

2. OPERATING INSTRUCTIONS

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2.1 Switch-on of main and control voltages

The switch-on is made from the excavator unit driver cabin; control desk +P10, with the switches

- +S=1010 16-S61 (Key switch for control voltages)
- +S=1010 16-S51 (Switch for main voltages).

Signalling in the driver cabins (+P12, +P32).

The motor ventilation of the dc drives starts after switch-on of the main voltages.

2.2 Drives

General.

The following superposed conditions must be fulfilled in order that a drive can be operated interlocked or de-interlocked:

- control voltage switched on
- main breaker closed
- HV isolator closed for 6 kV motors
- MCC protection elements (fuses, motor protection switch...) not tripped
- control voltage in safety box (SBO) not interrupted
- local control box (LCB) not in "0" position
- rope switches by conveyor belts not pulled
- no safety circuit actuated (end position reached; oil pressure - oil flow monitoring; speed monitoring; operational monitoring brakes; winding and gearbox temperature monitoring; coupling monitoring...)

If a drive has several motors (oil pumps, brakes, dirt belts....) then the above conditions must be fulfilled for each motor. If this is not the case it is not possible to start the drive, respectively it will be immediately stopped. The fault indication is given in the corresponding drivers cabin.

2.3 Material handling drives in non-interlocked operation

2.3.1 Bucket wheel drive

2.3.1.1 Main drive

Conditions:

- control switch +S=1015 05 S43 (+P10) in "Non-interlocked" position
- auxiliary drive de-coupled
- LCB oil pumps, - control switch at "central"
- superposed conditions in accordance with 2.2 fulfilled for the main drive

Switch on:

- press start push button +S=1015 05 S44 (+P10)
 - start oil pumps and start-up warning
 - start brakes
 - start main drive
 - drive runs with self hold

Switch off:

- press stop pushbutton +S=1015 05 S31 (+P10)

2.3.1.2 Auxiliary drive

Conditions:

- control switch +S=1015 05 S44 (+P10) in "Non-interlocked" position
- auxiliary drive coupled
- LCB oil pumps, -control switch at "central"
- Superposed conditions in accordance with 2.2 fulfilled for the auxiliary drive

Switch on:

- press start pushbutton +S=1015 05 S41 (+P10) for direction of rotation 1 or +S=1015 05 S42 (+P10) for direction of rotation 2

start oil pumps and brakes

start auxiliary drive, rotation 1 resp. 2.

The drive runs as long as switch is pressed (inching operation).

2.3.1.3 Oil pumps

Conditions:

- LCB oil pumps, - control switch on "central"
 - superposed conditions in accordance with 2.2. fulfilled for the oil pumps
 - LCB oil pumps, - turn control switch to "local start".
- The oil pumps run with self hold.

Switch off:

- LCB oil pumps, - turn control switch to "0".

2.3.2 Boom conveyor

2.3.2.1 Main drive

Conditions:

- LCB boom conveyor - selector switch at "Local"
- superposed conditions in accordance with 2.2. fulfilled for the main drive

Switch on:

- press start pushbutton for the main drive on the boom conveyor LCB
 - start oil pumps and starting warning
 - start brakes
 - start main drive

The drive runs with self hold.

Switch off:

- LCB boom conveyor - turn control switch to "0"

2.3.2.2 Oil pumps

Conditions:

- LCB boom conveyor - control switch at "Local"
- superposed conditions in accordance with 2.2. fulfilled for the oil pumps

Switch on:

- press start pushbutton for the oil pumps on the boom conveyor LCB

2.3.2.3 Dirt belt

Conditions:

- LCB dirt belt - control switch at "Local"
- superposed conditions in accordance with 2.2. fulfilled for the dirt belt.

Switch on:

- press the start push button on the dirt belt LCB
- The dirt belt runs with self hold.

Switch off:

- LCB dirt belt - turn control switch to "0".

2.3.2.4 Stone discharge

Conditions:

- LCB boom conveyor - control switch at "Local"
- superposed conditions in accordance with 2.2 fulfilled for the stone discharge drive

Switch on:

- press the "stone sighted" pushbutton +S=1015 05 S36 (+P10)
Stop boom conveyor normal operating range.
Nominal operation blocked. Indicator "Stone button pressed". Indicator lamp (Local) blinks.
- press the "stone discharge flap open" pushbutton +S=1015 05 S37.
Stone discharge flap opens. Indicator "flap open" (+P12).
- press the "boom conveyor stone discharge start" pushbutton +S=1015 05 S38 (+P10)
Start oil pumps and star-up warning
Start brakes
Start main drive reverse.

The boom conveyor runs as long as the pushbutton is pressed.

Switch off:

- release the pushbutton +S=1015 05 S38
Stop main drive, brakes, oil pumps
- press the pushbutton +S=1015 05 S36
Stone discharge flap closes.

2.3.3 Buffer drum drives

2.3.3.1 Buffer drum 1

Conditions:

- LCB buffer drum 1 - control switch at "Local"
- superposed conditions according to 2.2 fulfilled for buffer drum 1

Switch on:

- press start pushbutton for rotation

The buffer drum runs with self hold.

Switch off:

- LCB buffer drum - turn control switch to "0".

2.3.4.2 Buffer drum 2

The same as for 2.3.3.1

2.3.4 Middle hopper

2.3.4.1 Main drive

Conditions:

- LCB middle hopper - control switch at "Local"
- superposed conditions according to 2.2. fulfilled for the main drive

Switch on:

- press the start pushbutton for the main drive at the middle hopper LCB

Start main drive

The drive runs with self hold.

Switch off:

- LCB middle hopper - turn control switch to "0"

2.3.5 Intermediate

2.3.5.1 Main drive

Conditions:

- LCB intermediate conveyor - control switch at "Local"
- superposed conditions according to 2.2 fulfilled for the main drive

Switch on:

- press the start pushbutton for the main drive at the intermediate conveyor LCB

Start start-up warning

Start brakes

Start main drive

The drive runs with self hold

Switch off:

- LCB intermediate conveyor - turn control switch to "0"

2.3.6 Roller grate

Conditions:

- LCB roller grate control switch at "Local"
- superposed conditions according to 2.2 for the main drive
- switch on

Press the start pushbutton at the LCB.

The drives runs with self hold

Switch off:

- LCB roller grate turn control switch to "0"

2.3.7 Receiving conveyor drive

2.3.7.1 Main drive

Conditions:

- LCB receiving conveyor - control switch at "Local"
- superposed conditions according to 2.2 fulfilled for the main drive

Switch on:

- press the start pushbutton for the main drive at the receiving conveyor LCB

Start oil pumps and start-up warning

Start brakes

Start oil pumps

Start main drive

The drive runs with self hold

Switch off:

- LCB receiving conveyor - turn control switch to "0"

2.3.7.2 Dirt belt

Conditions:

- LCB dirt belt 1, - control switch at "Local"
- superposed conditions according to 2.2 fulfilled for the dirt belt 1

Switch on:

- press start pushbutton at the dirt belt LCB
- start the dirt belt

The dirt belt runs with self hold

Switch off:

- LCB dirt belt 1 - turn control switch to "0"

2.3.8 Roller grate

see 2.3.6

2.3.9 Discharge conveyor

2.3.9.1 Main drive

Conditions:

- LCB discharge conveyor - control switch at "Local"
- superposed conditions according to 2.2. fulfilled for the main drive

Switch on:

- press the start pushbutton for the main drive at the discharge conveyor LCB

Start start-up warning

Start brakes

Start main drive

The drive runs with self hold.

Switch off:

- LCB discharge conveyor - turn control switch to "0".

2.4 Material handling drives in interlocked operation

Conditions:

- LCB discharge conveyor main drives, control switch "Central"
- LCB roller grate, control switch "Central"
- LCB receiving conveyor, control switch "Central"
- LCB receiving conveyor, dirt belt control switch "Central"*
- LCB roller grate, control switch "Central"
- LCB intermediate conveyor, control switch "Central"
- LCB middle hopper, control switch "Central"
- LCB baffle drum, control switch "Central"
- LCB boom conveyor main drive, control switch "Central"
- LCB boom conveyor dirt belt, control switch "Central"*
- LCB bucket wheel oil pumps, control switch "Central"
- superposed conditions according to 2.2 fulfilled for the above mentioned drives. *Only start condition.
- installation crane of excavator unit in idle position
- control switch +S=1015 06 S32 (+P10) in position "excavator without conveyor system" or control switch +S=1015 06 S32 in position "excavator with conveyor system" and first conveyor and roller grate, receiving truck running.

If the above mentioned conditions are fulfilled, the indication "excavator ready to start" P12 is given.

Start sequence:

- press the start pushbutton +S=1015 05 S29 (+P10)
 - Pre-warning by all horns of material handling drives
 - Waiting phase
 - Start-up warning discharge conveyor
 - Start discharge conveyor drive
 - Start roller grate
 - Star-up warning receiving conveyor
 - Start receiving conveyor drive
 - Start roller grate
 - Start-up warning intermediate conveyor
 - Start intermediate conveyor
 - Start middle hopper
 - Start baffle drum
 - Start-up warning boom conveyor
 - Start boom conveyor drive
 - Star-up warning bucket wheel
 - Start bucket wheel drive
 - Indication in the mimic diagram (P12) for the individual material handling drives.
 - blinking light during run-up phase
 - continuous light by approx. 90% of rated speed.

Stop sequence:

- press stop pushbutton +S=1015 05 S40 (+P10) or +S=3015 05 S40 (+P30). Indication "Stop sequence actuated" (+P12).
Opposite of the start sequence.

In the case of a fault, the feeding drive to the faulty drive is switched off together with the faulty drive in order to avoid over-filling.

The switched-off part of the transport route can be started again after removal of the fault.

2.5 Hoist drive of excavator unit

2.5.1 Normal operation

Conditions:

- selector switch +S=1015 06 S32 (+P10) in position "positioning movement de-interlocked"; or selector switch in position "positioning movement interlocked" and bucket wheel runs interlocked (condition only valid for the lowering operation).
- superposed conditions according to 2.2 fulfilled for the excavator unit hoist drive

Switch on:

- put master switch +S=1015 07 S31(+P11) in the "0" position
- press down the "dead mans" button and shift the master switch forwards (lower) or backwards (lift).

Start hoist drive lift resp. lower

Start holding and operation brakes

The speed of the hoist drive can be stepless set through the shifting of the master switch out of the "0" position.

Switch off:

- put the master switch in the "0" position
- Stop hoist drive and operation brakes
Stop holding brakes

The "dead mans" button must be pressed down shortly at least every 5 seconds, otherwise the hoist drive will be switched off.

2.5.2 Automatic lift

If the limit switches for the "Zerfallscheibe" monitoring is actuated, the normal lift resp. lowering operation is interrupted and an automatic lift operation with a fixed speed is started. The indication "automatic lift running" (+P12) is given. When the situation is removed, the automatic lift operation is stopped after 2 sec. and the hoist drive can be restarted according to 2.5.1.

2.6 Slewing drive of excavator unit

2.6.1 Hand operation

Conditions:

- LCB turntable oil pump - control switch in position "Central"
- selector switch +S=1015 06 S32 (+P10) in position "positioning movement de-interlocked" or selector switch in position "positioning movement interlocked" and bucket wheel runs interlocked.
- selector switch +S=1015 08 S31 (+P11) in "0" position
- selector switch +S=1015 08 S34 (+P11) in "Hand position"
- superposed conditions according to 2.2 fulfilled for the slewing drive.

Switch on:

- put master switch +S=1015 07 S31 (+P11) in "0" position
- press down the "dead mans" button and shift the master switch to the right (slewing right) or to the left (slewing left).

Start slewing drive, brakes, oil pumps, for turntable.

The slewing speed can be stepless set through the shifting of the master switch out of the "0" position.

Switch off:

- put the master switch in the "0" position.

The "dead mans" button must be pressed down shortly at least every 5 seconds, otherwise the slewing drive will be switched off.

2.6.2 Semi-automatic operation

Conditions:

- LCB oil pumps turntable - control switch in "Central" position
- selector switch +S=1015 06 S32 (+P10) in position "positioning movement de-interlocked" or selector switch in position "positioning movement interlocked" and bucket wheel running.
- selector switch +S=1015 08 S31 (+P11) in position "cosa control", or in position "power regulation".
- selector switch +S=1015 08 S34 (+P11) in position "Hand"
- superposed conditions

Switch on:

- set the required basic reference value on the potentiometer for the cosa control (+P11) resp. for the "power regulation" (+P11).
- put the master switch +S=1015 07 S31 (+P11) in the "0" position
- press down the "dead mans" push button and shift the master switch to the right (slewing right) or to the left (slewing left)

Start slewing drive, brakes

Shifting of the master switch only selects the slewing direction. The slewing speed is, according to the pre-selection, set dependant of the slewing angle (cosa control) resp. of the bucket wheel current (power regulation).

Switch off:

- put the master switch into the "0" position
- The "dead mans" button must be pressed down shortly every 5 seconds, otherwise the slewing drive will be switched off.

2.6.3 Slewing angle limitation - hand and semi-automatic operation

The slewing range to the right and/or to the left can be limited as required by hand and semi-automatic operation. One or both angle limits (left, right) have to be set according to 2.8.2.

If the angle limit is reached, the slewing drive switches off automatically.

Left slewing: stop by left

Right slewing: stop by right.

2.6.4 Oil pumps turntable, local operation

Conditions:

- LCB oil pumps - control switch in "Local" position
- superposed conditions according to 2.2 fulfilled for the oil pumps

Switch on:

- LCB oil pumps - turn control switch to "Local on"
- The oil pumps run with self hold.

Switch off:

- LCB oil pumps - turn control switch to "0".

2.7 Travel drive - excavator unit

Since the superstructure can be rotated relative to the substructure, the relative travel direction forwards/reverse is changeable with the selector switch +S=1015 09 S31.

2.7.1 Hand operation

Conditions:

- selector switch +S=1015 06 S32 (+P10) in position "positioning movement de-interlocked", or selector switch in position "positioning movement interlocked" and bucket wheel runs interlocked
- selector switch +S=1015 08 S34 (+P11) in "Hand" position
- superposed conditions according to 2.2 fulfilled for the travel drive.

Switch on:

- put master switch +S=1015 06 S31 (+P10) in "0" position
- press down "dead mans" button and shift the master switch forwards (forwards) or backwards (reverse).

Start travel drive, brakes

The travel speed can be step-less adjusted through the shifting of the master switch from the "0" position.

Switch off:

- put the master switch in the "0" position.

The "dead mans" button must be shortly pressed down every 5 seconds, otherwise the travel drive will be switched off.

2.7.2 Advance stop

Conditions:

- selector switch +S=1015 06 S32 (+P10) in position "positioning movement de-interlocked", or selector switch in position "positioning movement interlocked" and bucket wheel running interlocked.
- travel drive not in operation
- superposed conditions according to 2.2 fulfilled for the travel drive.

Switch on:

- set the required advance length on the decade switch +S=1015 07 S22 (+P11)
- push start pushbutton (+P11).

The travel drive moves once times the set advance length forwards.

The execution of the advance step can be interrupted at any time with the pushbutton +S=1015-09 S37.

2.8 Automatic operation of slewing and travel drive for excavator unit

Conditions:

- LCB turntable oil pumps - control switch in "Central" position
- selector switch +S=1015 06 S32 (+P10) in position "positioning movement de-interlocked", or selector switch in position "positioning movement interlocked" and bucket wheel running interlocked.
- selector switch +S=1015 08S34(+P11) in "Automatic" position
- selector switch +S=1015 08S31(+P11) in "cosa control" position or "power regulation" position
- slewing angle calibration (refer to 2.8.1).
- angle limit set (refer to 2.8.2)
- slewing drive stands at a "limit position" (left or right)
- stop pushbutton for automatic operation +S=1015 09 S37 (P11) not actuated.
- superposed conditions according to 2.2 fulfilled for travel and slewing drives.

The indication "Automatic ready" in +P12 is given when all the above conditions are fulfilled.

2.8.1 Calibration of slewing angle

The position of the slewing drive must be detected after the control voltage has been switched on. (Indicator "slewing angle not calibrated" in (+P12)). In hand operation (refer to 2.6.1) one must also slew to one of the calibrated points.

2.8.2 Setting of angle limit

left/right setting:

- slew in hand operation (refer to 2.6.1) to the required left (right) limit position.
 - turn switch +S=1015 08 S35 (+P11) to position "left" ("right"). (Indicator "set left" / "set right") in P13)
- The switch returns on its own to the "0" position.

left/right cancel:

- turn switch +S=1015 08 S35 (+P11) again to the "left" ("right") position.

2.8.3 Start automatic operation

- set the required advance length on the decade switch +S=1015 07 S32 (+P11)
- set the required number of automatic steps (automatic travel and slewing movements) on the decade switch +S=1015 08 S36 (+P11)
- set the required basic reference value on the potentiometer for the cosa control (P11) resp. power regulation (P11)
- turn selector switch +S=1015 08 S34 (+P11) to "automatic start" position

Start travel drive

The travel drive travels the set advance length forwards.

Stop travel drive

Start slewing drive from left(right) to right (left) depending from which angle limit is started from.

The slewing speed is automatically set, depending on pre-selection in dependance of slewing angle (cosa control) resp. of bucket wheel current (power regulation.

Stop slewing drive

Start of next automatic step, running of 1st automatic step, indication "automatic continuation" given in +P12. If the pushbutton +S=1015 08 S33 (+P11) is pressed, the set number of automatic steps will be carried out again. If not, the slewing drive is stopped after execution of the last automatic step.

Automatic operation can be interrupted at any time by the pushbutton +S=1015 09 S37 (+P11).

2.9 Crawler steering - excavator unit

Conditions:

- travel drive of excavator runs with 5m/min
- superposed conditions according to 2.2 fulfilled for the crawler steering

Switch on:

- shift the master switch +S=1015 06 S31 (+P11) to the right (spindles right) or to the left (spindles left)

Start spindle drive

Switch off:

- put master switch into "0" position.

2.10 Travel drive - Loading unit

2.10.1 Main drive

Conditions:

- LCB cable drum - control switch at "Central"
- superposed conditions according to 2.2 fulfilled for the travel drive

Switch on:

- put master switch +S=3015 06 S31 (+P31) into "0" position
- push down "dead mans" button and shift master switch forwards (forwards) or backwards (reverse)

Start brakes

winding drive-, cable drive

Start travel drive

Switch off:

- put master switch into "0" position

2.11 Steering loading unit

Put mster switch +S=3015 06 S31 into left or right position, the according motor will be switch off and the thrustor falls down.

2.12 Hoist drive for driver cabin of excavator unit

Conditions:

- superposed conditions according to 2.2 fulfilled for hoist drive - excavator unit driver cabin

Switch on:

- push start pushbutton +S=1015 06 S35 (+P10) for raise or start pushbutton +S=1015 06 S36 (+P10) for lower

Start hoist drive, brakes.

The drive runs as long as the pushbutton is pressed. A pushbutton is fixed on the footbridge crossing to the excavator unit driver cabin (entrance point). The indication "entrance point selected" results in P12 if this button is actuated. The indication remains on until the driver cabin is driven to the entrance point.

2.13 Positioning of excavator unit drive cabin

2.13.1 Hand operation

If the pushbutton +S=1015 06 S34 is pressed, the thruster lift the brake and the cabin goes in the horizont position.

2.13.2 Automatic operation

As long as the boom hoist will be lift or lower the thruster is lifted.

2.14 Hoist drive of discharge conveyor

Conditions:

- superposed conditions according to 2.2 fulfilled for the discharge conveyor hoist drive

Switch on:

- press the start pushbutton +S=3015 05 S44(+P30) for raising or the start pushbutton +S=3015 05 S45 (+P30) for lowering
Start hoist drive, brakes

The drive runs as long as one of the pushbuttons is pressed.

2.15 Slewing drive of discharge conveyor

2.15.1 Normal operation

Conditions:

- superposed conditions according to 2.2 fulfilled for the extension drive

Switch on:

Press the start pushbutton +S=3015 05 S42(+P30) for clockwise or start pushbutton +S=3015 05S43(+P30) for anticlockwise.

The shifting procedure continuous as long as one of the push-buttons is pressed.

2.15.2 Leveling discharge conveyor

The leveling will be switch on automatically if the inclination is +/- 3%

2.16 Others2.16.1 Excavator unit driver cabin

Control desk P 10:

- pushbutton +S=1015 05 S31
- pushbutton +S=1015 05 S32
- pushbutton +S=1015 05 S33
- pushbutton +S=1015 05 S34

- switch +S=1015 06 S37

- pushbutton +S=1015 06 S35

Lamp test
Cancel fault indication
Cancel warning buzzer
Pushbutton for manual operation of warning horn
Selector switch for transport material (signal at conveyor system control desk)
Excavator ready to start (signal at conveyor system control desk)

Control desk P 11:

- switch +S=1010 15 S52
- switch +S=1010 15 S54
- switch +S=1010 15 S53
- switch +S=1010 10 S51
- pushbutton +S=1010 15 S31

Excavator unit lighting
Excavator travel drive flood lights
Excavator transfer station flood lights
Windscreen wiper/washer
Emergency STOP

2.16.2 Loading unit driver cabin

Control Desk +P30:

- pushbutton +S=3010 15 S31 Emergency stop
- pushbutton +S=3015 05 S31 Lamp test
- pushbutton +S=3015 05 S32 Cancel fault indication
- pushbutton +S=3015 05 S33 Cancel warning buzzer
- pushbutton +S=3015 05 S34 Pushbutton for hand operating
- pushbutton +S=3015 05 S35 Receiving truck forwards (signal at receiving truck)
- pushbutton +S=3015 05 S36 Receiving truck reverse (signal at receiving truck)
- pushbutton +S=3015 05 S37 Receiving truck roller grate start (signal at receiving truck)
- pushbutton +S=3015 05 S38 Receiving truck roller grate stop (signal at receiving truck)
- pushbutton +S=3015 05 S39 Stop first conveyor (signal at conveyor control desk)
- switch +S=3010 15 S52 Loading unit lighting
- switch +S=3010 15 S54 Travel drive flood lights
- switch +S=3010 15 S53 Transfer station flood lights
- switch +S=3010 06 S31 Windscreen wiper/washer