

## 9 Maintenance

The switchgear interlocking units do not require any special maintenance. They are completely static and maintenance-free. The input, interposing, and output relays are hermetically sealed and fitted with protective caps. Automatic self-test routines and a test run of all input and output circuits initiated by a remote command ensure systematic error detection in good time. If a fault on an interlocking unit module is detected as a result of this analysis, it must be returned to the manufacturer for repair. Local repair of the modules is not permissible. Exceptions to this rule require the agreement of the manufacturer.

### 9.1 Checks

It is recommended that a test of the input and output circuits be triggered at approximately one year intervals after commissioning either by pressing the TEST button on the unit or by remote command through the telecontrol input.

### 9.2 Systematic fault analysis and repair

#### 9.2.1 Explanation of the "ready" lamps for the feeder and central units

If the interlocking unit is without fault, the following lamps must light up when the steady light switch (button IND. ON/OFF on the manual control module) is pressed:

– interface and control module	intermediate position lamp (switching device not in intermediate position)	yellow
– manual control module	steady light switch IND. ON/OFF button CLOSE button OPEN	yellow green red
– microcomputer module (feeder unit)	receiver lamp ELL transmitter lamp SLL	green green
– microcomputer module (central unit)	data lamp DLL1 data lamp DLL2 <sup>1)</sup>	green green
– transmitter / receiver controlling module (only in central unit)	data lamp DLL transmitter lamp SLL ELL 1 to ELL 16 <sup>2)</sup>	green green
– power supply module	+5 V lamp +15 V lamp –15 V lamp +48 V lamp	green green green green

<sup>1)</sup> if second SAB is fitted

<sup>2)</sup> according to one line diagram

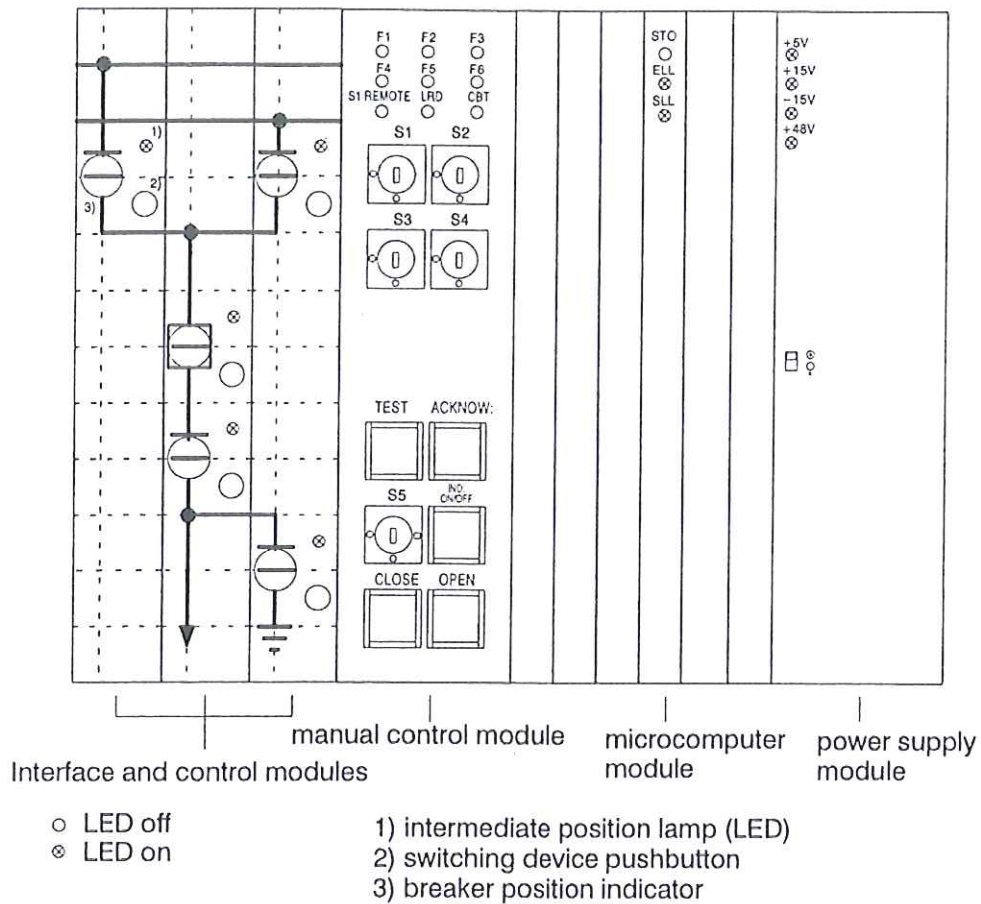


Fig. 9.1 "Ready" lamps on the feeder unit

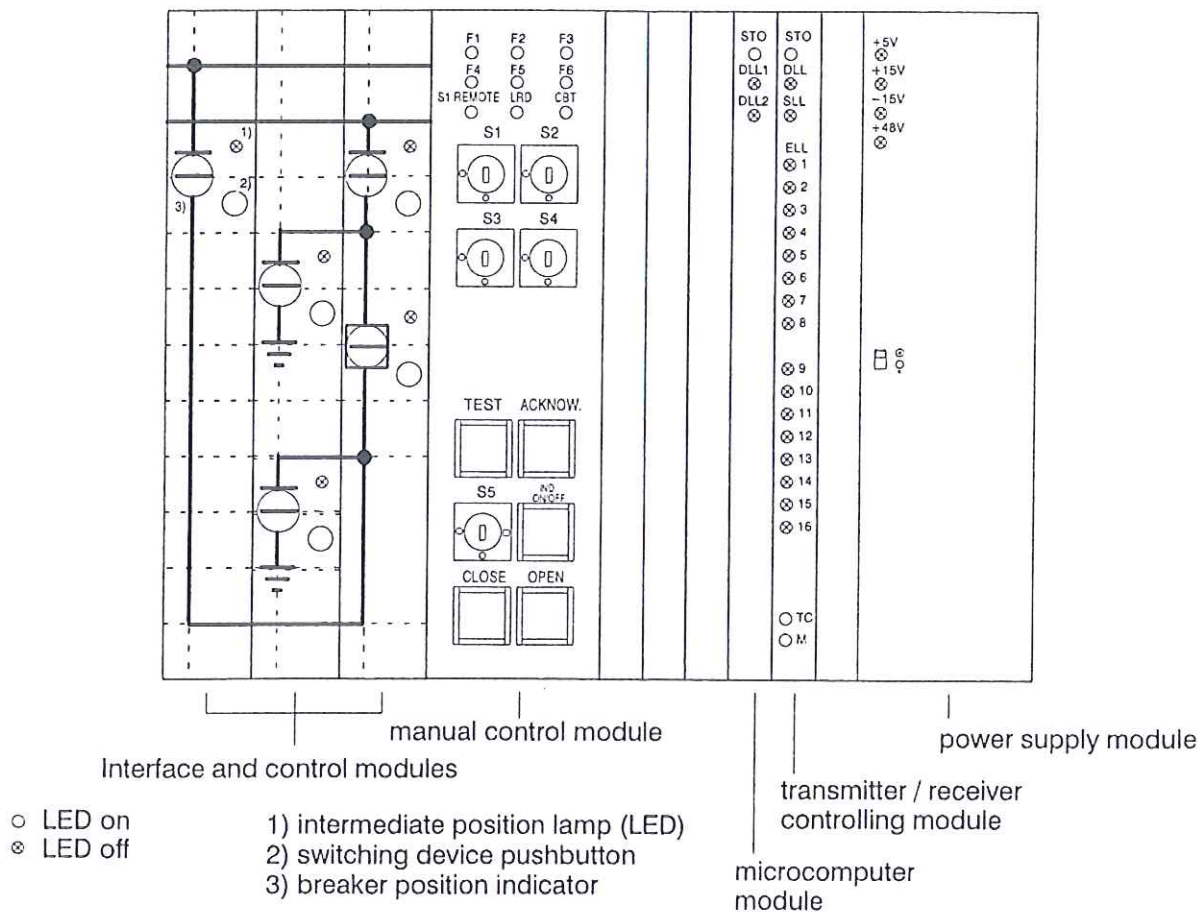


Fig. 9.2 "Ready" lamps on the central unit

## 9.2.2 Fault and operational displays

If faults occur during operation, for example, due to an equipment defect or a broken cable or if the unit is incorrectly operated either locally or through the telecontrol inputs, these events are indicated on the manual control module by lamps F1 to F6 and signaled to the higher-level control center via the telecontrol outputs. In the same way, a circuit-breaker trip and total override S1-Remote-On are signalled.

### 9.2.2.1 Explanation of each fault or operational display

**Fault 1 (F1):** Memory fault

This appears if a fault is detected when the program memory, configuration module, data memory, or processor internal data memory are tested.

**Fault 2 (F2):** Serial transmission fault

This appears if the processor internal transmitter or receiver ceases to function or the receiver does not receive any new data by a time-out.

**Fault 3 (F3):** Interlock / command input fault

a) Interlock condition not fulfilled

Appears if after a valid input command the interlock conditions for the intended switching operation are not fulfilled.

b) Command input fault

Appears

a) if two or more command pushbuttons are pressed at once

b) if a command input button is pressed too briefly (< 100 ms) or too long (e.g. sticking pushbutton approx. 30 seconds).

c) if another command input is made while a command output is running or during the test or reset routine.

**Fault 4 (F4):** Faulty checkback

Appears

a) if a fault is detected during reading in of checkback signals or during subsequent assignment in the checkback images

b) if a checkback signal is in the intermediate position although the circuit-breaker in question has not been operated by the interlocking unit

c) if the time-out has elapsed but the switch is still not in an intermediate position after a command output

With b) and c) the intermediate position lamp on the ABB for the appropriate circuit-breaker BLINKS.

**Fault 5 (F5):** Command output circuit defective

Appears

a) if a fault occurs during a test routine for the command output circuits. In addition, the intermediate position lamp on the ABB of the defective command output circuit goes out.

b) if a fault is detected during monitoring of the command output latching relay.

c) if a latching relay cannot be set or reset during command output.

d) if an incorrect latching relay is operated during command output.

For b), c), and d) the intermediate position lamp for the switching device in question on the ABB module also goes out and the LRD signal is set.



Fault 6 (F6):	<p><u>Switching device operating time exceeded</u></p> <p>Is set if after a command output the expected breaker position checkback signal is not received within the time-out. Moreover, the intermediate position lamp of the command output circuit BLINKS to indicate an intermediate position of the breaker position checkback signal. If the switching device is still in its original position, the intermediate position lamp is off.</p>
Indication S1-REMOTE	<p>This indication appears as a blinking lamp on the interlocking unit if a total override S1 remote is applied from the remote or local control.</p>
Indication latching relay monitor (LRD)	<p>See F5 b, c, d.</p>
Indication circuit-breaker trip (CBT):	<p>Appears if the checkback signal from the circuit-breaker changes to the OPEN position without a command having been output from the interlocking unit. The LED has a steady light. The contact indication is made with a 100 ms transient pulse.</p>
Fault display (STO):	<p>The display lights up if the microprocessor is being reset (by watchdog or voltage monitoring function).</p>
Transmitter lamp (SLL):	<p>The transmitter lamp goes out if the processor internal serial transmitter ceases to function or is not operated by the software.</p>
Receiver lamp (ELL):	<p>The receiver lamp goes out if the microcomputer does not receive any or only incorrect information via the interface.</p>

The fault and operational displays can only be reset jointly by REMOTE-RESET or pressing the ACKNOW button on the interlocking unit.

## 9.2.2.2 Interpretation of fault displays F3 to F6 feeder / central unit

Fault display	Cause	Remedy
F3 lit	Interlock conditions not fulfilled during check. Command input error	<ol style="list-style-type: none"> <li>1. Acknowledge (Reset)</li> <li>2. Check command input switches (e.g. pushbutton stuck?)</li> <li>3. Check switch positions (semaphore indicators) against interlocking conditions to see if they match</li> <li>4. Replace ABB1...n or EAB1...n or FGB1...n</li> </ol>
F4 lit SL (*) blinking	Position indication for the displayed switching device is not clear	<ol style="list-style-type: none"> <li>1. Acknowledge (Reset)</li> <li>2. Bring switching device into an end position</li> <li>3. Check checkback voltage</li> <li>4. Check switching device auxiliary contacts</li> <li>5. Exchange ABB module (note MLFB)</li> </ol>
F4 and F6 lit SL (*) blinking	Command execution time exceeded, switching device remains in INTERMEDIATE POSITION	<ol style="list-style-type: none"> <li>1. Acknowledge (Reset)</li> <li>2. Check drive motor control circuits</li> <li>3. Check checkback voltage</li> <li>4. Check switching device auxiliary contacts</li> <li>5. Exchange ABB module (note MLFB)</li> </ol>
F4 and LSF lit SL (*) blinking	Circuit-breaker not opened by interlock unit (switching time > 2.5 s)	<ol style="list-style-type: none"> <li>1. Acknowledge (Reset) (indication of circuit-breaker trip)</li> <li>2. Check checkback signal from CB</li> </ol>
F6 lit SL (*) not lit	Command execution time exceeded, switching device remains in END POSITION	<ol style="list-style-type: none"> <li>1. Acknowledge (Reset)</li> <li>2. Check drive motor circuits</li> <li>3. Check main switching device and auxiliary contacts</li> </ol>
F5 lit SL (*) not lit	Fault during TEST sequence for command output circuits	<ol style="list-style-type: none"> <li>1. Acknowledge (Reset)</li> <li>2. Exchange ABB module (characterized by the extinguished intermediate position lamp, note MLFB)</li> <li>3. Exchange BSF module (only if all intermediate position lamps are off)</li> </ol>

\*: SL = intermediate position  
lamp on the ABB module

Note:  
If these remedies are not effective, call a Siemens office.

Interpretation of fault displays F3 to F6 feeder / central unit (continued)

Fault display	Cause	Remedy
F5 and LRD lit	Fault in the latching relay circuits (EAB)	1. Check if jumper Ju1 is only soldered on the left EAB module (Note MLFB) 2. Exchange BSF module
F5 and LRD lit SL (*) not lit	Fault in the latching relay circuits (EAB)	1. Acknowledge (Reset) 2. Exchange EAB module which is assigned to the extinguished intermediate position lamp on ABB module

\*: SL = intermediate position lamp on the ABB module

Interpretation of fault displays F1, F2 feeder unit

Fault display	Cause	Remedy
F1 lit STO not lit	Fault in MC system	1. Switch power supply module off and then on again
F1 lit STO blinking	Fault in the planning Soldered jumper	
F2 lit ELL not lit SLL not lit	Receiving direction faulty	1. Check cable of serial interface
F2 lit ELL blinking SLL not lit	Feeder unit not polled by central unit	1. Feeder unit connector inserted in wrong position on central unit (see pages 7/4 and 3/8) 2. Check of serial interface cable
F2 lit ELL not lit SLL blinking	Central unit does not recognize connected feeder	1. Feeder unit connector inserted in wrong position on central unit (see pages 7/4 and 3/8) 2. Check of serial interface cable
F2 and F3 lit	Central unit has not responded to interlock request	1. Acknowledge (Reset)

Note:

If these remedies are not effective, call a Siemens office.



# Interpretation of fault displays F1, F2 central unit

Fault display	Cause	Remedy
F1 lit STO not lit	Fault in MC system	1. Switch power supply unit off and on
F1 lit STO (BSF) lit	Fault in MC (BSF) MC system	1. Switch power supply unit off and on
F2 lit ELLn not lit	Receiving direction fault	1. Acknowledge (Reset) 2. Feeder unit connector plug inserted in wrong slot. Check pages 7/4 and 3/8.
F2 lit DLLn not lit	Receiving direction fault	1. Acknowledge (Reset) 2. Switch power supply unit off and on
F2 lit STO (BSF) blinking	Central unit duplication: Other central unit has failed	Look for fault in other central unit
STO (SABn) lit	NVRAM written 9,000 times <sup>1)</sup>	1. Only max. 1,000 functions still possible <sup>1)</sup> . Order new SABn!
F1 (and F2) STO (SABn) lit	NVRAM written 10,000 times <sup>1)</sup>	1. Replace SABn
F1 lit STO (BSF) blinking	Planning fault Soldered jumper wrongly positioned	
F1 lit STO (SABn) blinking	Planning fault Soldered jumper wrongly positioned	1. A SAB module is in the wrong location (e.g. SAB1 in SAB2 slot)

- <sup>1)</sup> Relocation of the data in the NVRAMs of the SAB is only performed in the event of a power failure or power supply off / on on the central unit

Note:

If these remedies are not effective, call a Siemens office.

