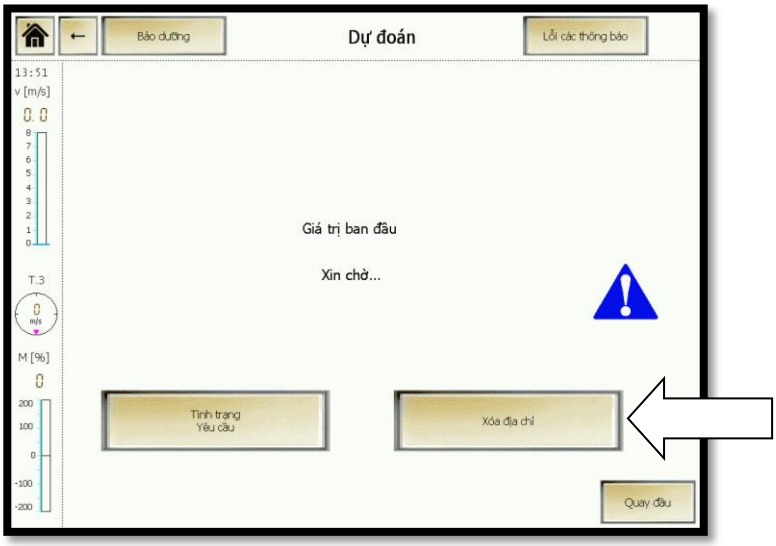


Here one can see the condition of every individual sensor. By pressing the "+/- buttons", the sensors can be scrawled down.

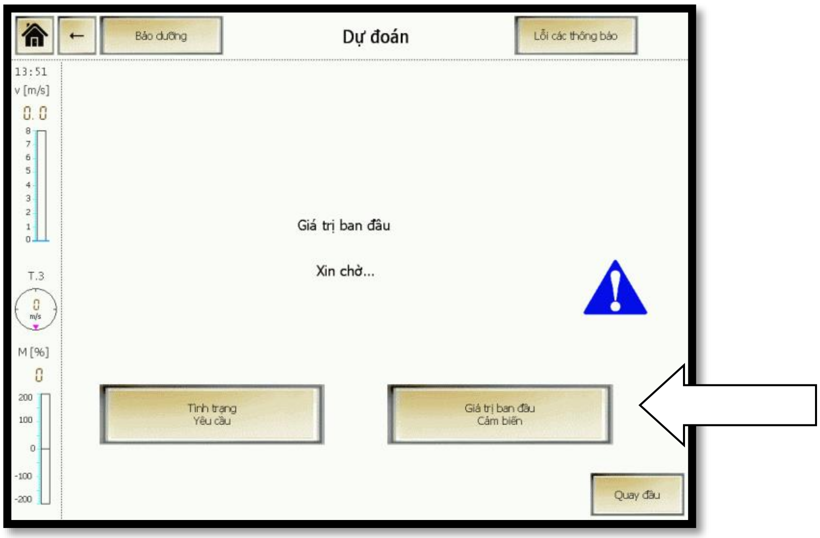


By dialing the sensor number one can call for a keyboard in order to type in higher sensor numbers more comfortably and faster.

A defective sensor needs to be replaced. Therefore, the according sensor has to be selected with the +/- buttons or by pressing the sensor number with the key board. Then the address of this sensor is deleted by pressing "Clear address"



The old sensor is now removed and replaced by a new one. As the new mounted sensor does not have an address yet, it has to be integrated in the system. With the button "Sensor initialization", a new address is assigned to the new sensor.



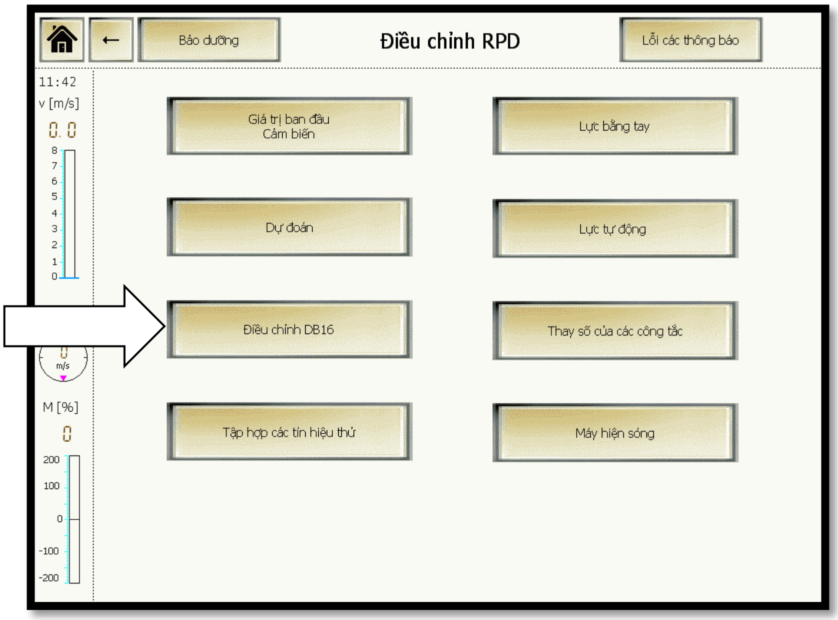
The list of addresses for RPD sensors can be found on top of the control cabinet or on the inside of the control cabinet door.

If all sensors are addressed in the system, the "Sensor Initialization" button will be replaced by "Clear Address". This button can be used to give an already assigned sensor a new address.
➔ In doing so you don't need to reinitialize the whole system every time you want to assign a new sensor.

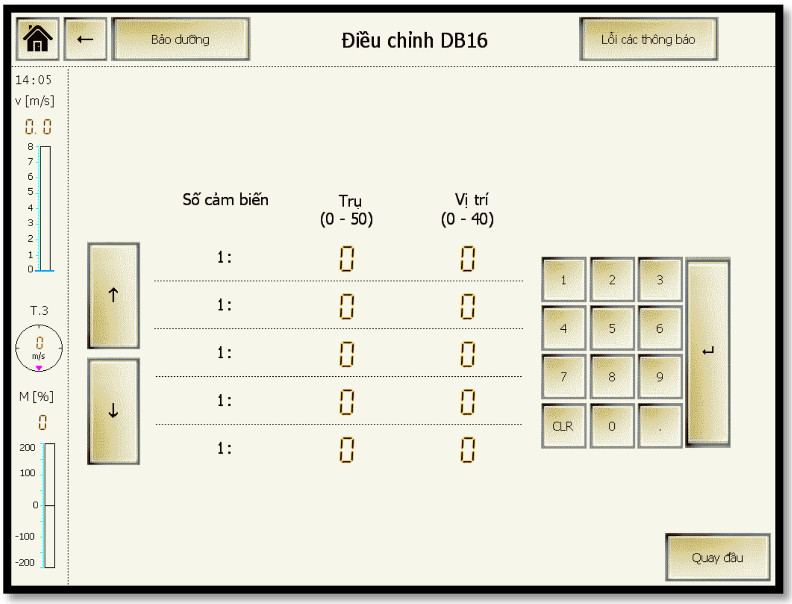
Use the "+" and "-" buttons to select a sensor and press "Sensor Initialization" or "Delete Address" to program the sensor for the first time or anew. (This is a useful function if you need to replace a sensor with a specific address.)

11.4.10 Adjustments DB16

Should there occur any faults in the allocation of sensor number to tower/position, the allocation can be altered via the picture "Adjustment DB16". Therefore, first switch to service menu and select the button "Adjustment DB16".



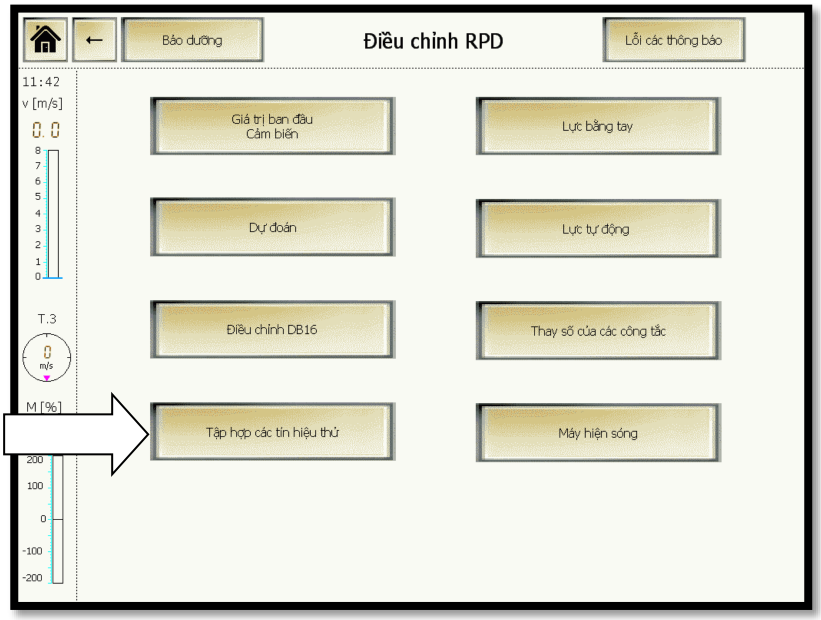
In this picture one can navigate through the sensor numbers by pressing the "arrow-buttons". In order to change a tower/position one simply has to select the corresponding input field, insert the number and confirm the process by pressing the "enter-button".



11.4.11 Troubleshooting at the Serial Interface

The serial interface is a special problem in the process of troubleshooting. Unlike the AOC and SRA signal, this serial interface will only be used when a fault occurs or if the display requires it.

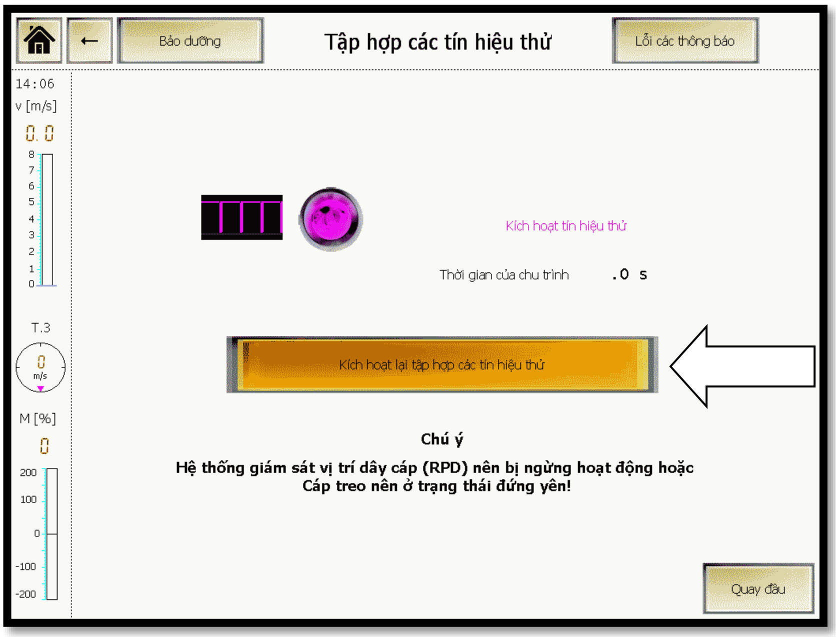
In current installation a button exists in the service menu which leads to a frame in which the test signal is sent. (In older installations that do not possess such a frame, this process can be started by connecting 24V (Important: RPD-Potential R+) with the input 0.12.



By pressing the button "Activate Serial Test Signal" the control will send a periodical signal (according to number of sensors between 2 and 22 seconds) on the serial interface and thereby allow a signal tracking on the lift line.

ATTENTION:

- For this troubleshooting the installation needs to stand still.
- During the troubleshooting process the frame must not be exited, otherwise the test signal will be deactivated automatically.
- During the troubleshooting process it will have to be made sure that the serial signal, opposite to the SRA / AOC signal, passes through all sensors.

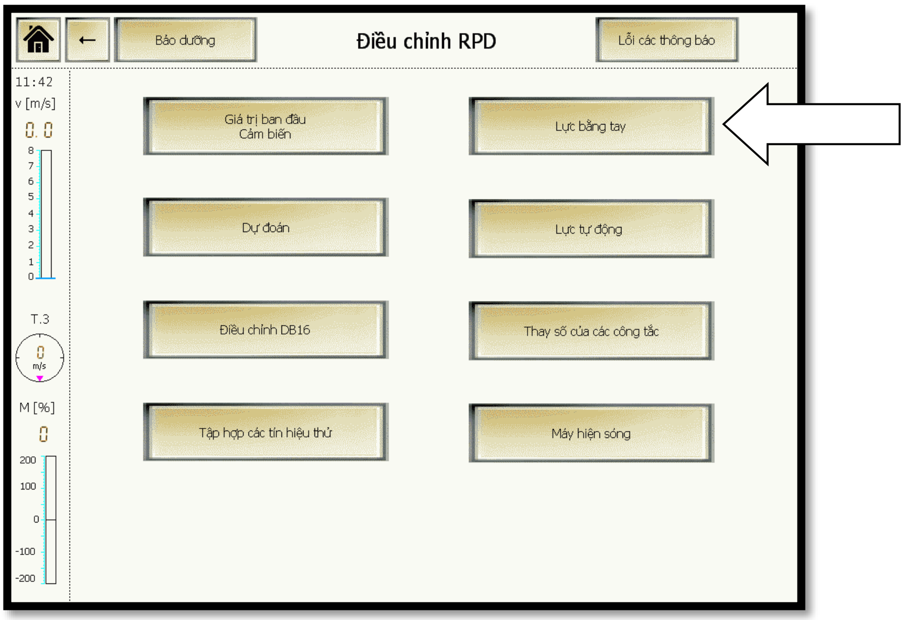


The display "Period duration" indicates for how many seconds a test signal will be sent (this time will be calculated with regard to the number of sensors)

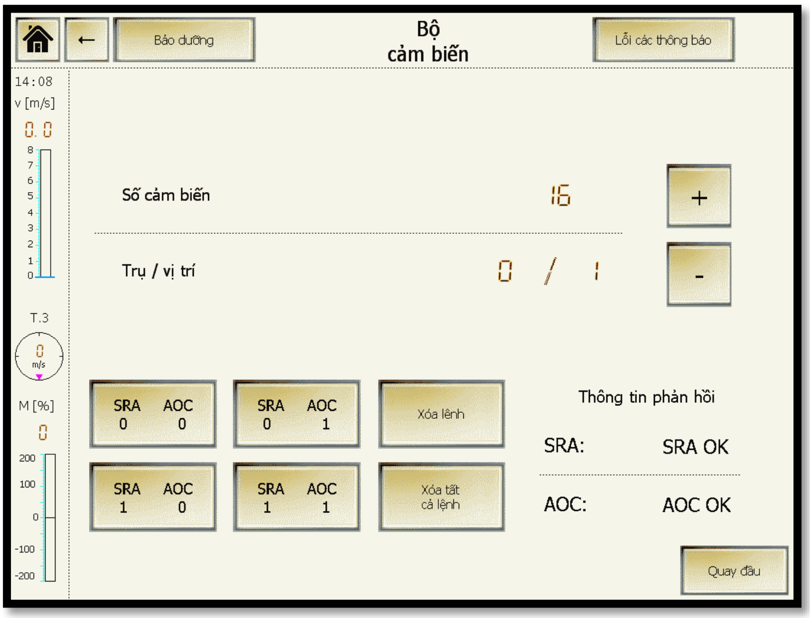
In order to track the signal exactly, it is required to record the serial signal first at the terminal (X15/15 SOUT with the help of an oscilloscope (and save it as reference signal) and then compare it at each tower with the serial input signal and at the terminal 5a (at uneven towers) or at terminal 15a (at even towers) and with the serial output signal at the terminal 5 (at uneven towers) or at terminal 15 (at even towers). The flanks, levels and the timing of the signals are important!

11.4.12 Manual Forcing

Pressing "Sensor Programming" will take you to a mask where the sensor status can be simulated.



This new feature has been implemented with the aim to check the sensor for correct switching behaviour in all required switch conditions on the one hand, and to localize line disconnection on the other.



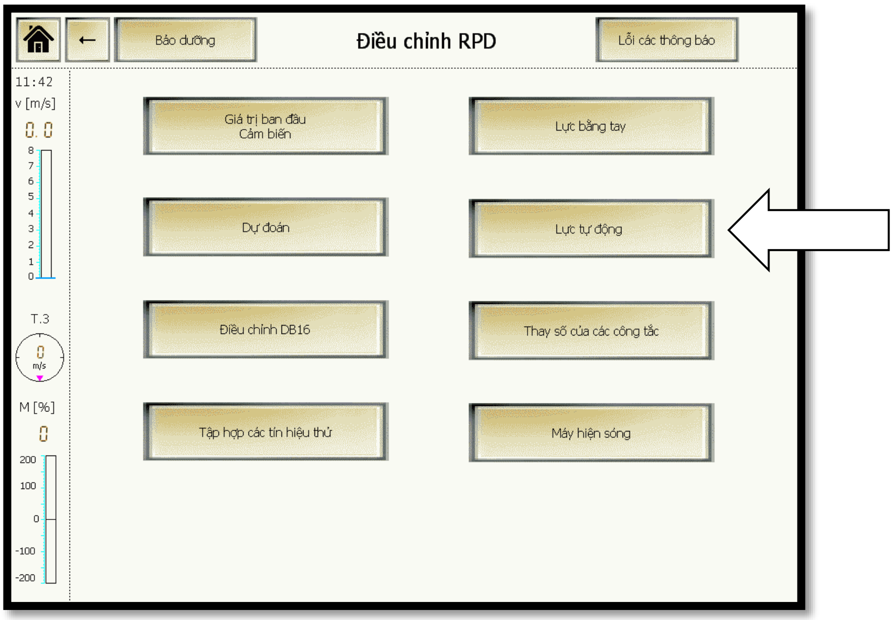
The "+" and "-" buttons can be used to select a sensor which you want to transmit (force) a specific signal combination. Forcing the AOC or SRA signals causes the RPD system to shut down the ropeway system immediately.

> **IMPORTANT:**
> The ropeway cannot be operated during this process.

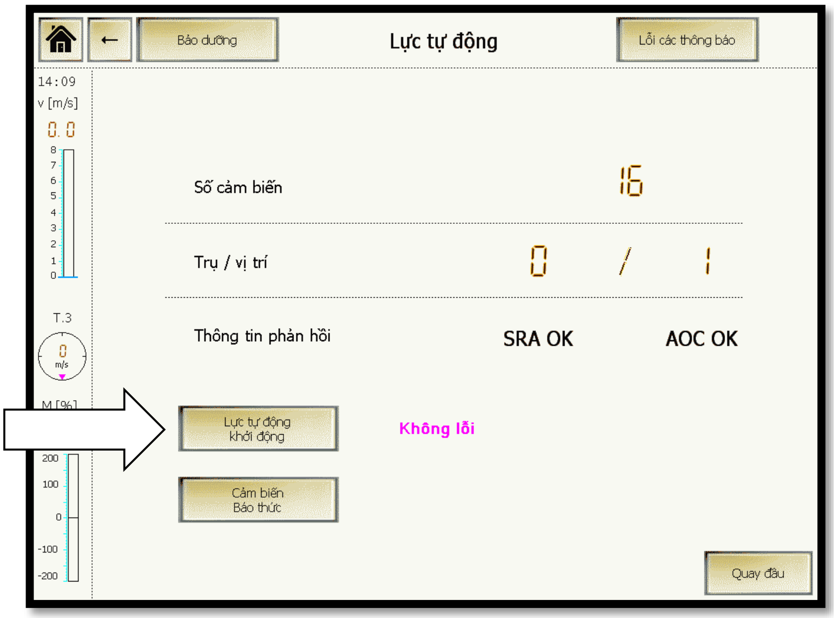
The signal combination can be reset by pressing "Delete command" or "Delete all commands" (in the case of several switches).

11.4.13 Automatic Forcing

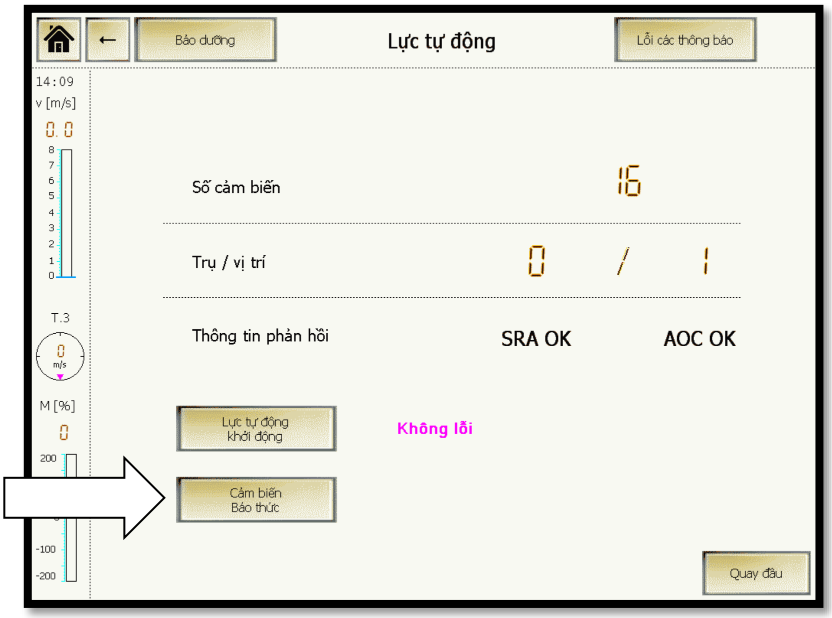
Sensor-programming is a possibility to find loose connections or other problems. In order to start this process automatically, the adjustment ‘Automatic forcing” can be selected in the service menu.



Within the mask, select the button "Automatic forcing". The PLC automatically starts searching through the sensors and displays the position of e.g. the loose connections.

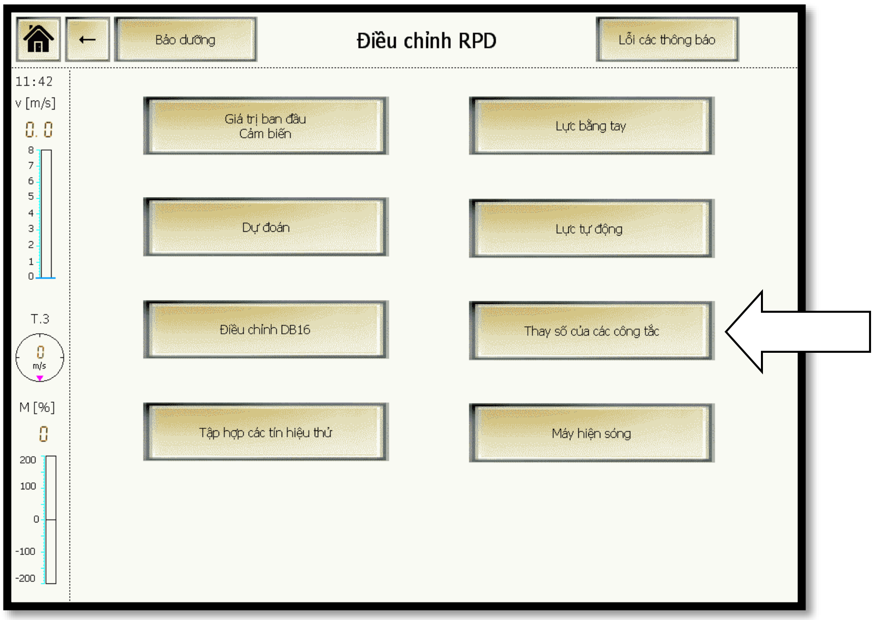


If the control unit was switched off in the meantime, the automatic forcing isn't working anymore, because the sensors haven't been activated. To activate them, the button "Sensor Wake-Up" has to be pressed. With this function, the sensors will be activated one by one, until the fault is reached. The fault position is displayed on the screen.



11.4.14 Change Number of Switches

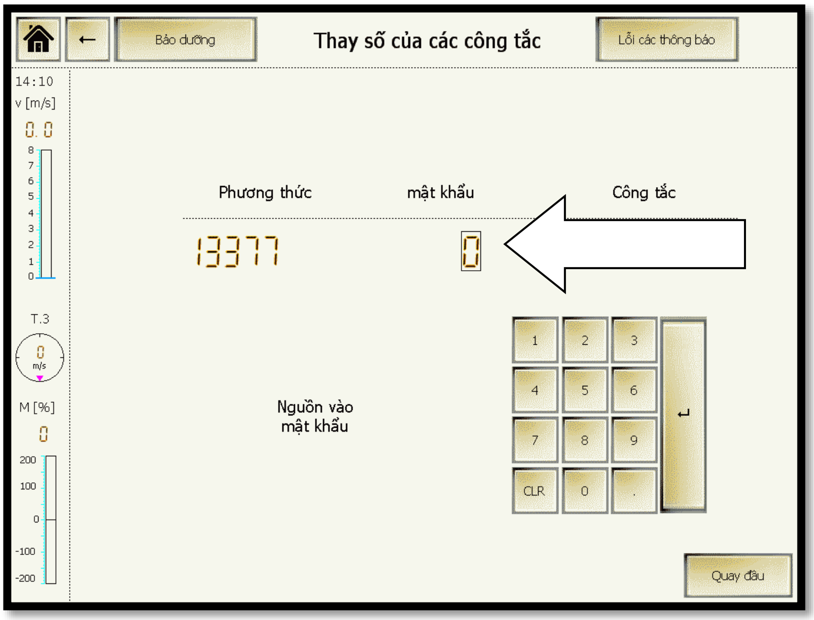
Normally, the number of sensors connected to the system is initially programmed by Doppelmayr Seilbahnen GmbH and is not going to be changed. Should this not be the case or the number of sensors changes, one can select "Change number of switches" in the service menu.



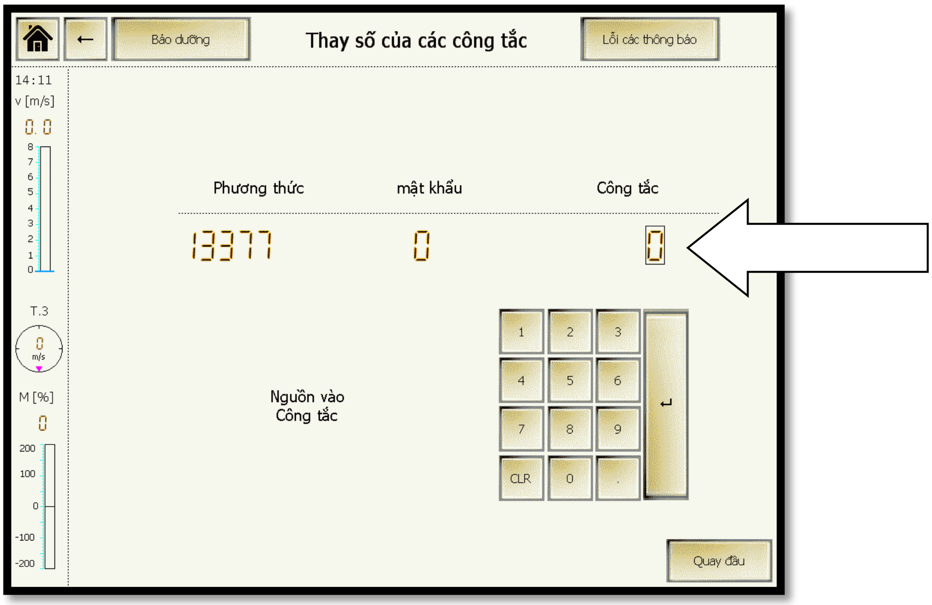
ACHTUNG:
Wurde die Anzahl der Sensoren noch nicht voreingestellt, startet der HMI automatisch in dieses Bild.

If this is the case, please immediately contact Doppelmayr Sailbahnen GmbH and inform the technicians about the password which is going to be generated randomly by the program and the number of your connected switches. You will be provided with a password, with the help of which you will be able to operate the system.
(Please note: the code is not as hitherto hexadecimal)

Therefore, first enter the password and confirm it by pressing the ENTER-button.

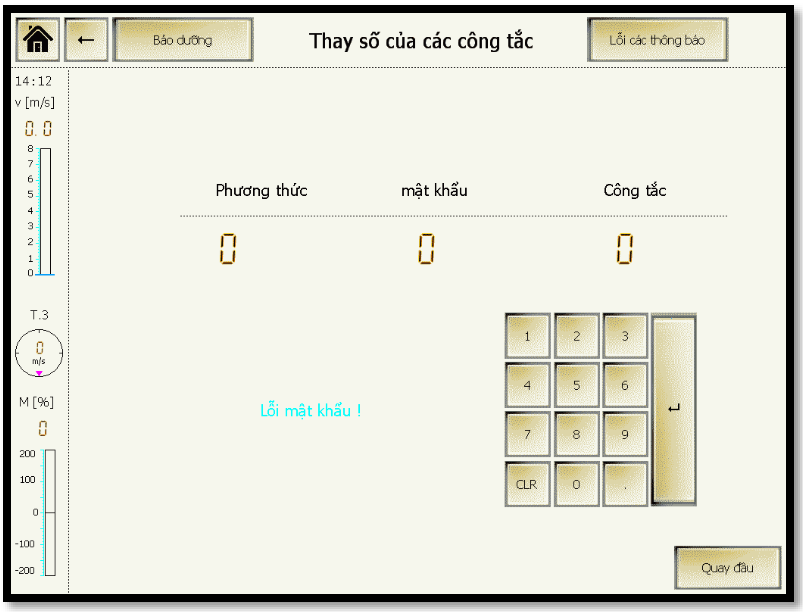


Upon entering the password, the display automatically switches to the input box for the switches. Enter the number of switches and confirm it by pressing ENTER.



Now the entered values are checked automatically and if the entry was correct, the message "Password OK!" appears on the screen.

If a wrong password was entered in relation to the code and the number of switches, the following message appears and the process has to be repeated.



11.4.15 Detection of Loose Connections

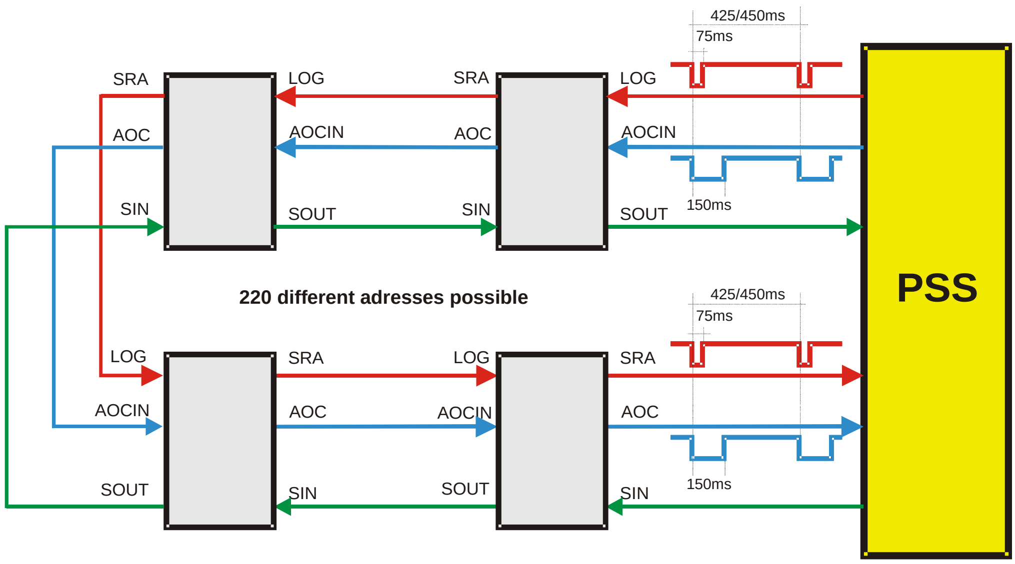
There are several options in the RPD-HMI to detect loose contacts that sometimes occur (e.g. when a carrier passes a tower) easier:

- Integrates oscilloscope function
- External oscilloscope

All these function have in common, that the function sensor programming is used. (Important: for this methode of error search the serial communication of the switches may not be interrupted!!!)

A sensor is directed to constantly put 24V on the AOC or SRA cable. Now, the incoming signal is either tested automatically or by means of an oscilloscope. The systematic programming of the sensor finds out, where the problem is located.

It is important to understand the system.
The SRA or AOC signal is put out at the output 2.8 or 2.9 and then sent to the LAST sensor. If this sensor is OK, it amplifies the incoming signal and passes it on to the next sensor.
This is done one by one until the sensor number 1 eventually feeds back the signal at input 0.4 and 0.5 to the PSS3047, where it is then analysed.
It has to be considered that SRA and AOC are contrarily connected to the serial signal.

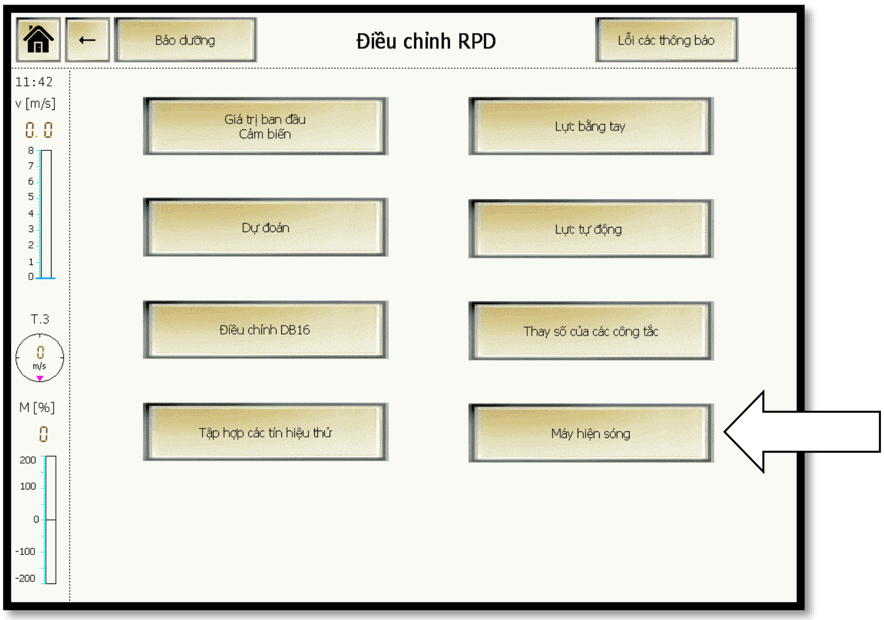


Error tolerance time: SRA ≤ 500ms
AOC ≤ 5 s

= sin / sout = not fail-safe !

11.4.15.1 Manual search for loose contacts with internal oscilloscope function

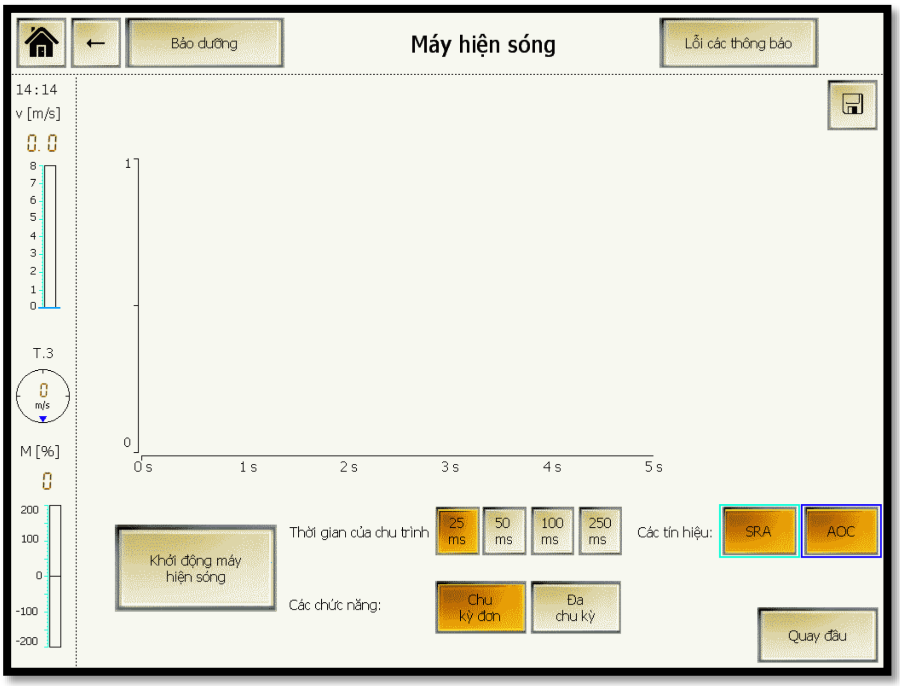
Next to the automatic error search there is also the possibility to monitor incoming SRA or AOC signals with an integrated oscilloscope function and to detect a possible loose contact.



There are several adjustment options:

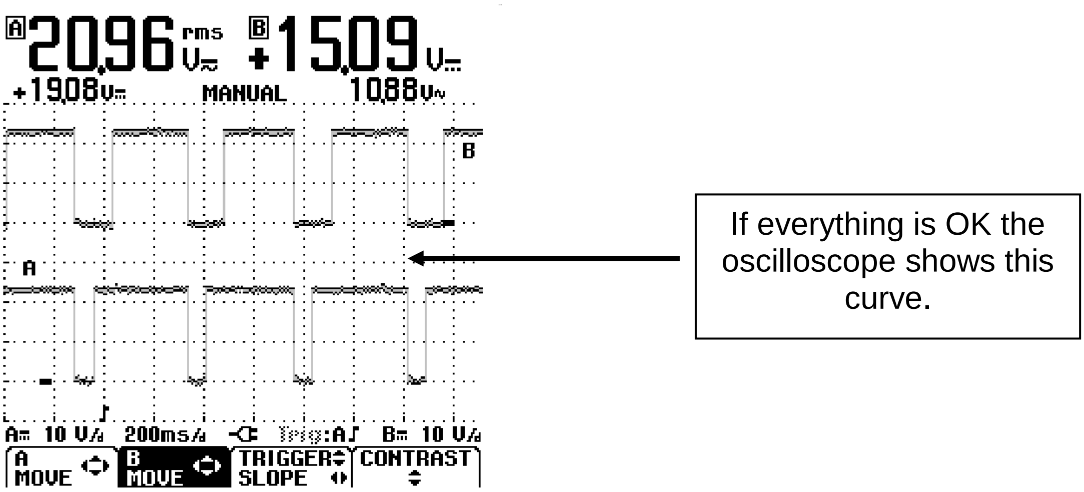
- Duration: Various durations (scanning time of the signal) may be selected
- Signals: Display SRA and / or AOC signals
- Function: Single-pass (the signal is once read in and displayed) or multi-pass (the signal is constantly read in and then displayed)

In addition there is the possibility to save a screenshot on a USB flash drive by clicking on the disc icon in the top right corner.

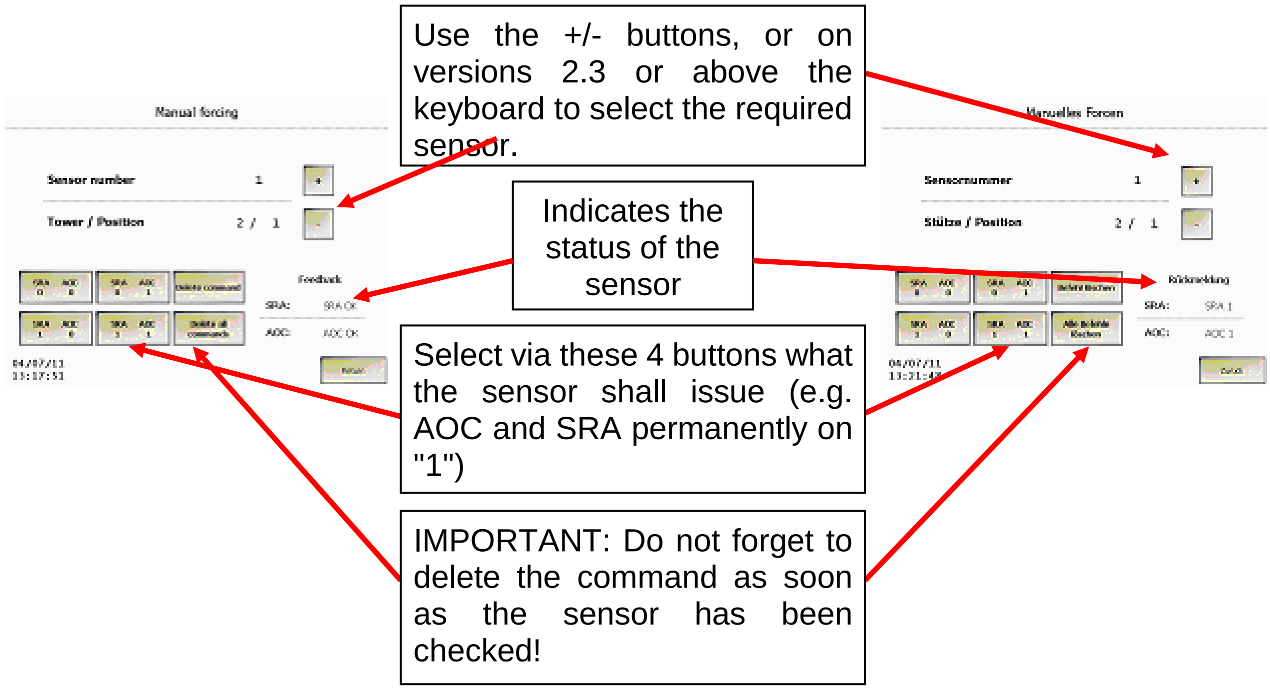

Bảo dưỡng
Máy hiện sóng
Lỗi các thông báo
14:14
v [m/s]
T.3
M [%]
0 s
1 s
2 s
3 s
4 s
5 s
Khởi động máy hiện sóng
Thời gian của chu trình
25 ms
50 ms
100 ms
250 ms
Các tín hiệu:
SRA
AOC
Các chức năng:
Chu kỳ đơn
Đa chu kỳ
Quay đầu

11.4.15.2 Manual search for loose contacts with external oscilloscope

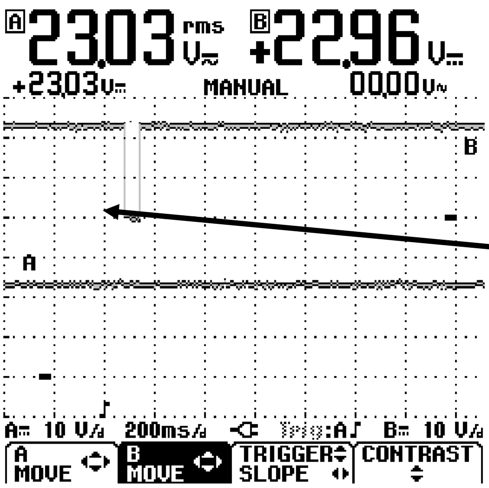
1) Connect the oscilloscope to input I 0.4 resp. I 0.5.



2) In order to find the fault more easily, the AOC and the SRA signal of the last sensor will be set to permanent positive (pulsing is switched off) by sensor programming.

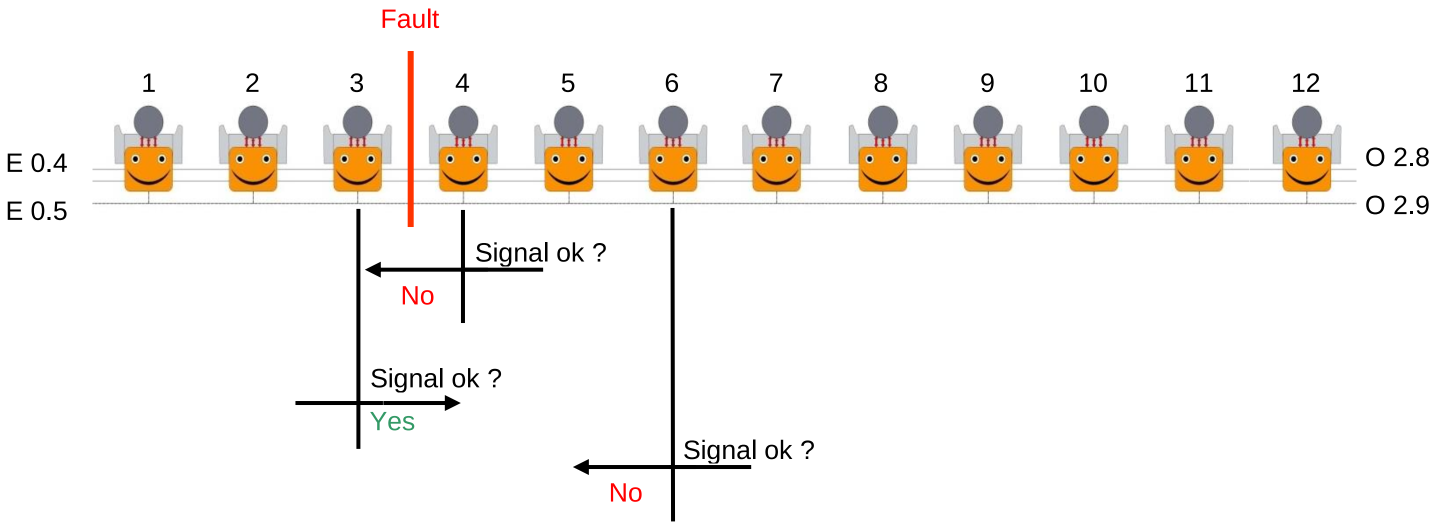


3) If there is a loose connection in the line, the following picture is shown on the oscilloscope (Important: Watch the oscilloscope for some time in order to make sure that there is really no loose connection in the line!):



There is a short voltage drop
→ e.g. due to a loose connection (this would lead automatically to a shutdown or slowdown of the ropeway).

4) In order to localize the fault, it is best to program the middle one of the sensors you want to test and then check the line between this sensor and the control unit. Repeat this process until you find the sensor / cable with the fault.



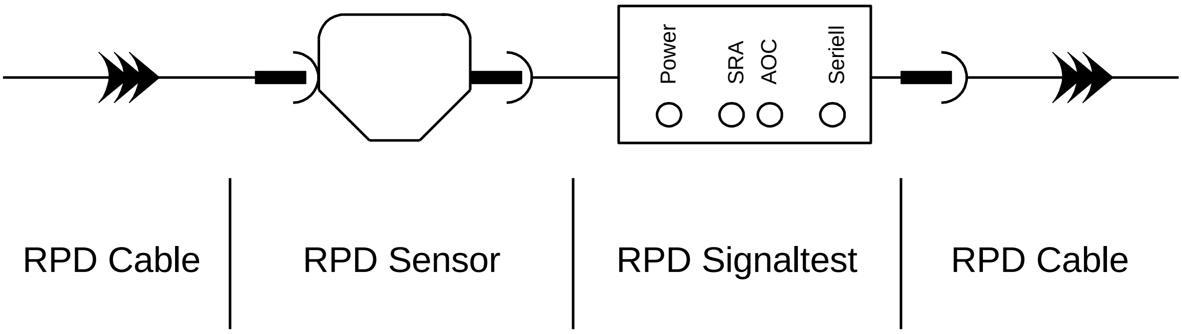
11.5 Doppelmayr RPD-SIGNAL TEST INSTRUMENT

With the RPD-SIGNAL TEST INSTRUMENT the signals in the RPD-circuit can be displayed and traced optically, via LEDs.

Attention: The integrated LEDs do not give any information about the voltage level.

The RPD-SIGNAL TEST INSTRUMENT consists of a cable with cable plug and a cable with cable housing. The RPD-SIGNAL TEST INSTRUMENT can be connected serially between the RPD-cable and the RPD sensor, or only single-sided along the cable or sensor, respectively with an additional short RPD-cable (KDKE or KSKE) with open end in the connecting box.

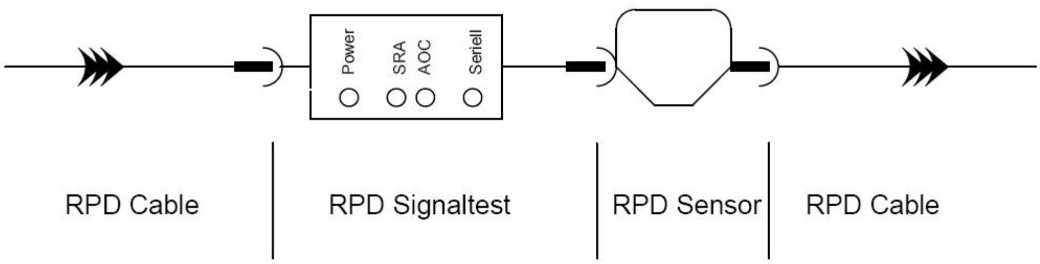
11.5.1 RPD-SIGNALTEST INSTURMENT between RPD cable and RPD sensor:



Display:

- SIN signal coming in to the sensor
- AOC and SRA going out from the sensor
- Power supply on both RPD-cables

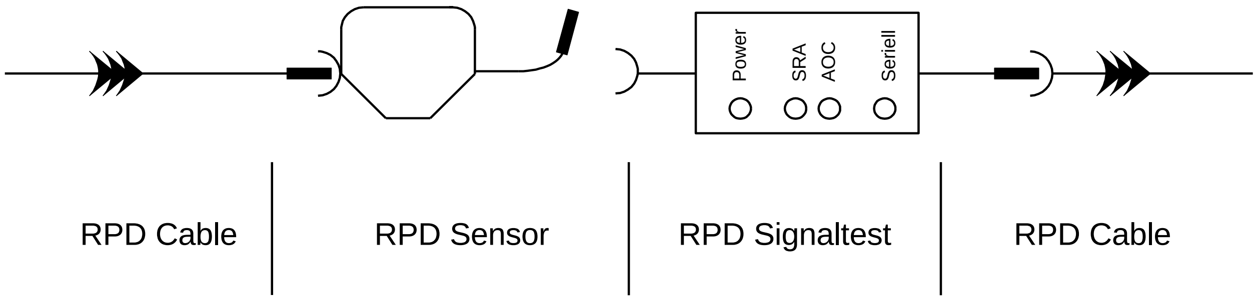
11.5.2 RPD-SIGNALTEST INSTURMENT between RPD cable and RPD sensor:



Display:

- SIN signal going out after the sensor
- AOC and SRA coming in to the sensor
- Power supply on both RPD-cables

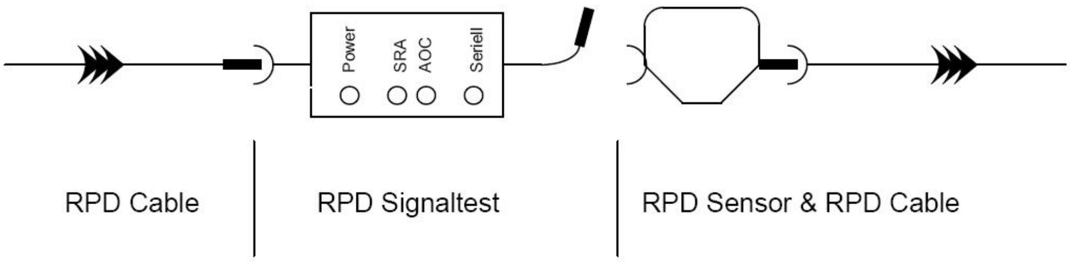
11.5.3 RPD-SIGNALTEST INSTURMENT connected to the RPD cable on one side– connection to the cable housing



Display:

- SIN coming in to the sensor
- AOC and SRA no display
- Power supply in the connected cable

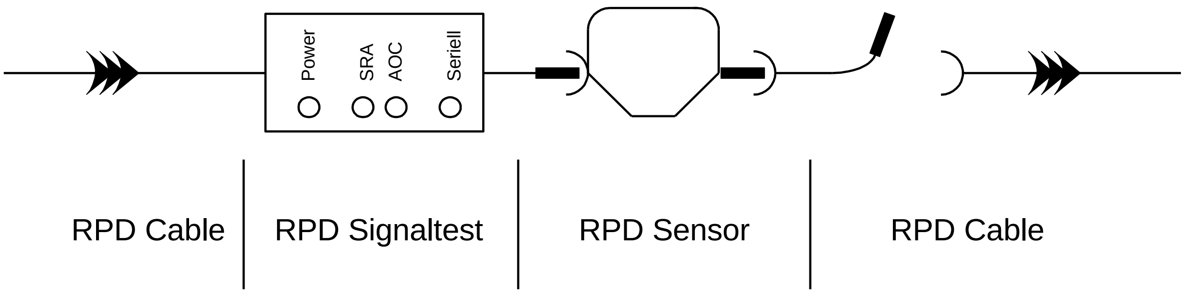
11.5.4 RPD-SIGNALTEST INSTURMENT connected to the RPD cable on one side



Display:

- SIN cannot be displayed
- AOC and SRA coming in to the sensor
- Power supply in the connected cable

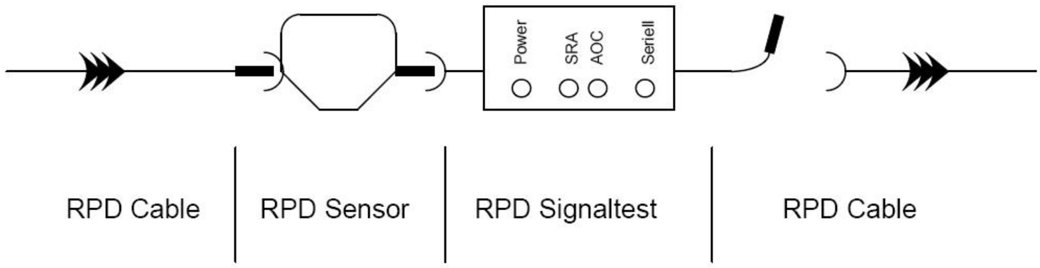
11.5.5 RPD-SIGNALTEST INSTURMENT connected to the RPD sensor (cable housing) on one side



Display:

- SIN Signal after the sensor
- AOC and SRA cannot be displayed
- Power supply by the other RPD cable that is connected to the sensor

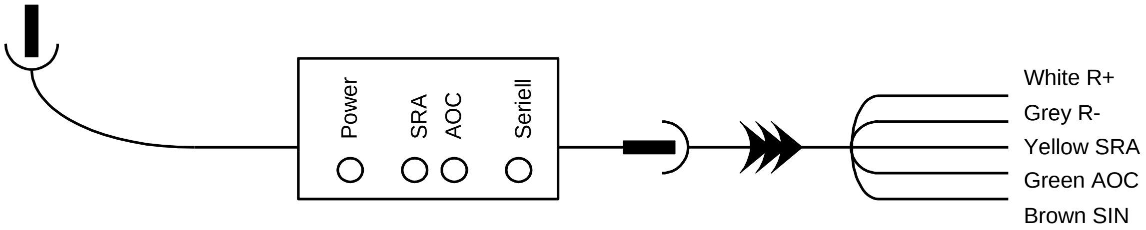
11.5.6 RPD-SIGNALTEST INSTURMENT connected to the RPD sensor (cable housing) on one side



Display:

- SIN Signal cannot be displayed
- AOC and SRA going out from the sensor
- Power supply from the RPD cable connected to the sensor

11.5.7 RPD-SIGNALTEST INSTURMENT connected to the RPD sensor (cable housing) on one side



Depending on where or to which terminal the RPD SIGNAL TEST INSTRUMENT is connected, the signals can be controlled as follows:

Terminal	Display
R+ and R-	Power supply
1	**SRA** signal coming in from the RPD controls or from the previous uneven tower numbers in the RPD circuit. On towers with even tower numbers the signal is led through.
1a	**SRA** signal going out to the next uneven tower number in the RPD circuit.
3, 3a	**AOC** signal, signal trace equal to terminal 1 and 1a.
5	**SIN** going out from this tower to the next uneven tower number or back to the RPD-controls. On towers with uneven tower numbers the signal is only led through.
5a	**SIN** signal coming in from the RPD controls or from the previous uneven tower numbers in the RPD circuit.
11	**SRA** signal coming in from the RPD controls or from the previous uneven tower numbers in the RPD circuit. On towers with even tower numbers the signal is led through.
11a	**SRA** signal going out to the next even tower number or back to the RPD controls.
13, 13a	**AOC** signal, signal trace equal to terminal 11 und 11a.
15	**SIN** going out from this tower to the next uneven tower number or back to the RPD controls. On towers with uneven tower numbers the signal is only led through.
15a	**SIN** signal coming in from the RPD controls or the previously used, even tower number in the RPD-circuit.

12 DESCRIPTION CIS (CARRIER INDICATING SYSTEM)

12.1 General

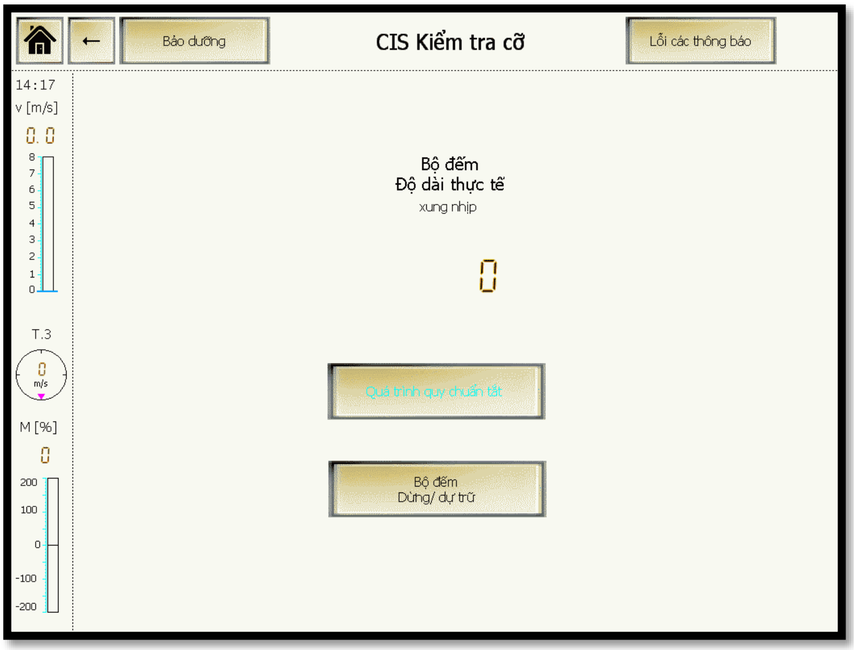
The Carrier Indicating System makes it possible to simultaneously mark up to 16 carriers uphill and 16 carriers downhill on the line and to continuously monitor their positions. Any carrier can be marked by the operator. The position of the first three marked carriers as well as the total number of all marked carriers on the line (uphill and downhill) are shown on the touch screen. A horn signal sounds in the station to indicate that a marked carrier will shortly arrive in the station. A start signal is sent via the line cable to the opposite station when the system has been started.

12.2 Calibration of the CIS

A great advantage of the CIS is that the lift length can be very simply programmed into the system. The lift length is stored in the battery-buffered RAM of the PLC. An additionally stored check sum recognizes an inadmissible alteration of this value (e.g. empty battery or exchange of the CPU or the power supply unit of the PLC). The drive and return stations must always be calibrated as these function independently of each other.

- In the MAIN MENU select the option SERVICE.
- Enter the password and confirm with ENT.
- In TESTS & ADJUSTMENTS select the option CIS CALIBRATION.

The following appears on the touch screen:



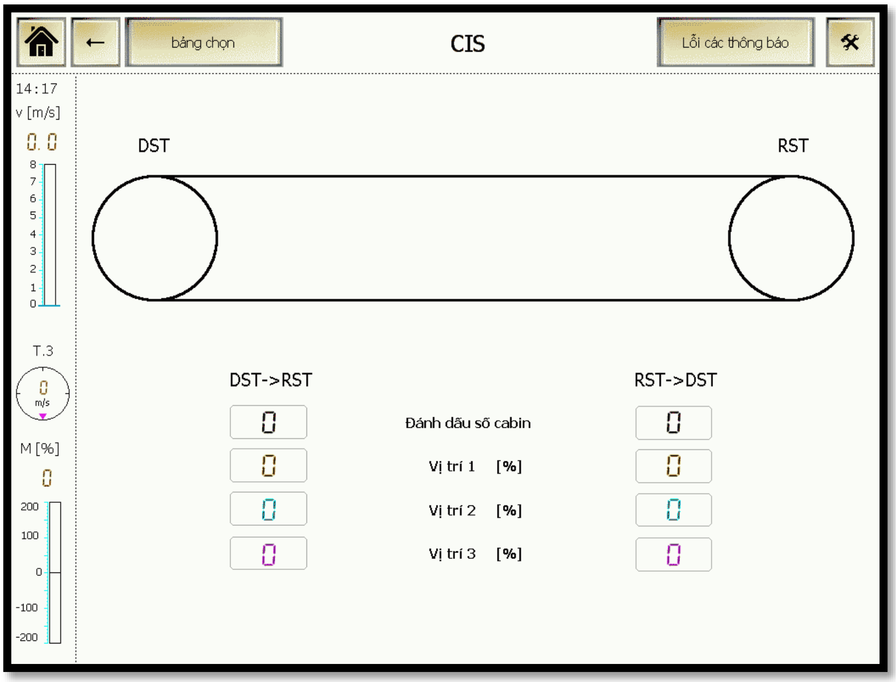
To start calibration, the 'ACTIVATION TEST SWITCHES' key switch must be set to 'ON'. Press the 'CALIBRATION OFF' field on the display until 'CALIBRATION ON' lights up. Now a carrier must be marked in the other station. To do so, press the 'CIS START' button (on the platform control panel) while a certain carrier is activating the last outgoing proximity switch. Once the marked carrier reaches the station, press the 'STOP/STORE COUNTER' field until the carrier activates incoming proximity switch no. 1.

The counter then stops, the value is stored and the calibration process is completed.

To interrupt the calibration process before it is completed, the button CALIBRATION ON can be pressed, and CALIBRATION OFF appears on the screen.

12.3 Operation of the CIS

To mark a carrier the button "CIS - START" (either on the remote control or on the control panel) must be pressed before this carrier passes proximity switch 2 (Carriage outside station). As soon as the carrier has passed this proximity switch, a counter is started via a start impulse in the other station which continuously monitors the position of the carrier on the line.



If the option CIS has been selected in the MAIN MENU on the touch screen the position of the first three carriers are shown as a percentage of the lift length. At the same time the number of marked carriers on the line at that moment is also shown. A maximum of 16 carriers (uphill and downhill) can be marked on the line at one time. Only the positions of the first 16 marked carriers are stored. All further marked carriers are ignored until the first marked carrier has reached the station.
The horn signal is triggered when a marked carrier is approximately 20 m away from the station. If the lift is run in reverse with marked carrier, the last carrier to be marked is deleted when it passes the last outgoing proximity switch (proximity switch carriage outside station).

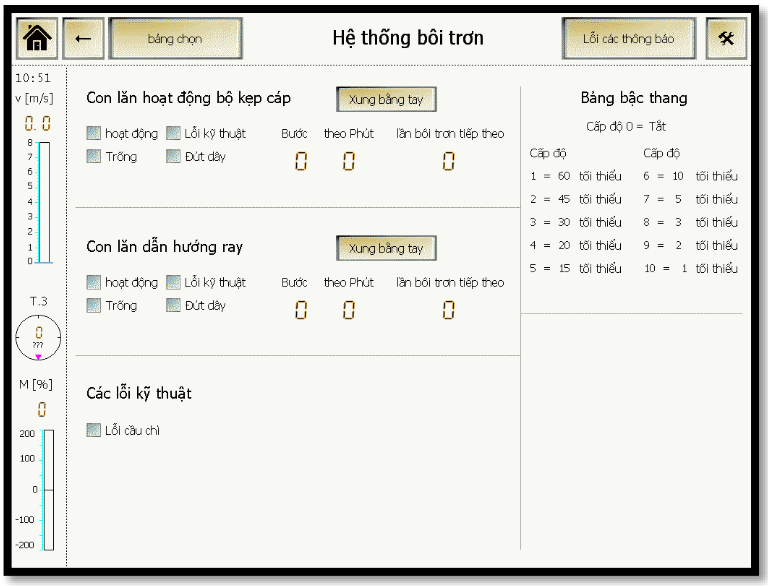
13 LUBRICATION SYSTEM

13.1 General

The lubrication system provides components, which has an critical wearing (e.g. Grip operating roller), with lubricant. A defined quantity of lubricant is emitted during each cycle. The release of lubricant by the lubrication device is started by an impulse from the PLC. The PLC regulates the drive unit of the lubrication system according to the adjusted level. The counter for the next impulse is only active while the installation is running. At standstill the counter stopps.
The quantity of the lubricant is already adjusted to 0.1cm³/Imp by the manufacturer.

13.2 Indications on the screen

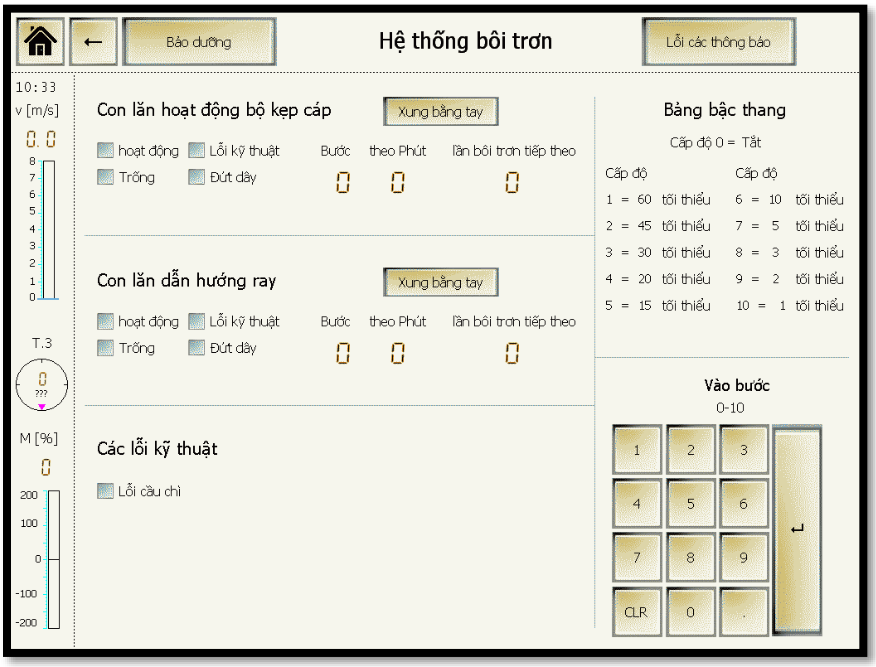
As soon as the option LUBRICATION SYSTEM has been selected, the following appears on the touch screen:



Anzeige	Beschreibung
Active	Indication that the individual lubricator is in operation.
Technical fault	Indicates a fault of the lubrication system.
Empty	Indicates, that the lubricator is empty.
Wire break	Indicates, that no activation occured.
Manual impulse	By setting out a manual impulse the lubrication can be started before the expiration of a term.
Step	Indication of the currently choosen interval.
In minutes	Indication of the currently choosen interval in minutes.
Next lubrication	Indication when the next lubrication starts.

13.3 Adjustments lubrications device

If the button LUBRICATION SYSTEM is pressed in the service menu, the following screen appears:



With the keypad on the right side the level can be adjusted (time in-between the lubrications). Level 0 means, that the lubrication system is turned off.

14 TEST INSTRUCTIONS

14.1 Tests

All safety equipment including the anti-collision system must be regularly tested (drive and return station). All tests carried out and results must be entered in the operation journal. Drafts for documentation of tests are to be found in the appendix (chapter 19).

Description	Interval			
	D	W	M	S
Inspection trip Before start of public operation the inspection trip has to be done daily with reduced speed. The person carrying out the inspection should remain in constant radio contact with the manned station!	X			
Check the stations and electrical operational premises: check the ventilation of the low-voltage room, visually control the stations,…	X			
Check function of wind units during inspection trip.	X			
Check all stop buttons, emergency stop buttons, stop SB buttons and stop EB buttons	X			
Check all speed switches	X			
Check stop, emergency stop and stop EB of return station	X			
Check the plausibility of all signalling and display devices (e.g.: spring force, currents, voltages, etc.) prior to and during operation.	X			
Check the telephones and the communication equipment	X			
Check all batteries and chargers (main panel, emergency drive, emergency power plant,...)		X		
Start of emergency drive and check all fluid levels		X		
Start of emergency power plant and check all fluid levels		X		
Check all maintenance lockout switches			X	
Check grip not open limit switches (incoming and outgoing side)			X	
Check grip not closed limit switches (incoming and outgoing side)			X	
Check grip fault limit switches (incoming and outgoing side)			X	
Check rope location limit switches (incoming and outgoing side)			X	
Check grip gauge limit switches (incoming and outgoing side)			X	
Check damped guide rail limit switch			X	
Check function of all GFCI protection switches (press test button)			X	
Check all limit switches for the weather doors and the slot covers			X	
Check limit switches for access control barrier			X	
Check function of safety clutch (door fault) – optional			X	
Check function of loudspeaker system resp. (optional)			X	
Check function of line illumination, station projector			X	
Check grip force system (see point 10.5.1)				X
Check limit switches for the grounding rods				X
Check all monitoring limit switches on the drive				X
Check all limit switches for the bullwheel position				X
Check all limit switches for the rails				X
Check function „carrier appr. rail"				X
Check all limit switches for the hydr. levers (brake hydr., tensioning system,…)				X
Check all limit switches for liftable tyre conveyors				X
Check limit switches for door monitoring in the loading area				X

Check all limit switches on the service brakes and emergency brakes				X
Make tests for the hydr. tensioning unit (see point 5.2.4)				X
Make tests for the drive (see point 6.2)				X
Make tests for seat heating - optional	X	X	X	X
Make tests for the anti-collision system (see point 9.5)				X
Check all tower switches. Lubricate the break forks from time to time with a little vaseline (protects against corrosion!).				X
Press button “Remote release power switch”				
Check all terminal connections (especially of the main power cables and the bus bars/current rails,…); Check all groundings,…	If needed, min. once a year			
Change batteries of telephones	If needed, min. once a year			
Change batteries of PLC See point 14.3	If needed, after 3 years at the latest			
Maintenance for motor	According to the Operation and Service Manual of the motor manufacturer			
Checking the shield grounding at the failsafe cable connections of the buttons emergency stop, stop EB, maintenance lock out switches, limit switches and connections from control cabinet to terminal boxes.	min. every 5 years			
Test STO-Signal (refer to 4.4.21)	min. every 2 years			

D......... daily
W .... weekly
M......... monthly
S .... seasonally

We also recommend having the complete electrical equipment checked every five years by the manufacturer

14.2 Adjustment of the Proximity Switches

14.2.1 Proximity switches for anti-collision and regulation

The proximity switches on the incoming and outgoing side must be adjusted in such a way that the distance between the back of the grip and the switching surface is between 5 mm and 8 mm. When a carrier passes a proximity switch the switch may only give one signal.

- Check functioning of the proximity switch (manually activate proximity switch using metallic object ⇒ red control LED on the switch must be lighting)
- Check signal at PLC input: If the signal does not reach the input, check proximity switches, cables / clamping points up to the control cabinet.
- Check switching distance between proximity switch and grip (5-8 mm). When a grip passes the proximity switch the switch may only give one signal.
- Check signal at PLC input: If the signal does reach the input, check on the screen if the correct field in the anti collision picture lights up (Attention: 1-2 sec. Delay on the indication), when the proximity is activated. Does the field not light up, the correspond digital input card needs to be changed.

14.2.2 Impulse proximities

The distance between impulse wheel and impulse proximity switches must be adjusted between 2.5 and 3 mm.

14.3 Exchanging the batteries of a PLC (by PILZ)

14.3.1 General

Each station contains a PLC (by PILZ), which is supplied with voltage by a power supply unit of the type PSS PS 24V (by PILZ). The battery integrated in this power supply unit balances the dates of the CPU, so that they will not get lost in case of a voltage breakdown or switched-off control.

The following dates are concerned:

- Dates about lift distance (spacing, CIS, ...)
- Values of grip force calibration
- Wind warning values
- Operation hours

14.3.2 Type of Battery

- Lithium 3,0V or 3,6V
- Size AA
- ≥ 2,0Ah
- Doppelmayr – ID: 10191058

14.3.3 Time of Battery Exchange

This battery needs to be changed on demand, however at least however every three years. If the battery voltage sinks below 2,5V, the CPU reports the fault “S-04”. In this case, a battery exchange will be necessary.

.

14.3.4 How to change the battery

Illustration 1

Illustration 2

ATTENTION:

Without battery, the dates of the ropeway control are only saved for approx. two minutes.
If the battery exchange takes longer than two minutes, the dates referred to in chapter 14.3.1 will be lost.
Instead of the current dates, the original dates will be used, which might differ from the current dates.

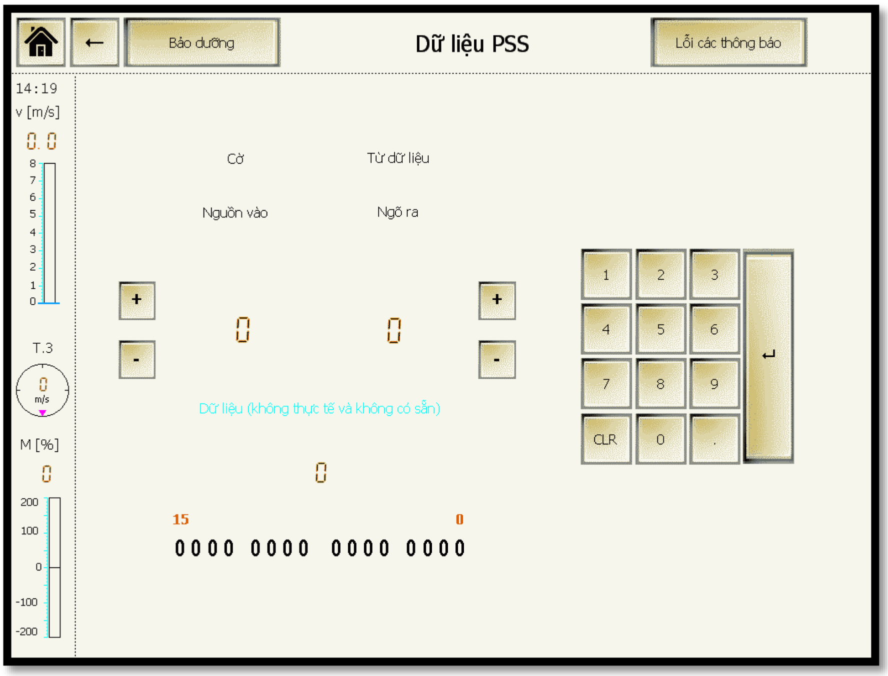
In order to exchange the battery, please proceed as follows:

1. The installation must not be in operation.
2. Open the lid of the power supply unit PSS PS 24V (by PILZ) as indicated in illustration 1.
3. Within two minutes, exchange the battery with switched off control voltage as indicated in illustration 2 (for battery type - please refer to chapter 14.3.2).
4. Check the dates of the CPU whether it still shows the current values. If necessary, insert the values anew.

15 USE OF DATA PSS (DW/MW) FOR SERVICE (OPTION)

For service work, the status of all flags and data in the PSS3000 FS and ST sections can be read via the service menu.

To do so, select the ‘DATA’ PSS field in the Service menu.



16 REMOTE DIAGNOSIS BY MODEM

16.1 Telephone modem (optional)

For service work, the Pilz PSS of the lift system can be directly accessed by telephone modem.

To grant Doppelmayr access to the control, the modem must be connected to the public telephone network (analogue connection).
The analogue telephone connection has to be conducted as main connection instead of a substation-connection.
After having provided the telephone number to Doppelmayr, the connection can be established and service personnel can access the PSS in drive-, mid- or return station (status request or reprogramming of spare CPU).

16.2 Internet modem

For service reasons one can dirctly access the PLC of the installation via an internet modem.

In order to enable Doppelmayr to access the control, the modem needs to be accessible via the internet. After dial-up it is possible to access the PLC respectively the monitors in the drive-, mid- or return station (status request or reprogramming of a substitute-CPU).

17 ERROR DIAGNOSIS OF PLCS WITH THE F-STACK BUTTON

17.1 Error Stack (F-STACK)

Errors diagnosed by the operating system of the PLC during operation are stored in an error stack. This stack includes the last 16 errors.
Each error consists of:

- Error class
- Error number
- Error location if applicable

Counting of the 16 errors in the F-Stack:
E R 0 1
E R 0 2
to
E R 1 6

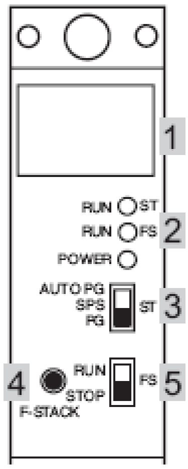
17.2 CPU Display

During operation the display shows at **RUN** condition **0000**.
Depending on the error class the CPU changes in **STOP** condition and shows following:

F - # #	⇒	Minor or severe error in the fail-safe part
S - # #	⇒	Error in the standard part
+ - # #	⇒	Fatal error in the fail-safe and standard part
* - # #	⇒	Fatal error in the fail-safe and standard part
E ####	⇒	Display Messages on Pilz Standard Function Blocks

17.3 Read out Errors by F-STACK Button

F-STACK button (4) on the front panel of the CPU.



1: Display with four-digit number
2: LED-display for operating mode and supply voltage
3: Three-step selector switch for operating mode of standard-part
4: Button for scrolling in Error-Stack (F-Stack button)
5: Two-step selector switch for operating mode of Fail-safe-part

❶ Press the F-Stack button at the CPU

☞ Every time the e-stack button is actuated the pointer moves up one entry in the error stack. This enables you to retrieve all entries in the error stack.

❷ The following messages appear on the screen, one after the other:

ER01 → F–20 → N–03

Explanation of the messages:

ER01

- Error number 1 (stack pointer) indicates the position of the message in the error stack. A maximum of 16 messages are stored.
  Error number 1 (ER01) is the most recent message.
- Fixed symbol for **ER**ror (error number)

F–20

- Error class
- Fail-safe message (error in the fail-safe part, S = standard message)

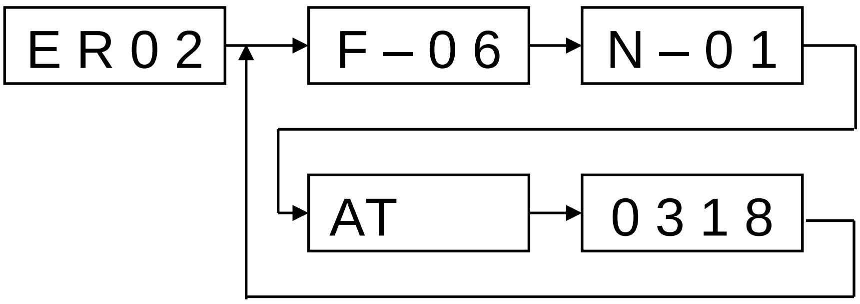
N–03

- Error number **03**
- Fixed symbol for Error **N**umber (error number)

error class = 20, number = 03	FS part was stopped by the operating system

❸ Press the F-Stack button again

❹ The following messages appear on the display, one after the other:



Explanation of the messages:

ER02

Error message **2**

Fixed symbol for **ER**ror (error number)

F–06

Error class **06**

Fail-safe message (error in the fail-safe part, S = standard message)

N–01

Error number **01**

Fixed symbol for Error **N**umber (error number)

AT

Fixed symbol for: '**Error location** follows'

0 3 1 8

Number of in/output

Slot number

TO

Fixed symbol for: ’End of faulty **part of slot**’

In case of a hole card defective only the end of the faulty part will be shown with slot number and in/output number.

error class = 06 number = 01 address = 3.18	The output signal (PAA) to the output transistor 'T+' cannot be read back.

❺ Now you can press the e-stack button again in order to move to the next error. You can repeat this process as often as you wish, after error number 16 the display begins again at error 1.

18 PSS ERRORS

18.1 PSS Error Categories in the Failsafe Section

18.1.1 F-01 = Hardware Error (CPU “68000”)

F-01	Error Description	Remedy
03	Flash EPROM cannot be cleared or programmed.	Reload FS application program into the PSS. Change PSS CPU.
06	Error burning the failsafe Flash EPROM.	
07	Error burning the failsafe Flash EPROM.	
08	Error in operating system ROM. An incorrect value has been determined when calculating the CRC (check sum).	Change PSS CPU.
09	Unable to write to failsafe RAM.	
0A	Unable to write to standard RAM.	
0B	Error discovered in the bit processor.	
0C	Error in the reference voltage test.	
0D	Error detected in dual port RAM “68”.	
0E	Error detected in dual port RAM “61”.	
0F	Error in failsafe Flash EPROM. Incorrect CRC from processing code in the 68000 processor.	Download FS application program to the PSS. Change PSS CPU.
10	Incorrect CRC from processing code in the 186 or C165 processor.	
11	Error in the reference voltage test.	Change PSS CPU.
13	Uart-timer fails to trigger an interrupt in the self test.	
14	Write protection error: 68000 processor able to write to dual port RAM “86”.	
15	Write protection error: 68000 processor able to write to dual port RAM “16”.	
16	Incorrect programming voltage for Flash EPROM chips.	Change PSS power supply.
17	PSS timer tolerance between 186 and 68000 processor is too high.	Change PSS CPU.
18	PSS timer tolerance between C165 and 68000 processor is too high.	
19	PSS timer tolerance is too high when comparing whether DI test timer is already done.	
1A	PSS timer tolerance is too high when comparing whether DI test timer is already done.	

18.1.2 F-02 = Hardware Error (CPU “186”)

F-02	Error Description	Remedy
01	Flash EPROM cannot be cleared or programmed.	Reload FS application program into the PSS. Change PSS CPU.
02	Error burning the failsafe Flash EPROM.	
03	Error in operating system ROM. An incorrect value has been determined when calculating the CRC (check sum).	Change PSS CPU.

F-02	Error Description	Remedy
04	Unable to write to failsafe RAM.	
05	Error detected in the bit processor.	
06	Error detected in dual port RAM “86”.	
07	Error detected in dual port RAM “81”.	
08	Error in the failsafe Flash EPROM. Incorrect CRC from processing code in the 186 processor.	Download FS application program to the PSS. Change PSS CPU.
09	Incorrect CRC from processing code in the 186 or C165 processor.	
0A	Write protection error: 186 processor able to write to dual port RAM “18”.	Change PSS CPU.
0B	Write protection error: 186 processor able to write to dual port RAM “68”.	
0C	Fault during burning of the FS Flash	Repeat download of the FS application program Change PSS CPU.
0D	Incorrect programming voltage for Flash EPROM chips.	Change PSS power supply.
0E	PSS timer tolerance between 68000 and 186 processor is too high.	Change PSS CPU.
0F	PSS timer tolerance between C165 and 186 processor is too high.	
10	Difference of DI test timer between C165 and 186 processor is too high	
11	Difference of DI test timer between C165 and 186 processor is too high	

18.1.3 F-03 = Hardware Error (CPU “C165”)

F-03	Error Description	Remedy
01	Error burning the failsafe Flash EPROM.	Reload FS application program into the PSS. Change PSS CPU.
02	Error in operating system ROM. An incorrect value has been determined when calculating the CRC (check sum).	Change PSS CPU.
03	Error in the failsafe Flash EPROM. Incorrect CRC from processing code in the 6800 processor.	Change PSS CPU.
04	Incorrect CRC from processing code in the C165 or 186 processor.	
0B	Error detected in external RAM	
0C	Error detected in dual port RAM “16”.	
0D	Error detected in dual port RAM “18”.	
0E	Write protection error: C165 processor able to write to dual port RAM “61”.	
0F	Write protection error: C165 processor able to write dual port RAM “81”.	
10	Incorrect programming voltage for Flash EPROMs	Change PSS power supply.
11	PSS timer tolerance between 68000 and 165 processor is too high.	Change PSS CPU.

F-03	Error Description	Remedy
12	PSS timer tolerance between 68000 and 186 processor is too high.	
13-28	Fault during the projectable timer test	

18.1.4 F-04 = Battery error

F-04	Error Description	Remedy
01	Battery is depleted Error parameter-1: Not assigned Error parameter-2: Not assigned	1. Change battery. Caution: data on the PSS is lost if voltage is removed from the PSS for more than 5 minutes. 2. Please contact Pilz

18.1.5 F-05 = Configuration Error

F-05	Error Description	Remedy
01	Module configuration error on start-up: Registered hardware setup does not match the actual configuration.	Check the configuration of the module rack and the data entered in DB 002 (configuration).
02	Module configuration error on RUN: Registered hardware setup does not match the actual configuration (data in DB 002 was lost).	Change PSS CPU.

18.1.6 F-06 = Module Error

L= Address, P= Slot (High byte: Slot number; low byte: 1= address 0 to 15, 2= address 16 to 31)

F-06	Error Description	Remedy
01	Error on the switch-off test of the dual-pole outputs. Short circuit to + 24 V or 0 V in the module or wiring.	If address: #.# + (FFFE): Check wiring for short circuit to +24 V. If address: #.# - (FEFF): Check wiring for short circuit to 0 V. Change PSS DIO Z*.
02	Error on the reset latch of the dual-pole outputs.	Change PSS DIO Z*.
03	Error on the safety circuit of the dual-pole outputs.	Change PSS DIO Z*.
04	Error on the switch-on test of the dual-pole outputs.	Check wiring for interrupt between the output and the actuator. Change PSS DIO Z*.
05	Unable to read back the output signal (PIO) on the dual-pole outputs of the output transistor “T-”. Short circuit to 0 V in the module or wiring.	Check wiring for short circuit to 0 V. Change PSS DIO Z*.
06	The monitoring optocoupler “+” on the dual-pole outputs is not low (‘0’-Signal). Short circuit to + 24 V in the module or wiring.	Check wiring for short circuit to +24 V. Change PSS DIO Z*.
07	Unable to read back the output signal (PIO) on the dual-pole outputs of the output transistor “T+”. Short circuit to +24 V in the module or wiring, or a break between the output and the actuator.	Check wiring for short circuit to +24 V. Check wiring for interrupt between the output and the actuator. Change PSS DIO Z*.

F-06	Error Description	Remedy
08	The monitoring optocoupler “-” on the dual-pole outputs is not low (‘0’-Signal). Short circuit to + 24 V in the module or wiring.	Check wiring for short circuit to +24 V. Change PSS DIO Z*.
09	The internal auxiliary voltage and/or relay on the dual-pole outputs did not drop out when the PSS started up. The supply voltage may be missing.	Check the +24 V supply voltage on the dual-pole output module. Change PSS DIO Z*.
0A	When the PSS started up, the internal auxiliary voltage and/or relay on the dual-pole outputs energized when the watchdog was triggered.	Change PSS DIO Z*.
0B	The internal auxiliary voltage on the dual-pole outputs cannot be generated when the PSS starts up.	
0C	The internal auxiliary voltage on the dual-pole outputs energized, although the watchdog dropped out.	
0D	The internal auxiliary voltage on the dual-pole outputs was triggered but the start-up disabler had not been cleared.	
0E	Error when testing the safety circuit on the dual-pole outputs.	
0F	When the PSS was starting up, neither of the monitoring optocouplers on the dual-pole outputs were low (‘0’-Signal). Short circuit to + 24 V or 0 V in the module or wiring.	If address: #.# + (FFFE): Check wiring for short circuit to +24 V. If address: #.# - (FEFF): Check the wiring for short circuit to 0 V. Change PSS DIO Z*.
11	When testing the unused dual-pole outputs, the monitoring optocouplers “+/-” were not low (‘0’-Signal).	Check the wiring for short circuit to +24 V. Change PSS DIO Z*.
12	The monitoring optocoupler “+” was not low (‘0’-Signal) during the test on the dual-pole outputs.	
13	The monitoring optocoupler “-” was not low (‘0’-Signal) after the test on the unused dual-pole outputs.	
14	When the PSS was starting up, different unused outputs were detected on T+ and T- on the dual-pole outputs.	Change PSS DIO Z*.
15	When the test on the dual-pole outputs was completed, no internal auxiliary voltage was generated, or the relays failed to energize.	
16	Before determining the unused dual-pole outputs, the internal auxiliary voltage was not generated within 11 ms and/or the relays failed to energize.	
17	During testing, the PSS DIF has triggered a non-configured interrupt.	Change PSS DIF*.
18	An error has occurred during the switch-off test of the test signal outputs.	Check the wiring for short circuit to +24 V. Change PSS DIO T*.
19	An error has occurred during the switch-off test of the single-pole outputs.	Check the wiring for short circuit to +24 V.

F-06	Error Description	Remedy
		Change PSS DO/DOS*
1A	Unable to read back the output signal (PIO) on the single-pole outputs. Short circuit to 0 V in the module or in the wiring, or the supply voltage may be missing.	Check 24 V supply voltage Check the wiring for a short circuit. Change PSS DO/DOS* or PSS DIO T*
1B	The internal auxiliary voltage on the test signal outputs did not de-energize as the PSS was starting up.	Change PSS DIO T*.
1C	The internal auxiliary voltage on the test signal outputs was energized, although the watchdog dropped out.	
1D	As the PSS was starting up, the internal auxiliary voltage on the test signal outputs energized when the watchdog was triggered.	
1E	The internal auxiliary voltage on the test signal outputs could not be generated while the PSS was starting up.	
1F	The internal auxiliary voltage on the test signal outputs was energized although the start-up disabler had not been cleared.	
20	An error occurred while switching on/off the transistors on the test signal outputs.	Check 24 V supply voltage. Check the wiring for a short circuit. Change PSS DIO T*.
21	The internal auxiliary voltage on the test signal outputs was not generated, though enabled.	Change PSS DIO T*.
22	The monitoring optocouplers on the test signal outputs were not low (‘0’-Signal) as the PSS was starting up.	Check the wiring for a short circuit to +24 V. Change PSS DIO T*.
23	The internal auxiliary voltage on the single-pole outputs did not de-energize as the PSS was starting up.	Change PSS DO/DOS*.
24	The internal auxiliary voltage on the single-pole outputs was energized, although the watchdog dropped out.	
25	As the PSS was starting up, the internal auxiliary voltage on the single-pole outputs was energized when the watchdog was triggered.	
26	Unable to generate the internal auxiliary voltage on the single-pole outputs as the PSS was starting up.	
27	The internal auxiliary voltage on the single-pole outputs was triggered although the start-up disabler had not been cleared.	
28	Unable to generate the internal auxiliary voltage on the single-pole outputs, though enabled.	
29	The monitoring optocouplers on the single-pole outputs were not low (‘0’-Signal) as the PSS was starting up.	Check the wiring for a short circuit to +24 V. Change PSS DO/DOS*.
2A	Although the test pulse was low (‘0’-Signal), the inputs on the connected input module were not low.	Check the wiring on the test pulses for a short circuit to +24 V. Change module**.
2B	A module with alarm capabilities is generating the process alarm incorrectly.	Check the wiring on the test pulses for a short circuit. Change PSS DIF*.

F-06	Error Description	Remedy
2C	An error occurred while switching on the discharging for the line capacitance	Check the wiring on the test pulses against the information given in the installation manual. Change PSS DIO T*.
2D	An error occurred while switching off the discharging for the line capacitance.	
2E	Bus error on the PSS DIF, after the DIF test register was written with a 0-Signal. Probably a short circuit between the output and the input from the DIF test register.	Change PSS DIF*.
2F	Bus error on the PSS DIF, after the DIF test register was written with a 0-Signal. Probably a short-circuit between the output and the input from the input register.	
30	Contents of the pulse edge register on the PSS DIF has changed since the last interrupt.	
31	After testing, the contents of the pulse edge register on the PSS DIF cannot be restored correctly.	
32	Error in the contents of the internal mask register during the bus test.	
33	Error occurred during the bit test by the internal mask register.	
34	During the bit test with a rising edge, the PSS DIF input currently being tested, has not set its appropriate bit in the internal register.	
35	During the bit test with a falling edge, the PSS DIF input currently being tested, has not set its appropriate bit in the internal register.	
36	During the bit test with a rising edge, the PSS DIF input currently being tested has not set the internal flag and therefore cannot trigger an interrupt.	
37	During the bit test with a rising edge, the PSS DIF input currently being tested is not resetting the internal flag and is generating a continuous interrupt.	
38	The interrupt enable did not function correctly during the bit test.	
39	During the bit test the PSS DIF input register did not contain the test pattern stored in the DIF test register.	
3A	Unable to clear the pulse edge register after the bit test.	
3B	Error occurred when performing the switch-off test of the PSS DIF using a test pattern.	
3C	Error occurred when performing the switch-off test of the PSS DIF using a test pattern.	
3D	Bus test on the PSS DIF is indicating an error.	
3E	Unable to switch on the test register after running the switch-off test.	
3F	Bus test on the inputs is indicating an error.	Change module **.

F-06	Error Description	Remedy
40	During the bit test the input register of the inputs did not contain the test pattern stored in the test register.	
41	Error during the switch-off test of the inputs.	
42	Error during the switch-off test of the inputs.	
43	The monitoring optocouplers on the test signal outputs do not contain the test pattern stored at these outputs.	Change PSS DIO T *.
44	During the function test of the PSS DIF, the process alarm interrupt service routine was not activated, although an interrupt was present on the PSS CPU.	Change PSS DIF*.
45	During the function test of the PSS DIF, the internal register contained the same error over 2 cycles, showing one interrupt missing or one interrupt too many.	
46	The input register on the PSS DIF does not contain the test pattern stored at the test signal outputs.	Check the signal wiring between the input device and the DIF input for a short circuit to +24 V. Change PSS DIF*.
47	The input register on the inputs does not contain the test pattern stored at the test signal outputs.	Check the signal wiring between the input device and the DI input for a short circuit to +24 V. Increase the ‘Digital input test period’ in configuration – ‘Basic Data’.*** Change module **.
48	PSS AI module is registering an error.	Change PSS AI.
49	PSS AI module is failing to stop the enable.	
4A	PSS AI module is registering an error in the scan’s XW-comparison.	
4B	During the XW-comparison, the PSS AI module is failing to end the enable within the scan.	
4C	PSS AI module is registering a module error during output.	
4E	PSS AI module is registering a module error as the application program is updated.	
4F	PSS AI module is not registering that its values are frozen as the application program is updated.	
50	PSS AI module is not ready in time to receive new values.	
51	PSS AI module is registering a module error as the application program is updated.	
52	The internal auxiliary voltage of the relay outputs did not switch off when the PSS started up.	Change PSS DOR.
53	An error occurred while testing the safety circuit of the relay outputs.	
54	The internal auxiliary voltage on the relay outputs energized, although the watchdog dropped out.	
55	Unable to generate the internal auxiliary voltage of the relay outputs as the PSS was starting up.	

F-06	Error Description	Remedy
56	As the PSS was starting up, the internal auxiliary voltage of the relay outputs energized when the watchdog was triggered.	
57	The internal auxiliary voltage or relay in the supply voltage to the relay outputs is not ready after 25 ms.	
58	The internal auxiliary voltage or relay in the supply voltage to the relay outputs is not ready after the watchdog test.	
59	The internal auxiliary voltage for the control circuit is not high (1-Signal) after the relay has switched.	
5A	The internal auxiliary voltage for the control circuit is not low (0-Signal) after the supply voltage has been activated.	
5B	The internal auxiliary voltage for the control circuit is not high (1-Signal) after the supply voltage has been reactivated.	
5C	The internal auxiliary voltage for the control circuit is not high (1-Signal) after the relay has switched (after the watchdog test).	
5D	Unable to generate the internal auxiliary voltage, though enabled.	
5E	The internal auxiliary voltage was triggered although the start-up disable had not been cleared.	
5F	The internal auxiliary voltage for the control circuit is not high (‘1’-Signal).	
60	The internal auxiliary voltage for the control circuit is not low (‘0’-Signal).	
61	Unable to switch off the transistors on the test signal outputs during the switch-off test.	Check the wiring for a short circuit to +24 V. Change PSS DIO T *.
62	The PSS DIF module is failing to trigger the configured process alarm.	Change PSS DIF *.
63	As the PSS started up, the watchdog did not drop out within the specified time. Problem with the reference voltage on the dual-pole outputs.	Change PSS DIO Z *.
64	The application program is writing a PIO to outputs designated as pulsed outputs in the test pulse configuration.	Check the application program. Check the test pulse allocation in the configuration.***
65	Unable to switch relays.	Change PSS DOR.
66	Unable to switch on the transistors on the test signal outputs during the switch-on test.	Check the wiring for a short circuit to 0 V. Change PSS DIO T *.
67	Unable to switch pulsed outputs back on after the function test.	Check the wiring for a short circuit to 0 V. Change PSS DIO T *.
68	Auxiliary voltages not switched off during start up	Check DOS outputs for short to 24V Change DOS*
69	Auxiliary voltages or relays turned on even that the Watchdog is down	
6A	Auxiliary voltages turned on while triggering the Watchdog	

F-06	Error Description	Remedy
6B	Auxiliary voltages not switched off when setting 'Restart disable'	
6C	Relay on DOS did not react during monitoring time (25ms)	Check 24V power on each terminator block of 8. Change DOS *
6D	Outputs (Lowbyte) can not be turned on after 300 µs	Check 24V power on each terminator block of 8.
6E	Outputs (Highbyte) can not be turned on after 300 µs	Check for short or overload on outputs
6F	Outputs stay high after low and high byte test.	Change DOS *
70	Fault during Switch on test of DOS	
71	Fault on optocoupler test of DI2	Change DI2
72	Stuck at 0 fault on test pulses	Check for short to 0 V Change DOT *
73	Stuck at 1 fault on test pulses	Check for short to 24 V Change DOT *
74	Short fault between test pulses	Check for short to other test pulse Change DOT *
76	Input did not turn to 0 after activating of test transistor	Change DI2
77	Input did not turn to 0 after switching test pulse off	Check wiring to input Change DI2

* Information on the modules is valid for the PSS 3000 and PSS 3100. On the PSS 3056 and PSS 3032, the whole system will need to be changed.

** Defective inputs on the modules: PSS DI, PSS DI 2, PSS DIO T, PSS DIO Z, PSS 3056 and PSS 3032.

*** If Configuration is amended, the program will need to be re-linked and downloaded to the PSS.

18.1.7 F-07 = CRC Error

F-07	Error Description	Remedy
01	Unable to calculate a valid CRC for the application program while the PSS was starting up (application program is missing).	Transfer program.
02	CRC for application program is no longer correct, i.e. something has changed in the Flash EPROM.	Transfer the program again.
03	CRC notified from 186 processor is incorrect.	
04	CRC notified from C165 processor is incorrect.	
05	CRC notified from 68K processor is incorrect.	

18.1.8 F-08 = I/O Module Errors for Selective Shutdown Function

F-08	Error Description	Remedy
00	Disabling of module not functioning	Change module
01	Auxiliary voltage stays on after watchdog is done	
02	Difference in DIF masks inside DPR of the CPUs during process of reactivation at RUN	Check configuration of SF
03	Test pulse or auxiliary voltage went down at all modules at the same time	Check test pulses Replace DOT or CPU
04	Auxiliary voltage went down at one modules	Check module position in slot Replace module

F-08	Error Description	Remedy
05	An I/O point is set in the configuration but physical not present	Check setting of SF configuration
06	Fault specialized to a XW module	Change XW module
07	Auxiliary voltage on DOT did not come up after watchdog went down	Change DOT module
08	Input fault on DIF detected by a neighbour CPU	Change DIF
09	Relay in DOZ not deenergized during start up	Change DOZ
0A	Relay in DOR not deenergized during start up	Change DOR
0B	Relay in DOS not deenergized during start up	Change DOS
0C	Load interrupt at DOZ output	Check wiring of DOZ output Add 1000 ohms resistor parallel to load Change DOZ
0D	Difference in PII	Change input module Change CPU
0E	Auxiliary voltage stuck high on disabled DOZ	Change DOZ
0F	Auxiliary voltage stayed 0 after watchdog went down	
10	PIO can not be read back from DO/DOS	Change DO/DOS
11	Auxiliary voltage pulled up on disabled DO/DOS	
12	Relays stayed on in disabled DOZ after watchdog was active	Change DOZ
13	PIO can not be read back from DOT	Change DOT
14	Auxiliary voltage pulled up on disabled DOT	
15	Auxiliary voltage pulled up on disabled DO	Change DO
17	Fault on output of a pair detected, partner already indicated as faulty	Change output module
18	At a DOS module 2 or more outputs in one block are registered as faulty	Change DOS
19	At a DOZ module 2 or more outputs are registered as faulty	Change DOZ
1A	A neighbour CPU more defective DIF inputs are marked	Change DIF
1B	Different PII	Change I/O module Change CPU
1C	2 or more segments of a XW module are defect	Change XW module
1D	Defective marked inputs at DIF have been redetected as faulty.	Change DIF
1E	Masked inputs at DIF are still detected as defect	
1F	Via SB 255(Funk=133) defective bits are indicated to the Op-Sys.	
21	Fault in XW module detected	Change XW module
22	XW module indicates enabled, even that it is complete deactivated	
23	Switched off XW module indicates enable	
24	XW module fault	
25	XW module not ready	Check module Reactivate module
26	PII of 165 and neighbours are different at L PB command. These inputs are not marked as defect	Change module
27	PII of 165 and neighbours are different at L PW command. These inputs are not marked as defect	
28	Auxiliary voltage at module is not off	
29	Auxiliary voltage of tested module is not off	

F-08	Error Description	Remedy
2A	Auxiliary voltage at module is not off	
2B	Auxiliary voltage or relays of tested module is not off	
2C	Auxiliary voltage at module is not on	
2D	Watchdog does not go off	Change Module or CPU
2E	Auxiliary voltage at module is not on	Change module
2F	Auxiliary voltage at module is not off	
30	Auxiliary voltage can not be generated	
31	Auxiliary voltage does not go off when bus pulse are stopped, even that Aux voltage disable was functioning before	
33	Auxiliary voltage can not be generated	
34	DOZ relays does not turn on	Check power to all sections of module Change module
35	DOR relays does not turn on	
36	DOS relays does not turn on	
37	Optocoupler R- not at 0	Check wiring at DOZ Check load connected to DOZ Change DOZ
38	Optocoupler R- and R+ not at 0	
39	Optocoupler R+ not at 0	
3A	Optocoupler R- and R+ not at 0	
3B	The used T- and T+ are not identical	
3C	Not used outputs are configured as safety relevant	Check output wiring Change configuration
3D	Fault in XW module indicated	Check XW module Change module
3E	XW enable timer done	
41	Different input / INT register bits at the CPUs	Change DIF
43	Only one CPU switched off test pulses	
44	Different inputs status at CPUs during reactivation	
45	XW module indicates fault	Change XW module
46	Freezing of XW module not OK	
48	A mask input generates an alarm	Change DIF
49	Interrupt enabled inputs signal fault	
4A	Not mask input starts alarm in one channel	
4B	One CPU indicates new faults on DIF	Change DIF /CPU
4C	INT-ACK for module not functioning	Change module
4D	Both DOZ relay feedback loops stuck at 1	Check power to DOZ
4E	Aux voltage at DOR in disable test stuck high	Change DOR
4F	Relay in DOR in disable test stuck at high	
50	Aux voltage at DOS in disable test stuck high	Change DOS
51	Relay in DOS in disable test stuck at high	
52	Relay in DOZ stuck high during start up	Change DOZ
54	Aux voltage fault detected during test of switched off modules → FS Stop	Change module
55	Module not found during start up test	Check Hardware registry Check present FS modules Change module
56	Module not found during self test	
57	Module not found during error handling	
58-59	Difference in feedback signals from not defective marked bits	OpSys fault/ Change CPU

18.1.9 F-09 = XW Module Errors for Selective Shutdown Function

F-09	Error Description	Remedy
01	Fault during read adjustment (word)	Change adjustment setting
02	Fault during read adjustment (dword)	Change XW module
03	Fault during read adjustment (word min, no sign)	Change adjustment setting Increase tolerance window Change XW module
04	Fault during read adjustment (dword, min, no sign)	
05	Fault during read adjustment (word, avrg, no sign	
06	Fault during read adjustment (dword, avrg, no sign)	
07	Fault during read adjustment (word, max, no sign)	
08	Fault during read adjustment (dword, max, no sign)	
09	Fault during read adjustment (word, min, sign)	
0A	Fault during read adjustment (dword, min, sign)	
0B	Fault during read adjustment (word, avrg, sign)	
0C	Fault during read adjustment (dword, avrg, sign)	
0D	Fault during read adjustment (word, max, sign)	
0E	Fault during read adjustment (dword, max, sign)	
0F	Faulty XW segment via SB255(FUNK=104) detected	

18.1.10 F-0C = Scan Time Exceeded

F-0C	Error Description	Remedy
01	Block run time monitoring on the FS application program has elapsed.	If possible, increase the FS block run time. Optimize the time when programming.
02	Maximum scan time was exceeded because the run time on the operating system was too long.	

18.1.11 F-12 = Process Alarm Overflow

F-12	Error Description	Remedy
01	Queue for process alarms has overflowed because they could not be processed quickly enough.	Make the block segments in the program blocks shorter. Optimize the time when programming.

18.1.12 F-14 = Process Alarm Error

F-14	Error Description	Remedy
01	A process alarm has been triggered by an undefined pulse on the PSS Bus, although no module with process alarm capabilities has been installed.	Remove sources of interference from the working environment. Change CPU.
02	A process alarm has been triggered at the CPU, but unable to find the module which is supposed to have triggered it.	Remove sources of interference from the working environment. Increase the alarm pulse. Change CPU.
03	The reaction time of a process alarm has been exceeded.	Reduce the load on the interrupt. Increase the alarm reaction time in configuration – 'Basic Data'. ***

*** If Configuration is amended, the program will need to be re-linked and downloaded to the PSS.

18.1.13 F-20 = CPU Display Messages

F-20	Error Description	Remedy
01	Cold start: FS program starting up.	None required, PSS is running normally!
03	Stop: the FS program switched to “FS-STOP” mode.	Operate FS-RUN/STOP switch.
05	Stop: the FS program switched to “No FS” mode.	Operate mains switch.
06	Minimum scan time exceeded. This means that the constant scan time could not be maintained because the FS program and the ST program are longer than the value in DB 002.	Increase the minimum scan time in DB 002 (configuration).*** Optimize the time when programming.***
07	Processing of the process alarm queue has exceeded the specified time. However, this is not yet critical, as it is still less than the block run time for processing the queue.	Increase the monitoring time for processing alarms in DB 002 (confi-guration).***
08	System test found an error in the CRC check sum of the error stack. Presumably the error stack was corrupted because the battery was flat.	Replace the battery.
09	Error constant incorrectly defined (parameter bit is set although there is no parameter for this error category).	
0A	PG evaluating the call-up parameters incorrectly or the parameters transferred are incorrect.	
0B	PG evaluating the call-up parameters incorrectly or the parameters transferred are incorrect.	
0C	Mains voltage control was activated while the standard section was being processed and the voltage did not drop out.	
0D	186 processor is registering a fatal error during test synchronization.	Change PSS CPU.
0E	C165 processor is registering a fatal error during test synchronization.	Change PSS CPU.
0F	An error in the operating system caused a synchronization error during the test phase.	
10	User has forgotten to re-enable the process alarm function at the end of the scan.	Check the application program.***
11	Unable to determine the cause of the process alarm.	Change PSS CPU.
12	The process alarm disappeared during initial synchronization within the interrupt service check, i.e., the process alarm was present for less than 1.5 ms and was therefore rejected.	Increase the length of the process alarms.
13	The AS command was issued within a process alarm OB.	Remove the AS/AF command from the process alarm OB (OB 140-171).***
14	The AF command was issued within a process alarm OB.	
15	CRC of remnant data was set to 0 by purpose	Status message
16	CRC of remnant data not OK	Change battery
18	Program loaded successfully	Status messages no action required
19	System powered up	
1A	Signal group deactivated	
1B	Program loading started	

F-20	Error Description	Remedy
1D	Reactivating started via SB255(FUNK=106)	
1E	Reset fault during reactivating SB255(FUNK=107)	
1F	ACK of reactivating SB255(FUNK=108)	
20	Reactivation during startup	
22	Max scan time during start up exceeded	
23	Max scan time during stop exceeded	
24	Reactivation successfully finished	

*** If the application program or DB 002 are amended, the program will need to be re-linked and transferred to the PSS.

18.1.14 F-21 = Out of Range Error

F-21	Error Description	Remedy
13	SE timer started with a negative time value.	Rectify program error.***
21	Byte division by 0.	
22	Byte division overflow (result no longer fits in the 16 bit format).	
32	Word division overflow (result no longer fits in the 16 bit format).	
33	Periphery word access to pulsed DI input in the process alarm OB.	Rectify program error in the process alarm OB (OB 140-171).***
34	Periphery byte access to pulsed DI input in the process alarm OB.	

*** If the application program or Configuration are amended, the program will need to be re-linked and transferred to the PSS.

18.1.15 F-22 = Data Block Access Errors

(Messages also for S-22)
L= Faulty program block (High byte = Block Type (OB,PB,FB,SB), Low byte = Block number)
P= Accessed Data block (High byte = Block Type (DB), Low byte = Data Block number)

F-22 S-22	Error Description	Remedy
01	Address in L DR out of DB range	Lengthen the data block. Check application program. Rectify program error . Transfer changed block to PSS ***.
02	Address in L DL out of DB range	
03	Address in T DR out of DB range	
04	Address in T DL out of DB range	
05	Address in AND DR out of DB range	
06	Address in AND DL out of DB range	
09	Address in OR DR out of DB range	
0A	Address in OR DL out of DB range	
0D	Address in XOR DR out of DB range	
0E	Address in XOR DL out of DB range	
0F	Address in + DR out of DB range	
10	Address in + DL out of DB range	
11	Address in - DR out of DB range	
12	Address in - DL out of DB range	
13	Address in ∗ DR out of DB range	
14	Address in ∗ DL out of DB range	

F-22 S-22	Error Description	Remedy
15	Address in ÷ DR out of DB range	
16	Address in ÷ DL out of DB range	
17	Address in I DR out of DB range	
18	Address in I DL out of DB range	
19	Address in D DR out of DB range	
1A	Address in D DL out of DB range	
1B	Address in > DR out of DB range	
1C	Address in > DL out of DB range	
1F	Address in != DR out of DB range	
20	Address in != DL out of DB range	
23	Address in < DR out of DB range	
24	Address in < DL out of DB range	
30	Address in L DW out of DB range	
31	Address in T DW out of DB range	
32	Address in AND DW out of DB range	
34	Address in OR DW out of DB range	
36	Address in XOR DW out of DB range	
37	Address in + DW out of DB range	
38	Address in – DW out of DB range	
39	Address in ∗ DW out of DB range	
3A	Address in ÷ DW out of DB range	
3B	Address in I DW out of DB range	
3C	Address in D DW out of DB range	
3D	Address in > DW out of DB range	
3F	Address in != DW out of DB range	
41	Address in < DW out of DB range	
51	Invalid contents in actual parameter with DR	
52	Invalid contents in actual parameter with DR	
53	DR out of range of actual DB	
54	DL out of range of actual DB	
61	DW out of range of actual DB	
62	DW in T=para out of range of actual DB	
63	DW in I=para out of range of actual DB	
64	DW in D=para out of range of actual DB	
65	DW, DR or DL before any ‘A DB’ command	

*** FS-section: If the application program is changed, the program will need to be re-linked and transferred to the PSS.

18.1.16 F-23 = Data Block “Read-Only” Errors

(Messages also for S-23)
L= Faulty program block (High byte = Block Type (OB,PB,FB,SB), Low byte = Block number)
P= Accessed Data block (High byte = Block Type (DB), Low byte = Data Block number)

F-23 S-23	Error Description	Remedy
01	Actual DB in T DR is read only	Change data block to R/W.
02	Actual DB in T DL is read only	Check application program.
03	Actual DB in I DR is read only	Rectify program error.
04	Actual DB in I DL is read only	Transfer changed block to PSS ***.

F-23 S-23	Error Description	Remedy
05	Actual DB in D DR is read only	
06	Actual DB in D DL is read only	
11	Actual DB in T DW is read only	
12	Actual DB in I DW is read only	
13	Actual DB in D DW is read only	
20	DL in T = para - actual DB is read only	
21	DL/DR in T = para - actual DB is read only	
31	DW in T=para - actual DB is read only	
32	DW in I=para - actual DB is read only	
33	DW in D=para - actual DB is read only	

*** FS-section: If the application program is changed, the program will need to be re-linked and transferred to the PSS.

18.1.17 F-24 = Error Setting Parameters for FBs and SBs

(Messages also for S-24)
L= Active program block (High byte = Block Type (OB,PB,FB,SB), Low byte = Block number)
P= Called program block (High byte = Block Type (FB,SB), Low byte = Block number)

F-24 S-24	Error Description	Remedy
01	Invalid contents of Bit (X) parameter	Change parameter
02	Invalid contents of Byte (B) parameter	Rectify program error.
03	Invalid contents of Word (W) parameter	Re-send data block or block to the PSS.
13	Invalid contents of Timer (SE) parameter	
16	Invalid contents of Counter (ZV) parameter	
17	Invalid contents of Counter (ZR) parameter	
18	Invalid contents of Reset (R) parameter	
19	Incorrect address in the actual parameter (R Txy)	
1A	Incorrect address in the actual parameter (R Zxy)	
21	Byte in T = para command invalid	
22	Byte in I = para command invalid	
23	Byte in D = para command invalid	
31	Word in T = para command invalid	
32	Word in I = para command invalid	
33	Word in D = para command invalid	
34	DB in A = para command invalid	
36	Write access to reserved bit in “S =para”	
37	Write access to read-only bit “S =para”	
38	“S =para” of input bit not permitted.	
39	Write access to reserved bit in “R =para”	
3A	Write access to read-only bit “R =para”	
3B	“R =para” of input bit not permitted.	
3C	Write access to reserved byte in “T =para”	
3D	Write access to read-only byte “T =para”	
3E	Write access to reserved word in “T =para”	
3F	Write access to read-only word “T =para”	
40	Wrong timer number in actual parameter (R = para)	
41	Wrong counter number in actual parameter (R = para)	

F-24 S-24	Error Description	Remedy
42	Counter in T = para command invalid	
43	S = para to reserved Marker area	
44	S = para to Read only Marker area	
45	S = para of Input bit not allowed	
46	R = para to reserved Marker area	
47	R = para to Read only Marker area	
48	R = para of Input bit not allowed	
49	T = para to reserved Marker area (Byte)	
4A	T = para to Read only Marker area (Byte)	
4B	T = para to reserved Marker area (Word)	
4C	T = para to Read only Marker area (Word)	
4D	I = para to reserved Marker area (Byte)	
4E	I = para to Read only Marker area (Byte)	
4F	I = para of input byte not allowed	
50	D = para to reserved Marker area (Byte)	
51	D = para to Read only Marker area (Byte)	
52	D = para of input byte not allowed	
53	I = para to reserved Marker area (Word)	
54	I = para to Read only Marker area (Word)	
55	I = para of input word not allowed	
56	D = para to reserved Marker area (Word)	
57	D = para to Read only Marker area (Word)	
58	D = para of input word not allowed	
59	Invalid contents in S, =, =N = para	
5A	Invalid contents in R = para	
5B	L = para with invalid XW address	
5C	T = para with invalid XW address	
5D	SE = para with invalid timer number	
5E	ZR = para with invalid counter number	
5F	ZV = para with invalid counter number	
60	Invalid address in parameterized bit command	
61	Invalid timer number in parameterized bit command	
62	Invalid counter number in parameterized bit command	
63	Invalid address in parameterized byte command	
64	Invalid address in parameterized word command	
65	Invalid counter number in parameterized word command	

*** If the application program is changed, the program will need to be re-linked and downloaded to the PSS.

18.1.18 F-25 = Indirect Addressing Errors

(Messages also for S-25)
L= Active program block (High byte = Block Type (OB,PB,FB,SB), Low byte = Block number)
P= program block with indirect addressing (High byte = Block Type (OB,PB,FB,SB), Low byte = Block number)

F-25 S-25	Error Description	Remedy
01	Faulty indirect marker bit addressing	Change parameter
02	Faulty indirect input bit addressing	Rectify program error.
03	Faulty indirect output bit addressing	Transfer changed block to PSS. ***

F-25 S-25	Error Description	Remedy
04	Faulty indirect timer bit addressing	
05	Faulty indirect counter bit addressing	
13	Faulty indirect SE timer addressing	
16	Faulty indirect ZV counter addressing	
17	Faulty indirect ZR counter addressing	
18	Faulty indirect R timer addressing	
19	Faulty indirect R counter addressing	
1A	Incorrect time base in command “SE T (t.y)”.	
20	Faulty indirect Marker byte addressing (ST)	
21	Faulty indirect Marker byte addressing (FS)	
22	Faulty indirect Input byte addressing	
23	Faulty indirect Output byte addressing	
24	Faulty indirect data byte/word addressing	
31	Faulty indirect Marker word addressing	
32	Faulty indirect Input word addressing	
33	Faulty indirect Output word addressing	
34	Faulty indirect Counter word addressing (FS)	
35	Faulty indirect Counter word addressing (ST)	
36	Faulty indirect XW addressing	
50	Faulty indirect Marker word addressing (I MW)	
51	Faulty indirect Output word addressing (I AW)	
52	Faulty indirect Marker word addressing (D MW)	
53	Faulty indirect Output word addressing (D AW)	
54	Read only Marker indirect decremented	
55	Read only Marker indirect incremented	
56	Read only Marker indirect altered	
57	Read only Marker indirect altered	
58	Read only Marker indirect written	
59	Faulty indirect XW addressing	
60	Faulty indirect XW addressing	

*** If the application program is changed, the program will need to be re-linked and downloaded to the PSS.

18.1.19 F-26 = Block Errors

F-26	Error Description	Remedy
01	The process alarm OB to be called up is not loaded on the PSS.	Edit process alarm OB (OB 140-171).***
02	The OB to be called up was deleted when the program was loaded.	Edit the relevant OB.***
03	Index for calling up an OB calculated incorrectly.	
11	A DB: selected DB does not exist.	Edit the relevant DB.***
12	A =para: selected DB does not exist.	Edit the relevant DB.***
14	The OB to be called up was deleted when the program was loaded.	Link the program again. Clear Flash-EPROM. Download the linked program.

*** If the application program is changed, the program will need to be re-linked and downloaded to the PSS.

18.1.20 F-27 = Parameter Error

F-27	Error Description	Remedy
01	Formal and actual parameters do not match (type, number, sequence).	Load the block initiating the call into the editor and set new parameters.***

*** If the application program is changed, the program will need to be re-linked and downloaded to the PSS.

18.1.21 F-28 = Nesting Error

(Messages also for S-28)
L= Called program block (High byte = Block Type (OB,PB,FB,SB), Low byte = Block number)

S-28	Error Description	Remedy
01	Too many block nesting levels when calling OB	Change program
03	Too many block nesting levels when calling PB	Rectify program error.
05	Too many block nesting levels when calling FB	Transfer changed block to PSS ***
07	Too many block nesting levels when calling SB	

*** If the application program is changed, the program will need to be re-linked and transferred to the PSS.

18.1.22 F-29 = PG Control Errors

F-29	Error Description	Remedy
01	FS Stop via PG	Status message, no action
02	FS Start via PG, mailbox busy	Restart PSS
03	FS Start via PG wrong Password (DB 002)	Entry right password
04	FS Start via PG, prohibited by active task	Restart PSS
05	FS Start via PG, FS switch at stop	Switch FS to RUN
06	FS Start via PG, request with wrong service	Op Sys fault
07	FS Start via PG, cancelled through PG	Status message, no action
08	FS Start via PG, PSS already in RUN	Status message, no action
09	FS Start via PG, Mailbox timeout	Op Sys fault

18.1.23 F-30 = SafetyBus User Stop

L= Group number, P= Device that initiated Stop

F-30	Error Description	Remedy
00	Group Stop by user	Status information, no action

18.1.24 F-31 = SafetyBus Internal Errors

L= see in table, P= Device that initiated Stop

F-31	Error Description	Remedy
00	Group Stop due to internal device fault L= Group number	Check faulty remote device
01	Group Stop due to major fault detected from PSS L= Group number (here 0xFE= all groups)	Read error stack of remote device
02	Group Stop due to system fault detected from PSS L= System fault message	

F-31	Error Description	Remedy
03-07	Unknown device in protocol detected L= System fault message	
08	Unknown device in POI L= Item number of faulty device	
09-0A	Unknown device in Task POI L= System fault message	
0B	Segment out of range L= none	

18.1.25 F-32 = SafetyBus Periphery Errors

L= Group number, P= Device that initiated Stop

F-32	Error Description	Remedy
00	Group Stop through fault in device	Check Error Stack of SafetyBus Device

18.1.26 F-33 = SafetyBus Device Errors

L= See in table if used, P= Device that initiated Stop

F-33	Error Description	Remedy
00	Group stop due to SafetyBus fault of device L= Group number	
01	MD is missing Cycle Start of Master LD	
02	Cycle of device missing	
03	Unexpected Event ACK received	
04	Unexpected Event ACK received	
05	Unexpected Test Event ACK received	
06	Timeout of Event ACK L= Item Number	
07	Timeout during byte transmission	
08	Timeout during configuration of MD L= Group number	
09	Timeout during configuration of LD L= Group number	
0A	Timeout during Domain transmission L= Domain number	
0B	Timeout during Domain request L= Domain number	
0C	Timeout during Cycle Start of one group	
0D	MD did not receive Cycle Strobe	
0E	CAN controller is BUS off	
0F	Telegram received under MD address	
10	Telegram received under LD address	
11	Event write access to device, not connected to LD	
12	Timeout during LD Group Start	
13	Unexpected LD Group Start ACK received	
14-20	No buffer reserved for Domain transmission	
21	Device with already running group want to connect	Group number used twice
22	Device is connecting while Group start in process	
23	Not connected Device is sending ready	
24	Group in wrong status is sending Start ready	

F-33	Error Description	Remedy
25	Wrong length of timeout data in LD configuration	
26	Server data from master LD different to stored data	
27-29	Wrong status or PSS not in RUN	
2A	MD Client connection table different to stored data	
2B	Device not allocated to staring group or in wrong status	
2C	Slave in LD configuration test detected that should not be present	
2D	Not requested device answering in connection response	
2E	Wrong slave responding in LD configuration test	
2F	Device not in starting group or wrong status in LD configuration test	
30	Wrong device object in LD configuration test to slave transmitted	
31	Wrong master or wrong own status in LD configuration table	
32	Sending device is wrong in LD configuration table, has wrong ID or is sending in wrong group	
33	Wrong device status in LD configuration table	
35	Device in wrong status or group in LD configuration table	
38	Device in wrong status or group in LD configuration table	
39	Device did not send ACK but connection response during connection start	
3A	Device did not response during group configuration Timeout during configuration of one group	
3B	Cycle of one device received twice	
3C-3F	Wrong status in MD configuration table	
40-44	Wrong status in LD configuration table	
45	Wrong device object in IOD part in LD configuration table	
46-47	Wrong status in LD configuration table	
48	Wrong master or wrong own status in LD configuration table	
49-4A	Wrong status in LD configuration table	
4B	'End of domain' sent before all domain data were received	
4C	No buffer reserved for domain transmission	

18.1.27 F-34 = SafetyBus Configuration Errors

F-34	Error Description	Remedy
01	Wrong configuration CRC of neighbour	
02	Wrong configuration CRC	
03-04	68K indicates fault while burning Flash	
05-06	165 indicates fault while burning Flash	
07	too many numbers of group in client table	
08	Invalid group number in client table	
09	Plausibility fault in client table	
0A	Invalid device address in client table of Master LD of group	

F-34	Error Description	Remedy
0B	Invalid master LD device address in client table of Slave LD of group	
0C	Invalid master LD device address in client table of Master LD of group	
0E	Invalid device address in client table	
0F	Invalid Item number in client table	
11	Invalid NUMBER OF Slave LDs in client table	
1D	Invalid Slave LD address	
22	More than 2 server tables for LD present	
23	Invalid device address for master LD of ID part	
24	Invalid group number for master LD of ID part	
25	Invalid item number for master LD of ID part	
25-2E	Already one server present in ID part	
2F	Plausibility fault in device objects	
30-39	Fault during burning flash in 165 CPU	
3A-3B	Invalid number of devices for the MD in connection table	
3C-3E	Invalid device address in connection table for MB	
3F	Invalid number of groups in connection table for MB	
40	Invalid group number in connection table for MB	
41	Invalid item number in connection table for MB	
43	Invalid number of slaves in connection table for MB	
44	Invalid slave address in connection table for MB	
45	Invalid CRC of neighbour	
46	Fault of neighbour during configuration	
47	Fault in process alarm table	
48	Fault of neighbour during configuration	
49	Fault during program transfer of PSS	
4A-51	Fault during parameter setting of general data	
52-53	Fault during program transfer of PSS	
54-5B	Fault during configuration	
5C	Fault in server class number	

18.1.28 F-35 = Error in the transfer of diagnostic data (SafetyBUS p 0)

F-35	Error Description	Remedy
00	Device <*Error parameter-2*> does not support a transmission rate of 500 kBit/s (devices's SBp bus version: <*Error parameter-1*>) Error parameter-1: SBp bus version Error parameter-2: Device address	1.) Replace Device <Error parameter-2> with a device with an SBp bus version greater than or equal to 3, so that it can support the transmission rate of 500 kBit/s 2.) When a Router is used: Reduce the transmission rate to 250 kBit/s for the bus segment containing Device <Error parameter-2> 3.) Reduce the transmission rate to 250 kBit/s 4.) Please contact Pilz
01-06	Error in the transfer of diagnostic data Error parameter-1: Error code (optional) Error parameter-2: Device address	1.) Please contact Pilz ase contact Pilz (error code: <*Error parameter-1 and -2*>). Have the error stack of Device <*Error parameter-2*> to hand

F-35	Error Description	Remedy
07-18	Error in the transfer of diagnostic data Error parameter-1: Device address Error parameter-2: Not assigned	1.) Please contact Pilz ase contact Pilz (error code: *<Error parameter-1 and -2>*). Have the error stack of Device *<Error parameter-1>* to hand
19-25	Error in the transfer of diagnostic data Error parameter-1: Error code (optional) Error parameter-2: Device address	1.) Please contact Pilz ase contact Pilz (error code: *<Error parameter-1 and -2>*). Have the error stack of Device *<Error parameter-2>* to hand
26	SafetyBUS p interface has returned to a RUN condition Error parameter-1: Not assigned Error parameter-2: Not assigned	1.) For information only, no remedy required

18.1.29 F- 36: Warning" or "Status" occurred (SafetyBUS p 0)

F-36	Error Description	Remedy
00 - 03	A "Warning" or "Status" type event has occurred Error parameter-1: DL: Device address DR: Error code (optional) Error parameter-2: Error code (optional)	1.) Evaluate error stack of Device <Error parameter-1> 2.) Please contact Pilz

F- 38: Assorted errors (SafetyBUS p 1)

F-38	Error Description	Remedy
00	I/O-Group <Error parameter-1> was stopped through the user program or via the FS selector switch on LD <Error parameter-2> Error parameter-1: Error parameter + 100 = I/O-Group Error parameter-2: Error parameter + 100 = Device address	1.) For information only, no remedy required
01	Too many decentralised alarms have occurred simultaneously Error parameter-1: Not assigned Error parameter-2: Not assigned	1.) Divide blocks into shorter segments 2.) Disable alarms for just a few segments (Operations "AS" and "AF") 3.) Reduce the number of decentralised alarms occurring simultaneously 4.) Please contact Pilz

18.1.30 F-39 = Assorted errors (SafetyBUS p 1)

F-39	Error Description	Remedy
0B-0C	Internal error Error parameter-1: Error code (optional) Error parameter-2: Error code (optional)	1.) Please contact Pilz
0D	SafetyBUS p can be restarted via the FS selector switch or via the system software (PG) Error	1.) For information only, no remedy required

F-39	Error Description	Remedy
	parameter-1: Not assigned Error parameter-2: Not assigned	

18.1.31 F-3B = Error on SafetyBUS p 1

F-3B	Error Description	Remedy
00	I/O-Group <*Error parameter-1*> was stopped via Device <*Error parameter-2*> Error parameter-1: Error parameter + 100 = I/O-Group Error parameter-2: Error parameter + 100 = Device address	1.) Evaluate error stack of Device <*Error parameter-2*> 2.) Please contact Pilz
01	Cannot transfer data between MD and LD <*Error parameter-1*> Error parameter-1: Error parameter + 100 = Device address Error parameter-2: Not assigned	1.) Evaluate PSS error stack 2.) Ensure there are no breaks in the wiring between LD <*Error parameter-1*> and the MD on SBp 1 3.) Increase the cycle timeout in the SBp configuration 4.) Reduce bus load 5.) Please contact Pilz
02	Cannot transfer data between MD and I/OD <*Error parameter-1*> Error parameter-1: Error parameter + 100 = Device address Error parameter-2: Not assigned	1.) Ensure there are no breaks in the wiring between I/OD <Error parameter-1> and the MD on SBp 1 2.) Evaluate error stack of Device <Error parameter-1> 3.) Increase the cycle timeout in the SBp configuration 4.) Reduce bus load 5.) Please contact Pilz
03-04	PSS is defective or Device <*Error parameter-1*> is defective or there is a non-SafetyBUS p-compatible device on the bus Error parameter-1: Error parameter + 100 = Device address Error parameter-2: Not assigned	1.) Ensure that the bus contains only SafetyBUS p-compatible devices 2.) Evaluate error stack of Device <*Error parameter-1*> 3.) Change module 4.) Change module or compact PSS 5.) Please contact Pilz
05	Internal error Error parameter-1: Error code (optional) Error parameter-2: Error code (optional)	1.) Please contact Pilz
06	Cannot transfer data to Device <*Error parameter-2*> Error parameter-1: Error code (optional) Error parameter-2: Error parameter + 100 = Device address	1.) Evaluate error stack of Device <Error parameter-2> 2.) Ensure there are no breaks in the wiring to Device <Error parameter-2> 3.) Increase the event timeout in the SBp configuration 4.) Reduce bus load 5.) Please contact Pilz
07	Internal error Error parameter-1: Error code (optional) Error parameter-2: Error code (optional)	1.) Please contact Pilz
08-09	Device **< !ERROR! >** u has triggered a timeout when starting the I/O-Group Error parameter-1: Error parameter + 100 = Device address Error parameter-2: Not assigned	1.) Evaluate error stack of Device <*Error parameter-1*> 2.) Increase the domain timeout in the SBp configuration 3.) Reduce bus load 4.) Please contact Pilz
0A-0B	Domain timeout through Device <*Error parameter-2*> Error parameter-1: Error code (optional) Error parameter-2: Error parameter + 100 = Device address	1.) Evaluate error stack of Device <*Error parameter-2*> 2.) Increase the domain timeout in the SBp configuration 3.) Reduce bus load 4.) Please contact Pilz

F-3B	Error Description	Remedy
0C	Error due to device Error parameter-1: Error parameter + 100 = Device address Error parameter-2: Not assigned	1.) Evaluate error stack of Device <Error parameter-1> 2.) Please contact Pilz
0D	Data transfer is disrupted Error parameter-1: Not assigned Error parameter-2: Not assigned	1.) Ensure there are no breaks in the wiring to the SafetyBUS p 2.) Ensure that SafetyBUS p is wired in accordance with the "SafetyBUS p Installation Manual" 3.) Increase the cycle timeout in the SBp configuration 4.) Increase the router correction time in the SBp configuration, even if SafetyBUS p does not contain a router 5.) Please contact Pilz
0E	Cannot transfer data to Device *<Error parameter-1>* Error parameter-1: Error parameter + 100 = Device address Error parameter-2: Not assigned	1.) Ensure that SafetyBUS p is wired in accordance with the "SafetyBUS p Installation Manual" 2.) Please contact Pilz
0F	Several MDs are on the bus, although only one MD is permitted Error parameter-1: Not assigned Error parameter-2: Not assigned	1.) Use the lastest version of the system software (PG) 2.) Configure only one PSS as MD 3.) Please contact Pilz
10	Several devices with device address *<Error parameter-1>* on the bus or Device *<Error parameter-1>* is defective Error parameter-1: Error parameter + 100 = Device address Error parameter-2: Not assigned	1.) Ensure that device address *<Error parameter-1>* is set on one device only 2.) Evaluate error stack of Device *<Error parameter-1>* 3.) Please contact Pilz
11	Internal error Error parameter-1: Error code (optional) Error parameter-2: Error code (optional)	1.) Please contact Pilz
12	The MD has triggered a timeout when starting the I/O-Group Error parameter-1: Not assigned Error parameter-2: Not assigned	1.) Evaluate error stack of MD 2.) Increase the domain timeout in the SBp configuration 3.) Reduce bus load 4.) Please contact Pilz
13-20	PSS is defective or Device *<Error parameter-1>* is defective or there is a non-SafetyBUS p-compatible device on the bus Error parameter-1: Error parameter + 100 = Device address Error parameter-2: Not assigned	1.) Ensure that the bus contains only SafetyBUS p-compatible devices 2.) Evaluate error stack of Device *<Error parameter-1>* 3.) Change module 4.) Change module or compact PSS 5.) Please contact Pilz
22	Several devices with device address *<Error parameter-1>* on the bus or Device *<Error parameter-1>* is defective Error parameter-1: Error parameter + 100 = Device address Error parameter-2: Not assigned	1.) Ensure that device address *<Error parameter-1>* is set on one device only 2.) Evaluate error stack of Device *<Error parameter-1>* 3.) Please contact Pilz
23	I/O-Groups on Device *<Error parameter-1>* cannot be started on bus start up Error parameter-1: Error parameter + 100 = Device address Error parameter-2: Not assigned	1.) Evaluate error stack of Device *<Error parameter-1>* 2.) When the bus is starting up, switch on the FS sections on the LDs one after the other, and finish with the FS section of the MD 3.) Ensure there is an interruption-free supply when the bus is starting up 4.) Change module or compact PSS 5.) Please contact Pilz
24	I/O-Groups on Device <Error parameter-1> cannot be started Error parameter-1:	1.) Evaluate error stack of Device <Error parameter-1> 2.) Ensure that Device <Error parameter-1>

F-3B	Error Description	Remedy
	Error parameter + 100 = Device address Error parameter-2: Not assigned	has an interruption-free supply 3.) Change module or compact PSS 4.) Please contact Pilz
25	Internal error Error parameter-1: Error code (optional) Error parameter-2: Error code (optional)	1.) Please contact Pilz
26	SBp configuration is different to the SBp configuration in the MD PSS Error parameter-1: Error code (optional) Error parameter-2: Not assigned	1.) Assign the same SBp configuration to every PSS on the bus, relink all FS programs and download 2.) Please contact Pilz
27-29	I/O-Groups cannot be started Error parameter-1: Error code (optional) Error parameter-2: Not assigned	1.) Switch on the FS sections on the LDs one after the other, and finish with the FS section of the MD 2.) Please contact Pilz
2A	SBp configuration is different to the SBp configuration in the MD PSS Error parameter-1: Error code (optional) Error parameter-2: Not assigned	1.) Assign the same SBp configuration to every PSS on the bus, relink all FS programs and download 2.) Please contact Pilz
2B	PSS is defective or Device <*Error parameter-1*> is defective or there is a non-SafetyBUS p-compatible device on the bus Error parameter-1: Error parameter + 100 = Device address Error parameter-2: Not assigned	1.) Ensure that the bus contains only SafetyBUS p-compatible devices 2.) Evaluate error stack of Device <*Error parameter-1*> 3.) Change module 4.) Change module or compact PSS 5.) Please contact Pilz
2C-2F	I/O-Groups cannot be started Error parameter-1: Error parameter + 100 = Device address Error parameter-2: Not assigned	1.) Assign the same SBp configuration to every PSS on the bus, relink all FS programs and download 2.) Ensure that the bus contains only SafetyBUS p-compatible devices 3.) Evaluate error stack of Device <Error parameter-1> 4.) Change module 5.) Change module or compact PSS 6.) Please contact Pilz
30	SBp configuration is different to the SBp configuration in the PSS <*Error parameter-1 and -2*> Error parameter-1: Device address Error parameter-2: Not assigned	1.) Assign the same SBp configuration to every PSS on the bus, relink all FS programs and download 2.) Please contact Pilz
31	I/O-Groups cannot be started Error parameter-1: Error code (optional) Error parameter-2: Not assigned	1.) Switch on the FS sections on the LDs one after the other, and finish with the FS section of the MD 2.) Please contact Pilz
32	I/O-Groups cannot be started Error parameter-1: Error code (optional) Error parameter-2: Not assigned	1.) Assign the same SBp configuration to every PSS on the bus, relink all FS programs and download 2.) Change module or compact PSS 3.) Please contact Pilz
33-38	Internal error Error parameter-1: Error code (optional) Error parameter-2: Error code (optional)	1.) Please contact Pilz
39	I/O-Groups on Device <*Error parameter-1*> cannot be started Error parameter-1: Error parameter + 100 = Device address Error parameter-2: Not assigned	1.) Evaluate error stack of Device <Error parameter-1> 2.) Change module 3.) Please contact Pilz
3A	Cannot transfer data to Device <*Error parameter-1*> Error parameter-1: Error parameter + 100 = Device address Error parameter-2: Not assigned	1.) Evaluate error stack of Device <*Error parameter-1*> 2.) Ensure that Device <*Error parameter-1*> is not defective (e.g. evaluate "Device" LED) 3.) Ensure there are no breaks in the

F-3B	Error Description	Remedy
		wiring to Device <*Error parameter-1*> 4.) Please contact Pilz
3B	Several devices with device address <*Error parameter-1*> on the bus or Device <*Error parameter-1*> is defective Error parameter-1: Error parameter + 100 = Device address Error parameter-2: Not assigned	1.) Ensure that device address <Error parameter-1> is set on one device only 2.) Evaluate error stack of Device <Error parameter-1> 3.) Please contact Pilz
3C-43	Internal error Error parameter-1: Error code (optional) Error parameter-2: Error code (optional)	1.) Please contact Pilz
44	I/O-Groups cannot be started Error parameter-1: Error code (optional) Error parameter-2: Not assigned	1.) Switch on the FS sections on the LDs one after the other, and finish with the FS section of the MD 2.) Please contact Pilz
45	I/O-Groups cannot be started Error parameter-1: Error code (optional) Error parameter-2: Not assigned	1.) Assign the same SBp configuration to every PSS on the bus, relink all FS programs and download 2.) Change module or compact PSS 3.) Please contact Pilz
46	Internal error Error parameter-1: Error code (optional) Error parameter-2: Error code (optional)	1.) Please contact Pilz
47	I/O-Groups cannot be started Error parameter-1: Error code (optional) Error parameter-2: Not assigned	1.) Switch on the FS sections on the LDs one after the other, and finish with the FS section of the MD 2.) Please contact Pilz
48-4A	Internal error Error parameter-1: Error code (optional) Error parameter-2: Error code (optional)	1.) Please contact Pilz
4B	PSS is defective or Device <*Error parameter-1*> is defective Error parameter-1: Error parameter + 100 = Device address Error parameter-2: Not assigned	1.) Evaluate error stack of Device <Error parameter-1> 2.) Change module 3.) Change module or compact PSS 4.) Please contact Pilz
4C	PSS is defective or Device <*Error parameter-1*> is defective or there is a non-SafetyBUS p-compatible device on the bus Error parameter-1: Error parameter + 100 = Device address Error parameter-2: Not assigned	1.) Ensure that the bus contains only SafetyBUS p-compatible devices 2.) Evaluate error stack of Device <*Error parameter-1*> 3.) Change module 4.) Change module or compact PSS 5.) Please contact Pilz
4D	A timeout occurred Error parameter-1: Error code (optional) Error parameter-2: Not assigned	1.) Reduce bus load 2.) Please contact Pilz
4E-4F	Cannot assign device address <*Error parameter-1*> because there are several devices on the bus without a device address Error parameter-1: Error parameter + 100 = Device address Error parameter-2: Not assigned	1.) When assigning the device addresses, make sure that only one device is connected to the bus without a device address 2.) Please contact Pilz
50-58	Data transfer is disrupted Error parameter-1: Error parameter + 100 = Device address Error parameter-2: Not assigned	1.) Increase the domain timeout in the SBp configuration 2.) Ensure that the bus contains only SafetyBUS p-compatible devices 3.) Evaluate error stack of Device <*Error parameter-1*> 4.) Change module 5.) Change module or compact PSS 6.) Please contact Pilz
59-5D	PSS is defective or Device <*Error parameter-2*> is defective or there is a non-SafetyBUS p-compatible device on the bus Error parameter-1:	1.) Ensure that the bus contains only SafetyBUS p-compatible devices 2.) Evaluate error stack of Device <*Error*

F-3B	Error Description	Remedy
	Error code (optional) Error parameter-2: Error parameter + 100 = Device address	*parameter-2*> 3.) Change module 4.) Change module or compact PSS 5.) Please contact Pilz
5E	PSS is defective or Device <*Error parameter-2*> is defective Error parameter-1: Error code (optional) Error parameter-2: Error parameter + 100 = Device address	1.) Evaluate error stack of Device <Error parameter-2> 2.) Change module 3.) Change module or compact PSS 4.) Please contact Pilz
5F-60	PSS is defective or Device <*Error parameter-2*> is defective or there is a non-SafetyBUS p-compatible device on the bus Error parameter-1: Error code (optional) Error parameter-2: Error parameter + 100 = Device address	1.) Ensure that the bus contains only SafetyBUS p-compatible devices 2.) Evaluate error stack of Device <*Error parameter-2*> 3.) Change module 4.) Change module or compact PSS 5.) Please contact Pilz
61	Data transfer is disrupted Error parameter-1: Error code (optional) Error parameter-2: Error parameter + 100 = Device address	1.) Increase the domain timeout in the SBp configuration 2.) Ensure that the bus contains only SafetyBUS p-compatible devices 3.) Evaluate error stack of Device <Error *parameter-2*> 4.) Change module 5.) Change module or compact PSS 6.) Please contact Pilz
62	A timeout occurred Error parameter-1: Error code (optional) Error parameter-2: Not assigned	1.) Evaluate error stack of MD 2.) Reduce bus load 3.) Please contact Pilz
63	Several devices with device address <*Error parameter-2*> on the bus or Device <*Error parameter-2*> is defective Error parameter-1: Error code (optional) Error parameter-2: Error parameter + 100 = Device address	1.) Ensure that device address <*Error parameter-2*> is set on one device only 2.) Evaluate error stack of Device <*Error parameter-2*> 3.) Please contact Pilz
64	I/O-Group <*Error parameter-1*> was stopped via Device <*Error parameter-2*> Error parameter-1: Error parameter + 100 = I/O-Group Error parameter-2: Error parameter + 100 = Device address	1.) Evaluate error stack of Device <Error parameter-2> 2.) Please contact Pilz
65-69	Internal error on SafetyBus p Error parameter-1: Error code (optional) Error parameter-2: Error code (optional)	1.) Please contact Pilz

18.1.32 F-3C = Error on SafetyBUS p 1 configuration

F-3C	Error Description	Remedy
01	SBp configuration is faulty Error parameter-1: Not assigned Error parameter-2: Not assigned	1.) Check SBp configuration and correct if necessary 2.) Switch PSS off and then on again, clear PSS program memory and download program to the PSS again 3.) Change module or compact PSS 4.) Please contact Pilz
02	SBp configuration is faulty Error parameter-1: Not assigned Error parameter-2: Not assigned	1.) Check SBp configuration and correct if necessary 2.) Switch PSS off and then on again, clear PSS program memory and download program to the PSS again 3.) Change module or compact PSS 4.) Please contact Pilz

F-3C	Error Description	Remedy
03-05	Program is corrupt Error parameter-1: Error code (optional) Error parameter-2: Error code (optional)	1.) Switch PSS off and then on again, clear PSS program memory and download program to the PSS again 2.) Change module or compact PSS 3.) Please contact Pilz
07-20	SBp configuration is faulty Error parameter-1: Not assigned Error parameter-2: Not assigned	1.) Check SBp configuration and correct if necessary 2.) Switch PSS off and then on again, clear PSS program memory and download program to the PSS again 3.) Change module or compact PSS 4.) Please contact Pilz
21	Cross over connection in the SBp configuration Error parameter-1: Not assigned Error parameter-2: Not assigned	1.) Change the SBp configuration so that there are no more cross over connections 2.) Switch PSS off and then on again, clear PSS program memory and download program to the PSS again 3.) Change module or compact PSS 4.) Please contact Pilz
22-2F	SBp configuration is faulty Error parameter-1: Not assigned Error parameter-2: Not assigned	1.) Check SBp configuration and correct if necessary 2.) Switch PSS off and then on again, clear PSS program memory and download program to the PSS again 3.) Change module or compact PSS 4.) Please contact Pilz
30-35	Program is corrupt Error parameter-1: Error code (optional) Error parameter-2:	1.) Switch PSS off and then on again, clear PSS program memory and download program to the PSS again 2.) Change module or compact PSS
36-41	SBp configuration on the MD is faulty Error parameter-1: Not assigned Error parameter-2: Not assigned	1.) Check SBp configuration of MD and correct if necessary 2.) Switch PSS off and then on again, clear PSS program memory and download program to the PSS again 3.) Change module or compact PSS 4.) Please contact Pilz
42	Several Master LDs are configured for one I/O-Group Error parameter-1: Not assigned Error parameter-2: Not assigned	1.) Change the SBp configuration so that just one Master LD is assigned to each I/O-Group 2.) Switch PSS off and then on again, clear PSS program memory and download program to the PSS again 3.) Change module or compact PSS 4.) Please contact Pilz
43-44	SBp configuration on the MD is faulty Error parameter-1: Not assigned Error parameter-2: Not assigned	1.) Check SBp configuration of MD and correct if necessary 2.) Switch PSS off and then on again, clear PSS program memory and download program to the PSS again 3.) Change module or compact PSS 4.) Please contact Pilz
45	Configuration of decentralised alarms is faulty Error parameter-1: Not assigned Error parameter-2: Not assigned	1.) Check configuration of the decentralised alarms and correct if necessary 2.) Switch PSS off and then on again, clear PSS program memory and download program to the PSS again 3.) Change module or compact PSS 4.) Please contact Pilz

F-3C	Error Description	Remedy
46	SBp configuration is faulty Error parameter-1: Not assigned Error parameter-2: Not assigned	1.) Check SBp configuration and correct if necessary 2.) Switch PSS off and then on again, clear PSS program memory and download program to the PSS again 3.) Change module or compact PSS 4.) Please contact Pilz
47	Configuration of decentralised alarms is faulty Error parameter-1: Not assigned Error parameter-2: Not assigned	1.) Check configuration of the decentralised alarms and correct if necessary 2.) Switch PSS off and then on again, clear PSS program memory and download program to the PSS again 3.) Change module or compact PSS 4.) Please contact Pilz
48	Program is corrupt Error parameter-1: Error code (optional) Error parameter-2: Error code (optional)	1.) Switch PSS off and then on again, clear PSS program memory and download program to the PSS again 2.) Change module or compact PSS 3.) Please contact Pilz
49	SBp configuration is faulty Error parameter-1: Not assigned Error parameter-2: Not assigned	1.) Check SBp configuration and correct if necessary 2.) Switch PSS off and then on again, clear PSS program memory and download program to the PSS again 3.) Change module or compact PSS 4.) Please contact Pilz
4A	Program is corrupt Error parameter-1: Error code (optional) Error parameter-2: Error code (optional)	1.) Clear PSS program memory and download program to the PSS again 2.) Change module or compact PSS 3.) Please contact Pilz
4B	Device address of MD/LD (PSS) is outside the permitted range Error parameter-1: Not assigned Error parameter-2: Not assigned	1.) The device address configured for the MD/LD (PSS) must lie within the permitted range 2.) Switch PSS off and then on again, clear PSS program memory and download program to the PSS again 3.) Change module or compact PSS 4.) Please contact Pilz
4C	Event timeout is outside the permitted range Error parameter-1: Not assigned Error parameter-2: Not assigned	1.) The value configured for the event timeout must lie within the permitted range 2.) Switch PSS off and then on again, clear FS program memory on the PSS and download FS program to the PSS again 3.) Change module or compact PSS 4.) Please contact Pilz
4D	Byte timeout is outside the permitted range Error parameter-1: Not assigned Error parameter-2: Not assigned	1.) The value configured for the byte timeout must lie within the permitted range 2.) Switch PSS off and then on again, clear FS program memory on the PSS and download FS program to the PSS again 3.) Change module or compact PSS 4.) Please contact Pilz
4E	Domain timeout is outside the permitted range Error parameter-1: Not assigned Error parameter-2: Not assigned	1.) The value configured for the domain timeout must lie within the permitted range 2.) Switch PSS off and then on again, clear PSS program memory and download program to the PSS again

F-3C	Error Description	Remedy
		3.) Change module or compact PSS 4.) Please contact Pilz
4F	Cycle timeout is outside the permitted range Error parameter-1: Not assigned Error parameter-2: Not assigned	1.) The value configured for the cycle timeout must lie within the permitted range 2.) Switch PSS off and then on again, clear FS program memory on the PSS and download FS program to the PSS again 3.) Change module or compact PSS 4.) Please contact Pilz
50	Transmission rate is outside the permitted range Error parameter-1: Not assigned Error parameter-2: Not assigned	1.) The configured transmission time must lie within the permitted range 2.) Switch PSS off and then on again, clear PSS program memory and download program to the PSS again 3.) Change module or compact PSS 4.) Please contact Pilz
51	FS block run time is outside the permitted range Error parameter-1: Not assigned Error parameter-2: Not assigned	1.) The configured FS block run time must lie within the permitted range 2.) Switch PSS off and then on again, clear PSS program memory and download program to the PSS again 3.) Change module or compact PSS 4.) Please contact Pilz
52-5B	Program is corrupt Error parameter-1: Error code (optional) Error parameter-2: Error code (optional)	1.) Switch PSS off and then on again, clear PSS program memory and download program to the PSS again 2.) Change module or compact PSS 3.) Please contact Pilz
5C	Program is corrupt Error parameter-1: Error code (optional) Error parameter-2: Error code (optional)	1.) Clear PSS program memory and download program to the PSS again 2.) Use the lastest version of the system software (PG) 3.) Change module or compact PSS 4.) Please contact Pilz
5D	Device *<Error parameter-1>* does not support a transmission rate of 500 kBit/s (devices's SBp bus version: *<Error parameter-2>*) Error parameter-1: Error parameter + 100 = Device address Error parameter-2: SBp bus version	1.) Replace Device <Error parameter-1> with a device with an SBp bus version greater than or equal to 3, so that it can support the transmission rate of 500 kBit/s 2.) When a Router is used: Reduce the transmission rate to 250 kBit/s for the bus segment containing Device <Error parameter-1> 3.) Reduce the transmission rate to 250 kBit/s 4.) Please contact Pilz
5E-60	Internal error Error parameter-1: Error code (optional) Error parameter-2: Error code (optional)	1.) Please contact Pilz
61-62	Device *<Error parameter-2>* is not supported by the PSS Error parameter-1: Error code (optional) Error parameter-2: Error parameter + 100 = Device address	1.) Use a version of the PSS that supports Device <Error parameter-2> 2.) Please contact Pilz

18.1.33 F-3D = Error in the transfer of diagnostic data (SafetyBUS p 1)

F-3D	Error Description	Remedy
00	Device <*Error parameter-2*> does not support a transmission rate of 500 kBit/s (devices's SBp bus version: <*Error parameter-1*>) Error parameter-1: SBp bus version Error parameter-2: Error parameter + 100 = Device address	1.) Replace Device <*Error parameter-2*> with a device with an SBp bus version greater than or equal to 3, so that it can support the transmission rate of 500 kBit/s 2.) When a Router is used: Reduce the transmission rate to 250 kBit/s for the bus segment containing Device <*Error parameter-2*> 3.) Reduce the transmission rate to 250 kBit/s 4.) Please contact Pilz
01-06	Error in the transfer of diagnostic data Error parameter-1: Error code (optional) Error parameter-2: Error parameter + 100 = Device address	1.) Please contact Pilz ase contact Pilz (error code: <*Error parameter-1 and -2*>). Have the error stack of Device <*Error parameter-2*> to hand
07-18	Error in the transfer of diagnostic data Error parameter-1: Error parameter + 100 = Device address Error parameter-2: Not assigned	1.) Please contact Pilz ase contact Pilz (error code: <*Error parameter-1 and -2*>). Have the error stack of Device <*Error parameter-1*> to hand
19-25	Error in the transfer of diagnostic data Error parameter-1: Error code (optional) Error parameter-2: Error parameter + 100 = Device address	1.) Please contact Pilz ase contact Pilz (error code: <*Error parameter-1 and -2*>). Have the error stack of Device <*Error parameter-2*> to hand
26	SafetyBUS p interface has returned to a RUN condition Error parameter-1: Not assigned Error parameter-2: Not assigned	1.) For information only, no remedy required

18.1.34 F-3E = Error in the transfer of diagnostic data (SafetyBUS p 1)

F-3E	Error Description	Remedy
00	A "Warning" or "Status" type event has occurred Error parameter-1: DL: Device address DR: Error code (optional) Error parameter-2: Error code (optional)	1.) Evaluate error stack of Device <Error parameter-1> 2.) Please contact Pilz
01-03	A "Warning" or "Status" type event has occurred Error parameter-1: DL: Device address DR: Error code (optional) Error parameter-2: Error code (optional)	1.) Evaluate error stack of Device <Error parameter-1> 2.) Please contact Pilz
01	Internal error Error parameter-1: Error code (optional) Error parameter-2: Error code (optional)	1.) Please contact Pilz
06	Internal error Error parameter-1: Error code (optional) Error parameter-2: Error code (optional)	1.) Please contact Pilz
07	Internal error Error parameter-1: Error code (optional) Error parameter-2: Error code (optional)	1.) Please contact Pilz
08	Internal error Error parameter-1: Error code (optional) Error parameter-2: Error code (optional)	1.) Please contact Pilz
09	Internal error Error parameter-1: Error code (optional) Error parameter-2: Error code (optional)	1.) Please contact Pilz
0A-0D	Internal error Error parameter-1: Error code (optional) Error parameter-2: Error code (optional)	1.) Please contact Pilz
0E	Internal error Error parameter-1: Error code (optional) Error parameter-2: Error code (optional)	1.) Switch PSS off and then on again 2.) Change module or compact PSS 3.) Please contact Pilz

F-3E	Error Description	Remedy
0F-10	Internal error Error parameter-1: Error code (optional) Error parameter-2: Error code (optional)	1.) Please contact Pilz
11-18	Internal error Error parameter-1: Error code (optional)	1.) Please contact Pilz

18.1.35 F-70 = Operating System Errors of 68000 Processor

F-70	Error Description	Remedy
01	When determining the timer status, this was found not to be identical on all CPUs.	Change PSS CPU.
06	C165 processor registering an incorrect state in the change state field.	
07	186 processor registering an incorrect state in the change state field.	
08	“Clear Flash EPROM” command was unsuccessful, as the PSS in its current state does not understand the required utility.	
09	Mailbox busy during clearing of Flash	
0A	Adjacent CPU registering an error on “Clear Flash EPROM” while this function is inactive on the 68000 processor (normal state).	
0B	C165 processor registering an incorrect state in the change state field.	
0C	186 processor registering an incorrect state in the change state field.	
0D	Process alarm queue contains too many entries and cannot link any of them into the program.	
0E	Switch on the 68000 processor is not at stop, but an adjacent processor has registered a stop.	
0F	C165 processor registering an incorrect state in the change state field.	
10	186 processor registering an incorrect state in the change state field.	
11	An adjacent CPU has registered a fatal error.	
12	68000 processor has detected an illegal condition in the error program.	
13	An adjacent CPU has switched from operating mode “FS Stop” to “No FS”.	
14	An adjacent CPU has detected an illegal condition in the error program.	
15	Error program has reacted incorrectly.	
16	Not all CPUs have the same error, although they should have.	
17	186 processor is registering an invalid change in state.	
18	C165 processor is registering an invalid change in state.	
19	Incorrect CRC calculated via configuration tables.	
1A	C165 processor has issued a mailbox command to the 68000 processor, for which it does not have a process.	

F-70	Error Description	Remedy
1B	186 processor has issued a mailbox command to the 68000 processor, for which it does not have a process.	
1C	The monitoring on the mailbox timeout of DPR 16 was given the wrong utility.	Change PSS CPU.
1D	Indicator to DB 002 is no longer correct.	
21	An adjacent CPU is registering an error on “Load Program” while this is inactive on the 68000 processor (normal state).	
22	Incorrect utility used when detecting the system status.	
23	68000 processor has detected an adjacent CPU registering an error (illegal condition) in “FS RUN” mode. The error program is interrupted by a process alarm OB, which contains an application error.	
24	68000 processor has discovered that one of the adjacent CPUs is in “No FS” mode.	
25	68000 processor has detected an illegal condition in the error program.	
26	186 processor is registering an unknown process alarm ID when an error occurs.	
27	C165 processor is registering an unknown process alarm ID when an error occurs.	
28	Not all 3 CPUs have the same error, although they should have.	
29	CPUs want to process different error OBs.	
2A	The module activated by the start-up manager was called up too often, i.e. it was not ready or an adjacent CPU was not ready in time with the corresponding start-up section.	
2B	80186 processor is registering a minor error in a process; the 68000 processor does not recognize the error and therefore cannot deal with it.	
2C	C165 processor is registering a minor error in a process; the 68000 processor does not recognize the error and therefore cannot deal with it.	
2D	In the error program, the 68000 processor has detected an adjacent CPU synchronizing in the stop command. This must not occur, because all errors in the application program must be detected on all CPUs and all CPUs must carry out the stop command in the same cycle.	
2E	Error while generating the configuration tables during the PSS start-up.	Change PSS CPU.
2F	68000 processor has discovered that one of the adjacent CPUs is in “Fatal Error” mode.	
30	Sub-program Fs_run_error had a serious reaction to an untraceable error.	
31	The current state is to be maintained after an error has been rectified. No CPU contains an error, which must not occur on all 3 CPUs in the same cycle.	

F-70	Error Description	Remedy
32	An error OB is to be processed for an error, which all CPUs must register simultaneously, but one CPU is not registering an error.	
33	CRC calculated via configuration tables is incorrect.	
40	Change of state has occurred which indicates an error in the system. The process alarm queue can only be processed in the application program or activated from the interrupt service check.	
41	Change of state has occurred which indicates an error in the system. The process alarm queue can only be processed in the application program or activated from the interrupt service check.	
42	Change of state has occurred which indicates an error in the system. The process alarm queue can only be processed in the application program or activated from the interrupt service check. The three CPUs are not in the same position when processing alarms.	Check the process alarm configuration in DB 002 (configuration).*** Change the PSS.
43	The three CPUs are trying to process different process alarm OBs. The process alarm queues are not identical.	
44	Attempt to process the alarm queue, but it contains no entries.	
46	Table with the OB start addresses has changed during the cycle.	Change the PSS CPU.
47	68000 processor has discovered in “RUN” mode that one of the adjacent CPUs has a minor error. This error will cause the unit to switch to STOP via the error program.	
48	186 processor is registering an invalid change state field in the “L PB” command.	
49	C165 processor is registering an invalid change state field in the “L PB” command.	
4A	186 processor is registering an invalid change state field in the “L PW” command.	
4B	C165 processor is registering an invalid change state field in the “L PW” command.	
4C	Illegal condition: command sub-program “L PB”.	
4F	Illegal condition: command sub-program “L PW”.	
52	Command sub-program “L PB” can only be called up in “RUN” mode.	
53	Command sub-program “L PW” can only be called up in “RUN” mode.	
54	186 processor is registering an invalid change state field in the “T PB” command.	
55	C165 processor is registering an invalid change state field in the “T PB” command.	
56	186 processor is registering an invalid change state field in the “T PW” command.	
57	C165 processor is registering an invalid change state field in the “T PW” command.	
58	Illegal condition: command sub-program “T PB”.	
5B	Illegal condition: command sub-program “T PW”.	

F-70	Error Description	Remedy
5E	Command sub-program “T PB” can only be called up in “RUN” mode.	
5F	Command sub-program “T PW” can only be called up in “RUN” mode.	
62	In the current condition, the module calling up the block does not understand the requested utility.	
63	An adjacent CPU has registered an error in the module calling up the block.	
64	Unable to freeze the inputs on a PSS DIF. The inputs may be changing state too quickly.	Check the signals on the PSS DIF*. Change PSS CPU.
65	Different INT masks in DPR after error handling	Fault in Op-Sys Change PSS CPU
66	Neighbour status for store timer not in time	
67	Store timer not active, even that a neighbour indicates a done timer	
68	Valid and reset field are different before exchange of timer status	
69	Verifying stored remnant data indicates difference to neighbour	
6A	Deactivated inputs are different	
6B	Invalid tolerance type detected	
6C	Valid and reset field are different before exchange of timer status	
6D	Too large tolerance of store timer (FS RUN)	
6E	Neighbour status for store timer not in time	
6F	Signal group not allocated to I/O points deactivated	
70	Problem to allocate deactivated XW input segments	
71	Problem to allocate deactivated XW output segments	
72	Overflow of parameter stack	
73	Already defective marked I/O points again detected as faulty	
74	Full parameter stack detected	
75	Difference between CPUs in read DIF values	
76	Fault on slot w/o module detected	
77	Fault on module detected, but all Bits are OK	
78	general module fault detected, but not all individual bits marked as defect	
79	DIF INT field in DPR different in CPUs shortly after data exchange	
7A	Error constant for SF set, but not in FK F06, 08, 09, D0.	
7B	CRC calculation via SB001: 186 has different CRC	
7C	CRC calculation via SB001: 165 has different CRC	
7D	On L PW reading different overwritten input values in CPUs	
7E	On L PB reading different overwritten input values in CPUs	
7F	Process reactivation called with wrong service	

*** If DB 002 is changed, the program will need to be re-linked and downloaded to the PSS.

18.1.36 F-71 = Synchronization Errors

F-71	Error Description	Remedy
01	Unable to synchronize with an adjacent CPU in “FS-Stop” mode.	Change PSS CPU.
02	Unable to synchronize with an adjacent CPU in “FS-RUN” mode.	

18.1.37 F-72 = Errors in the Adjacent CPU

F-72	Error Description	Remedy
01	While “Clearing the Flash-EPROM” one of the adjacent CPUs has failed to respond within the preset time.	Change PSS CPU.
02	One of the three adjacent CPUs has failed to register its CRC.	
03	C165 processor has not acknowledged the process image of inputs (PII) in dual port RAM 61.	
04	186 processor has not acknowledged the process image of inputs (PII) in dual port RAM 68.	
05	Acknowledgement of mailbox instructions from the C165 processor has fallen out of step.	
06	Acknowledgement of mailbox instructions from the 186 processor has fallen out of step.	
07	Mailbox timeout monitor on DPR 16 has detected that the time has been exceeded.	
08	Mailbox timeout monitor on DPR 86 has detected that the time has been exceeded.	
09	PIO field in DPR 68 is occupied.	
0A	PIO field in DPR 61 is occupied.	
0B	186 processor is not triggering the mailbox in time when loading the program.	
0C	When loading the program, one of the adjacent CPUs is not responding within the preset time.	
0D	When determining the system status, one of the adjacent CPUs is failing to respond within the preset time.	
0E	Adjacent CPU not triggering the mailbox in time.	
0F	Timeout has elapsed on an adjacent CPU.	
10	One of the adjacent CPUs has not carried out all the tests.	
11	Not all CPUs are able to carry out the PSS DIF test simultaneously	
12	C165 processor is registering an invalid change of state during synchronization.	
13	186 processor is registering an invalid change of state during synchronization.	
14	When the PIIs are being compared, the PII from the C165 processor is not registering in time.	
15	When the PIIs are being compared, the PII from the 186 processor is not registering in time.	
16	The enable on the PSS AI on start-up is not being registered in time on one of the adjacent CPUs.	

F-72	Error Description	Remedy
17	C165 processor has not released the PI field in the DPR.	
18	186 processor has not released the PI field in the DPR.	
19	C165 processor has not released the PI field in the DPR during the XW-update of the PSS AI in the application program.	
1A	186 processor has not released the PI field in the DPR during the XW-update of the PSS AI in the application program.	
1B	186 processor not triggering the mailbox in time when processing the module for calling up the block.	
1C	One of the adjacent CPUs is not responding within the preset time when processing the module for calling up the block.	
1D	C165 processor has not released the PI field in the DPR when outputting the XW to a PSS AI in the application program.	
1E	186 processor has not released the PI field in the DPR when outputting the XW to a PSS AI in the application program.	
1F	186 processor signals that it is synchronizing within the STOP command, although this cannot be true.	
20	C165 processor signals that it is synchronizing within the STOP command, although this cannot be true.	
21	The PI field is not free for the command sub-program “L PB”.	
22	The PI field is not free for the command sub-program “L PW”.	
23	The PI field is not free for the command sub-program “T PB”.	
24	The PI field is not free for the command sub-program “T PW”.	
25	Error clearing the Flash EPROM on the C165-processor.	Clear the program again. Change PSS CPU.
26	Error clearing the Flash EPROM on the 186-processor.	
27	186 processor fails to register itself during the initial synchronization (purpose of error is only for the error stack entry and not to call up the error program).	Change PSS CPU.
28	C165 processor fails to register itself during the initial synchronization (purpose of error is only for the error stack entry and not to call up the error program).	
29	Adjacent CPU synchronizes during process alarm routine and no process interrupt is present on the 68000 processor.	
2A	186 and 165 did not response after CRC calculation of remnant SF data (message only)	

F-72	Error Description	Remedy
2B	Channel C did not response in time after CRC calculation of remnant SF data (message only)	
2C	Channel B did not response in time after CRC calculation of remnant SF data (message only)	
2D	One of the neighbours is indicating enable of XW during reactivation not in time	
2E	DPR field to 186 not free	
2F	DPR field to 165 not free	
30	One neighbour indicates invalid DPR	
31	During reactivation too long waiting of 186 for end of DOx pulse test	
32	During reactivation too long waiting of 165 for end of DOx pulse test	
33	186 can not connect to SafetyBus during connection start P= Fatal error number in 186 Bus interface	
34	165 can not connect to SafetyBus during connection start P= Fatal error number in 165 Bus interface	
35	68k can not connect to SafetyBus during connection start P= Fatal error number in 68k Bus interface	
36	Channels do not agree that SafetyBus is present	

18.1.38 F-73 = Error in the Process Image of Inputs (PII)

F-73	Error Description	Remedy
04	Process image of inputs is not identical on the three CPUs.	Increase the max. response time for inputs in DB 002 (configuration).*** Change the module**. Change PSS CPU.
05	The PSS DIF inputs are not identical.	Reduce the interrupt load on the PSS start-up. Change PSS DIF*. Change PSS CPU.
06	During the command sub-program “L PB”, the three CPUs were unable to determine the same PB value.	Increase the max. response time for inputs in DB 002 (configuration).*** Change the module**. Change PSS CPU.
07	During the command sub-program “L PW”, the three CPUs were unable to determine the same PB value.	

** Defective inputs on modules PSS DI, PSS DI 2, PSS DIO T, PSS DIO Z, PSS 3056 and PSS 3032.
*** If DB 002 is changed, the program will need to be re-linked and downloaded to the PSS.

18.1.39 F-74 = Errors in the Block Table

F-74	Error Description	Remedy
02	Block table in the FS Flash EPROM contains a failsafe OB that is invalid.	Clear Flash EPROM. Download the current FS application program.
03	OB 101 is not loaded.	Download the current FS application program.
04	Block table contains a failsafe data block that is invalid.	Clear Flash EPROM. Download the current FS application program. Change PSS CPU.
05	Memory range for “read-write” data blocks is full.	Reduce the number and length of the “read-write” data blocks.***
06	DB 002 is not loaded.	Re-link the FS application program. Clear Flash EPROM. Download the current FS application program.
07	Invalid setting found in DB 002.	Check DB 002 (configuration).***
08	In DB 002, an invalid slot has been entered for the test pulse output module.*	Check the slot for the PSS DIO T* in DB 002 (configuration).***
09	The slot entered in DB 002 as the slot for the test pulse output module contains no pulsed outputs.	Check the PSS configuration. Check the slot for the PSS DIO T* in DB 002 (configuration).***
0A	When building up the configuration table it was established that no failsafe application program had been loaded.	Re-link the FS application program. 2. Clear Flash EPROM. Download FS application program.
0B	Max. number of test pulses exceeded.*	Re-enter the number of test pulses in DB 002 (configuration).***
0C	Two neighbouring inputs are being tested with the same test pulse.*	Re-enter the test pulse allocation in DB 002 (configuration).***
0D	Highest test pulse number used is greater than 15.*	Re-enter the number of test pulses in DB 002 (configuration).***
0E	Configuration of the process alarm OB is not consecutive.*	Re-enter the process alarm OB in DB 002 (configuration).***
0F	A process alarm OB has been loaded which has not been configured.	Check the FS application program.*** Re-enter the process alarm OB in DB 002 (configuration).***
10	An invalid slot has been configured for the PSS DIF.	Check the PSS configuration. Check the slot for the PSS DIF* in DB 002 (configuration).***
11	The slot entered in DB 002 as the slot for the process alarm module “PSS DIF” does not contain a PSS DIF.	
12	An invalid pulse edge configuration has been entered in DB 002 in a process alarm OB, relating to a special DIF (process alarm OB must be activated with a rising and falling pulse edge).*	Check the process alarm OB in DB 002 (configuration).***
13	An invalid pulse edge definition has been entered in DB 002 for process alarm modules (PSS DIF).*	
14	A process alarm OB has been configured which has not been loaded.*	Check the process alarm OB in DB 002 (configuration).*** Check the FS application program.***
15	Too many process alarm OBs have been configured on one slot.*	Check the process alarm OB in DB 002 (configuration).***

F-74	Error Description	Remedy
16	Inputs and slot on the PSS DIF have not been configured to be in continuous, ascending order.*	
17	Invalid configuration data has been entered for a pulse edge, although this has already been tested for the individual modules.*	
18	Minimum scan time is greater than the maximum permitted scan time.*	Re-enter the minimum scan time in DB 002 (configuration).***
19	An invalid slot has been entered for the XW read segments on the PSS AI.	Check the XW input and output segments in DB 002 (configuration).***
1A	Slots for the XW read-in segments on the PSS AI have not been allocated in ascending order.*	
1B	XW read-in segments have been defined on a slot that has no word module (e.g. PSS AI).*	
1C	Start address for XW read-in segment on the PSS AI is too high.*	
1D	XW read-in segments on the PSS AI overlap.*	Check the XW input and output segments in DB 002 (configuration).***
1E	An XW read-in segment on the PSS AI has an invalid segment length.*	
1F	XW read-in segment on the PSS AI would extend beyond the module.*	
20	An XW read-in segment on the PSS AI has an unknown match algorithm.*	
21	XW read-in segment on the PSS AI: double word segment is not located at a double word address.*	
22	Word modules (PSS AI) are not entered in ascending order.*	
23	Match point of the XW read-in segment on the PSS AI is incorrect or has not been defined.*	
24	A word module (PSS AI) has an invalid slot.	Check the PSS configuration. Check the XW input and output segments in DB 002 (configuration).***
25	Slots for the XW read-out segments on the PSS AI are not allocated in ascending order.*	Check the XW input and output segments in DB 002 (configuration).***
26	XW read-out segments have been defined on a slot that has no word module (e.g. PSS AI).*	
27	The start address for XW read-out segments on the PSS AI is too high.*	Check the XW input and output segments in DB 002 (configuration).***
28	XW read-out segments on the PSS AI overlap.*	
29	An XW read-out segment on the PSS AI has an invalid segment length.*	
30	XW read-out segment on the PSS AI would extend beyond the module.*	Check the XW input and output segments in DB 002 (configuration).***
31	XW read-out segment on the PSS AI: double word segment is not located at a double word address.*	
32	Word modules (PSS AI) are not entered in ascending order.*	
33	An XW read-out segment on the PSS AI has an unknown output time.*	
34	PSS DIF and PSS DI/DI 2 inputs are tested with the same pulse.*	Re-enter the test pulse allocation in DB 002 (configuration).***
35	More than 2 DIF in Hardware Registry	Check FS configuration (Hardware)
36	Pulse DOT set, but number of test pulses = FF	Check FS configuration (Test pulses)

F-74	Error Description	Remedy
37	Not support Op sys type	Check FS configuration (Op sys type)
38	Config-DB for selective shut down not loaded	Check configuration, relink, reload Fault in Op Sys or PG
39	Not valid code for config-DB of SF	
3A	Not valid type of config-DB in SF	
3B	Tolerance type in Signal group 0 is not 0	
3C	Output is not a pulse output, but allocated to signal group FF	
3D	I/O point allocated to invalid signal group	
3E	A input of a different signal group is allocate to a test pulse	
3F	A signal group w/o allocated I/O point is set to tolerance type other than FF	
40	Wrong index in OB table	
41	A deactivation OB for a signal group w/o an allocated I/O point is loaded	
42	A deactivation OB for a signal group w/ allocated I/O points is not loaded	
43	Addresses of an output pair are the same	
44	The signal groups of an output pair are different	
45	Output pair at a DOS are in the same block of 8	
46	Output pair at a DOR are not adjacent 8	
47	A pair does not consists of two outputs	
48	A FS module not supported by the Op-Sys was found	
49	T+ and T- of a DOZ are in a different signal group	
4A	DO or DOT output is allocated to signal group <12	
4B	Group config-DB is not marked as Read-only	
4C	Config-DB for Safety-Bus missing	
4D	Config-DB for Safety-Bus is not marked as Read-only	
4E	Config-DB for Safety-Bus is has wrong type code	
4F	Config-DB for Safety-Bus is has wrong type	
50	Main Config-DB for Safety-Bus is too short	
51	Too many Config-DBs for Safety-Bus	
52	Faulty client table DB	
53	Too many client table DBs	
54	Wrong length code in client table DB	
55	Faulty connection table DB	
56	Too many connection table DBs	
57	Wrong length code in connection table DB	
58	Error message DB not present	
59	DB with device object not present	
5A	DB with device object is too short	
5B	DB is too short	
5C	Not valid slot number	
5D	Not valid Event Item	
5E	Different groups in one Event Item	
5F	DB does not exist	
60	Error message DB is read-only	
61	Bit 6 or 7 in DB2/DR544 (Test pulse alloc.) is not 0	
62	Bit 6 or 7 in DB2/DL544 (Test pulse alloc.) is not 0	
63	Two adjacent inputs are set to Test pulse 0 in DB2/DW544	

F-74	Error Description	Remedy
64	Two adjacent inputs are set to Test pulse 1 in DB2/DW544	

* These invalid entries in DB 002 (system data block for PSS configuration data) will not be possible if the user works with the configuration in the PG.
*** If any changes are made to the application program or to DB 002, the program will need to be re-linked and downloaded to the PSS.

18.1.40 F-75 = Error in the PG

F-75	Error Description	Remedy
01	The PG is sending an invalid command to clear the Flash-EPROM.	Restart PG. Repeat the process.
02	The PG is sending an invalid command to load the application program.	Restart PG. Reload the application program.
03	The PG is sending an invalid command to the module to transfer a block.	Restart PG.
04	The PG is trying to transfer a block that has not been loaded.	

18.1.41 F-76 = Compiler Errors

(Messages also for S-76)
L= Program block (High byte = Block Type (OB,PB,FB,SB), Low byte = Block number)
P= Line Number

F-76 S-76	Error Description	Remedy
01	Undefined Source code	Re-send data block or block to the PSS Change PSS CPU
02	Undefined Parameter	
03	Invalid input address	
04	Invalid output address	
05	Invalid marker address	
06	Invalid input byte address	
07	Invalid output byte address	
08	Invalid marker byte address	
09	Invalid input word address	
0A	Invalid output word address	
0B	Invalid periphery word address	
0C	Invalid XW address	
0D	Invalid marker word address	
0E	Invalid indirect address marker	
0F	Marker (Bit/Byte/Word) is read only	
11	Invalid segment number	
12	Invalid DB	
13	Undefined parameter	
14	Too many parameter in CAL block	
15	Internal compiler error calculating jump address	
16	Segment does not exist	
17	Invalid time base	
18	Invalid timer number	
19	Invalid counter number	
1A	BE missing	

F-76 S-76	Error Description	Remedy
1B	Invalid system routine call	
1C	Overflow in link table	
1D	Overflow in 68K execute code buffer	
1E	Overflow in Jump table	
1F	Max. nesting level attained	
20	Closing parenthesis w/o open parenthesis	
21	Instruction in parenthesis not allowed	
22	Call of not existing Block	
23	Parameter code is nor Bit, Byte nor Word	
24	Invalid periphery byte address	
7F	Invalid instruction	

18.1.42 F-77 = Program Load Errors

F-77	Error Description	Remedy
01	Too many blocks have been loaded.	Optimize application program.***
02	PG communication error: invalid CRC in block.	Reload the application program into the PSS. Change the PSS CPU.
03	PG communication error: data on block length in the block header is incorrect.	
04	No block allocation table found in the Flash EPROM.	
05	PG communication error: error occurred while calculating the CRC via the buffered code	
06	PG communication error: error occurred while calculating the CRC via the buffered code of the whole program.	Reload the application program into the PSS.
07	An adjacent CPU has registered an error while loading the application program.	Change the PSS CPU.
08	Flash EPROM for the application program is full. Probably blocks have been reloaded too often, without clearing it in between.	Clear Flash EPROM. Reload the application program into the PSS. Change the PSS CPU.
09	PG communication error: ID in block header is incorrect.	Reload the application program into the PSS. 2. Change the PSS CPU.
0A	PG communication error: block has been transferred twice.	
0B	PG communication error: block transfer bit has been set, but the CRC for the block transfer is not at ‘0’.	
0C	PG communication error: CRC via the transferred block is incorrect.	
0D	DB 002 does not have “read-only” status. Note: DB 002 was not created using the PG configuration.	Recreate DB 002 (configuration). Link FS application program. Load the application program into the PSS. Change the PSS CPU.

*** If DB 002 is changed, the program will need to be re-linked and downloaded to the PSS.

18.1.43 F-78 = Program Linking Errors

F-78	Error Description	Remedy
01	Block allocation table in the Flash EPROM was not found while the program was being linked.	Reload the application program into the PSS. Change the PSS CPU.
02	Flash EPROM error: Link table is invalid.	
03	Block is missing during linking.	

18.1.44 F-79 = Error in the Process Image of Outputs (PIO)

F-79	Error Description	Remedy
01	Error in PIO comparison with 186 processor.	Change PSS CPU.
02	Error in PIO comparison with C165 processor.	
03	Error in XW-PIO comparison with C165 processor.	
04	Error in XW-PIO comparison with 186 processor.	
05	XW compare error with the output in the application program: 186 processor is registering a different value.	Correct the enable parameter in DB 003.*** Change PSS CPU.
06	XW compare error with the output in the application program: C165 processor is registering a different value.	
09	At least one of the adjacent CPUs has an incorrect periphery byte.	Change PSS CPU.
0A	At least one of the adjacent CPUs has an incorrect periphery word.	

*** If DB 003 is changed, the program will need to be re-linked and downloaded to the PSS.

18.1.45 F-7A = Selective Shut Down (SF) System Errors

F-7A	Error Description	Remedy
00	More than 5 scans test time difference to neighbour	System fault, Change CPU Note fault if persists Contact Pilz service office
01	Deactivation data in DB1 different in CPUs	
02	Busy communication field in one CPU	
03	All 3 CPU did not find existing fault	
04	Single XW module fault indicated, that does not belong to F-09 class	
05	Deactivating bit was indicated on not allowed odd part slot number	
06	Deactivation loop indicated undefined tolerance type	
07	Single fault indicated on already shut down module	
08	32 bit user program timer Channel B out of tolerance	
09	32 bit user program timer Channel C out of tolerance	
0A	SB255(FUNK=118 to 147) Fault occurred during domain processing	
0B	Not valid domain order parameter found	

18.1.46 F-80 = Fatal Errors

F-80	Error Description	Remedy
01	C165 processor is registering a fatal error. The constant will only be used for error stack entries and will not provoke any reaction.	Change PSS CPU.
02	80166 processor is registering a fatal error. The constant will only be used for error stack entries and will not provoke any reaction.	
03	68000 processor has discovered that the 186-processor is in “Fatal Error” mode. Error used solely as an error stack entry, as the adjacent CPU is not supplying a correct error constant.	
04	68000 processor has discovered that the C165-processor is in “Fatal Error” mode. Error used solely as an error stack entry, as the adjacent CPU is not supplying a correct error constant.	

18.1.47 F-81 = Block Call Up Errors

L= actual Block Number, P= See in table if used

F-81	Error Description	Remedy
01	Changing the number of test slices: user wants to set more than 99 test slices.	Correct the enable parameter in DB 003.***
02	Changing the match algorithm: invalid slot has been stated.	
03	Changing the match algorithm: the slot stated does not have a word module.	
04	Changing the match algorithm: entry for segment number is invalid.	
05	Changing the match algorithm: entry for match algorithm number is invalid.	
06	Changing the match algorithm: the match segment that has been stated does not exist.	Check DB 002 (configuration).***
07	SB 255 was called up with an invalid function number.	Check the program block that calls up SB 255.***
08	SB 255 was called up with an invalid segment number (enable range DB 003).	Correct the enable parameter in DB 003.***
09	SB 255 was called up with a match segment that does not exist.	Check DB 002 (configuration).*** Correct the enable parameter in DB 003.***
0A	SB 255 was called up with an invalid slot entry.	Correct the enable parameter in DB 003.***
0B	SB 255 was called up with a slot that does not have an XW module (PSS AI).	
0C	SB 255 was called up with an invalid segment number for the XW output.	
0D	SB 255 was called up with an output segment that does not exist.	Check DB 002 (configuration).*** Correct the enable parameter in DB 003.***
0E	During the XW output, SB 255 was called up with an invalid slot.	Correct the enable parameter in DB 003.***

F-81	Error Description	Remedy
0F	There is no XW module on the stated slot.	Check DB 002 (configuration).**
10	One of the DBs stated does not exist.	Check FS application program.***
11	Attempting to address a data word that is located outside the DB.	
12	Attempting to write to a data block that has "read-only" status.	
13	An invalid flag byte address has been entered.	Check FS application program.***
14	Attempting to address a flag byte address that is greater than the address MB 114.24.	
18	Not valid start address for CRC calculation	
19	Not valid end address for CRC calculation	
1A	Maximum number of parallel CRC calculations exceeded	
1D	SB255(FUNK=100) called without defined selective shut down	
1E	Transferred Signal group number not existing or not defined in call SB255(FUNK=100)	
1F	Transferred Signal group number not deactivated when calling SB 255(FUNK=100).	
20	Transferred running time to large value. Not possible, was already tested before.	
21	SB255(FUNK=101) called without defined selective shut down	
22	Transferred Signal group number not existing or not defined in call SB255(FUNK=101)	
23	SB255(FUNK=102) called without defined selective shut down	
24	Transferred Signal group number not existing or not defined in call SB255(FUNK=102)	
25	Transferred Signal group number not deactivated when calling SB 255(FUNK=102).	
27	SB255(FUNK=103) called without defined selective shut down	
28	Indicated Slot not used when calling SB255 (FUNK=103)	
29	Deactivation not possible. Tolerance type in SB 255(FUNK=104) too week	
2A	Deactivation not possible. Tolerance type in SB 255(FUNK=104) too week	
2B	SB 255(FUNK=104) No XW module at this slot	
2C	SB 255(FUNK=104) undefined XW I/O segment transferred	
2D	SB255(FUNK=105) called without defined selective shut down	
2E	SB255(FUNK=105) call from alarm OB not allowed	
2F	SB255(FUNK=106) called without defined selective shut down	
31	SB255(FUNK=106) call from alarm OB not allowed	
32	SB255(FUNK=106) call from OB 120 not allowed	
33	SB255(FUNK=106) already active or waiting for ACK	
34	SB255(FUNK=106) one or more signal groups not defined	

F-81	Error Description	Remedy
35	SB255(FUNK=106) one or more in DB3 defined signal groups not deactivated	
36	SB255(FUNK=106) signal group does not allow reactivation	
37	SB255(FUNK=106) signal group does not allow reactivation	
39	SB255(FUNK=107) called without defined selective shut down	
3A	SB255(FUNK=107) call from alarm OB not allowed	
3B	SB255(FUNK=107) no active deactivation	
3C	SB255(FUNK=107) Reactivation active but not in status for error reset	
3E	SB255(FUNK=108) called without defined selective shut down	
3F	SB255(FUNK=108) call from alarm OB not allowed	
40	SB255(FUNK=108) no active deactivation	
41	SB255(FUNK=108) fault during reactivation	
42	SB255(FUNK=108) reactivation not finished	
44	SB255(FUNK=109) called without defined selective shut down	
45	SB255(FUNK=108) invalid signal group number	
46	SB255(FUNK=108) invalid tolerance type transferred	
47	Reactivation could not be processed	
49	In DB3/DW 202 set Config DB too short (<7 words)	
4A	In DB3/DW 204 set Send DB too short (<3 words)	
4B	In DB3/DW 203 set Receive DB too short (<3 words)	
4C	Periphery fault call SB255(FUNK=103) not possible for XW module	
4D	Invalid parameter (outside 0 to 5) at call SB255(FUNK=104)	
4E	Selective shut down self test was prohibited more than 3 times	
4F	SB255 (FUNK=111) - Group Stop; group number Invalid	
50	SB255 (FUNK=111) - Group Stop; start during active task	
51	SB255 (FUNK=112) - Group Stop; Error reset w/o error	
52	SB255 (FUNK=115) - Group Start; group number invalid	
53	SB255 (FUNK=115) - Group Start; start during active task	
54	SB255 (FUNK=116) - Group Start; Error reset w/o error	
55	SB255 (FUNK=118) – Status Send Domain; User parameter invalid P= DW Number in DB3 (0= Faulty Domain Number, 1= Faulty Device Number)	
56	SB255 (FUNK=119) – Start Send Domain; User parameter invalid P= DW Number in DB3 (0= Faulty Domain Number, 1= Faulty Device Number, 2= Faulty destination DB Number, 3=	

F-81	Error Description	Remedy
	Faulty Start DW in Source DB, 4= Faulty Number of expected DW in Source DB)	
57	SB255 (FUNK=119) – Start Send Domain; Source DB not loaded P= DB Number	
58	SB255 (FUNK=119) – Start Send Domain; DB not enough data	
59	SB255 (FUNK=119) – Start Send Domain; No read access to device for item 0 P= Device Number	
5A	SB255 (FUNK=122) – Status Request Domain; User parameter invalid P= DW Number in DB3 (0= Faulty Domain Number, 1= Faulty Device Number)	
5B	SB255 (FUNK=123) – Start Request Domain; User parameter invalid P= DW Number in DB3 (0= Faulty Domain Number, 1= Faulty Device Number, 2= Faulty destination DB Number, 3= Faulty Start DW, 4= Faulty Number of expected DW)	
5C	SB255 (FUNK=123) – Start Request Domain; Destination DB not loaded P= Destination DB Number	
5D	SB255 (FUNK=123) – Start Request Domain; Destination DB too short	
5E	SB255 (FUNK=123) – Start Request Domain; Destination DB read-only P= Destination DB Number	
5F	SB255 (FUNK=123) – Start Request Domain; No read access to device for item 0 P= Destination Device Number	
60	SB255 (FUNK=124) – Reset Request Domain; User parameter invalid P= DW Number in DB3 (0= Faulty Domain Number, 1= Faulty Device Number)	
61	SB255 (FUNK=127) – Start Accept Domain; User parameter invalid P= DW Number in DB3 (0= Faulty Domain Number, 1= Faulty Device Number, 2= Faulty destination DB Number, 3= Faulty Start DW, 4= Faulty Number of expected DW)	
62	SB255 (FUNK=127) – Start Accept Domain; Function not called from OB 131 P= Domain Number	
63	SB255 (FUNK=127) – Start Accept Domain; Domain or Device number uneven to parameter in OB 131 P= Domain Number	
64	SB255 (FUNK=127) – Start Accept Domain; Destination DB not loaded P= Destination DB	
65	SB255 (FUNK=127) – Start Accept Domain; Destination DB too short	
66	SB255 (FUNK=127) – Start Accept Domain; Destination DB is read-only P= Destination DB	
67	SB255 (FUNK=127) – Start Accept Domain; No IOD server configured	

F-81	Error Description	Remedy
68	SB255 (FUNK=131) – Deny Domain; User parameter invalid P= DW Number in DB3 (0= Faulty Domain Number, 1= Faulty Device Number)	
69	SB255 (FUNK=131) – Deny Domain; No unexpected Domain received or call not from OB 131	
6A	SB255 (FUNK=131) – Deny Domain; Domain or Device number uneven to parameter in OB 131 P= Domain Number	
6B	SB255 (FUNK=135) – Accept Domain later; User parameter invalid P= DW Number in DB3 (0= Faulty Domain Number, 1= Faulty Device Number)	
6C	SB255 (FUNK=135) – Accept Domain later; No unexpected Domain received or call not from OB 131	
6D	SB255 (FUNK=135) – Accept Domain later; Domain or Device number uneven to parameter in OB 131 P= Domain Number	
6E	SB255 (FUNK=139) – Accept Domain Request; User parameter invalid P= DW Number in DB3 (0= Faulty Domain Number, 1= Faulty Device Number, 2= Faulty Source DB Number, 3= Faulty Start DW, 4= Faulty Number of DW)	
6F	SB255 (FUNK=139) – Accept Domain Request; No Domain Request received or call not from OB 132	
70	SB255 (FUNK=139) – Accept Domain Request; Domain or Device number uneven to parameter in OB 132 P= Domain Number	
71	SB255 (FUNK=139) – Accept Domain Request; Destination DB not loaded P= Source DB	
72	SB255 (FUNK=139) – Accept Domain Request; Destination DB too short	
73	SB255 (FUNK=139) – Accept Domain Request; IOD part not configured	
74	SB255 (FUNK=143) – Deny Domain Request; User parameter invalid P= DW Number in DB3 (0= Faulty Domain Number, 1= Faulty Device Number)	
75	SB255 (FUNK=143) – Deny Domain Request; No Domain Request received or call not from OB 132	
76	SB255 (FUNK=143) – Deny Domain Request; Domain or Device number uneven to parameter in OB 132 P= Domain Number	
77	SB255 (FUNK=147) – Accept Domain Request later; User parameter invalid P= DW Number in DB3 (0= Faulty Domain Number, 1= Faulty Device Number)	
78	SB255 (FUNK=147) – Accept Domain Request later; No Domain Request received or call not from OB 132	
79	SB255 (FUNK=147) – Accept Domain Request later; Domain or Device number uneven to parameter in OB 132 P= Domain Number	

*** If the application program is changed, the program will need to be re-linked and downloaded to the PSS.

18.1.48 F-82 = Test Pulse Errors (≅ F-A2 and F-C2)

F-82	Error Description	Remedy
01	Test pulse stuck at ‘0’.	Check the wiring of the test pulse for a short circuit to 0 V. Change PSS DIO T*.
02	Test pulse stuck at ‘1’.	Check the wiring of the test pulse for a short circuit to +24 V. Change PSS DIO T*.
03	A test pulse has a short circuit to another test pulse.	Check the wiring of the test pulse for a short across two test pulses. Change PSS DIO T*.

* The advice given about the PSS DIO T is only valid for the PSS 3000 and PSS 3100. On the PSS 3056 and PSS 3032, you will need to change the whole system.

18.1.49 F-83 = Debug Errors

F-83	Error Description	Remedy
01	The block timer interrupt occurred in the operating system during debugging.	Change PSS CPU.
02	A bus error trap occurred in the operating system during debugging.	
03	A bus error trap occurred in the operating system during debugging.	
04	An address error trap occurred in the operating system during debugging.	
05	An address error trap occurred in the operating system during debugging.	
06	A miscellaneous trap occurred in the operating system during debugging.	
07	A category 0 error was entered in the error stack during debugging.	

18.1.50 F-84 = XW Match Errors

F-84	Error Description	Remedy
00	XW module (PSS AI): error while matching the read-in segment (compare: segment length from a word).	Reselect the match algorithm. Change PSS AI.
01	XW module (PSS AI): error while matching the read-in segment (compare: segment length from a double word).	
02	XW module (PSS AI): error while matching the read-in segment (minimum: segment length of an unsigned word).	Change match algorithm or increase tolerance. Change PSS AI.
03	XW module (PSS AI): error while matching the read-in segment (minimum: segment length of an unsigned double word).	
04	XW module (PSS AI): error while matching the read-in segment (mean: segment length of an unsigned word).	
05	XW module (PSS AI): error while matching the read-in segment (mean: segment length of an unsigned double word).	

F-84	Error Description	Remedy
06	XW module (PSS AI): error while matching the read-in segment (maximum: segment length of an unsigned word).	
07	XW module (PSS AI): error while matching the read-in segment (maximum: segment length of an unsigned double word).	
08	XW module (PSS AI): error while matching the read-in segment (minimum: segment length of a signed word).	
09	XW module (PSS AI): error while matching the read-in segment (minimum: segment length of a signed double word).	
0A	XW module (PSS AI): error while matching the read-in segment (mean: segment length of a signed word).	
0B	XW module (PSS AI): error while matching the read-in segment (mean: segment length of a signed double word).	
0C	XW module (PSS AI): error while matching the read-in segment (maximum: segment length of a signed word).	
0D	XW module (PSS AI): error while matching the read-in segment (maximum: segment length of a signed double word).	

18.1.51 F-90 to F-C4 = Errors of 186 and C165 Processor

For documentation see corresponding errors F-70 to F-84 according to following table

68 000 Processor (A)	186 Processor (B)	C 165 Processor (C)
F-70	F-90	F-B0
F-71	F-91	F-B1
F-72	F-92	F-B2
F-73	F-93	F-B3
F-74	F-94	F-B4
F-75	F-95	F-B5
F-76	F-96	F-B6
F-77	F-97	F-B7
F-78	F-98	F-B8
F-79	F-99	F-B9
F-7A	F-9A	F-BA
F-80	F-A0	F-C0
F-81	F-A1	F-C1
F-82	F-A2	F-C2
F-83	F-A3	F-C3
F-84	F-A4	F-C4

18.1.52 F-D0 = Selective Shutdown Function 1

L= Signal group number, P= Tolerance type for deactivation

F-D0	Error Description	Remedy
01	Error program for deactivating of signal group was started	Status message, no action
02	Dead man timer done	
03	Error timer done	
04	User deactivates signal group via SB 255	
06	One deactivated signal group with tolerance type 4 should be defined to shut down defective outputs	Change configuration or user program

18.1.53 F-D1 = Selective Shutdown Function 2 (SF)

L= Deactivating OB, P= Signal group number

F-D1	Error Description	Remedy
01	Acknowledge fault during reactivation	Acknowledge reactivation use SB 255(FUNK=100)

18.1.54 F-D6 = Safety Bus Errors

F-D6	Error Description	Remedy
00	Bus POI was not read within one scan	Increase min scan time Change CPU (Bus interface defect)
01	Interrupt commando buffer overflow	Change CPU (Bus interface defect)
02	Error when reading bus PII	
03	Error during SafetyBus L PB command	
04	Error during SafetyBus L PW command	
05	Error during SafetyBus T PB command	
06	Error during SafetyBus T PW command	
07	Fault when programming SafetyBus	
08	Fault when deleting SafetyBus Flash	
09	Undefined interrupt command received	
0A	Bus interface indicates fault	
0B	Bus error when loading SafetyBus program	
0C	Bus error when deleting SafetyBus Flash	
0D	Bus interface indicates system status change	
0E	Undefined bus commando more often in commando queue than allowed.	
0F	SZU was not picked up during one scan	Increase min scan time Change CPU (Bus interface defect)
10	Error of bus coupler reading	Change CPU (Bus interface defect)
11	Error when deleting SafetyBus Flash	
12	Data faults on programming unit commands	
13	NMI error detected with PSS to STOP	
14	NMI error detected with PSS to AKT	
15	NMI error detected with PSS to NO_FS	
16	NMI error change to Bus error after PSS to NO_FS	
17	NMI error change to Bus error after PSS to STOP	
18	NMI error change to Bus error after PSS to NO-FS	

F-D6	Error Description	Remedy
19	Fault in SBUS-NMI test	
1A	Fault in SBUS-DPR test	
1B	NMI error change to Bus error after PSS to NO-FS	
1C	Timeout fault in communication channel	
1D	Fault in SBUS-DPR write protection test	
1E	SBUS-DPR test after PSS to NO_FS	
1F	Low level communication fault	
20	Communication fault on self-test DPR to bus interface	
21	Message of fatal error in Bus interface to PSS L= Error constant 1, P= Error constant 2	
22	Restart of Bus interface detected	Status message, no action
23	Error during Domain transfer from Bus interface to PSS L= Domain Number, P= Device Number	Change CPU (Bus interface defect)
24	Error during Domain transfer from PSS to Bus interface L= Domain Number, P= Device Number	
25	Error during Domain transfer from PSS to Bus interface	
26	Error during Domain request transfer from PSS to Bus interface L= Domain Number, P= Device Number	

18.2 Fatal Errors

#	Error Description	Remedy
∗100	24 VDC supply voltage on the PSS is above or below the permitted tolerance range.	Check the 24 VDC supply voltage on the PSS. Change the PSS CPU
∗113	Fault in power supply of the expansion module rack.	Check the line voltage on the power supply of the expansion module rack. Change the power supply on the expansion rack. Change PSS CPU.*
∗302	Fluctuations in the 24 VDC supply voltage.	Check the 24 VDC supply voltage on the PSS. Change PSS CPU*
other ∗xxx	Internal PSS CPU fault (Hardware or Op-Sys)	Switch Power of PSS off and on If faults persists change CPU

#	Error Description	Remedy
+000 to +FFF	Internal PSS CPU fault (Hardware or Op-Sys)	Switch Power of PSS off and on If faults persists change CPU

18.3 PSS Error Categories in the Standard Section

18.3.1 S-01-S03 = Hardware Errors (CPU "68000")

S-01	Error Description	Remedy
01	Flash EPROM or RAM cartridge cannot be cleared.	Reload FS application program into the PSS.
02	Error writing the Standard EPROM or RAM.	.Delete complete ST Memory
03	Error writing the Standard EPROM or RAM	Change PSS CPU
04	Real time clock defect	Change PSS CPU.

18.3.2 S-04 = Battery Error

S-04	Error Description	Remedy
01	Buffer battery on the power supply is low.	Replace battery.

18.3.3 S-05 = Configuration Errors

P= Slot number

S-05	Error Description	Remedy
01	Configuration error on the module rack during Start of ST section .	Check the modules' configuration. Execute a reset - keep the F-STACK button pressed while switching the ST selector switch from "PG" to "SPS".
02	Configuration error on the module rack during RUN of ST section .	Check the Hardware registry -> entries in DB 004.

18.3.4 S-06 = Module Errors

P= Slot number

S-06	Error Description	Remedy
01	ST-expansion module detected	Change the relevant module.
03	Defective ST-module detected during ST-Start up	
04	Defective ST-module detected during hardware reset	

18.3.5 S-07 = ST-Program Errors

S-07	Error Description	Remedy
01	At least one defective block in memory	Delete ST-program.
02	End of Block table not found	Reload ST program to PSS
03	Unknown block code in block table detected	Change ST program cartridge
04	Unknown Block number in block table detected	or replace CPU
05	Block loaded twice	
06	Number of loaded blocks wrong	
07	No valid memory (Cartridge) present	
08	No valid memory (Cartridge) present	
09	No memory (Cartridge) present	Insert Cartridge
0A	Fault in user program	Check program

18.3.6 S-08 = ST-Memory Cartridge Errors

S-08	Error Description	Remedy
04	Program cartridge pulled	Insert cartridge
05	P10 Programming adapter inserted	Adapter not necessary for PSS
06	Wrong cartridge type inserted	Select right cartridge
07	No Flash cartridge in Slot	
08	No valid PSS cartridge	
09	Error during init of DB table	Delete ST-Memory

18.3.7 S-0B = ST-Power Errors on Expansion Rack

S-0B	Error Description	Remedy
02	Power fault on expansion rack during ST-Start	Check power supply on expansion rack
03	Power fault on expansion rack during ST-RUN	

18.3.8 S-0C = ST-Scan Time Exceeded

S-0C	Error Description	Remedy
01	ST-Block run timer done (ST-Watchdog)	Check user program for endless loops
02	ST-Program too long	Increase ST-Block run timer
03	OB20/22 too long	Reduce ST-program code

18.3.9 S-0F = ST-XW Module Errors

S-0F	Error Description	Remedy
01	No XW module responding under used address P= Access address	Change user program
04	Free addressable module transmits invalid address size P= (Low byte only) Slot number	Change defective module
05	Free addressable module is addressed outside of range P= (Low byte only) Slot number	Check ST-module on rack
06	More than allowed free addressable modules	Check Base address in DB 5
07	Overlapping address areas at free addressable module P= (Low byte only) Slot number	
09	Two free addressable modules have same base address P= (Low byte only) Slot number	
0A	Base address is not a multiple of the address size of the free addressable module P= (Low byte only) Slot number	

18.3.10 S-10 = Cartridge Errors

S-10	Error Description	Remedy
01	Cartridge is missing during OB call.	Insert ST Cartridge.

18.3.11 S-20 = ST-Display Messages

S-20	Error Description	Remedy
01	ST – Start	No action required
02	ST – Stop	
14	ST – Hardware reset processed	

18.3.12 S-21 = ST- Arithmetic Errors

L= High byte = Block Type, Low byte = Block number

S-21	Error Description	Remedy
01	Accumulator contains an invalid conversion value for DEF operation.	Change user program
02	Accumulator contains an invalid conversion value for DUF operation.	
21	Division by 0 during a byte operation.	
22	Dividend too high during a byte operation.	
31	Division by 0 during a word operation.	
32	Dividend too high during a word operation.	

18.3.13 S-22 bis S-2A = Programming Error

	Error message	Remedy
S-22	Addressed data element is beyond the active data block.	Data block extend. Checking ST-User program. Debug error Retransmit Data block or component to PSS
S-23	Trying to write on a Read-only-Data block.	Checking ST-User program.
S-24	Invalid content in an actual parameter.	Debug error
S-25	Fault during indirect addressing.	Checking ST-User program.
S-26	Call with operation "CAL" on a nonexistent data block.	
S-27	Actual- and Formal parameter disaccord	
S-28	Exceed maximum data block nesting depth of 16	
S-29	Access violation with operation "L XW“ respectively. "T XW“ on addressable data blocks.	
S-2A	Fault during starting a time stage.	

18.3.14 S-64

Errornumber	**Error para-meter 1**	**Error para-meter 2**	**Error message**	**Remedy**
00..08, error number corresponds to the slot number of the ETH interface	01	Not relevant	Error due to Ethernet interface	1.) If there has just been a change in the PSS operating status, restart the PSS. 2.) If you have just downloaded a program or blocks to the PSS, restart the PSS 3.) If you have just downloaded an ETH configuration to the ETH interface, restart the PSS 4.) If you have just changed the ETH firmware, ensure that the firmware has been downloaded completely (ETH Configurator: Online -> View Firmware Version) and then restart the PSS 5.) Increase the value for the minimum scan time in the PSS configuration 6.) Please contact Pilz
	10		Error due to Ethernet interface	1.) Restart the PSS 2.) Please contact Pilz
	20 ... 23		As 01	
	30		Call SB254, FUNK = 192: Status DB is not available	1.) Call SB254, FUNK = 192: State an existing DB and not the DB stated in DB004, DW200 2.) Create the DB stated in DB004, DW200 (note length and access rights) 3.) Please contact Pilz
	31		Call SB254, FUNK = 192: Status DB is too short	1.) Call SB254, FUNK = 192: Increase the length of the status DB stated in DB004, DW200 (length = Offset + 27) 2.) Call SB254, FUNK = 192: State a lower start address in DB004, DW201. 3.) Please contact Pilz
	32		Call SB254, FUNK = 192: DB is "Read only"	1.) Call SB254, FUNK = 192: Configure "Read/write" access for the DB stated in DB004, DW200 2.) Call SB254, FUNK = 192: State a "Read/write" DB in DB004, DW200 3.) Please contact Pilz
	40 ... 4c		As 01	
	50 ... 5e		As 01	

Errornumber	Error para-meter 1	Error para-meter 2	Error message	Remedy
	60 61 62		Error due to Ethernet interface	1.) If there has just been a change in the PSS operating status, restart the PSS. 2.) If you have just downloaded a program or blocks to the PSS, restart the PSS 3.) If you have just downloaded an ETH configuration to the ETH interface, restart the PSS 4.) If you have just changed the ETH firmware, ensure that the firmware has been downloaded completely (ETH Configurator: Online -> View Firmware Version) and then restart the PSS 5.) Ensure that the activation bit for SB254, FUNK = 190 is not reset while a job is being executed (e.g. do not perform a general reset, do not download any programs or blocks, do not reset in the user program) 6.) Restart the PSS 7.) Increase the value for the minimum scan time in the PSS configuration 8.) Please contact Pilz
	63 ... 6a		Call SB254, FUNK = 190/191/192: Data in the job configuration DB does not match the ETH configuration or is invalid	1.) SB254, FUNK = 190/191/192: Ensure that the data in the job configuration DB matches the ETH configuration and is valid. 2.) If there has just been a change in the PSS operating status, restart the PSS. 3.) If you have just downloaded a program or blocks to the PSS, restart the PSS 4.) If you have just downloaded an ETH configuration to the ETH interface, restart the PSS 5.) If you have just changed the ETH firmware, ensure that the firmware has been downloaded completely (ETH Configurator: Online -> View Firmware Version) and then restart the PSS 6.) Ensure that the activation bit for SB254, FUNK = 190 is not reset while a job is being executed (e.g. do not perform a general reset, do not download any programs or blocks, do not reset in the user program) 7.) Increase the value for the minimum scan time in the PSS configuration 8.) Please contact Pilz

Errornumber	Error para-meter 1	Error para-meter 2	Error message	Remedy
	6b		Call SB254, FUNK = 190/191/192: Data not received with 9 seconds of calling the block	1.) SB254, FUNK = 190/191/192: Ensure that data is received within 9 seconds of calling the block or use a PSS with FS operating system version >= 65. 2.) Please contact Pilz
	6c ... 7f		As 63	
	80 81 82		Call SB254, FUNK = 194: Could not poll IP settings	1.) If there has just been a change in the PSS operating status, restart the PSS. 2.) If you have just downloaded a program or blocks to the PSS, restart the PSS 3.) If you have just downloaded an ETH configuration to the ETH interface, restart the PSS 4.) If you have just changed the ETH firmware, ensure that the firmware has been downloaded completely (ETH Configurator: Online -> View Firmware Version) and then restart the PSS 5.) Increase the value for the minimum scan time in the PSS configuration 6.) Please contact Pilz
	a0 a1 a2 a3		Error due to Ethernet interface	1.) Restart the PSS 2.) Please contact Pilz
09	-		Internal error	1.) Please contact Pilz
0a	-		Hardware registry is invalid	1.) Change the hardware registry so that the ETH-2 module is on slot 0 ... 8. 2.) Please contact Pilz
0b	-		As error 00, but ETH interface is integrated within the CPU or compact PSS	

18.3.15 S-76 = Compiler Errors

See Error Messages F-76

18.3.16 S-77 = Block Loading Errors

S-77	Error Description	Remedy
01	Too many blocks loaded in Memory	Check Memory size
02	Length of blocks different to transmitted data	Reload blocks
03	Transmitted block is not a ST-block	Check PG Software

S-77	Error Description	Remedy
04	DB with reserved number may not be loaded P= block (High byte = Block Type (DB), Low byte = Block number)	Change DB number
05	DB 4 or DB 5 do not have nominal length P= block (High byte = Block Type (DB), Low byte = Block number)	Check length of DB
06	Wrong CRC of transmitted block	Reload block
07	End of Memory in ST-program memory	Increase ST-Program Memory size
08	Invalid Op-Sys Call	Check Version of PSS and PG
09	Invalid assembler block	Load block in PSS code
0A	R/W area of DB is full	Increase ST-Program Memory size

18.3.17 S-80 = Timer Error

S-80	Error Description	Remedy
01	Fatal Error in ST section of Op-Sys detected P= Fatal Error Number	Restart PSS

18.3.18 S-81 = Op-Sys Call Error

S-81	Error Description	Remedy
01	SB 254 called with not defined FUNK number	Check User program Check PSS Version

18.3.19 S-83 = Debug Errors

S-83	Error Description	Remedy
01	Module called from Start up manager does not indicate ready P= Status of Startup Manager	Increase ST- block run timer
02	Module called from Start up manager does exceed set time limit P= Status of Startup Manager	Change CPU
03	Start up Manager in invalid status	Restart CPU Change PSS

18.4 Display Messages on Pilz Standard Function Blocks

#	Error Description	Remedy
E001 ‘FS’	MBS parameter error: value of “SSNR” is outside the range of 1 to 200.	Check parameters in the FS-application program.*
E002 ‘FS’	Block call up error for SB 060 and SB 061: An MBS block is not being called up in the application program as part of each cycle. The two operations “A DB 015” and “I DW 1015” are missing at the end of OB 101.	Check parameter “SSNR” in the FS application program, to ensure the allocation has not been duplicated.* Check block call ups for SB 060 and SB 061 in the FS application program, to ensure the MBS blocks in the application program are not omitted.* Check that the two operations are programmed in OB 101.*
E003	Reserved	
E004	Reserved	

E005 'ST'	Parameter error on SB 252 in the ST application program.	Check parameters in the ST application program.
E006 'FS'	Parameter error on SB 149: value for "W_BA" or "D_BA" is outside the range of 0 to 4.	Check parameters in the FS application program.*
E007 'FS'	Parameter error on SB 151, SB 153, SB 154 or SB 157: a negative time value has been loaded.	
E008 to E0CB	Reserved	
E0CC 'FS'	Error on SICK-FGS blocks: Invalid CRC value transferred from ST section.	Switch system on and off by operating the mains switch on the PSS power supply (PS).

*The FS application program will need to be re-linked and downloaded to the PSS.
End of List

19 ANNEX CHECKS

In this annex you find the draft sheets for the checks that have to be carried out regularly. Each test/action that has to be made is described. In addition there is a description how the test has to be done and what the required effect of the test should be. It is only necessary to carry out the tests that are marked with a cross (☒). The test sheets are each separated into the test intervals as well as into the different stations.

DAILY TESTS
DRIVE STATION

Comm.No. : WAA0004186
Installation : BaNa 5

Year : 20___

Electrical Department

DAILY TESTS DRIVE STATION

Testing necessary *	Description	Effect	Procedure	Carried out						
				Mo	Tu	We	Th	Fr	Sa	Su
☒	Inspection run	---	Line inspection run before operation start with reduced speed. Constant radio contact with the manned station.	☐	☐	☐	☐	☐	☐	☐
☒	Function control anemometers	---	Check the function of the anemometer at line inspection.	☐	☐	☐	☐	☐	☐	☐
☒	Tour of inspection in the station and electrical operating rooms	---	Tour of inspection through the stations and operating rooms before operation start: optical control, ventilation and so on	☐	☐	☐	☐	☐	☐	☐
☒	Function control communication devices	---	Test the correct function of all the operation telephones and communication devices.	☐	☐	☐	☐	☐	☐	☐
☒	Test display devices for plausibility	---	Test plausibility of all display and signal devices (e.g. currents, voltages, …).	☐	☐	☐	☐	☐	☐	☐
☒	Function control Stop-buttons	Stop	Test function of all Stop-buttons.	☐	☐	☐	☐	☐	☐	☐
☒	Function control E.Stop-buttons	E.Stop	Test function of all emergency stop-buttons.	☐	☐	☐	☐	☐	☐	☐
☒	Function control Stop SB-buttons	Stop SB	Test function of all stop service brake-buttons.	☐	☐	☐	☐	☐	☐	☐
☒	Function control Stop EB-buttons	Stop EB	Test function of all stop emergency brake-buttons.	☐	☐	☐	☐	☐	☐	☐
☒	Function control slow switch	Reduc. speed	Test function of all slow switches.	☐	☐	☐	☐	☐	☐	☐
☒	Function control Stop – RST	Stop	Trigger a Stop-shutdown in the return station and check the Stop circuit in the drive station.	☐	☐	☐	☐	☐	☐	☐
☒	Function control E.Stop – RST	E.Stop	Trigger an emergency stop-shutdown in the return station and check the emergency stop-shutdown in the drive station.	☐	☐	☐	☐	☐	☐	☐
☒	Function Control Stop EB – RST	Stop EB	Trigger an stop emergency brake-shutdown in the return station and check stop emergency brake-circuit in the drive station.	☐	☐	☐	☐	☐	☐	☐
☐	Function control Stop – MST	Stop	Trigger a Stop-shutdown in the mid station and check the Stop circuit in the drive station.	☐	☐	☐	☐	☐	☐	☐
☐	Function control E.Stop – MST	E.Stop	Trigger an emergency stop-shutdown in the mid station and check the emergency stop circuit in the drive station.	☐	☐	☐	☐	☐	☐	☐
☐	Function control Stop EB – MST	Stop EB	Trigger an stop emergency brake-shutdown in the mid station and check the Stop emergency brake-circuit in the drive station.	☐	☐	☐	☐	☐	☐	☐
☐	Function control Stop – Section I	Stop	Trigger a Stop-shutdown in section I and check in Stop-circuit in section II.	☐	☐	☐	☐	☐	☐	☐
☐	Function control E.Stop – Section I	E.Stop	Trigger an emergency stop-shutdown in section I and check in emergency stop-circuit in section II.	☐	☐	☐	☐	☐	☐	☐
☐	Function control Stop SB – Section I	Stop SB	Trigger an stop service brake-shutdown in section I and check in stop service brake-circuit in section II.	☐	☐	☐	☐	☐	☐	☐
☐	Function control Stop EB – Section I	Stop EB	Trigger an stop emergency brake –shutdown in section I and check in stop emergency brake-circuit in section II.	☐	☐	☐	☐	☐	☐	☐

DAILY TESTS
DRIVE STATION

Comm.No. : WAA0004186
Installation : BaNa 5

Year : 20___

Doppelmayr®

Electrical Department

Testing necessary *	Description	Effect	Procedure	Carried out						
				Mo	Tu	We	Th	Fr	Sa	Su
☐	Function control Stop – Section II	Stop	Trigger a Stop-shutdown in section II and check in Stop-circuit in section I.	☐	☐	☐	☐	☐	☐	☐
☐	Function control E.Stop – Section II	E.Stop	Trigger an emergency stop-shutdown in section II and check in emergency stop-circuit in section I.	☐	☐	☐	☐	☐	☐	☐
☐	Function control Stop SB – Section II	Stop SB	Trigger an stop service brake-shutdown in section II and check in stop service brake circuit in section I.	☐	☐	☐	☐	☐	☐	☐
☐	Function control Stop EB – Section II	Stop EB	Trigger an stop emergerncy brake-shutdown in section II and check in stop emergency brake circuit in section I.	☐	☐	☐	☐	☐	☐	☐
☐	Visual control seat heating	---	All seats of the carriers have to be checked for damages (cuts, ...).	☐	☐	☐	☐	☐	☐	☐
☐				☐	☐	☐	☐	☐	☐	☐
☐				☐	☐	☐	☐	☐	☐	☐
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			Date	__.__.20__	__.__.20__	__.__.20__	__.__.20__	__.__.20__	__.__.20__	__.__.20__
			Signature							

*** ☒ => Device available and testing necessary**

DAILY TESTS
RETURN STATION

Comm.No. : WAA0004186
Installation : BaNa 5

Year : 20___

Doppelmayr®

Electrical Department

DAILY TESTS RETURN STATION

Testing necessary*	Description	Effect	Procedure	Carried out Mo	Tu	We	Th	Fr	Sa	Su
☒	Tour of inspection Stations and electrical operating rooms	---	Tour of inspection through the stations and operating rooms before operation start: optical control, ventilation and so on.	☐	☐	☐	☐	☐	☐	☐
☒	Function control communication devices	---	Test the correct function of all the operation telephones and communication devices.	☐	☐	☐	☐	☐	☐	☐
☒	Test plausibility display devices	---	Test plausibility all display and signal devices (e.g. currents, voltages, …).	☐	☐	☐	☐	☐	☐	☐
☒	Function control Stop-buttons	Stop	Test function of all Stop-buttons.	☐	☐	☐	☐	☐	☐	☐
☒	Function control E.Stop-buttons	E.Stop	Test function of all emergency stop-buttons.	☐	☐	☐	☐	☐	☐	☐
☒	Function control Stop EB-buttons	Stop EB	Test function of all stop emergency brake-buttons.	☐	☐	☐	☐	☐	☐	☐
☒	Function control slow switch	Reduc. speed	Test function of all slow switches.	☐	☐	☐	☐	☐	☐	☐
☐	Visual control seat heating	---	All seats of the carriers have to be checked for damages (cuts, ...).	☐	☐	☐	☐	☐	☐	☐
☐				☐	☐	☐	☐	☐	☐	☐
☐				☐	☐	☐	☐	☐	☐	☐
☐				☐	☐	☐	☐	☐	☐	☐
☐				☐	☐	☐	☐	☐	☐	☐
			Date	__.__.20__	__.__.20__	__.__.20__	__.__.20__	__.__.20__	__.__.20__	__.__.20__
			Signature							

*** ☒ => Devices available and testing necessary**

WEEKLY TESTS
DRIVE STATION

Comm.No. : WAA0004186
Installation : BaNa 5

Year : 20___

Doppelmayr®

Electrical Department

WEEKLY TESTS DRIVE STATION

Testing necessary*	Description	Effect	Procedure	Carried out
☒	Function control battery and charging devices	---	Check function of all batteries and charging devices. Check charging via display.	☐
☒	Start emergency drive	---	Start emergency drive and check all liquid levels.	☐
☒	Start diesel generators	---	Start the diesel generators and check all liquid levels	☐
☐				☐
☐				☐
☐				☐
☐				☐
☐				☐
☐				☐

*** ☒ => Devices available and testing necessary**	**Date**	__.__.20__
	Signature	

WEEKLY TESTS
RETURN STATION

Comm.No. : WAA0004186
Installation : BaNa 5

Year : 20___

Doppelmayr®

Electrical Department

WEEKLY TESTS RETURN STATION

Testing necessary*	Description	Effect	Procedure	Carried out
☒	Function control battery and charging devices	---	Check function of all batteries and charge devices. Check charging via display.	☐
☒	Start diesel generators	---	Start the diesel generators and check all liquid levels.	☐
☐				☐
☐				☐
☐				☐
☐				☐
☐				☐
☐				☐

* ☒ => Devices available and testing necessary	Date	__.__.20__
	Signature	

MONTHLY TESTS
DRIVE STATION

Comm.No. : WAA0004186
Installation : BaNa 5

Year : 20___

Doppelmayr®

Electrical Department

MONTHLY TESTS DRIVE STATION

Testing necessary*	Description	Effect	Procedure	Carried out											
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
☒	Function control GFCI protector	Activ-ation GFCI	Test function of all GFCI-protectors by using the test switches.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☒	Function control maintenance lock out switch	Stop EB	Test function of all maintenance lock out switches.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	Check ”Grip not open“	E.Stop	Switch grip gauge (incoming and outgoing).	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☒	Check “Grip lever fault +/-10%“	E.Stop	Switch grip gauge (outgoing).	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☒	Check “Fault grip appr. outgoing “	E.Stop	Switch grip gauge (incoming and outgoing).	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☒	Check “Rope position Station“	E.Stop	Switch grip gauge (incoming and outgoing).	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☒	Check “Grip / rope fault“	E.Stop	Switch grip gauge (incoming and outgoing).	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☒	Check “Damped guide rail“	E.Stop	Trigger limit switch of the damped guide rail.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	Check limit switch weather door	E.Stop	At open weather door, trigger all limit switches of the upper end position (incoming and outgoing).	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	Check limit switch slit cover	E.Stop	At open slot cover, trigger all limit switches of the open end position (incoming and outgoing).	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	Check “Bubble closed“	E.Stop	Put bubble before grip gauge switch in closed position and continue operation.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☒	Check “Access control“	E.Stop	Moving the closing rail or the access barrier and check additionally that the clutch “Start Position” switches to braking.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	Check safety clutches for door fault	Stop carrier	Use test buttons on screen	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	Function control limit switch position locking rail for restraining bar	E.Stop	Trigger limit switch in upper and lower position of the locking restraining bar rail.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	Testing „Actuating pressure safety valve“	Stop	Unplug the safety valve.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	Testing “Variation tension force +8%“	Stop	Change pressure with the test switches – test according to hydraulic description.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	Testing “Variation tension force -8%“	Stop	Change pressure with the test switches – test according to the hydraulic description.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	Testing “Actual/Actual control loading carpet “	E.Stop	Carry out the test according to the information in the Electrical Description.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	Testing “Reference/Actual control loading carpet “	E.Stop	Carry out the test according to the information in the Electrical Description.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

MONTHLY TESTS
DRIVE STATION

Comm.No. : WAA0004186
Installation : BaNa 5

Year : 20___

Doppelmayr®

Electrical Department

Testing necessary*	Description	Effect	Procedure	Carried out											
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
☒	Check loudspeaker system	Function loud speaker	Test at inspection run the correct function of all loud speakers.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	Check cabin communication system	Function cabin commu-nication system	Check the correct function of the cabin communication system in all cabins.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	Check line illumination	Function line flood light	Test at inspection run the correct function of all flood lights at the towers.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☒	Check station projector	Function line flood light (station)	Test flood light, check the correct function.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
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☐				☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐				☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
* ☒ => Devices available and testing necessary			Date	. .20	. .20	. .20	. .20	. .20	. .20	. .20	. .20	. .20	. .20	. .20	. .20
			Signature												

MONTHLY TESTS
RETURN STATION

Comm.No. : WAA0004186
Installation : BaNa 5

Year : 20___

Electrical Department

MONTHLY TESTS RETURN STATION

Testing necessary*	Description	Effect	Procedure	Carried out											
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
☒	Function control GFCI protector	Activ-ation GFCI	Test function of all GFCI-protectors by using the test switches.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☒	Function control maintenance lock out switch	Stop EB	Test function of all maintenance lock out switches.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	Check “Grip not open“	E.Stop	Switch grip gauge (incoming and outgoing side).	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☒	Check “Grip lever fault +/-10%“	E.Stop	Switch grip gauge (outgoing).	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☒	Check “Fault grip appr. outgoing“	E.Stop	Switch grip gauge (incoming and outgoing).	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☒	Check “Rope position Station“	E.Stop	Switch grip gauge (incoming and outgoing).	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☒	Check “Grip / rope fault“	E.Stop	Switch grip gauge (incoming and outgoing).	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☒	Check “Damped guide rail“	E.Stop	Trigger limit switch of the damped guide rail.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	Check limit switch weather door	E.Stop	At open weather door, trigger all limit switches of the upper end position (incoming and outgoing).	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	Check limit switch slit cover	E.Stop	At open slot cover, trigger all limit switches of the open end position (incoming and outgoing side).	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	Check “Bubble closed“	E.Stop	Put bubble before grip gauge switch in closed position and continue operation.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☒	Check “Access control“	E.Stop	Moving the closing rail or the access barrier and check additionally that the clutch “Start Position” switches to braking.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	Check safety clutches for door fault	Stop carrier	Use test buttons on screen	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	Function control limit switch position locking rail for restraining bar	E.Stop	Trigger limit switch in upper and lower position of the locking restraining bar rail.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	Testing “Actuating pressure safety valve“	Stop	Unplug the safety valve.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☒	Testing “Variation tension force +8%“	Stop	Change pressure with the test switches – test according to the hydraulic description.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☒	Testing “Variation tension force -8%“	Stop	Change pressure with the test switches – test according to the hydraulic description.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	Testing “Actual/Actual control loading carpet “	E.Stop	Carry out the test according to the information in the Electrical Description.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	Testing “Reference/Actual control loading carpet “	E.Stop	Carry out the test according to the information in the Electrical Description.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

MONTHLY TESTS
RETURN STATION

Comm.No. : WAA0004186
Installation : BaNa 5

Year : 20___

Doppelmayr®

Electrical Department

Testing necessary*	Description	Effect	Procedure	Carried out											
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
☒	Check station projector	Function line flood light (station)	Test flood light, check the correct function.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐				☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
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☐				☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
* ☒ => Devices available and testing necessary			Date	. . .20	. . .20	. . .20	. . .20	. . .20	. . .20	. . .20	. . .20	. . .20	. . .20	. . .20	. . .20
			Signature												

MONTHLY TESTS
EMERGENCY DRIVE

Comm.No. : WAA0004186
Installation : BaNa 5

Year : 20___

Doppelmayr®

Electrical department

MONTHLY TESTS EMERGENCY DRIVE

Testing necessary*	Description	Effect	Procedure	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
☒	Testing rope position monitoring	Stop E.Drive	Simulate with the test switches the rope position monitoring of all towers.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☒	Function control Grip operating monitoring drive station	Stop E.Drive	Switch all grip gauges of the “Fault grip appr. outgoing“ as well as the “Rope position Station“ (incoming and outgoing) of the drive station At installations with limited emergency operation with the main drive also the grip force testing must be tested with the trigger test button.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☒	Function control Grip operating monitoring return station	Stop E.Drive	Switch all grip gauges of the “Fault grip appr. outgoing“ as well as the “Rope position Station“ (incoming and outgoing) of the return station At installations with limited emergency operation with the main drive also the grip force testing must be tested with the trigger test button.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	Function control Grip operating monitoring mid station	Stop E.Drive	Switch all grip gauges of the “Fault grip appr. outgoing“ as well as the “Rope position Station“ (incoming and outgoing) of the mid station	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☒	Function control E.Stop/Stop-EB/maintenance lock out-switch drive station	Stop E.Drive	Trigger in the drive station an E.Stop-button, an Stop EB-button and a maintenance lock out switch one after another.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☒	Function control E.Stop/Stop-EB/maintenance lock out-switch return station	Stop E.Drive	Trigger in the return station an E.Stop-button, an Stop EB-button and a maintenance lock out switch one after another.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	Function control E.Stop/Stop-EB/maintenance lock out-switch mid station	Stop E.Drive	Trigger in the mid station an E.Stop-button, an Stop EB-button and a maintenance lock out switch one after another.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☒	Testing ”Overspeed“	Stop E.Drive	Trigger test button – testing according to the Electrical Description, carry out part „Test functions drive unit”	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☒	Testing „Variation Tension force Emergency Drive “	Stop E.Drive	Trigger test button – testing according to the Electrical Description, carry out part “Testing Tensioning”.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☒	Function control switch “Emergency brake mech. blocked “	Indi-cation E.Drive	Testing function of the monitoring switch of the hydraulic cross-over ball cock.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☒	Function control “Emergency brake manual operation “	Indica-tion E.Drive	Testing function of the monitoring switches of the hydraulic cross-over ball cock. Switch every cross-over ball cock separately.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☒	Function control indication emergency brakes open/closed	Indica-tion	Check the indication of the emergency brakes at open and closed position of the brake.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

MONTHLY TESTS
EMERGENCY DRIVE

Comm.No. : WAA0004186
Installation : BaNa 5

Year : 20___

Doppelmayr®

Electrical department

Testing necessary*	Description	Effect	Procedure	Carried out											
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
☒	Function control indication service brakes open/closed	Indica-tion	Check the indication of the service brake at open and closed position of the brake.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☒	Function control Boost pressure	Stop E.Drive	Switch off Dieselmotor (Motor Stop)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐				☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
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☐				☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
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*** ☒ => Device available and testing necessary**			**Date**	. . .20	. . .20	. . .20	. . .20	. . .20	. . .20	. . .20	. . .20	. . .20	. . .20	. . .20	. . .20
			Signature												

SEMI-ANNUAL TESTS
DRIVE STATION

Comm.No. : WAA0004186
Installation : BaNa 5

Year : 20___

Doppelmayr®

Electrical Department

SEMI-ANNUAL TESTS DRIVE STATION

Testing necessary*	Description	Effect	Procedure	Carried out: Summer season	Carried out: Winter season
☒	Testing “Grip force“	E.Stop	Test every sensor separately with the test buttons – testing according to the Electrical Description “Testing the shutdown grip force”	☐	☐
☒	Checking grounding rod	Stop	Remove all grounding rods from the holder.	☐	☐
☒	Function control “Interlock Emergency Drive”	Stop EB	Remove devices from position main drive and trigger the switches. If there are several devices, test them separately.	☐	☐
☒	Function control bull wheel position	Stop EB	Trigger the monitoring switch for the bullwheel position.	☐	☐
☒	Function control axel position monitoring	Stop EB	Trigger the monitoring switch for the axle position monitoring.	☐	☐
☒	Function control emergency bearing	Stop EB	Trigger the monitoring switch for the monitoring of the emergency bearing. Reduce speed to slow 2 at deactivated emergency bearing monitoring.	☐	☐
☐	Function control switch rail end switch	E.Stop	Set every switch rail end position switch separately in “swing in” (parking mode) and “swing out” (circulation mode).	☐	☐
☐	Function control end position lifting platform	E.Stop	Trigger every limit switch separately in the lower (parking mode) and the upper (circulation mode) position.	☐	☐
☐	Function control “Carrier appr. rail “	E.Stop	Move switch rail in position “swing in” and move a carrier slowly towards the switch rail (chose driving direction so that the carrier would drive into the switch rail).	☐	☐
☒	Function control limit switch liftable tire conveyor	E.Stop	Trigger every limit switch separately in the lower and upper position.	☐	☐
☒	Function control “Door control“	E.Stop	Test monitoring of a door in the structural clearance of the ropeway – move door out of open position.	☐	☐
☐	Function control “Restraining bar monitoring loading point“	E.Stop or slow	Stop carrier before the limit switch for the monitoring of the open restraining bar, open restraining bar manually and start again.	☐	☐
☐	Function control “Restraining bar monitoring outgoing station“	E.Stop	Stop carrier before limit switch for the monitoring of the closed restraining bar, open restraining bar manually and start again.	☐	☐
☐	Function control limit switch “position opening rail” for restraining bar	E.Stop	Trigger limit switch separately in the lower (direction forward) and the upper position (direction reverse) of the opening rail.	☐	☐
☐	Function control limit switch “position closing rail” for restraining bar	E.Stop	Trigger limit switch separately in the lower (direction forward) and the upper position (direction reverse) of the closing rail.	☐	☐
☐	Function control limit switch “O/C Machine”	---	Check if the limit switch of the closing and opening rail switches when reaching the end position and that the corresponding valves switch off.	☐	☐
☐	Function control “Light barrier O/C interrupted“	Bubble stays open	Check if the bubble at outgoing of the carrier stays open in case of an interruption of the light barrier of the opening/closing mech.	☐	☐
☐	Function control “Light barrier O/C not interrupted“	Bubble closes	Check if the bubble at outgoing of the carrier closes in case of no interrupted light barrier of the opening/closing mech.	☐	☐

SEMI-ANNUAL TESTS
DRIVE STATION

Comm.No. : WAA0004186
Installation : BaNa 5

Year : 20___

Doppelmayr®

Electrical Department

Testing necessary*	Description	Effect	Procedure	Carried out: Summer season	Carried out: Winter season
☐	Function control limit switch “position opening rail”	E.Stop	Trigger every limit switch separately in the lower and upper position of the opening rail.	☐	☐
☐	Function control “Seat occupied after unloading “	E.Stop	Function control of the light barrier which monitors if a seat after the unloading is still occupied (Chondolas). In addition to the shutdown, the disconnecting clutches have to stop the tire conveyor and thus the carrier.	☐	☐
☒	Function control switch “Emergency brake mech. blocked“	Stop SB	Test function of the monitoring switch of the hydraulic ball cock valve.	☐	☐
☒	Function control switch “Emergency brake manual operation “	Stop EB	Test function of the monitoring switch of the hydraulic ball cock valves. Switch every ball cock valve separately.	☐	☐
☒	Function control Switch “Service brake mech. blocked “	Stop EB	Test function of the monitoring switch of the hydraulic ball cock valve.	☐	☐
☒	Checking the brake limit switch	Compare display on screen	Check the adjustments and function of the limit switch of the emergency brake(s) and service brake(s). Check the end position display by triggering the limit switch.	☐	☐
☒	Function control “Brake liner OK“	Reset locked	Trigger limit switch of the brake liner control manually and reset safety circuits.	☐	☐
☐	Function control “Stop valve test position“ or “valve position extend cylinder”	Stop	Check the function of the monitoring switch of the hydraulic ball cock valves of the tensioning. Switch every ball cock valve separately.	☐	☐
☐	Function control “Carriage limit“	Stop	Trigger limit switch in both directions (front and back end position).	☐	☐
☐	Testing “Difference pressure transducer tensioning“	Stop	Trigger test button – carry out test according to the Electrical Description, part “Testing tensioning“.	☐	☐
☐	Testing “Stop Revision loading carpet“	Stop Loading carpet	Operate the loading carpet in operation mode ‘Revision’ and press Stop-button. Test function of all buttons.	☐	☐
☐	Testing “Gate Open“	E.Stop	In case of operation of the installation with loading carpet, move selector switch of the gate to position open. ATTENTION: Only active at operation with loading carpet!	☐	☐
☐	Function control “Overcurrent gate motor“	E.Stop	Trigger the motor protection switch of the barrier in case of operation of installation with loading carpet. ATTENTION: Only active at operation with loading carpet!	☐	☐
☐	Testing “Actual/Actual-driving speed seat heating”	Seat heating off	Trigger test switches – carry out tests according to the Electrical Description, part “Seat heating – Tests to be carried out”.	☐	☐
☒	Function control “Failure lighting protection “	Stop	Trigger a protection switch in the lightning protection box.	☐	☐
☒	Check “Overcurrent motor brake hydraulic“	Stop	Trigger motor protection switch in the control panel.	☐	☐
☒	Check “Overcurrent oil cooler + oil pump“	Az	Trigger motor protection switch in the control panel.	☐	☐
☐	Check “Overcurrent water cooler + water pump“	Az	Trigger motor protection switch in the control panel.	☐	☐

SEMI-ANNUAL TESTS
DRIVE STATION

Comm.No. : WAA0004186
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Year : 20___

Doppelmayr®

Electrical Department

Testing necessary*	Description	Effect	Procedure	Carried out	
				Summer season	Winter season
☐	Check “Overcurrent motor tensioning“	Az	Trigger motor protection switch in the control panel.	☐	☐
☐	Check “Overcurrent motor O/C mech.“	Az	Trigger motor protection switch in the control panel.	☐	☐
☒	Check “Overcurrent motor fan”	Stop SB	Trigger motor protection switch in the control panel.	☐	☐
☐	Check “Overload motor processor spacing“	Stop	Trigger motor protection switch in the control panel.	☐	☐
☐	Check “Overcurrent Thyristor fan“	NH-BB	Trigger motor protection switch in the control panel.	☐	☐
☒	Check “Overload fan motor terminal conveyor incoming“	E.Stop	Trigger motor protection switch in the control panel.	☐	☐
☒	Check “Overload fan motor terminal conveyor outgoing“	E.Stop	Trigger motor protection switch in the control panel.	☐	☐
☒	Check “Overload fan motor processor spacing“	E.Stop	Trigger motor protection switch in the control panel.	☐	☐
☒	Check “Overload brake processor spacing“	E.Stop	Trigger motor protection switch in the control panel.	☐	☐
☐	Check “Overload fan motor park conveyor“	E.Stop	Trigger motor protection switch in the control panel.	☐	☐
☐	Check “Overload brake park conveyor“	E.Stop	Trigger motor protection switch in the control panel.	☐	☐
☐	Check “Fault power converter“	Stop SB	Simulate with the test buttons a fault in the power converter.	☐	☐
☒	Function control “Circuit breaker remote release”	Power switch off	Test function of the curcuit breaker remote release – press release button. ATTENTION: Testing only at standstill of the ropeway!	☐	☐
☒	Check Lamp test	LED’s shine	Trigger lamp test button – all LED’s have to shine.	☐	☐
☒	Check Overspeed Step 1	Stop SB	Trigger test button – carry out test according to the Electrical Description, part “Test functions drive”.	☐	☐
☒	Check Overspeed Step 2	Stop EB	Trigger test button – carry out test according to the Electrical Description, part “Test functions drive unit”.	☐	☐
☒	Check Torque surge dM/dt	Stop SB	Trigger test button – carry out test according to the Electrical Description, part “Test functions drive unit”.	☐	☐
☒	Check Reference value 0	Run blocked	Trigger test button – carry out test according to the Electrical Description, part “Test functions drive unit”.	☐	☐
☒	Check Step fault	SB closes	Trigger test button – carry out test according to the Electrical Description, part “Test functions drive unit”.	☐	☐
☒	Check Release control emergency brake valve 1	Stop EB	Trigger test button – carry out test according to the Electrical Description, part “Test functions drive unit”.	☐	☐
☒	Check release control emergency brake valve 2	Stop EB	Trigger test button – carry out test according to the Electrical Description, part “Test functions drive unit”.	☐	☐
☒	Check Actual/Actual-monitoring bullwhell tacho	Stop EB	Trigger test button – carry out test according to the Electrical Description, part “Test functions drive unit”.	☐	☐

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DRIVE STATION

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Testing necessary*	Description	Effect	Procedure	Carried out Summer season	Carried out Winter season
☒	Check Actual/Actual-monitoring motor tachot	Stop EB	Trigger test button – carry out test according to the Electrical Description, part “Test functions drive unit”.	☐	☐
☒	Check “Reference/Actual-monitoring” actual value	Stop SB	Trigger test button – carry out test according to the Electrical Description, part “Test functions drive unit”.	☐	☐
☒	Testing “Reference/Actual-monitoring reference value”	Stop SB	Trigger test button – carry out test according to the Electrical Description, part “Test functions drive unit”.	☐	☐
☒	Testing “deceleration monitoring Stop”	Stop SB	Trigger test button – carry out test according to the Electrical Description, part “Test functions drive unit”.	☐	☐
☒	Testing “deceleration monitoring Emergency Stop”	Stop SB + Stop EB	Trigger test button – carry out test according to the Electrical Description, part “Test functions drive unit”.	☐	☐
☒	Testing “deceleration monitoring Stop-SB”	Stop EB	Trigger test button – carry out test according to the Electrical Description, part “Test functions drive unit”.	☐	☐
☒	Testing “deceleration monitoring Stop EB”	Stop SB	Trigger test button – carry out test according to the Electrical Description, part “Test functions drive unit”.	☐	☐
☒	Testing “deceleration monitoring Stop EB+SB”	Stop SB + Stop EB	Trigger test button – carry out test according to the Electrical Description, part “Test functions drive unit”.	☐	☐
☐	Testing “synchronicity monitoring chain conveyor”	E.Stop	Trigger test button – carry out test according to the Electrical Description, part “Test functions drive unit”.	☐	☐
☐	Testing “synchronicity monitoring section ½”	E.Stop	Trigger test button – carry out test according to the Electrical Description, part “Test functions drive unit”.	☐	☐
☒	Testing “Anti-collision system upper limit value“	E.Stop	Trigger test switch – testing according to the Electrical Description, part “Tests anti-collision“ (incoming and outgoing).	☐	☐
☒	Testing “Anti-collision system lower limit value“	E.Stop	Trigger test switch – testing according to the Electrical Description, part “Tests anti-collision“ (incoming and outgoing). ATTENTION: Testing has to be carried out in operation mode “Station manned”!	☐	☐
☒	Testing “Spacing fault outgoing”	E.Stop	Trigger test button – testing according to the Electrical Description, part “Tests anti-collision”.	☐	☐
☐	Testing ” Spacing fault station“	E.Stop	Trigger test buttons – testing according to the Electrical Description, part “Tests anti-collision”. ATTENTION: Test has to be carried out in operation mode “Station manned“!	☐	☐
☒	E-installation of the towers and in the stations	---	Checking the E-installation on the towers and in the stations. Focus on damaged cables and spots of abrasion.	☐	☐
☐	Insulation tests seat heating	---	Testing insulation of the seat heating – testing according to the Electrical Description, part “Seat heating – tests to be carried out”.	☐	☐
☐	Act/Act monitoring seat heating	Seat heating off	Test actual/actual with ttest buttons - testing according to the Electrical Description, part “Seat heating – tests to be carried out”.	☐	☐
☒	Function control Tower switches	E.Stop	Test correct function of all tower switches (break forks, RPD) on the towers and at the roller batteries in the station (if necessary lubricate the brake fork switches with a little bit of Vaseline or conductive grease – protection against corrosion).	☐	☐

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DRIVE STATION

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Electrical Department

Testing necessary*	Description	Effect	Procedure	Carried out: Summer season	Carried out: Winter season
☒	Check "Door monitoring" (at cabin with sitting and standing transport)	E.Stop	After locking the door, unlock and open it again, so the limit switch for monitoring the roller lever does not trigger. Additional check that the start position or the safety clutches switch to braking.	☐	☐
☐	Check "Door monitoring" (only at cabins with standing transport)	E.Stop	After locking the door, unlock and open the door again, so the limit switch for monitoring the door mechanism does not trigger. Additional check if the start position or the safety clutches switch to braking.	☐	☐
☐				☐	☐
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☐					
☐				☐	☐

		Summer season	Winter season
* ☒ => Devices available and testing necessary	Date	__.__.20__	__.__.20__
	Signature		

SEMI-ANNUAL TESTS
RETURN STATION

Comm.No. : WAA0004186
Installation : BaNa 5

Year : 20___

Electrical Department

SEMI-ANNUAL TESTING RETURN STATION

Testing necessary*	Description	Effect	Procedure	Carried out: Summer season	Carried out: Winter season
☒	Testing „Grip force“	E.Stop	Test every sensor separately with the test buttons – testing according to the Electrical Description “Testing the shutdown grip force”.	☐	☐
☒	Checking grounding rod	Stop	Remove all grounding rods from the holder.	☐	☐
☒	Function control bull wheel position	Stop EB	Trigger the monitoring switch for the bullwheel position.	☐	☐
☒	Function control axel position monitoring	Stop EB	Trigger the monitoring switch for the axle position monitoring.	☐	☐
☒	Function control emergency bearing	Stop EB	Trigger the monitoring switch of the emergency bearing. Reduce speed to slow 2 at deactivated emergency bearing monitoring.	☐	☐
☒	Function control Switch rail end switch	E.Stop	Set every switch rail end position switch separately in “swing in” (parking mode) and “swing out” (circulation mode).	☐	☐
☒	Function control end position lifting platform	E.Stop	Trigger every limit switch separately in the lower (parking mode) and the upper (circulation mode) position.	☐	☐
☒	Function control “Carrier appr. rail “	E.Stop	Move switch rail in position “swing in” and move a carrier slowly towards the switch rail (chose driving direction so that the carrier would drive into the switch rail).	☐	☐
☒	Function control limit switch liftable tire conveyor	E.Stop	Trigger every limit switch separately in the lower and upper position.	☐	☐
☒	Function control “Door control“	E.Stop	Test monitoring of a door in the structural clearance of the ropeway – move door out of open position.	☐	☐
☐	Function control “Restraining bar monitoring loading point“	E.Stop or slow	Stop carrier before the limit switch for the monitoring of the open restraining bar, open restraining bar manually and start again.	☐	☐
☐	Function control “Restraining bar monitoring outgoing station“	E.Stop	Stop carrier before limit switch for the monitoring of the closed restraining bar, open restraining bar manually and start again.	☐	☐
☐	Function control limit switch “position opening rail” for restraining bar	E.Stop	Trigger limit switch separately in the lower (direction forward) and the upper position (direction reverse) of the opening rail.	☐	☐
☐	Function control limit switch “position closing rail” for restraining bar	E.Stop	Trigger limit switch separately in the lower (direction forward) and the upper position (direction reverse) of the closing rail.	☐	☐
☐	Function control limit switch “O/C Machine”	---	Check if the limit switch of the closing and opening rail switches when reaching the end position and that the corresponding valves switch off.	☐	☐
☐	Function control “Light barrier O/C interrupted“	Bubble stays open	Check if the bubble at outgoing of the carrier stays open in case of an interruption of the light barrier of the opening/closing mech.	☐	☐
☐	Function control “Light barrier O/C not interrupted“	Bubble closes	Check if the bubble at outgoing of the carrier closes in case of no interrupted light barrier of the opening/closing mech.	☐	☐

SEMI-ANNUAL TESTS
RETURN STATION

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Doppelmayr®

Electrical Department

Testing necessary*	Description	Effect	Procedure	Carried out	
				Summer season	Winter season
☐	Function control limit switch "position opening rail"	E.Stop	Trigger every limit switch separately in the lower and upper position of the opening rail.	☐	☐
☐	Function control "Seat occupied after unloading"	E.Stop	Function control of the light barrier which monitors if the seat after the unloading is still occupied (Chondolas). In addition to the shutdown, the disconnecting clutches have to stop the tire conveyor and thus the carrier.	☐	☐
☒	Function control "Stop valve test position" or "valve position extend cylinder"	Stop	Check the function of the monitoring switch of the hydraulic ball cock valves of the tensioning. Switch every ball cock valve separately.	☐	☐
☒	Function control "Carriage limit"	Stop	Trigger limit switch in both directions (front and back end position).	☐	☐
☒	Testing "Difference pressure transducer tensioning"	Stop	Trigger test button – carry out test according to the Electrical Description, part "Testing tensioning".	☐	☐
☐	Testing "Stop Revision Loading carpet"	Stop Loading carpet	Operate the loading carpet in operation mode Revision and press Stop-button. Test function of all buttons.	☐	☐
☐	Testing "Gate Open"	E.Stop	In case of operation of the installation with loading carpet, move selector switch of the gate to position open. ATTENTION: Only active at operation with loading carpet!	☐	☐
☐	Function control "Overcurrent gate motor"	E.Stop	Trigger the motor protection switch of the barrier in case of operation of installation with loading carpet. ATTENTION: Only active at operation with loading carpet!	☐	☐
☐	Testing "Actual/Actual-driving speed seat heating"	Seat heating off	Trigger test switches – carry out tests according to the Electrical Description, part "Seat heating – Tests to be carried out".	☐	☐
☒	Function control "Failure lighting protection "	Stop	Trigger a protection switch in the lightning protection box.	☐	☐
☒	Check "Overcurrent motor tensioning"	Az	Trigger motor protection switch in the control panel.	☐	☐
☐	Check "Overcurrent motor O/C mech."	Az	Trigger motor protection switch in the control panel.	☐	☐
☐	Check "Overload motor processor spacing"	Stop	Trigger motor protection switch in the control panel.	☐	☐
☒	Check "Overload fan motor terminal conveyor incoming"	E.Stop	Trigger motor protection switch in the control panel.	☐	☐
☒	Check "Overload fan motor terminal conveyor outgoing"	E.Stop	Trigger motor protection switch in the control panel.	☐	☐
☒	Check "Overload fan motor terminal conveyor"	E.Stop	Trigger motor protection switch in the control panel.	☐	☐
☒	Check "Overload brake processor spacing"	E.Stop	Trigger motor protection switch in the control panel.	☐	☐
☐	Check "Overload fan motor park conveyor"	E.Stop	Trigger motor protection switch in the control panel.	☐	☐

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RETURN STATION

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Electrical Department

Testing necessary*	Description	Effect	Procedure	Carried out: Summer season	Carried out: Winter season
☐	Check "Overload brake park conveyor"	E.Stop	Trigger motor protection switch in the control panel.	☐	☐
☒	Check Lamp test	LED's shine	Trigger lamp test button – all LED's have to shine.	☐	☐
☒	Testing "Anti-collision system upper limit value"	E.Stop	Trigger test switch – testing according to the Electrical Description, part "Tests anti-collision" (incoming and outgoing).	☐	☐
☒	Testing "Anti-collision system lower limit value"	E.Stop	Trigger test switch – testing according to the Electrical Description, part "Tests anti-collision" (incoming and outgoing). ATTENTION: Test has to be carried out in operation mode "Station manned"!	☐	☐
☒	Testing "Spacing fault outgoing"	E.Stop	Trigger test button – testing according to the Electrical Description, part "Tests anti-collision".	☐	☐
☐	Testing " Spacing fault station"	E.Stop	Trigger test buttons – testing according to the Electrical Description, part "Tests anti-collision". ATTENTION: Test has to be carried out in operation mode "Station manned"!	☐	☐
☒	E-Installation of the towers and in the stations	---	Checking the E-installation on the towers and in the stations. Focus on damaged cables and spots of abrasion.	☐	☐
☐	Insulation tests seat heating	---	Testing insulation of the seat heating – testing according to the Electrical Description, part "Seat heating – tests to be carried out".	☐	☐
☐	Act/Act monitoring seat heating	Seat heating off	Test actual/actual with ttest buttons - testing according to the Electrical Description, part "Seat heating – tests to be carried out".	☐	☐
☒	Function control tower switches	E.Stop	Test correct function of all tower switches (break forks, RPD) on the towers and at the roller batteries in the station (if necessary lubricate the brake fork switches with a little bit of Vaseline or conductive grease – protection against corrosion).	☐	☐
☒	Check "Door monitoring" (at cabin with sitting and standing transport)	E.Stop	After locking the door, unlock and open it again, so the limit switch for monitoring the roller lever does not trigger. Additional check that the start position or the safety clutches switch to braking.	☐	☐
☐	Check "Door monitoring" (only at cabins with standing transport)	E.Stop	After locking the door, unlock and open the door again, so the limit switch for monitoring the door mechanism does not trigger. Additional check if the start position or the safety clutches switch to braking.	☐	☐

		Summer season	Winter season
*** ☒ => Device available and testing necessary**	**Date**	__.__.20__	__.__.20__
	Signature		

SEMI-ANNUAL TESTS
EMERGENCY DRIVE

Comm.No. : WAA0004186
Installation : BaNa 5

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Elelctrical Department

SEMI-ANNUAL TESTS EMERGENCY DRIVE

Testing necessary*	Description	Effect	Procedure	Carried out: Summer season	Carried out: Winter season
☐	Function control "Zero-position valve mech. blocked"	Stop E.Drive	Zero-position valve mechanically blocked.	☐	☐
☒	Function control "Oil motor Bypass"	Stop E.Drive	Switch cross-over ball cock valve for the bypass of the oil motor. Switch every cross-over ball cock valve separately.	☐	☐
☒	Function control "Gearing control emergency drive"	Display/ horn E.Drive	Put devices out of position emergency drive or trigger limit switch. Optic display at not reset stop circuit, optic/acoustic indication at reset stop circuit.	☐	☐
☒	Test of the control circuits of the two solenoids for the emergency brake	correct function of solenoid	See operation manual of the emergency drive	☐	☐
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☐				☐	☐
☐				☐	☐
☐				☐	☐

		Summer season	Winter season
*** ☒ => Devices available and testing necessary**	**Date**	__.__.20__	__.__.20__
	Signature		

ANNUAL TESTS
ALL STATIONS

Comm.No. : WAA0004186
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Doppelmayr®

Electrical Department

ANNUAL TESTS – ALL STATIONS

Testing necessary*	Description	Effect	Procedure	Carried out
☒	Retighten all terminal connections	---	Retighten all terminal connections, power rail connections and grounding connections, otherwise contact problems may occur.	☐
☒	Exchange telephone batteries	---	Replace the telephone batteries of the station telephones. Replacing if necessary, at least once a year	☐
☐				☐
☐				☐
☐				☐
☐				☐

* ☒ => Devices available and testing necessary	Date	__.__.20__
	Signature	

TESTING WITH SPECIAL INTERVALS
ALL STATIONS

Comm.No. : WAA0004186
Installation : BaNa 5

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Electrical Department

TESTING WITH SPECIAL INTERVALS – ALL STATIONS

Testing necessary*	Description	Effect	Procedure	Carried out
☒	Replace batteries PLC	---	Replace the batteries that are in the power supply unit of the PLC. Replacing if necessary, at the latest after 3 years.	☐
☒	Perform motor maintenance	---	Perform the motor maintenance according to the instructions from the motor manufacturer.	☐
☒	Checking the shield grounding at the failsafe cable connections of Emergency Stop-buttons, Stop EB-buttons, maintenance lock out switches, limit switches and connections from the control panel to the terminal boxes		The test can be performed in two different ways and need be carried out at installations with failsafe cable connections and shield grounding every 5 years: 1. Making a connection between the switch and the cable shield with a jumper. The PLC have to switch off with Watchdog FS. Restart the PLC with the power supply switch (200A2/600A2) before doing other tests and wait until the LEDs POWER, RUN ST and RUN FS at the PLC light up again and the display shows “0000”). 2. Using a resistance measurement to measure the continuous connection between the cable shield and ground. Disconnect the cable shield from the ground at a switch/button and measure the resistence between the cable shield and ground on the other side of the cable. This connection needs a low value of resistance.	☐
☒	Testing the fan of the power converter or frequency converter		Conforming to the specifications of the device manufacturer this test has to be made. Necessary informations about the test as well as the inspection interval you will find in the description of the device manufacturer.	☐
☒	Testing the intermediate circuit capacitors at frequency converters		Conforming to the specifications of the device manufacturer this test has to be made. Necessary informations about the test as well as the inspection interval you will find in the description of the device manufacturer.	☐
☒	Testing STO station conveyors		Trigger test button – testing according to the Electrical Description, part “Test STO-Signal”. Testing every 2 years.	☐
☐	Testing STO main motor		Trigger test button – testing according to the Electrical Description, part “Test STO-Signal”. Testing every 2 years.	☐
☐				☐

TESTING WITH SPECIAL INTERVALS
ALL STATIONS

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Electrical Department

Testing necessary*	Description	Effect	Procedure	Carried out
☐				☐
☐				☐

* ☒ => Devices available and testing necessary	Date	__.__.20__
	Signature	